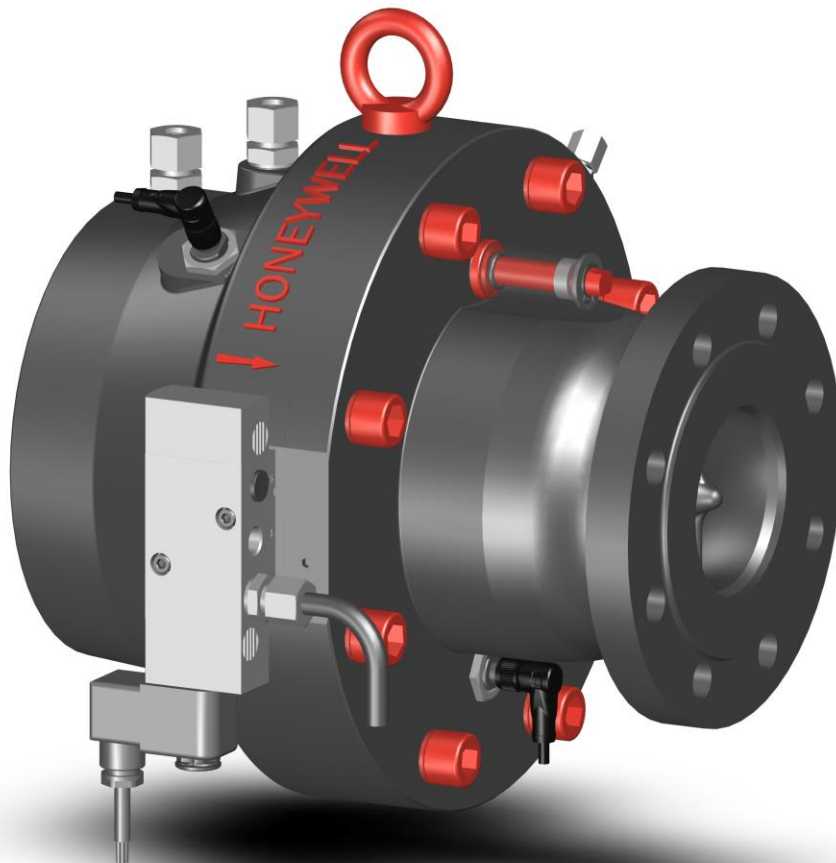


Honeywell



HON 750 Safety Shut-Off Valve

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

This user manual applies to the HON 750 safety shut-off valve.

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

- Transport
- Installation
- Start-up
- Troubleshooting
- Maintenance
- Putting the valve back into operation
- Decommissioning, disassembly, storage, and disposal

Target group

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

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

Illustration

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



Safety

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

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

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

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Details about the manufacturer’s liability

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

Constructive changes

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

1.2 About the safety notices




Meaning


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

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

Types of safety notices

This document contains the following types of safety notices:

Type of safety notice	Description	Sign
Basic safety notices	Superordinate safety notices not relating to a specific task: <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	7
Identifying the device	8
Layout and operation	9
Assemblies and their function	11
Technical specifications	12

2.1 Intended use

Intended use

The HON 750 safety shut-off valve is intended to be used to seal off a pipe in a gas-tight manner in order to prevent gases from flowing through when the valve is closed. The valve is controlled electro-pneumatically with closing times < 1 sec. The compact axial flow design behind the HON 750 safety shut-off valve makes it possible to use the valve in control paths for which limited installation space is available, e.g., on ships. It can also be used in transfer stations used in gas transportation networks, as well as in power plants and industrial facilities. The HON 750 safety shut-off valve is suitable for use with natural gas or dry, non-aggressive industrial gases.

Note: The device's operating limits concerning the gas, the operating pressure, and the operating temperature can be found either on the rating plate affixed to the device or in the device's 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 Labels/Markings

Illegible labels

⚠ WARNING

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

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

- ⇒ Make sure to always keep all relevant labels in good condition so that they will be easily legible.
- ⇒ Immediately replace damaged and missing labels.

Labels on the device

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

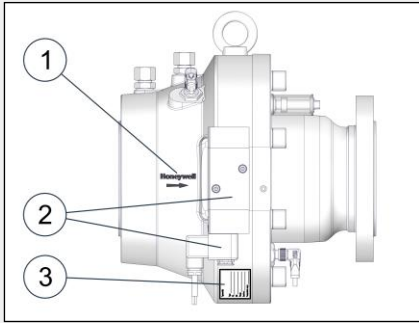
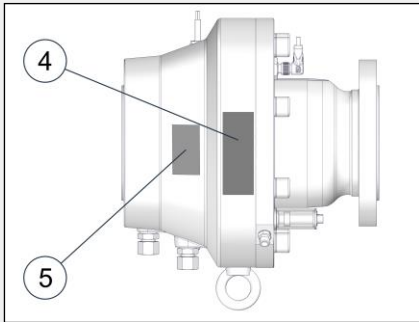
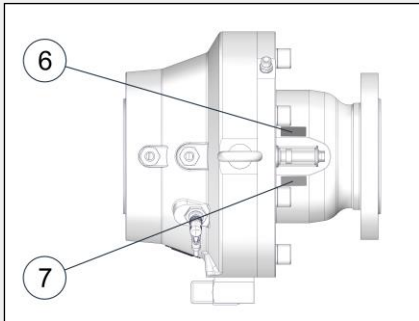
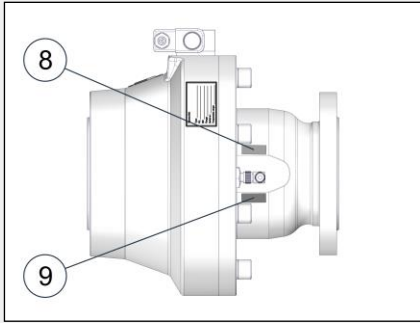
Figure (front)	No.	Meaning
	1	<ul style="list-style-type: none"> ▪ Manufacturer's logo ▪ Arrow indicating the direction of flow
	2	Control valve rating plates
	3	HON 750 rating plate
Figure (back)	No.	Meaning
	4	<ul style="list-style-type: none"> ▪ Batch number ▪ Material number
	5	<ul style="list-style-type: none"> ▪ Foundry code ▪ Heat number
Figure (view from above)	No.	Meaning
	6	Part number for blank
	7	Material number

Figure (view from below)	No.	Meaning
	8	<ul style="list-style-type: none"> ▪ Foundry code ▪ Heat number
	9	Part number for machined part

Labels on connection lines

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

Nameplates

For a detailed list of the information on the nameplate and what it means: *Identifying the device* (see page 8)

2.3 Identifying the device

Identifying the device

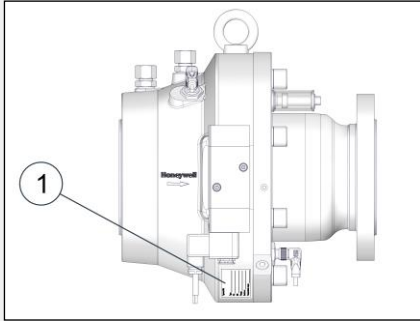
Make sure you have the right manual for your device.
Identify the device by means of the type plates.

Verifying the technical specifications

Make sure that the conditions on site correlate with the information on the type plate and the technical specifications. *Technical specifications* (see page 12)

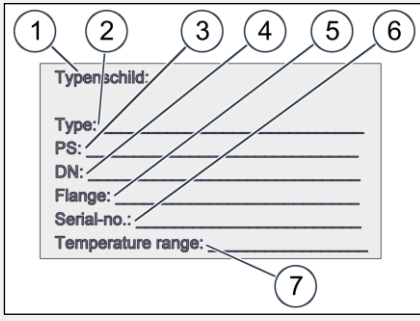
Device rating plate location

The device's rating plate can be found in the location shown below:

Figure	No.	Description
	1	Inlet body next to the control valve

How to read the device's rating plate

The details on the type plate have the following meaning:

Figure	No.	Meaning
	1	Name of the device
	2	Device model
	3	Operating pressure (max.) (Maximum inlet pressure)
	4	Nominal diameter
	5	Flange size
	6	Serial number
	7	Temperature range

Control valve rating plates

The specifications on the rating plates indicate the following:

Figure	No.	Meaning
	1	Manufacturer's information
	2	Max. ambient temperature
	3	Max. fluid (compressed air) temperature
	4	Electrical specifications
	5	Model number
	6	Operating pressure range
	7	Schematic for 3/2-way directional control valve

2.4 Layout and operation

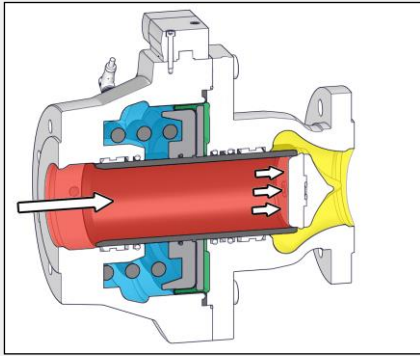




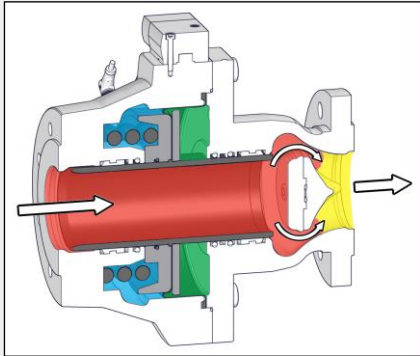
Figure

Device components:

Figure	No.	Description and function
	1	Inlet body for gas line
	2	Inlet pressure gauge fitting
	3	Sensor 1 (optional), used to monitor the "open" position
	4	Vent line connection
	5	Eye bolt for transportation purposes, slinging point
	6	Open port, must be routed to a space with gas detectors
	7	Visual position indicator for opening state
	8	Outlet body for gas line
	9	Sensor 2 (optional), used to monitor the "closed" position
	10	Control valve (electro-pneumatic 3/2-way solenoid valve)
	11	Diaphragm unit (inside)

Pressure sections

The device is subdivided into the following pressure sections:

Figure	Color	Description
Closed state: 		Inlet pressure
		Motorization pressure
		Outlet pressure
		Atmospheric pressure
Open state: 		

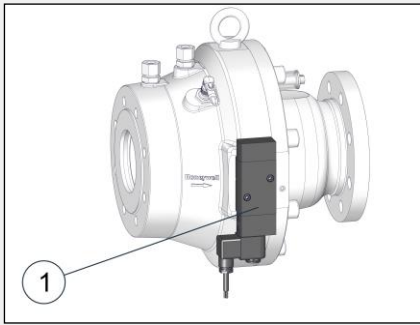
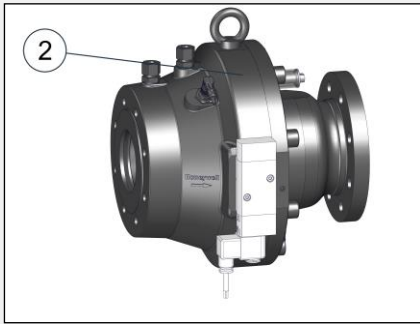
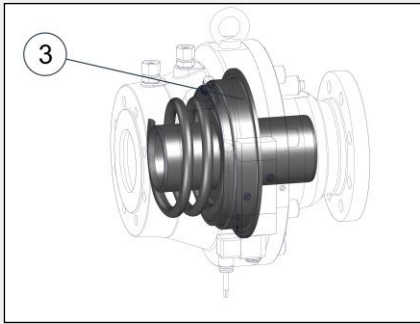
How it works

- The diaphragm unit inside the device subdivides the inside of the body into two chambers that are separated from each other in a gas-tight manner and into the gas flow path.
- The diaphragm unit inside the device can be moved axially.
When this unit is moved to its right-hand position (in the gas' direction of flow), the sleeve that conveys gas will slide onto the valve disc. The device is now closed and the gas flow is shut off.
In the left-hand position, the sleeve allows a gap between it and the valve disc. In this state, the device will be open and the flow of gas will be at its maximum level.
- To open the device, the control valve is used to convey compressed air into the loading pressure chamber, causing the diaphragm unit to move axially. This will result in the tension of the compression spring on the other side of the diaphragm unit being tightened.
- An electrical signal to the control valve – e.g., generated when the motor is switched off – will cause the compressed air to be abruptly discharged from the loading pressure chamber.
When this occurs, the compression spring's tension will be released and the diaphragm unit will move axially until the device is fully closed. The closing time will be less than 1 sec.
- If there is no auxiliary energy (compressed air), the safety shut-off valve will be closed.
- In addition to the visual position indicator that shows the HON 750's opening state, there is the option of using two sensors as limit switches for the "closed" and "open" positions.

2.5 Assemblies and their function

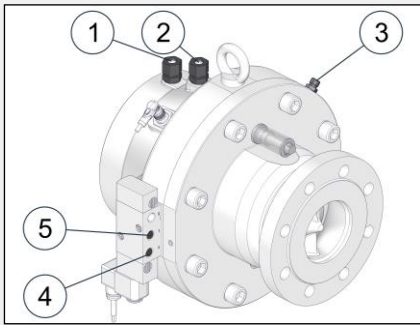
Assemblies and their functions

The HON 750 is made up of the following assemblies:

Figure	No.	Description and function
	1	<p>Control valve:</p> <ul style="list-style-type: none"> Regulates the supply and release of the compressed air inside the body that is used to open the device
	2	<p>Case:</p> <ul style="list-style-type: none"> Is the device's pressure-resistant body Contains the ports for the connection lines Contains the flanges at the inlet and outlet that are used for installation in piping
	3	<p>Diaphragm unit:</p> <ul style="list-style-type: none"> The sleeve's axial displacement opens and closes the safety shut-off valve. The diaphragm subdivides the inside of the body, creating an enclosed chamber that is exposed to compressed air in order to open the device. The compression spring closes the device when the latter is de-energized.

Connection lines

The numbers have the following meaning:

Figure	No.	Description
	1	Inlet pressure gauge fitting
	2	Vent line fitting (ambient pressure compensation)
	3	Open fitting: <ul style="list-style-type: none"> Must be routed to a space with gas detectors. Is used to test the valve sleeve's leak-tightness during inspections and after maintenance
	4	Compressed air release fitting
	5	Compressed air supply fitting

2.6 Technical specifications

Device models

Nominal size	Flange type	Inlet body material	Outlet body material
1" (DN 25)	PN 16 / PN 40	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT) ASTM A351-CF8M (1.4408)
	ANSI 150	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT) ASTM A351-CF8M (1.4408)
2" (DN 50)	PN 16 / PN 40	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT) ASTM A351-CF8M (1.4408)
	ANSI 150	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT) ASTM A351-CF8M (1.4408)
3" (DN 80)	PN 16 / PN 40	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT) ASTM A351-CF8M (1.4408)
	ANSI 150	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT) ASTM A351-CF8M (1.4408)
4" (DN 100)	PN 16	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT)
		1.0566 (P355NL1)	ASTM A351-CF8M (1.4408)
	PN 25 / PN 40	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT)
		1.0566 (P355NL1)	ASTM A351-CF8M (1.4408)
	ANSI 150	1.6220+QT (G20Mn5+QT)	1.6220+QT (G20Mn5+QT)
		1.0566 (P355NL1)	ASTM A351-CF8M (1.4408)

Characteristic device values

Nominal size	Pressure rating (P rating) [bar]	v_{max} [m/s]	K_G coefficient [m ³ /(h*bar)]	Lock-up time [s]	Certifications (type approvals)	Certification type	Temperature range
1" (DN 25)	40	100	550	< 1	DNV GL*	Ship classification	0 °C to +60 °C (32 °F to 140 °F)
					CE, PED, DVGW	Type approval	-20 °C to +60 °C (-4 °F to 140 °F)
2" (DN 50)	40	100	2200	< 1	DNV GL*	Ship classification	0 °C to +60 °C (32 °F to 140 °F)
					CE, PED, DVGW	Type approval	-20 °C to +60 °C (-4 °F to 140 °F)
3" (DN 80)	40	100	5600	< 1	DNV GL*	Ship classification	0 °C to 60 °C (32 °F to 140 °F)
					CE, PED, DVGW	Type approval	-20 °C to +60 °C (-4 °F to 140 °F)
4" (DN 100)	40	100	8800	< 1	CE, PED, DVGW	Type approval	-20 °C to +60 °C (-4 °F to 140 °F)

*) Available until October 2021

Control valve motorization pressure

The lower and upper motorization pressures must be taken into account to ensure the requirements of DIN EN 16678 are met with respect to a lock-up time of <1 s.

The lower motorization pressure indicates the minimum pressure that is required to open the valve completely.

The upper motorization pressure indicates the maximum pressure possible in order to still achieve the required lock-up time.

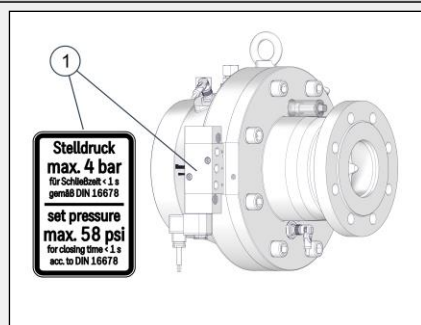
With motorization pressures above the stated value, lock-up times of >1 s are to be expected and, according to the standard cited above, are not permitted.

Nominal size	Lower motorization pressure [bar]	Upper motorization pressure [bar]
1" (DN 25)	2.5	8
2" (DN 50)	2.5	8
3" (DN 80)	2.8	8
4" (DN 100)	2.5	4*

*) Observe the information plate on the control valve.

Information plate on the control valve

Figure (front)

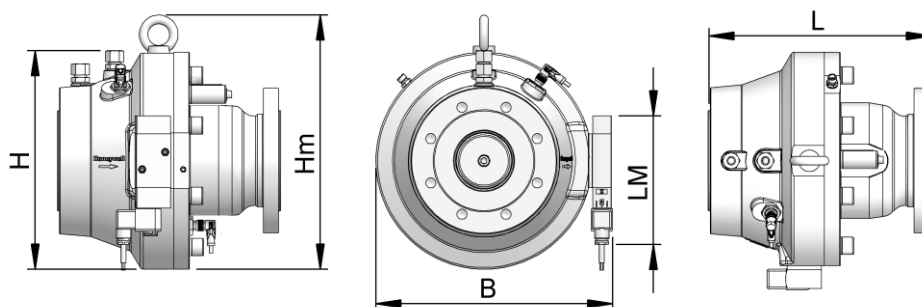


No. Meaning

1 Motorization pressure information plate*

NOTICE! The information plate required as of a nominal size of DN 100.

Dimensions and weights



Metric system:

Nominal size	Weight [kg]	Sleeve diameter [mm]	Length L [mm]	Height H [mm]	Width W [mm]	Max. height Hm [mm]	LM control valve length [mm]
1" (DN 25)	Approx. 25	25	200	230	250	275	180
2" (DN 50)	Approx. 56	50	270	305	330	355	180
3" (DN 80)	Approx. 66	80	310	305	330	355	180
4" (DN 100)	Approx. 97	100	350	380	415	450	180
4" (DN 100)*	Approx. 126	100	350	380	415	450	180

*) 3-part body

Imperial system:

Nominal size	Weight [lbs]	Sleeve diameter [inch]	Length L [inch]	Height H [inch]	Width W [inch]	Max. height H _m [inch]	LM control valve length [inch]
1" (DN 25)	Approx. 55	0.98	7.87	9.06	9.84	10.83	7.09
2" (DN 50)	Approx. 123	1.97	10.63	12.01	12.99	13.98	7.09
3" (DN 80)	Approx. 146	3.15	12.20	12.01	12.99	13.98	7.09
4" (DN 100)	Approx. 216	3.94	13.78	14.96	16.34	17.72	7.09
4" (DN 100)*	Approx. 277	3.94	13.78	14.96	16.34	17.72	7.09

*) 3-part body

Pressure and electrical specifications

Control valve				
Compressed air in accordance with ISO 8573-1:2010 [bar]	Rated operating voltage [V]	Frequency [Hz]	Power [W]	Power [VA]
Up to a max. of 8	24 VDC	-	2.6	-
	110 VAC	50/60	-	2.4
	230 VAC	50/60	-	2.1

Sensors used to monitor the opening state (optional)			Isolation amplifier for sensors (optional)
Number of pins [Qty.]	Rated voltage [V]	Switching frequency [Hz]	
4	8.2 VDC	0 ... 400	In the <i>appendix</i> (see page 49)

Gas properties

The properties of the gas conveyed through the HON 750 valve 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

Topic	Page
Basic safety rules	16
Requirements concerning the workforce, personal protective gear, workplaces	17

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, work-places

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
Electricians	Electrical installation and removal	<ul style="list-style-type: none"> ▪ Professional training and electrician certification in accordance with applicable country-specific and local regulations
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 Transport, installation and start-up

Contents

Topic	Page
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Mounting the device	22
Installing the device connections	24
Checking the system for leaks	26
Putting the device into operation	29

4.1 Transporting the device

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.

The following are adequate for use as slings:

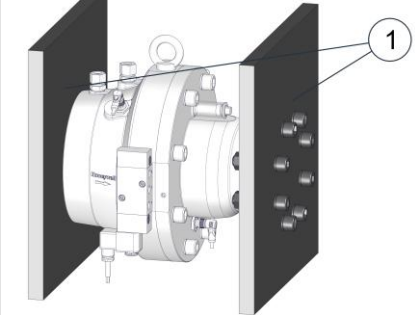
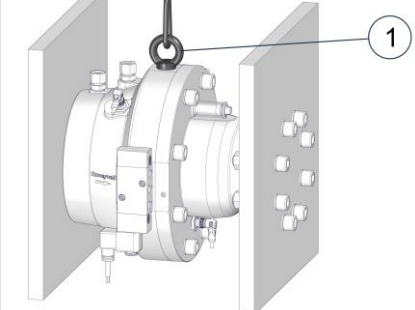
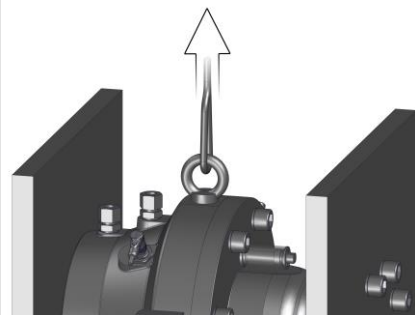
- Ropes
- Belts
- Chains

The hoisting equipment and slings must meet the following criteria:

- The load-bearing capacity is adequate for the weight of the HON 750.
- The hoisting height is adequate for the mounting position at the installation site.

Transporting the device

Proceed as follows:

Figure	Step	Description
	1	<p>Leave the protective plates (1) of the flange on the HON 750 during transport.</p>
	2	<p>WARNING! Crushing hazard due to the device pivoting outward in an uncontrolled manner.</p> <p>⇒ Use only the eye bolt as an attachment point for horizontal installation and removal positions.</p> <p>Rig the sling to the eye bolt (1).</p>
	3	<p>Lift the device.</p> <p>Slowly and carefully transport the device to the location where it will be installed.</p>

4.2 Mounting the device

Preparing the materials

Prepare the following materials:

- Flange gaskets
- Screws or studs
- Washers
- Nuts

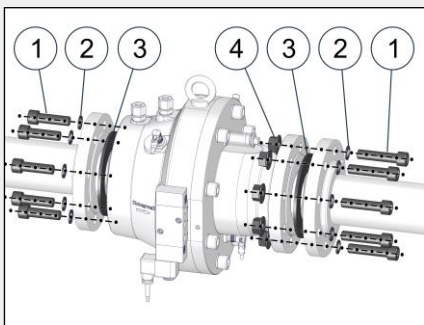
The quantity, size, and thread type will depend on the following criteria:

- Design and size of the flange

Assessing the situation

Assess the installation situation.

The numbers have the following meaning:

Figure	No.	Meaning
	1	Screws
	2	Washers
	3	Flange gaskets
	4	Nuts

Mounting the device

Proceed as follows:

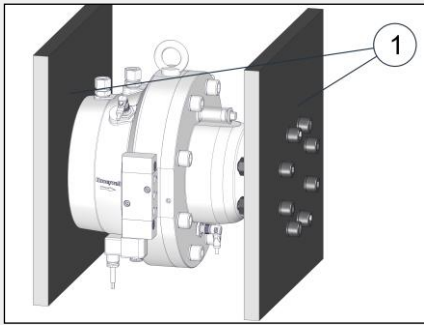
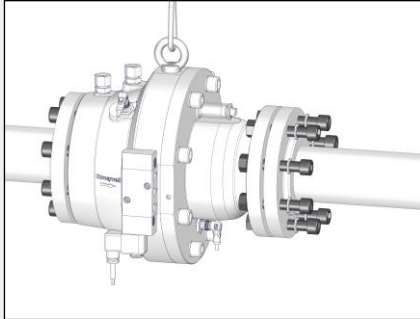
Figure	Step	Description
	1	Remove the protective plates from the flange.

Figure	Step	Description
	2	<p>WARNING! Crushing hazard due to the device pivoting outward in an uncontrolled manner.</p> <p>⇒ Use only the eye bolt as an attachment point for horizontal installation and removal positions.</p> <p>Transport the device to the location where it will be installed.</p> <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	Insert the screws.
	6	Tighten the screws on the flanges in a criss-cross sequence. 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 screws on the device have been checked to make sure 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:
Installing the device connections (see page 24)

4.3 Installing the device connections

Live parts



Electric shock hazard posed by live parts

When performing work on electrical connections, coming into contact with live parts may result in electric shock.

- ⇒ Make sure that all work on the electrical system is carried out exclusively by an electrician.
- ⇒ Observe all country-specific and local regulations applicable to electrical equipment.
- ⇒ Before working on the electrical system, de-energize all connections.
- ⇒ Lock and tag out all connections.
- ⇒ Before working on the electrical system, double-check to make sure that the system is de-energized.
- ⇒ Before putting the device into operation, make sure that the electrical connections are undamaged and securely connected.

Preparing the materials

Prepare the following materials:

- Connection lines (including necessary shut-off devices) for the blowdown, bleeder, and vent fittings.
- Connection lines for the compressed air supply

Installing the device's connection lines

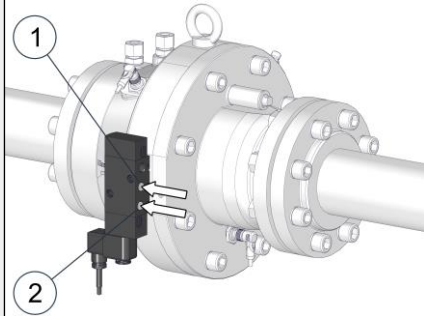
Proceed as follows:

Figure	Step	Description
	1	Use fitting (1) to install a pressure gauge in order to monitor the inlet pressure, for example. If you will not be using this fitting, seal it off.
	2	Fitting (2) must remain open and be routed to a space with gas detectors.
	3	Install a vent line on fitting (3).

Installing the control valve connections

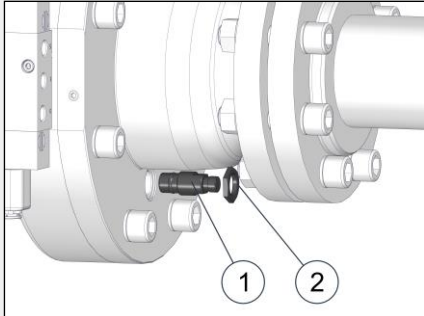
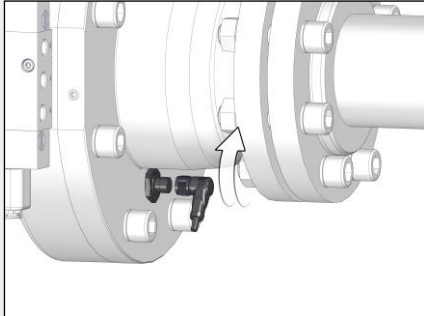

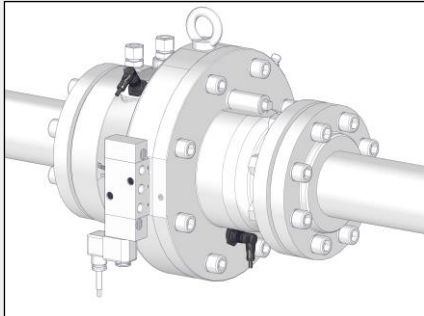
Proceed as follows:

Figure	Step	Description
	1	Connect the control valve's solenoid coil assembly (1). When doing so, make sure to observe the specifications in the <i>Pressure and electrical specifications</i> section under <i>Technical specifications</i> (see page 12).

Figure	Step	Description
	2	<p>Connect the control valve to the compressed air supply as indicated in the 3/2-way valve schematic.</p> <ul style="list-style-type: none"> ▪ Fitting (1): Compressed air supply ▪ Fitting (2): Compressed air release <p>When doing so, make sure to observe the specifications in the <i>Pressure and electrical specifications</i> section under <i>Technical specifications</i> (see page 12).</p>

Installing the sensors used to monitor the opening state (optional)

Proceed as follows:

Figure	Step	Description
	1	With the device closed, screw the sensor (1) into the hole on the outlet body as far as it will go.
	2	Unscrew the sensor half a turn.
	3	Use the nut (2) to lock the sensor in place.
	4	Screw the cable connector onto the sensor and connect the sensor. When doing so, make sure to observe the specifications in the <i>Pressure and electrical specifications</i> section under <i>Technical specifications</i> (see page 12).
	5	Open the device completely. In order to be able to do this, the control valve must be connected in such a way as to be fully functional.
	6	Install the sensor on the inlet body the same way you installed the sensor on the outlet body.
	7	Check both sensors' switching signals.

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.
- All electrical connections are securely fastened / clamped and fused.

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 26)

4.4 Checking the system for leaks

Leak test conducted by the manufacturer

Prior to delivery, the manufacturer conducted a strength and leak test on the device in accordance with DIN EN 14382.

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

The device installed into the system must undergo a leak test at the set-up location as follows:

Normative basis	DVGW Worksheet 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)

Observe the manufacturer's *General Operating Manual for Gas Pressure Regulators and Safety Devices* as well.

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.

Observe the manufacturer's *General Operating Manual for Gas Pressure Regulators and Safety Devices* as well.

Pressurized parts



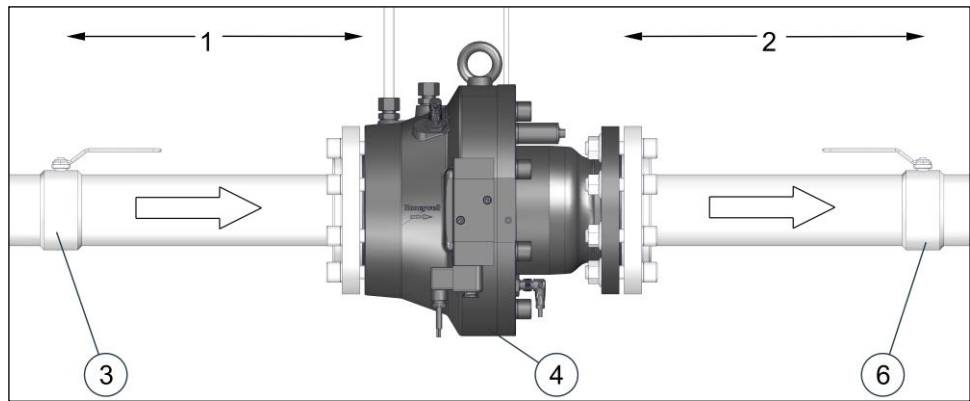
Risk of serious injury posed by pressurized components moving in an uncontrolled manner when handled improperly.

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:

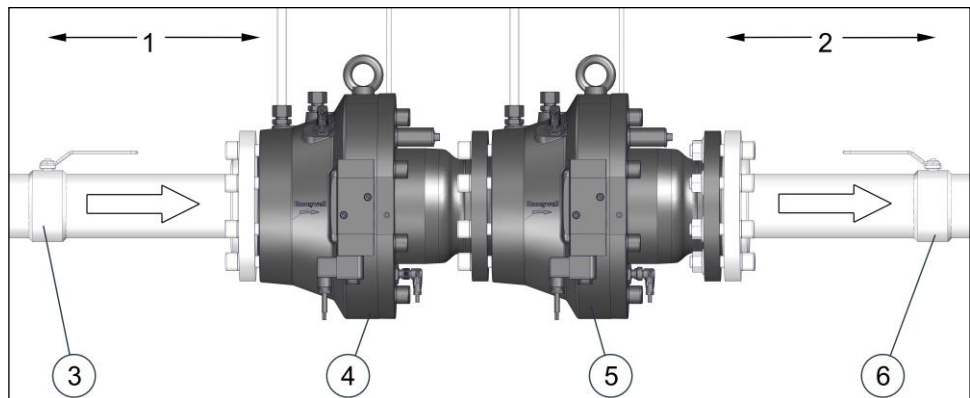
- ⇒ Close all connections leading to the gas-carrying line.
- ⇒ Establish a depressurized status. Residual amounts of energy must be depressurized as well.

Test configuration

The test configuration for a single valve is shown below (schematic diagram):



The test configuration for two valves used as a block-and-bleed setup is shown below (schematic diagram):



The numbers have the following meaning:

No.	Meaning
1	Inlet area
2	Outlet area
3	Inlet valve
4	Safety Shut-Off Valve
5	Redundancy, safety shut-off valve
6	Outlet valve

Requirements

Make sure that the following requirements are met:

- The blowdown line(s) is (are) sealed with a shut-off device (e.g., ball valve).

Checking the system for leaks

Proceed as follows:

Step	Description
1	Close the outlet valve.
2	Open the safety shut-off valve(s).
3	Slowly pressurize the inlet area with 1.1 times the operating pressure (MOP). For more information regarding the maximum permissible pressure, please refer to the <i>technical specifications</i> (see page 12).
4	Apply the test medium to all detachable pipe joints.
5	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 6.

Step	Description
6	Close the inlet shut-off device (the outlet shut-off device should still be closed).
7	Depressurize the area between the inlet and outlet shut-off devices as follows: <ul style="list-style-type: none"> ▪ Test configuration with one single safety shut-off valve <ul style="list-style-type: none"> ▪ Close the safety shut-off valve. ▪ Open the blowdown line's shut-off device. ▪ Open the valve two to three times. ▪ Test configuration with two safety shut-off valves <ul style="list-style-type: none"> ▪ Close both safety shut-off valves. ▪ Open the shut-off devices for both blowdown lines. ▪ Open and close the redundant downstream device two to three times.
8	Seal the leaking pipe joints.
9	Close the blowdown line(s)'s shut-off device(s).
10	Repeat the leak test starting with step 1.

4.5 Putting the device into operation

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.

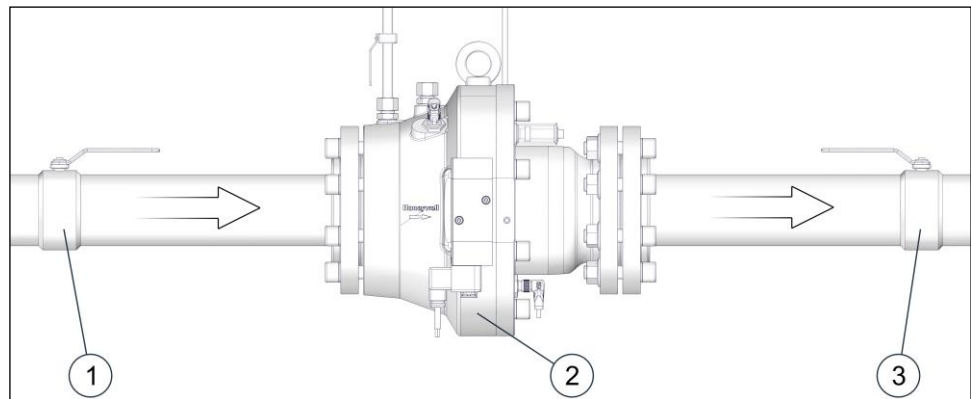
⇒ Pressurize the system only on the inlet side.

Requirements

Make sure that the following requirements are met:

- The system has been checked, is fully functional, and has no leaks.
- The inlet and outlet shut-off devices are closed.
- The blowdown line's shut-off device is closed.
- The device is closed.
- The inlet pressure is present upstream of the inlet shut-off device. For more information regarding the maximum permissible pressure, please refer to the *technical specifications* (see page 12).
- The system is depressurized between the inlet shut-off device and the outlet shut-off device.

Piping schematic diagram



The numbers have the following meaning:

No.	Meaning
1	Inlet valve
2	Safety Shut-Off Valve
3	Outlet valve

Start-up

Proceed as follows:

Step	Description
1	Open the inlet shut-off device (1). Result: The inlet pressure is present at the safety shut-off valve (2).
2	Open the safety shut-off valve (2) by sending the corresponding electrical signal to the control valve. Result: The inlet pressure will be present at the outlet shut-off device.
3	Open the outlet shut-off device (3).

5 Malfunctions

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5.1 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
No flow	The control valve is not connected correctly	Check the control valve's operation and connections; replace the control valve if necessary
	Low or no air pressure	Check the control valve's compressed air supply
	The diaphragm is defective	Check the components' condition and installation as indicated under <i>Maintaining the device</i> (see page 33)
Low flow rate	The control valve is not opening the safety shut-off valve completely due to soiling, damage, or incorrectly sized connection lines	Check the control valve and the compressed air lines and clean or replace them if necessary
	Excessively low air pressure	Check the control valve's compressed air supply
The valve is opening too slowly	Excessively low air pressure or incorrectly sized connection lines	Check the air pressure supply
The valve is closing too slowly	The control valve is releasing the compressed air too slowly due to soiling, damage, or incorrectly sized connection lines	Check the control valve and the compressed air lines and clean or replace them if necessary
	Excessively low air pressure	Check the air pressure
	The sleeve is getting caught in the guide rings	Check the components' condition and installation as indicated under <i>Maintaining the device</i> (see page 33)
	The vent connection is not open	Open the vent connection
	Impurities in the gas flow	<ul style="list-style-type: none"> ▪ Check the components' cleanliness as indicated under <i>Maintaining the device</i> (see page 33) ▪ Check the gas quality

Malfunction	Possible causes	Correction
The valve will not close	The compression spring is faulty	Check the component's condition and installation as indicated under <i>Maintaining the device</i> (see page 33)
	The control valve is not being released	Check the control valve's operation and connections; replace the control valve if necessary
	The sensors for the open/closed position are installed incorrectly	Check their installation as indicated under <i>Installing the device connections</i> (see page 24)
	The sleeve is jammed	Check the components' condition and installation as indicated under <i>Maintaining the device</i> (see page 33)
	Impurities in the gas flow	<ul style="list-style-type: none"> ▪ Check the components' cleanliness as indicated under <i>Maintaining the device</i> (see page 33) ▪ Check the gas quality
Leaks on the outside	The flange gaskets are damaged or are not in place	Check the flange gaskets and the device's proper assembly as indicated under <i>Mounting the device</i> (see page 22)
	The device's gaskets are damaged or are not in place	Check all gaskets as indicated under <i>Maintaining the device</i> (see page 33)
	The device's screws have not been tightened enough	Check the screws' tightening torques as indicated under <i>Maintaining the device</i> (see page 33)
Leaks on the inside in the "closed" position	The valve disc is damaged	Check the component's condition as indicated under <i>Maintaining the device</i> (see page 33)
	The sleeve's sealing edge is damaged	Check the component's condition as indicated under <i>Maintaining the device</i> (see page 33)
	All the reasons why the valve is not closing (as specified above)	See above
The visual position indicator is not working	<ul style="list-style-type: none"> ▪ The magnetic ring is jammed ▪ The spring is damaged or not in place 	Disassemble the assembly, check it, and clean it as indicated under <i>Maintaining the device</i> (see page 33)

6 Maintenance

Contents

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Preparing for the maintenance	33
Maintaining the device	33
Completing the maintenance	41

6.1 Maintenance schedule

Meaning

The maintenance schedule provides an overview of the periodically required maintenance.

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

Maintenance schedule

Maintenance must be performed on the device at the following intervals (whichever comes first):

- every 5 years
- After every 15,000 operation cycles

6.2 Preparing the tools, spare parts and lubricants

Special tools

If special tools are required, the appropriate details will be provided at the beginning of the respective section.

Spare parts

The spare part specifications can be found in the spare parts list.
The spare parts list can be found in the appendix of this user manual.

Lubricants

The specifications for the lubricants can be found in the *Lubricant table* section in the *appendix* (see page 49) to this user manual.

6.3 Preparing for the maintenance

Maintenance parts	<p>Have the following maintenance parts ready:</p> <ul style="list-style-type: none"> ▪ All O-rings (eight or nine depending on the device's nominal size) ▪ One (1) diaphragm ▪ One (1) valve disc
Spare parts	<p>The following parts are subject to wear and tear. During maintenance, their condition must be checked and they must be replaced if necessary. Because of this, it is recommended to have the following spare parts ready for maintenance in order to avoid downtimes:</p> <ul style="list-style-type: none"> ▪ Control valve ▪ Sleeve ▪ Pilot spring ▪ Sensor (proximity sensor) ▪ Cable connector for proximity sensor ▪ Guide ring ▪ Visual position indicator
Preparing to disassemble the device	<p>Prepare to disassemble the device as indicated in the <i>Preparing for disassembly</i> (see page 43) section.</p>
Disassembling the device	<p>Remove the device from the piping as indicated in the <i>Disassembling the device</i> (see page 45) instructions.</p>

6.4 Maintaining the device

Falling components	<div style="border: 1px solid black; padding: 2px; display: inline-block;">CAUTION</div> <p>Crush and impact hazard posed by components falling or toppling over accidentally.</p> <p>When working with heavy components that have been removed or are yet to be installed, injury may result if the components start moving in an uncontrolled manner, e.g., fall down from the working surface or topple over.</p> <ul style="list-style-type: none"> ⇒ Place removed components exclusively on level, horizontal working surfaces with enough load-bearing capacity. ⇒ If necessary, secure removed components (e.g., when on the sea) so that they will not fall or topple over. ⇒ Wear the required personal protective equipment. ⇒ Exercise caution when performing the relevant tasks. 																				
Tightening torques	<p>When tightening fasteners, observe the following tightening torques:</p> <table border="1"> <thead> <tr> <th>Nominal size</th> <th>Control valve screws</th> <th>Diaphragm plate screws</th> <th>Outlet body screws</th> </tr> </thead> <tbody> <tr> <td>1" (DN25)</td> <td>4 Nm (3 ft lbs)</td> <td>6 Nm (5 ft lbs)</td> <td>100 Nm (74 ft lbs)</td> </tr> <tr> <td>2" (DN50)</td> <td>4 Nm (3 ft lbs)</td> <td>10 Nm (8 ft lbs)</td> <td>250 Nm (185 ft lbs)</td> </tr> <tr> <td>3" (DN80)</td> <td>4 Nm (3 ft lbs)</td> <td>10 Nm (8 ft lbs)</td> <td>250 Nm (185 ft lbs)</td> </tr> <tr> <td>4" (DN100)</td> <td>4 Nm (3 ft lbs)</td> <td>10 Nm (8 ft lbs)</td> <td>250 Nm (185 ft lbs)</td> </tr> </tbody> </table>	Nominal size	Control valve screws	Diaphragm plate screws	Outlet body screws	1" (DN25)	4 Nm (3 ft lbs)	6 Nm (5 ft lbs)	100 Nm (74 ft lbs)	2" (DN50)	4 Nm (3 ft lbs)	10 Nm (8 ft lbs)	250 Nm (185 ft lbs)	3" (DN80)	4 Nm (3 ft lbs)	10 Nm (8 ft lbs)	250 Nm (185 ft lbs)	4" (DN100)	4 Nm (3 ft lbs)	10 Nm (8 ft lbs)	250 Nm (185 ft lbs)
Nominal size	Control valve screws	Diaphragm plate screws	Outlet body screws																		
1" (DN25)	4 Nm (3 ft lbs)	6 Nm (5 ft lbs)	100 Nm (74 ft lbs)																		
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4" (DN100)	4 Nm (3 ft lbs)	10 Nm (8 ft lbs)	250 Nm (185 ft lbs)																		
Lubricants	<p>In regard to lubricants, observe the information in the lubricant table found in the <i>appendix</i> (see page 49).</p>																				

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.

Removing the position indicator

Proceed as follows:

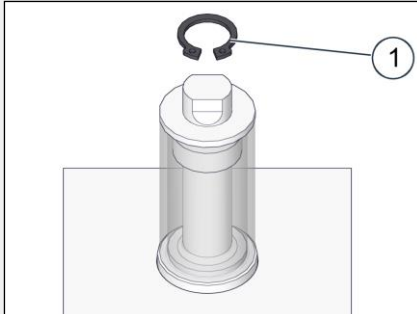
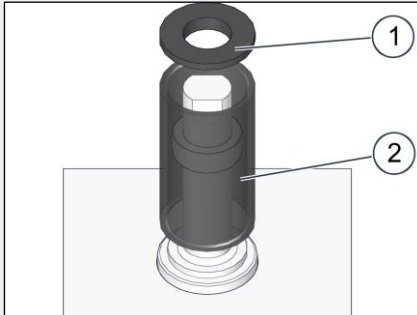
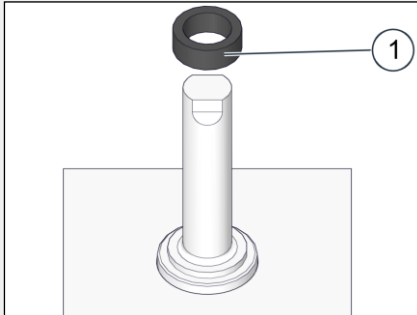
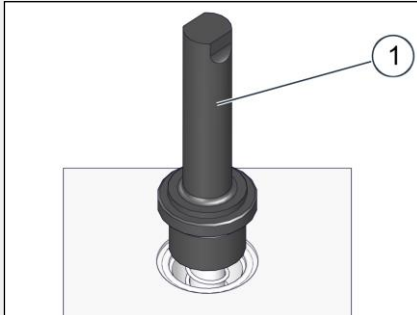
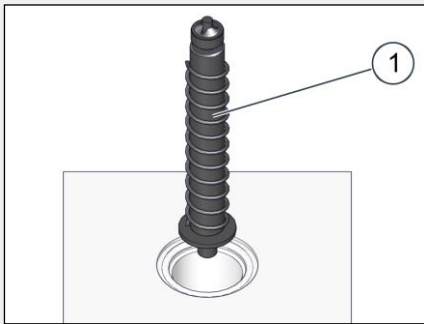
Figure	Step	Description
	1	Remove the visual position indicator's retaining ring (1).
	2	Remove the cover ring (1) and the sight glass (2).
	3	Remove the magnetic ring (1).
	4	Use an open-end wrench to unscrew the position indicator's housing (1).

Figure	Step	Description
	5	Remove the indicator pin, including the spring (1).

Maintaining the device

Proceed as follows:

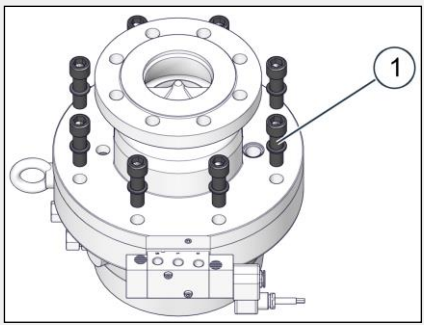
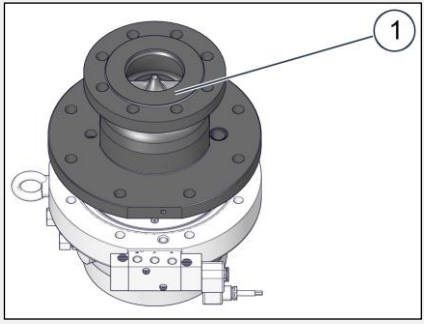
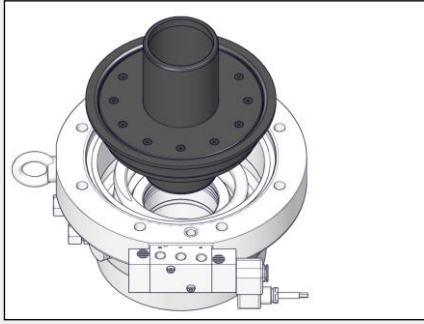
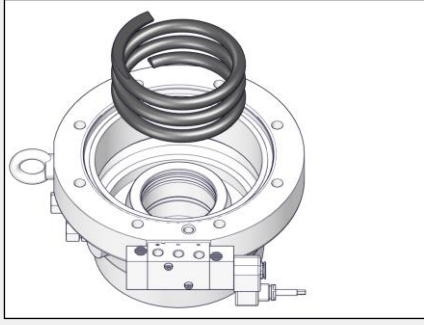
Figure	Step	Description
	1	<p>Unscrew the outlet body. When doing so, make sure to unscrew the screws (1) in a criss-cross sequence.</p> <p>Please note that the spring will be exerting a slight amount of pressure on the body. Slowly unscrew the screws until the compression spring's pressure is relieved.</p>
	2	Remove the outlet body (1).
	3	Remove the diaphragm unit.
	4	Remove the compression spring.

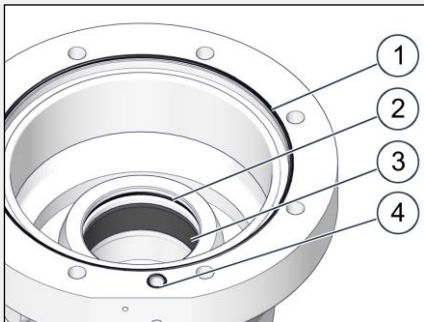
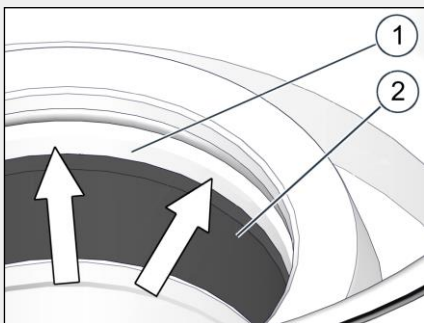
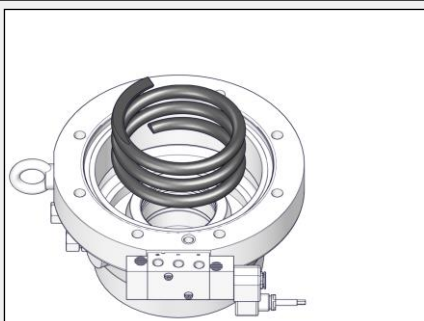
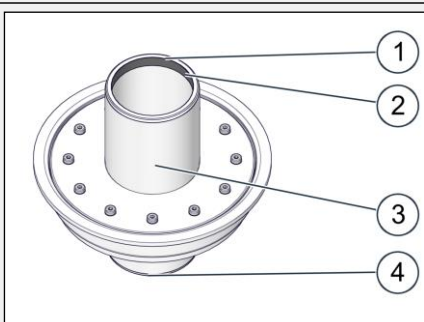
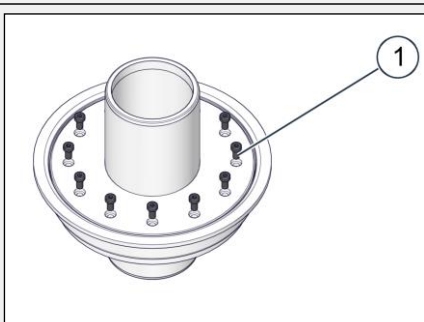
Figure	Step	Description
	5	Replace the O-rings (1, 2, 4) in the inlet body with new, greased O-rings and clean the inlet body during the process. Check the guide ring (3) for damage and replace it with a new one if necessary.
	6	Use grease for valve sleeves to fill the chamber (1) via the guide ring (2).
	7	Check the compression spring for damage and replace it with a new one if necessary. Place the compression spring back in the inlet body.
	8	Take the diaphragm unit. Use the sleeve (3) as a reference. The figure on the left shows the sealing edge (1) facing upwards. This sealing edge features a longer chamfer (2) than the sleeve's lower edge (4).
	9	Unscrew the diaphragm unit screws (1) in a criss-cross sequence.
10		Remove the mounting plate (1) and the diaphragm (2).

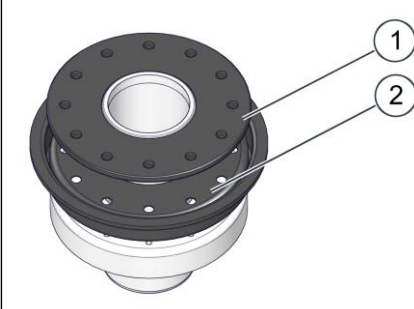
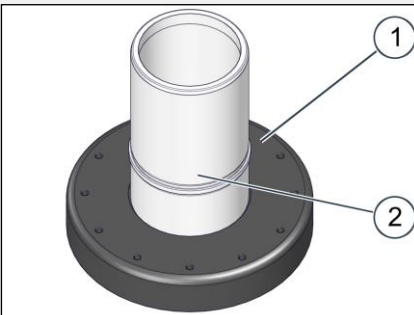
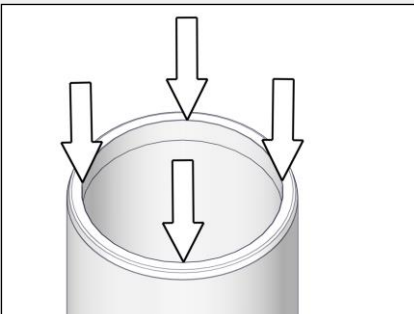
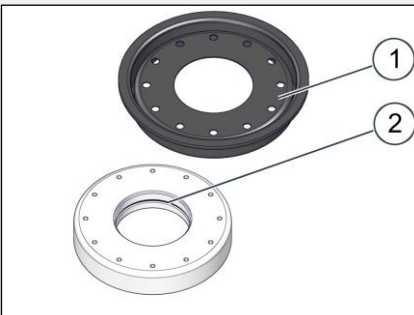
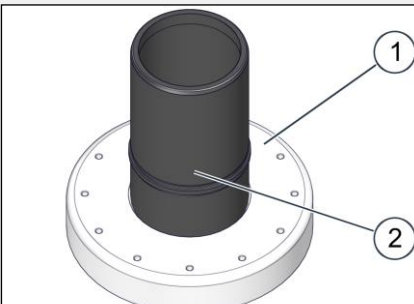
Figure	Step	Description
	<p>11</p>	<p>When the nominal size is 1" (DN 25) or 2" (DN 50), there will be an O-ring in the mounting plate (1). Replace this O-ring with a new, greased O-ring.</p>
	<p>12</p>	<p>Slide the diaphragm plate (1) downwards and remove the sleeve (2). Use a rubber mallet if necessary.</p>
	<p>13</p>	<p>Check the sleeve's sealing edge (1) for notches/damage. If necessary, replace the sleeve with a new one. See step 9 for reference.</p>
	<p>14</p>	<p>Replace the O-ring (2) in the diaphragm plate with a new, greased O-ring and clean the diaphragm unit during the process. Remove the old, used diaphragm (1).</p>
	<p>15</p>	<p>Slide the sleeve (2) back into the diaphragm plate (1). Make sure that the sealing edge is facing upwards. See step 9 for reference.</p>


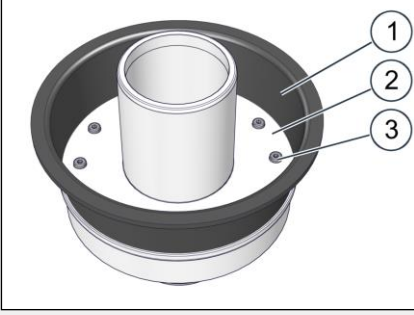
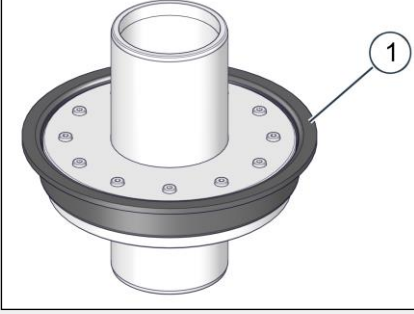
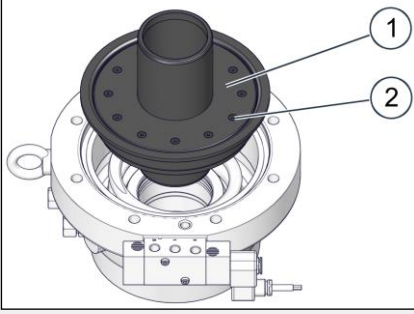
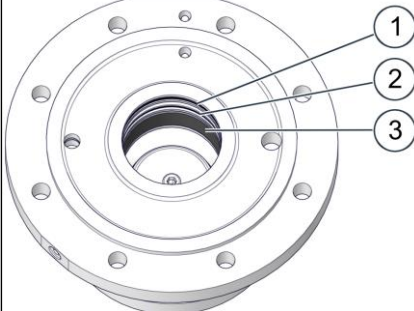
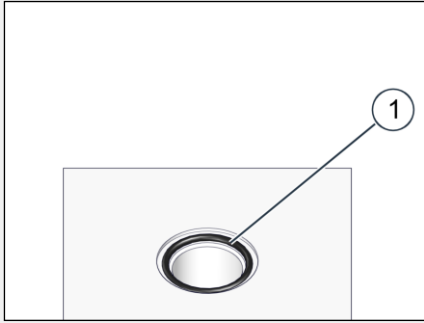
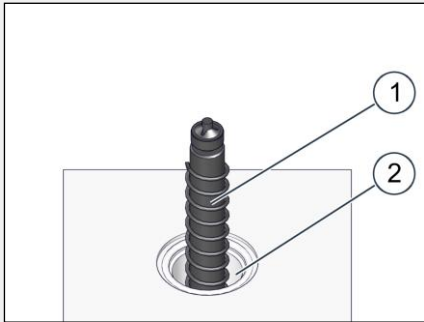
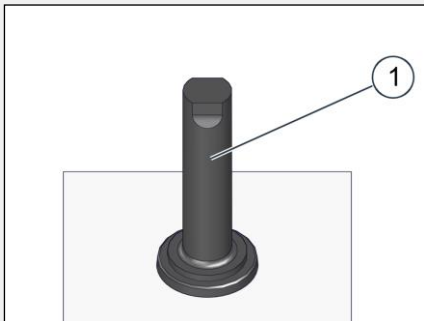
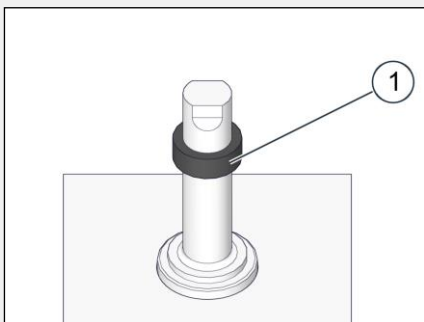
Figure	Step	Description
	<p>16</p>	<p>Take a new diaphragm that has not yet been unfolded and grease it.</p>
	<p>17</p>	<p>Place the new diaphragm (1) and the mounting plate (2) on the diaphragm plate as shown in the figure to the left. Tighten the screws (3) in a criss-cross sequence. Refer to the additional tightening torque information at the beginning of this topic.</p>
	<p>18</p>	<p>Pull the diaphragm (1) all the way down over the diaphragm plate. Then fold the diaphragm body back to half its height.</p>
	<p>19</p>	<p>Place the diaphragm unit back in the inlet body. Make sure that the mounting plate (1) and the screws (2) are facing upwards.</p>
	<p>20</p>	<p>Turn the outlet body. Replace the O-rings (1,2) with new, greased O-rings. Check the guide ring (3) for damage and replace it with a new one if necessary.</p>

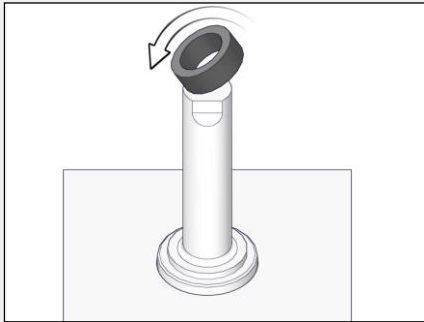
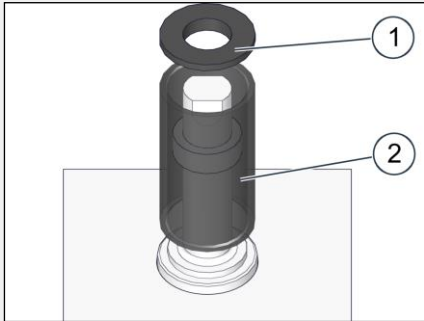
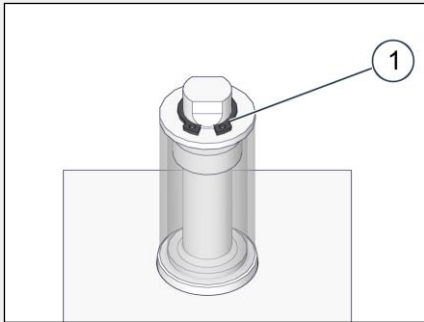
Figure	Step	Description
	21	Use grease for valve sleeves to fill the chamber (1) via the guide ring (2).
	22	Unscrew the screw (1) on the valve disc (2).
	23	Replace the valve disc (1) and the O-ring (2) with new ones. Grease the O-ring (2). Install both parts back in the outlet body. Do NOT use an impact driver to screw in the valve disc screw.
	24	Place the outlet body back on the inlet body. Align the body sections in such a way that the milled surface (1) and the control valve (2) are on top of each other and the holes (3) in both body sections are aligned.
	25	Tighten the outlet body's screws (1) and washers (2) in a criss-cross sequence. When doing so, press down on the plate until the screws are screwed in all the way. Refer to the additional tightening torque information at the beginning of this topic.

Maintaining and installing the position indicator

Proceed as follows:

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

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

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

Next task

Proceed as follows:

Completing the maintenance (see page 41)

6.5 Completing the 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.

Checking the inside of the device for leaks

Proceed as follows:

Step	Description
1	Prepare an appropriate test setup that will ensure that the safety shut-off valve can be tested for leaks with a bubble-tight sealing unit.
2	Install the safety shut-off valve in the test setup; please refer to <i>Mounting the device</i> (see page 22).
3	Seal off the inlet pressure gauge fitting. Also seal off the fitting that is used to check the valve sleeve's leak-tightness during inspections and after maintenance, and which would otherwise remain open.
4	Connect the control valve; please refer to <i>Installing the device connections</i> (see page 24).
5	Pressurize the device with 1.1 times the operating pressure (MOP) in the fully open state and then in the fully closed state. For more information regarding the maximum permissible pressure, please refer to the <i>technical specifications</i> (see page 12).
6	Use the bubble-tight sealing unit to check that the device has no leaks inside and then depressurize the device.

If ...	then ...
There are no leaks inside the device	<ul style="list-style-type: none"> ▪ You can reinstall the device. ▪ You can store the device if you are planning to put it back into operation later on.
There ARE leaks inside the device.	<ul style="list-style-type: none"> ▪ The device must NOT be reinstalled. ▪ The device must NOT be put into operation. ▪ Proceed with step 7.

Step	Description
7	Disassemble the safety shut-off valve into its sub-assemblies and individual parts as indicated in the <i>Maintaining the device</i> (see page 33) section.
8	Check all spare parts to make sure they are in good condition. Replace any damaged or questionable spare parts.
9	Properly reassemble the safety shut-off valve as indicated in the <i>Maintaining the device</i> (see page 33) section.
10	Repeat the leak test starting with step 2.

Next task

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

- *Mounting the device* (see page 22)
- *Storing the device* (see page 47)
- *Disposing of the device* (see page 48)

7 Decommissioning, storage, renewed start-up, disposal

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7.1 Preparing for disassembly

Pressurized parts

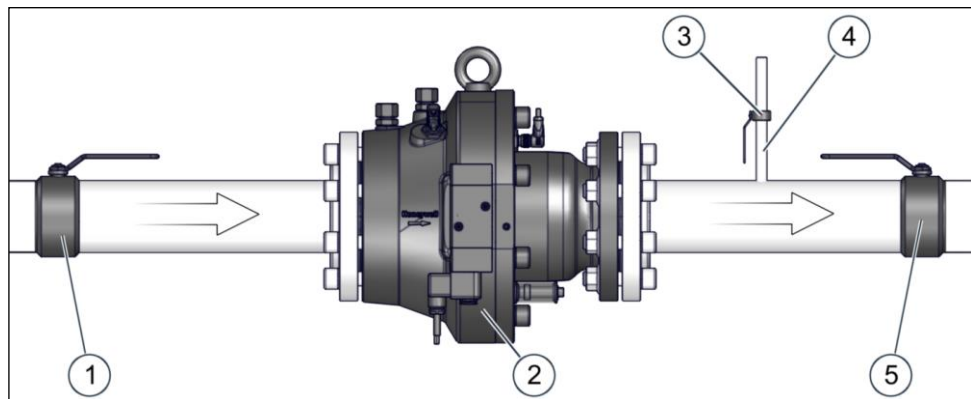
⚠ WARNING

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.

Piping schematic diagram



The numbers have the following meaning:

No.	Meaning
1	Inlet valve
2	Safety Shut-Off Valve
3	Blowdown line shut-off device (e.g., ball valve)
4	Blowdown line
5	Outlet valve

Establishing the depressurized status

Proceed as follows:

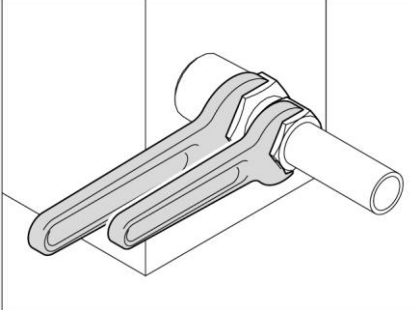
Step	Description
1	Close the inlet valve (1).
2	Close the outlet valve (5).
3	Close the safety shut-off valve (2).
4	Open the shut-off device (3) in the blowdown line (4) in order for the pressure in the outlet chamber to be relieved.
5	Close and open the safety shut-off valve (2) two to three times in order to relieve the pressure in the inlet chamber.

Purging the lines with nitrogen

Purge all of the safety shut-off valve's lines with nitrogen before removing the device.

Protecting the pipe joints from being twisted

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

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

7.2 Disassembling the device

Live parts

⚠ DANGER

Electric shock hazard posed by live parts

When performing work on electrical connections, coming into contact with live parts may result in electric shock.

- ⇒ Make sure that all work on the electrical system is carried out exclusively by an electrician.
- ⇒ Observe all country-specific and local regulations applicable to electrical equipment.
- ⇒ Before working on the electrical system, de-energize all connections.
- ⇒ Lock and tag out all connections.
- ⇒ Before working on the electrical system, double-check to make sure that the system is de-energized.
- ⇒ Before putting the device into operation, make sure that the electrical connections are undamaged and securely connected.

Suspended loads

⚠ WARNING

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.

Requirements

Make sure that the following requirements are met:

- The device is depressurized and all lines have been purged with nitrogen.
- The device is closed.
- NO compressed air is reaching the device via the control valve.
- The device's electrical connections (control valve and optional sensors) are de-energized and locked and tagged out.

Disassembling the device

Proceed as follows:

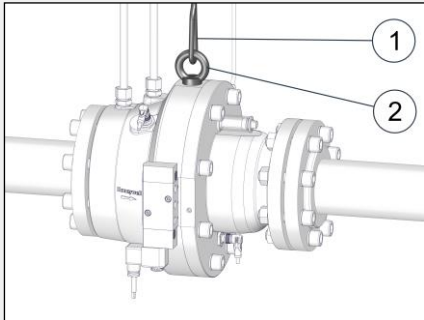
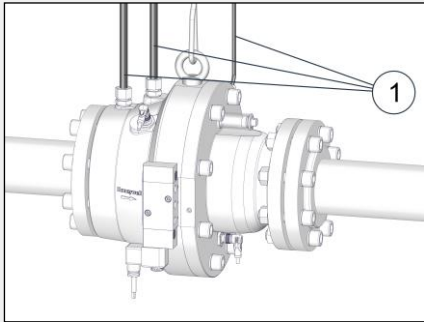
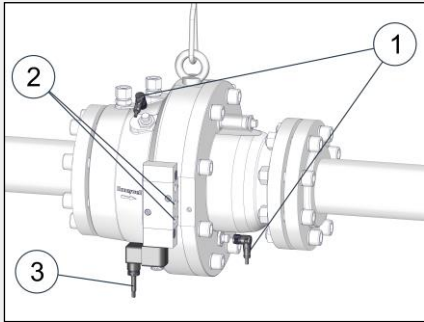
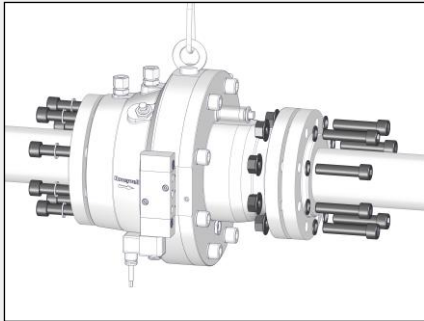
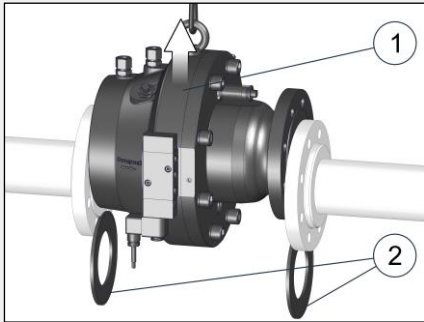
Figure	Step	Description
	1	<p>WARNING! Crushing hazard due to the device pivoting outward in an uncontrolled manner.</p> <p>⇒ Use only the eye bolt as an attachment point for horizontal installation and removal positions.</p> <p>Stabilize the device in its installation position without using the threaded joints to do so. Use slinging gear (1) and the eye bolt (2) for this purpose, for example.</p>

Figure	Step	Description
	2	Disconnect all device connection lines (1) (if any).
	3	Remove the sensors' cable connectors (1) (if any).
	4	Remove the control valve's compressed air connections (2).
	5	Disconnect the control valve's connecting cable (3).
	6	Unscrew the connecting screws from the connection flange. Make sure to follow a criss-cross sequence when doing so.
	7	Remove the device (1) from the piping and remove the flange gaskets (2).
	8	Slowly and carefully transport the device.

Next task

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

- *Maintaining the device* (see page 33)
- *Storing the device* (see page 47)
- *Disposing of the device* (see page 48)

7.3 Storing the device

Storage of the packing units

Observe the following rules:

- Do not store the device outdoors.
- Store the device in a dry and dust-free environment on a flat surface.
- Do not expose the device to any aggressive media, ozone or ionizing radiation or to direct heat sources.
- Storage conditions:
 - Temperature: 0 °C to 25 °C (32 °F to 77 °F)
 - Relative humidity: < 55%.
- Avoid mechanical vibrations.
- Storage periods:
 - If the device is stored for up to one year:
Store the device in the original packaging in the original delivery status. All protective caps of the device must remain in place.
 - If the device is stored longer than 1 year (e.g. as a reserve unit):
Store the device in the original packaging in the original delivery status and check it annually for damage and dirt accumulation. Consider the storage period in the maintenance cycles.

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

Storage of spare parts

The following rules apply to the storage of spare parts:

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

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

Observe the following rules:

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

7.4 Starting up the device again

Starting up the device again

Proceed as follows:

Step	Description
1	Check the device with regard to its maintenance condition as indicated in the <i>Maintenance</i> (see page 32) chapter.
2	Put the device back into operation as indicated in the <i>Transport, installation and start-up</i> (see page 20) chapter.

7.5 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.

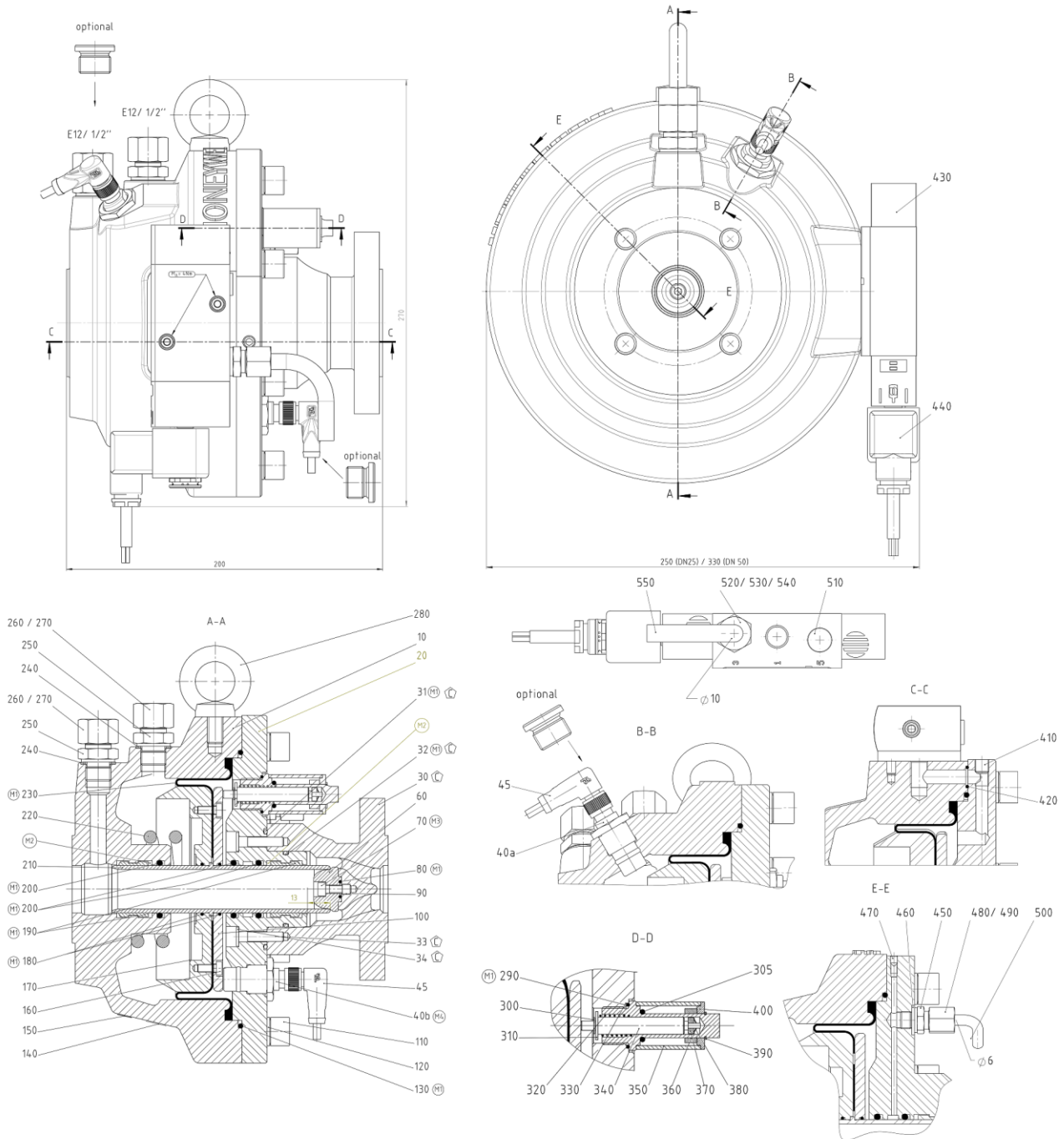
8 Appendix

Contents

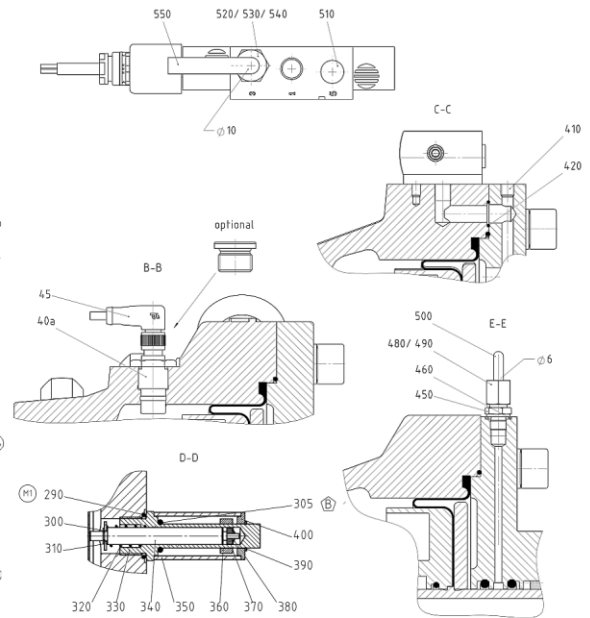
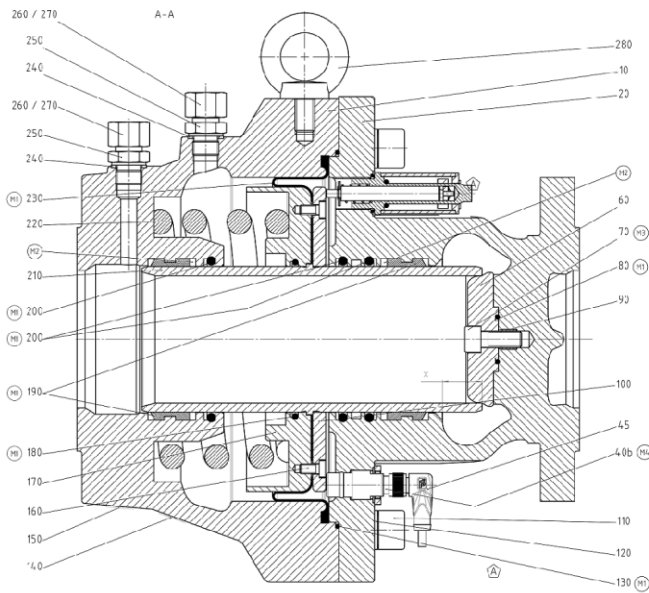
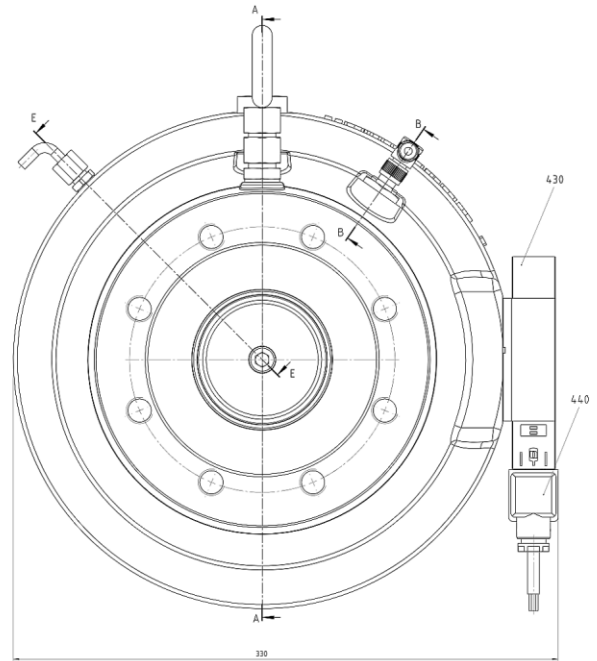
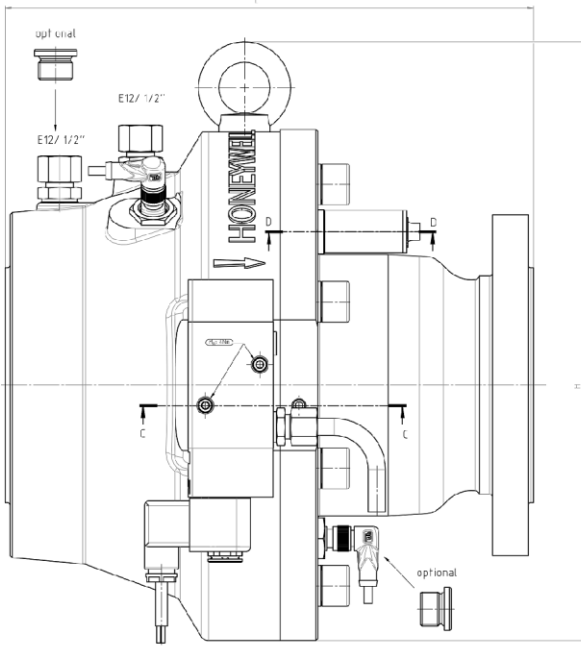
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8.1 Spare parts for HON 750 safety shut-off valve

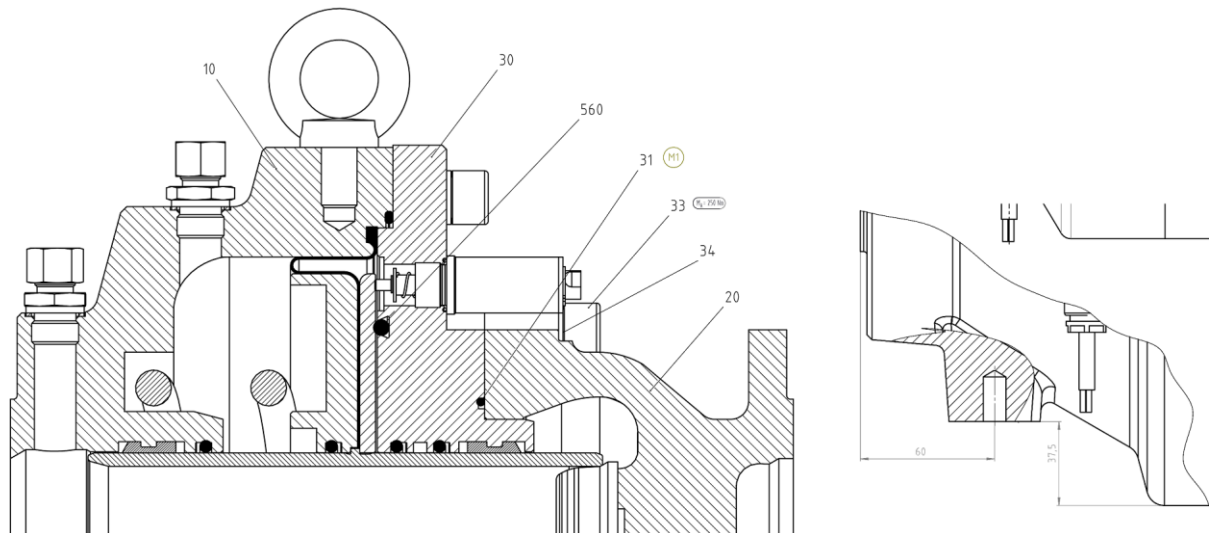
Spare part drawing for DN 25



Spare part drawing for DN 50 / DN 80 / DN 100



Additional drawing of the 3-part body of the version (DN 100)



Spare parts

The spare parts always required for maintenance are marked with an "x" in the "Maint." column in the spare parts list. The required number of spare parts is indicated under the part number in the "Part No." column. If no quantity is specified, this means that only one unit is required.

No.	Name	Maint.	Part no.			
			DN 25	DN 50	DN 80	DN 100
10	Body. Versions:					
	PN16 - PN40, cast steel		10032085	10032094	10032102	-
	PN16, cast steel		-	-	-	10032895
	CLASS 150, cast steel		10032086	10032095	10032103-RMK	10032897
	PN25/40, cast steel		-	-	-	10032896
	PN16, steel		-	-	-	18362430
	CLASS 150, steel		-	-	-	18362432
	PN25/40, steel		-	-	-	18362431
20	Valve body. Versions:					
	PN16 - PN40, cast steel		10032088	10032097	10032105	-
	PN16, cast steel		-	-	-	10032898 18362433
	CLASS 150, cast steel		10032089	10032098	10032106	10032900 18362435
	PN25/40, cast steel		-	-	-	10032899 18362434
	PN16 - PN40, cast stainless steel		10032091	10032100	10032108	-
	PN16, cast stainless steel		-	-	-	10032908 18362436
	CLASS 150, cast stainless steel		10032092	10032101-RMK	10032109	10032910 18362438
	PN25/40, cast stainless steel		-	-	-	10032909 18362437
	30	Connection flange, steel		10032837	-	-
Connection flange, stainless			10032845	-	-	18362445

No.	Name	Maint.	Part no.			
			DN 25	DN 50	DN 80	DN 100
31	O-ring		20242-RMK	-	-	20262-RMK
32	O-ring		21141-RMK	-	-	-
33	Socket cap screw		10120 (6 units)	-	-	10609-RMK (8 units)
34	Washer		14069 (6 units)	-	-	14116-RMK (8 units)
40	Proximity switch		101442-RMK (2 units)	101442-RMK (2 units)	101442-RMK (2 units)	101442-RMK (2 pcs.)
45	Cable connector		103304-RMK (2 units)	103304-RMK (2 units)	103304-RMK (2 units)	102453-RMK (2 units)
50	Isolation amplifier		300151	300151	300151	300151
60	Valve disc	x	18356982	18353929	18352614	18356669
70	Socket cap screw		10318-RMK	10324	10325-RMK	10328
80	O-ring	x	20231-RMK	20234-RMK	20235-RMK	20613
90	Heli-Coil wire thread insert		100146-RMK	100147-RMK	100148-RMK	100149-RMK
100	Mounting plate		10032185	10032186	10032187	18362440
110	Socket cap screw		10563-RMK (8 units)	10555-RMK (8 units)	10609-RMK (8 units)	10555-RMK (12 units)
120	Washer		14114 (8 units)	14116-RMK (8 units)	14116-RMK (8 units)	14116-RMK (12 units)
130	O-ring	x	20827	20843-RMK	20843-RMK	20838-RMK
140	Rating plate		10030309	10030309	10030309	10030309
150	Label		10013294	10013294	10013294	10013294
160	Socket cap screw		10540-RMK (6 units)	10596-RMK (12 units)	10596-RMK (12 units)	10596-RMK (16 units)
170	Diaphragm plate		10032188	10032189	10032190	18362441
180	O-ring	x	20430-RMK (2 units)	20413 (2 units)	20414 (1 unit)	21016
190	Guide ring		21014 (2 units)	21009 (2 units)	21018-RMK (2 units)	21015-RMK (2 units)
200	O-ring	x	20252-RMK (3 units)	20596-RMK (3 units)	20976 (3 units)	21016 (3 units)
210	Valve sleeve		10032164	10032110	10032112	10032165
220	Closing spring		18361031	18360333	18360190	18360260
230	Diaphragm	x	10013485	10013535	10032163	18362442
240	Gasket		18694 (2 units)	18694 (2 units)	18694 (2 units)	18684-RMK (2 units)
250	Screw-in connecting piece		30130-RMK (2 units)	30130-RMK (2 units)	30130-RMK (2 units)	30142 (2 units)
260	Sleeve nut		30823-RMK (2 units)	30823-RMK (2 units)	30823-RMK (2 units)	30823-RMK (2 units)

No.	Name	Maint.	Part no.			
			DN 25	DN 50	DN 80	DN 100
270	Cutting ring		30919 (2 units)	30919 (2 units)	30919 (2 units)	30919 (2 units)
280	Eye bolt		10487-RMK (2 units)	10021 (2 units)	10021 (2 units)	10003-RMK
290	O-ring	x	20382	20382	20382	20382
300	Washer		19101	19101	19101	19101
305	O-ring		20914	20914	20914	20914
310	Washer		104246-RMK	104246-RMK	104246-RMK	104246-RMK
320	Compression spring		10013284	10013384	10013384	10013384
330	Position indicator case		10013280	10013380	10013380	10013380
340	Indicator pin		10032379	10032651	10032651	10013541
350	Sight glass		10013283	10013383	10013383	10013383
360	Outer magnetic ring		27043	27043	27043	27043
370	Inner magnetic ring		27044-RMK	27044-RMK	27044-RMK	27044-RMK
380	Fixing disc		27063-RMK	27063-RMK	27063-RMK	27063-RMK
390	Circlip		19172-RMK	19172-RMK	19172-RMK	19172-RMK
400	Lock ring		10013286	10013286	10013286	10013286
410	Set screw		12219-RMK	12219-RMK	12219-RMK	12471-RMK
420	O-ring	x	20595-RMK	20588	20588	20588
430	3/2-way solenoid valve		103152-RMK	103152-RMK	103152-RMK	103152-RMK
440	Solenoid coil		103153-RMK	103153-RMK	103153-RMK	103153-RMK
450	Screw-in connecting piece		300923	300923	300923	300923
460	Gasket		6419	18740-RMK	18740-RMK	18740-RMK
470	Set screw		102554-RMK	-	-	-
480	Sleeve nut		30832	30832	30832	30832
490	Cutting ring		30937	30937	30937	30937
500	Elbow		36460	36460	36460	36460
510	Cap		26162	26162	26162	26162
520	Screw-in connecting piece		30146-RMK	30146-RMK	30146-RMK	30146-RMK
530	Cutting ring		30915	30915	30915	30915
540	Sleeve nut		30817-RMK	30817-RMK	30817-RMK	30817-RMK
550	Elbow		18353504	18353504	18353504	18353504
560	O-ring		-	-	-	20973-RMK
*	Screw plug M18x1 stainless steel with gasket		103329-RMK	103329-RMK	103329-RMK	103329-RMK
*	O-ring		20284	20284	20284	20284

*) optional

Spare parts kit for nominal size of 1" (DN 25)

No.	Name	Part no.
1	WTS HON750 DN25 <ul style="list-style-type: none"> ▪ Spare parts always required for maintenance: O-rings, diaphragm, valve disc 	K750-001

Spare parts kit for nominal size of 2" (DN 50)

No.	Name	Part no.
1	WTS HON750 DN50 <ul style="list-style-type: none"> ▪ Spare parts always required for maintenance: O-rings, diaphragm, valve disc 	K750-002

Spare parts kit for nominal size of 3" (DN 80)

No.	Name	Part no.
1	WTS HON750 DN80 <ul style="list-style-type: none"> ▪ Spare parts always required for maintenance: O-rings, diaphragm, valve disc 	K750-003

Spare parts kit for nominal size of 4" (DN 100)

No.	Name	Part no.
1	WTS HON750 DN100 <ul style="list-style-type: none"> ▪ Spare parts always required for maintenance: O-rings, diaphragm, valve disc 	K750-004

8.2 Lubricants

Lubricant table

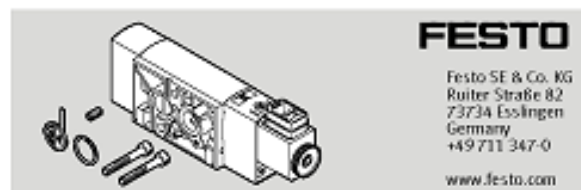
Important! All parts must be slightly greased.

Use the following lubricants:

Components	Lubricant	Part no.
<ul style="list-style-type: none"> ▪ All O-rings ▪ Diaphragm grip body ▪ Grease chambers ▪ Valve sleeve sliding surfaces Valve sleeve gaskets	Silicone grease	27 052
<ul style="list-style-type: none"> ▪ All fastening screws ▪ All fittings 	Assembly lubricant	27 091

8.3 FESTO VSNC-FC-M52-MD-...14-F8 solenoid valve

VSNC-F...-M52-...-F... Solenoid valve



Assembly instructions

8149717
2020-12c
[8149719]



FESTO

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73734 Esslingen
Germany
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www.festo.com

Translation of the original instructions

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1 Applicable Documents



All available documents for the product → www.festo.com/sp.

2 Safety

2.1 Safety instructions

- Before working on the product, switch off the power supply and secure it against being switched on again.

2.2 Intended use

The solenoid valve is intended for mounting on a drive with a NAMUR plug pattern in accordance with VDI/VDE 3845 Sheet 1:2010-09.

3 Additional information

- Accessories → www.festo.com/catalogue.

4 Scope of delivery

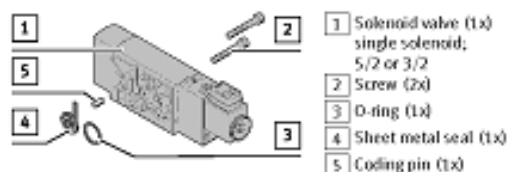


Fig. 1

5 Preassembly

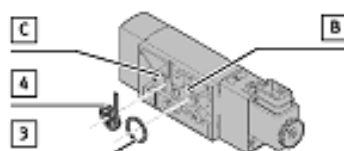


Fig. 2 Valve function 5/2

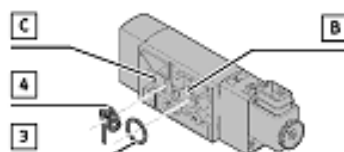


Fig. 3 Valve function 3/2

- Press D-ring [3] into the recess [B].
- Orient the sheet metal seal [4] in accordance with the desired valve function.
- Press the sheet metal seal [4] into the recess [C].

6 Assembly

Requirement for outdoor application:

Protection against sealing of exhaust ducts 3/5 e.g. by frozen condensate or nesting insects.

- Take on-site environmental conditions into account.
- Take suitable protective measures. For example:
 - Use exhaust protection WABD-D3-SN-G14.
 - Duct exhaust air.

Requirement for solenoid valves VSNC...-FN and VSNC...-FB:

- Set manual override to unactuated prior to mounting.

Manual override	
unactuated	actuated

Tab. 1

Installing the solenoid valve



The alignment of the solenoid valve [1] depends on the position of the coding pin [5]. The position of the coding pin [5] determines the direction of movement at the drive.

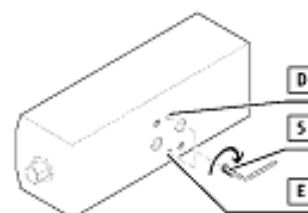


Fig. 4

- Position coding pin [5] on the thread [D]/[E] in accordance with the desired direction of movement.
- Screw coding pin [5] into the thread [D]/[E] to the stop.

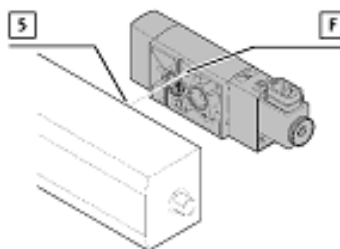


Fig. 5

- Place coding recess [F] on the coding pin [5].

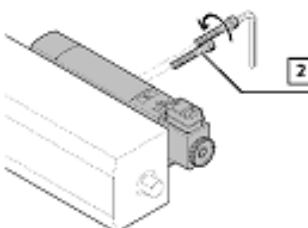
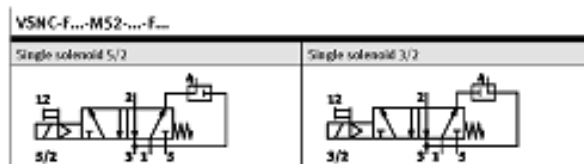


Fig. 6

- Tighten screws [2]. Tightening torque: 3.5 Nm ± 20%.

7 Circuit diagrams



Tab. 2

Solenoid valve VSNC-FC-M52-MD-G14-FN

Part number: 577267

FESTO



Data sheet

Feature	Value
Valve function	5/2-way or 3/2-way, convertible
Type of actuation	Electric
Construction width	32 mm
Standard nominal flow rate	1250 l/min
pneumatic working port	NAMUR port pattern
Operating voltage	Via solenoid coil, must be ordered separately
Operating pressure	2.5 bar ... 8 bar
Design	Piston gate valve
Type of reset	Mechanical spring
Certificate issuing authority	DNVGL-TAA000011J
Exhaust air function	With flow control option
Sealing principle	Soft
Mounting position	optional
Conforms to standard	VDI/VDE 3845 (NAMUR)
Manual override	Detenting Non-detenting
Type of piloting	Pilot actuated
Pilot air supply	Internal
Flow direction	Non-reversible
Symbol	00991831
lap	Positive overlap
Signal status display	With accessories
b value	0.4
C value	5.2 l/sbar
Standard nominal flow rate, exhaust return 4→3	110 l/min
Switching time off	92 ms
Switching time on	35 ms
Duty cycle	100%
Characteristic coil data	See solenoid coil, to be ordered separately
Explosion protection	Zone 1 (ATEX) Zone 2 (ATEX) Zone 21 (ATEX) Zone 22 (ATEX)
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]
Note on operating and pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)
Corrosion resistance class CRC	2 - Moderate corrosion stress

Feature	Value
Media temperature	-20 °C ... 60 °C
Ambient temperature	-20 °C ... 60 °C
Product weight	415 g
Type of mounting	With through-hole
Breather connection	Not ducted
Pneumatic connection, port 1	G1/4
Pneumatic connection, port 2	NAMUR port pattern
Pneumatic connection, port 3	G1/4
Pneumatic connection, port 4	NAMUR port pattern
Pneumatic connection, port 5	G1/4
Note on materials	RoHS-compliant
Material seals	NBR
Material housing	Wrought aluminium alloy
Material screws	High-alloy stainless steel

Solenoid valve VSNC-FC-M52-MD-G14-FN

Part number: 577267

FESTO

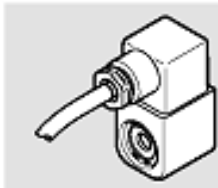


Data sheet

Feature	Value
Valve function	5/2-way or 3/2-way, convertible
Type of actuation	Electric
Construction width	32 mm
Standard nominal flow rate	1250 l/min
pneumatic working port	NAMUR port pattern
Operating voltage	Via solenoid coil, must be ordered separately
Operating pressure	2.5 bar ... 8 bar
Design	Piston gate valve
Type of reset	Mechanical spring
Certificate issuing authority	DNVGL-TAA000011J
Exhaust air function	With flow control option
Sealing principle	Soft
Mounting position	optional
Conforms to standard	VDI/VDE 3845 (NAMUR)
Manual override	Detenting Non-detenting
Type of piloting	Pilot actuated
Pilot air supply	Internal
Flow direction	Non-reversible
Symbol	00991831
lap	Positive overlap
Signal status display	With accessories
b value	0.4
C value	5.2 l/sbar
Standard nominal flow rate, exhaust return 4→3	110 l/min
Switching time off	92 ms
Switching time on	35 ms
Duty cycle	100%
Characteristic coil data	See solenoid coil, to be ordered separately
Explosion protection	Zone 1 (ATEX) Zone 2 (ATEX) Zone 21 (ATEX) Zone 22 (ATEX)
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]
Note on operating and pilot medium	Lubricated operation possible (in which case lubricated operation will always be required)
Corrosion resistance class CRC	2 - Moderate corrosion stress

8.4 FESTO VACN-N-K1-EX4-M solenoid coil

VACN-...-EX4-M Solenoid coil


FESTO

 Festo SE & Co. KG
 Ruitter Straße 82
 73734 Esslingen
 Deutschland
 49 7141 347-0

www.festo.com

Operating instructions

 8152649
 2021-02b
 [8152651]


8152649

Translation of the original instructions

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1 Identification EX

Identification	Certificate	
ECEX ATEX	Exemb IIC T4 Exemb IIIC T80°C II 2G Exmb IIC T4 II 2D Exmb IIIC T80°C	ECEX PIB 15.0016 X PIB 14 AFE 8 2027 X
INMETRO	Exemb IIC T4 Gb Exemb IIIC T80°C Db	DEW 15.0016 X
CCC EX	Exemb I T4 Gb Exemb II T4 T80	CCC 2021322387001994

Tab. 1: Identification EX

2 Applicable documents

NOTICE

Technical data for the product can have different values in other documents. For operation in an explosive atmosphere, the technical data in this document always have priority.


 All available documents for the product → www.festo.com/sp.

3 Certified solenoid coils

Voltage	Cable length	Type	T. no.
24 V DC	3 m	VACN-N-K1-1-EX4-M	80591A3
24 V DC	10 m	VACN-N-K1-1-10-EX4-M	01A1696
110 V AC	3 m	VACN-N-K1-16B-EX4-M	80591A2
230 V AC	3 m	VACN-N-K1-3A-EX4-M	80591A1

Tab. 2: Certified solenoid coils

4 Safety

4.1 General safety instructions

- The device can be used under the stated operating conditions in zones 1 and 2, explosive gas atmospheres, and in zones 21 and 22, explosive dust atmospheres.
- The device may only be used in the delivered configuration in a potentially explosive atmosphere.
- Use the device in its original status without any unauthorised modifications.
- All work must be carried out outside of potentially explosive areas.

4.2 Intended use

The solenoid coil is intended to be used to actuate Festo valves.

4.3 Identification X: special conditions

- Install a fuse or a motor protection switch appropriate for the rated current upstream of the solenoid coil as short-circuit protection.
 - Short circuit protection for max. 3 times the rated current in accordance with IEC 60127-1.
 - The fuse with the lowest current value in accordance with IEC 60127-1 is sufficient for very low rated currents of the solenoid coil.

- Select the fuse rated voltage equal to or greater than the nominal voltage of the solenoid coil.
- Motor protection switch with short circuit triggering and thermal quick triggering, adjustment to rated current.
- Install the fuse in the supply unit or wire it separately upstream.
- The interruption rating of the fuse unit must be greater than or equal to the maximum expected short-circuit current at the installation location, normally 1500 A.
- Max. permissible ripple with solenoid coils in direct current: 20%.

5 Function

When switching on the voltage, the solenoid is energised, and the valve is actuated.

6 Commissioning

⚠ WARNING

The discharge of electrostatically charged parts can lead to ignitable sparks.

- Prevent electrostatic charging by taking appropriate installation and cleaning measures.
- Include the device in the system equipotential bonding.

NOTICE

Installation and commissioning should only be carried out in accordance with operating instructions and by qualified personnel.

- Prevent short circuit or interruption resulting from bending the connecting cable too tightly.
- Observe the product labelling.
- Do not commission the solenoid coil until after assembly.

7 Maintenance and care

⚠ WARNING

The discharge of electrostatically charged parts can lead to ignitable sparks. If used in group IIC:

- Only clean the device with a damp cloth.

- Repairs to the solenoid coil are not permitted.
- The device is maintenance-free.

8 Technical data

Technical data	
Ambient temperature Ta	
Individual mounting	[°C] -20 ≤ Ta ≤ +50
Block mounting	[°C] -20 ≤ Ta ≤ +40
Nominal voltage Un	
VACN-N-K1-1-EX4-M [V DC]	24
VACN-N-K1-1-10-EX4-M [V DC]	
VACN-N-K1-16B-EX4-M [V AC]	110 (50 ... 60 Hz) 120 (50 Hz)
VACN-N-K1-3A-EX4-M [V AC]	230 (50 ... 60 Hz)
Rated current In	
VACN-N-K1-1-EX4-M [mA]	109
VACN-N-K1-1-10-EX4-M [mA]	
VACN-N-K1-16B-EX4-M [mA]	22
VACN-N-K1-3A-EX4-M [mA]	9
Duty cycle [%]	100 (continuous operation)
Degree of protection	IP65
Relative humidity [%]	95 (non-condensing)
Assembly	Individual mounting/block mounting
Block mounting, minimum distance	
VACN-N-K1-1-EX4-M [mm]	2
VACN-N-K1-1-10-EX4-M [mm]	
VACN-N-K1-16B-EX4-M [mm]	1
VACN-N-K1-3A-EX4-M [mm]	1
Mounting position	any

Tab. 3: Technical data

Solenoid coil VACN-N-K1-1-EX4-M

Part number: 8029143

FESTO



Data sheet

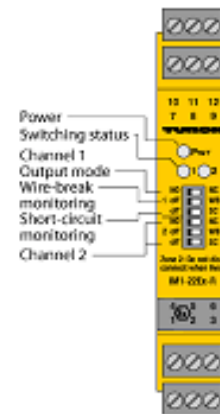
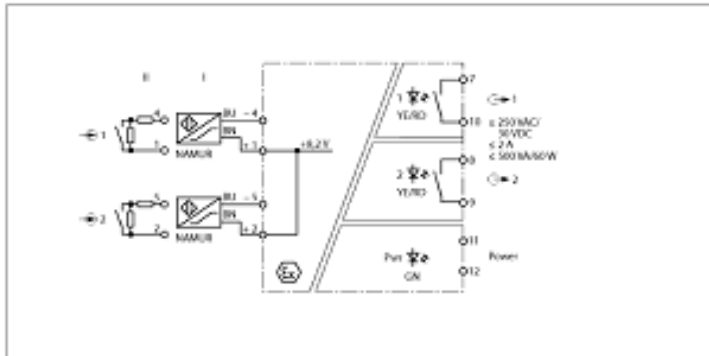
Feature	Value
Type of actuation	Electric
Mounting position	optional
Duty cycle	100%
Insulation material class	F
Insulation material class of enamelled wire	II
Characteristic coil data	24 V DC; 2.6 W
Permissible voltage fluctuations	+/- 10 %
Maritime classification	See certificate
CE mark (see declaration of conformity)	To EU Explosion Protection Directive (ATEX) In accordance with EU RoHS Directive
Explosion protection certification outside the EU	EPL Db (BR) EPL Db (CN) EPL Db (IEC-EX) EPL Gb (BR)
Explosion protection	Zone 1 (ATEX) Zone 2 (ATEX) Zone 21 (ATEX) Zone 22 (ATEX) Zone 1 (BR) Zone 21 (BR) Zone 21 (IEC-EX) Zone 21 (CN)
Certificate issuing authority	DNVGL-TA/000011J IECEX PTB 15.0016X PTB 14 ATEX 2027 X
ATEX category gas	II 2G
ATEX category dust	II 2D
Explosion ignition protection type for gas	Ex mb IIC T6 Gb
Explosion ignition protection type for dust	Ex mb tb IIC T80°C Db
Explosion ambient temperature	-20°C ≤ T _a ≤ +50°C
Corrosion resistance class CRC	2 - Moderate corrosion stress
PWIS conformity	VDMA24364-B2-L
Degree of protection	IP65
Ambient temperature	-20 °C ... 50 °C
Product weight	353 g
Electrical connection	Cable
Cable diameter	7 mm
Cable length	3 m
Type of mounting	Via knurled nut

Feature	Value
Note on materials	RoHS-compliant
Material housing	Polymer Steel
Material winding	Copper

8.5 TURCK IMX12-DI01-2S-2R-0/24VDC isolation amplifier

interface
modul

Isolating switching amplifier
2-channel
IM1-22EX-R



The 2-channel IM1-22EX-R isolating switching amplifier is equipped with intrinsically safe input circuits.

Sensors according to EN 60947-5-6 (NAMUR) or potential-free contact transmitters can be connected to the device.

The output circuits feature 2 relays, each with 1 NO contact.

Via six switches on the front, you can set the operating behaviour for each channel separately (work or quiescent current behavior, i.e. NO/NC) as well as switch wire-break (WB) and short-circuit monitoring (SC) on and off.

When using mechanical contacts, wire-break and short-circuit monitoring must be switched off or the contacts must be wired to resistors (R) (see circuit diagram).

The Pwr LED lights green to indicate operational readiness. The 2-color LEDs 1 and 2 light yellow to indicate the switching status of the associated output. In the event of an input circuit error, the 2-color LED of the assigned faulty input turns red, with the input circuit monitoring switched on. Thereupon the output relay drops out.

- 2 relay outputs (NO)
- Output mode adjustable (NO/NC mode)
- Input circuits monitored for wire-break/short-circuit (ON/OFF switchable)
- SIL 2
- Complete galvanic isolation
- Input reverse-polarity protected

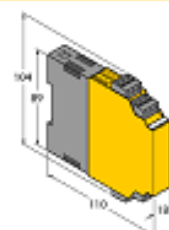


Isolating switching amplifier 2-channel IM1-22EX-R

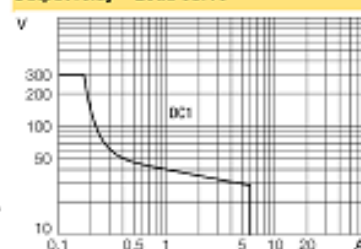


Type designation	IM1-22EX-R
Ident. no.	7541231
Nominal voltage	Universal voltage supply unit
Operating voltage	20...250 VAC
Frequency	40...70 Hz
Operating voltage range	20...125 VDC
Power consumption	≤ 3 W
Power dissipation, typ.	≤ 0.98 W
NAMUR input	
NAMUR	EN 60947-5-8
Input circuit monitoring	on/off switchable
No-load voltage	8.2 VDC
Short-circuit current	8.2 mA
Input resistance	1 kΩ
Cable resistance	≤ 50 Ω
Switch-on threshold	1.75 mA
Switch-off threshold	1.55 mA
Wire breakage threshold	≤ 0.08 mA
Short-circuit threshold	> 6.4 mA
Output circuits (digital)	2 × relays (NO)
Output switching voltage relay	≤ 30 VDC / ≤ 250 VAC
Switching current per output	≤ 2 A
Switching capacity per output	≤ 500 VA/60 W
Switching frequency	≤ 10 Hz
Contact quality	AgNi, Sp, Au
Galvanic isolation	
Test voltage	2.5 kV
Important note	For Ex-applications, the values specified in the corresponding Ex certificates (ATEX, IECEx, UL, etc.) apply.
Ex approval acc. to conformity certificate	TÜV 04 ATEX 2553
Application area	II (1) G, II (1) D
Ignition protection category	[Ex ia Ga] IIC; [Ex ia Da] IIC
Ex approval acc. to conformity certificate	TÜV 06 ATEX 552968 X
Application area	II 3 G
Ignition protection type	Ex nA nC [c Gc] IIC/IB T4 Gc
Characteristic	linear
Important note	If the device is used in applications to achieve functional safety according to IEC 61508, the safety manual must be used. Information in the data sheet are not valid for functional safety.
Approval	SIL 2 acc. to EN 61508
Use in SIL safety circuits	SIL 2 acc. to IEC 61508
Indication	
Operational readiness	green
Switching state	yellow
State/ Fault	2 × yellow/red
Error indication	red

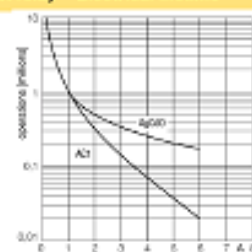
Dimensions



Output relay – Load curve



Output relay – Electrical lifetime





Isolating switching amplifier
2-channel
IM1-22EX-R



Mechanical Data

Protection class	IP20
Flammability class acc. to UL 94	V-0
Ambient temperature (min.)	-25 °C
Ambient temperature (max.)	70 °C
Storage temperature	-25 ... +60 °C für UL, FM, TIS
Relative humidity	-40...+60 °C
Dimensions	≤ 95 %
Weight	104 x 18 x 110 mm
Mounting instructions	169 g
Housing material	DIN rail (NS35) or panel
Electrical connection	Polycarbonate/ABS
Terminal cross-section	4 x 3-pin removable terminal blocks, reverse polarity protected, screw terminal
Tightening torque	1 x 2.5 mm ² / 2 x 1.5 mm ²
	0.5 Nm

interface
modul



Isolating switching amplifier
2-channel
IM1-22EX-R

Accessories

Type code	Ident. no.	Description	Dimension drawing
WM1 WIDER- STANDSMODUL	0912101	The resistor module WM1 meets the requirements for line monitoring between a mechanical contact and a TURCK signal processor. The input circuit of the signal processor is designed for sensors acc. to EN60947-5-6 (NAMUR) and equipped with a wire-break and short-circuit monitoring function.	
IM-CC-3X2BU2BK	0900475	Cage clamp terminals for IM modules (Ex devices with 10 mm overall width); includes: 2 pcs. 3-pin blue terminals and 2 pcs. 3-pin black terminals.	
IM-CC-3X2BU2BK	-	Spring-type terminals for IM modules (Ex devices with 10 mm overall width); includes: 2 pcs. 3-pin blue terminals and 2 pcs. 3-pin black terminals.	

interface
modul

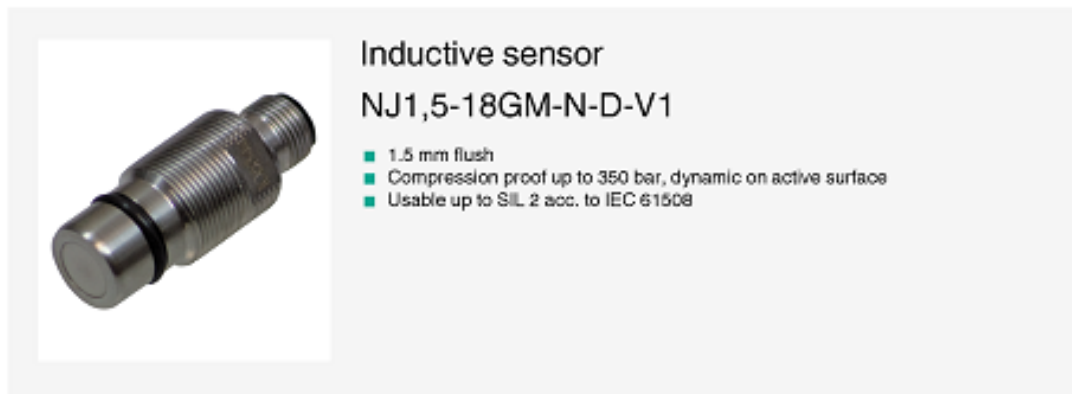
Isolating switching amplifier
2-channel
IM1-22EX-R



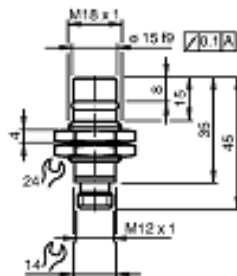
Accessories

Type code	Ident. no.	Description	Dimension drawing
WM1 WIDER-STANDSMODUL	0912101	The resistor module WM1 meets the requirements for line monitoring between a mechanical contact and a TURCK signal processor. The input circuit of the signal processor is designed for sensors acc. to EN60947-5-6 (NAMUR) and equipped with a wire-break and short-circuit monitoring function.	
IM-CC-3X2BU2BK	6900475	Cage clamp terminals for IM modules (Ex devices with 18 mm overall width); includes: 2 pcs. 3-pin blue terminals and 2 pcs. 3-pin black terminals.	
IM-CC-3X2BU2BK	-	Spring-type terminals for IM modules (Ex devices with 18 mm overall width); includes: 2 pcs. 3-pin blue terminals and 2 pcs. 3-pin black terminals.	

8.6 Inductive sensor NJ1,5-18GM-N-D-V1



Dimensions



Technical Data

General specifications		
Switching function		Normally closed (NC)
Output type		NAMUR
Rated operating distance	s_n	1.5 mm
Installation		flush
Assured operating distance	s_a	0 ... 1.22 mm
Reduction factor r_{20}		0
Reduction factor $r_{C_{20}}$		0
Reduction factor $r_{S_{20}}$		0.55
Output type		2-wire
Nominal ratings		
Nominal voltage	U_n	8.2 V (R_n approx. 1 k Ω)
Switching frequency	f	0 ... 400 Hz
Hysteresis	H	typ. %
Current consumption		
Measuring plate not detected		min. 3 mA
Measuring plate detected		≤ 1 mA

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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PEPPERL+FUCHS

1

Inductive sensor

NJ1,5-18GM-N-D-V1

Technical Data

Limit data		
Operating pressure		350 bar (5076.4 psi)
Functional safety related parameters		
Safety Integrity Level (SIL)		SIL 2
MTTF _d		10887 a
Mission Time (T _M)		20 a
Diagnostic Coverage (DC)		0 %
Compliance with standards and directives		
Standard conformity		
NAMUR		EN 60947-5-6:2000 IEC 60947-5-6:1999
Standards		EN 60947-5-2:2007 EN 60947-5-2/A1:2012 IEC 60947-5-2:2007 IEC 60947-5-2 AMD 1:2012
Approvals and certificates		
IECEX approval		
Equipment protection level Gb		IECEX PTB 11.0037X
Equipment protection level Da		IECEX PTB 11.0037X
Equipment protection level Mb		IECEX PTB 11.0037X
ATEX approval		
Equipment protection level Gb		PTB 00 ATEX 2048 X
Equipment protection level Da		PTB 00 ATEX 2048 X
EAC conformity		
		TR CU 012:2011
FM approval		
Control drawing		116-0165
UL approval		
		cULus Listed, General Purpose
CCC approval		
Hazardous Location		2020322315002255
NEPSI approval		
NEPSI certificate		GYJ16.1393X
ANZEx		
		18.3018X
KCC approval		
Hazardous Location		19-AV4BO-0227
Marine approval		
		DNVGL TAA0000106
Ambient conditions		
Ambient temperature		-25 ... 85 °C (-13 ... 185 °F)
Mechanical specifications		
Connection type		Connector plug
Housing material		Stainless steel 1.4305 / AISI 303
Sensing face		Ceramic
Degree of protection		IP66 / IP67
Connector		
Threading		M12 x 1
Number of pins		4
Mass		41.81 g
General information		
Use in the hazardous area		see instruction manuals

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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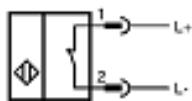
 **PEPPERL+FUCHS**

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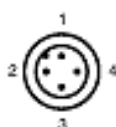
Inductive sensor

NJ1,5-18GM-N-D-V1

Connection



Connection Assignment



Wire colors in accordance with EN 60947-5-6

1		BN	(brown)
2		BU	(blue)

Accessories

**V1-W-N-2M-PUR**

Female cordset single-ended M12 angled A-coded, 2-pin, PUR cable blue, NAMUR

**V1-G-N-2M-PUR**

Female cordset single-ended M12 straight A-coded, 2-pin, PUR cable blue, NAMUR

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Refer to "General Notes Pertaining to Pepperl+Fuchs Product Information".

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3

Inductive sensor

NJ1,5-18GM-N-D-V1

Installation

Note

Please refer to the technical information about this product at www.pepperl-fuchs.com. This information describes the necessary geometry of the installation space!

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Subject to change without notice

Additional information

To learn more about Honeywell's solutions for the gas industry, contact your local contact person or visit our website at www.honeywellprocess.com.

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