



Operating Instructions

VARICOVER®
Pig Stopper 3A

Edition 29/04/2014
English

Product Pig Stopper 3A

Document Operating Instructions
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English

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Notes for the Reader

The present Operating Instructions are part of the user information for the pig stopper. The Operating Instructions contain all the information you need to transport, install, commission, operate and carry out maintenance for the pig stopper.

Binding Character of These Operating Instructions

These Operating Instructions contain the manufacturer's instructions to the operator of the pig stopper and to all persons who work on or use the pig stopper regarding the procedures to follow.

Carefully read these Operating Instructions before starting any work on or using the pig stopper. Your personal safety and the safety of the pig stopper can only be ensured if you act as described in the Operating Instructions.

Store the Operating Instructions in such a way that they are accessible to the operator and the operating staff during the entire life cycle of the pig stopper. When the location is changed or the pig stopper is sold make sure you also provide the Operating Instructions.

Notes on the Illustrations

The illustrations in these Operating Instructions show the pig stopper in a simplified form. The actual design of the pig stopper can differ from the illustration. For detailed views and dimensions of the pig stopper please refer to the design documents.

Symbols and Highlighting

In these Operating Instructions, important information is highlighted by symbols or special formatting. The following examples illustrate the most important types of highlighting.



DANGER

Warning: Fatal Injuries.

Failure to observe the warning can cause serious damage to health, or even death.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.



WARNING

Warning: Serious Injuries.

Failure to observe the warning note can result in serious damage to health.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.



CAUTION

Warning: Injuries.

Failure to observe the warning note can result in minor or moderate damage to health.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

IMPORTANT NOTE

Warning: Damage to Property.

Non-observance of the warning note can cause serious damage to the pig stopper or in the vicinity of the pig stopper.

→ The arrow identifies a precautionary measure you have to take to avoid the hazard.

Carry out the following steps: = Start of a set of instructions.

1. First step in a sequence of operations.
2. Second step in a sequence of operations.
 - Result of the previous operation.



The operation is complete, the goal has been achieved.

NOTE

Further useful information.

Abbreviations and Terms

Abbreviation	Explanation
BS	British Standard
bar	Unit of measurement of pressure [bar] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [bar _g /psi _g] unless explicitly specified otherwise.
approx.	approximately
°C	Unit of measurement of temperature [degree Celsius]
dm ³ _n	Unit of measurement of volume [cubic decimetre] Volume (litre) at standard temperature and pressure
DN	DIN nominal width
DIN	German standard issued by DIN (Deutsches Institut für Normung e.V., German Institute for Standardization)
EN	European Standard
EPDM	Material designation Short designation according to DIN/ISO 1629: Ethylene Propylene Diene Rubber
°F	Unit of measurement of temperature [degree Fahrenheit]
FKM	Material designation, short designation according to DIN/ISO 1629: Fluorine rubber
h	Unit of measurement of time [hour]
HNBR	Material designation Short designation according to DIN/ISO 1629: Hydrogenated Acrylonitrile Butadiene Rubber
IP	Protection class
ISO	International standard issued by the International Organization for Standardization
kg	Unit of measurement of weight [kilogram]
kN	Unit of measurement of force [kilonewton]
Kv value	Flow coefficient [m ³ /s] 1 KV = 0.86 x Cv
l	Unit of measurement of volume [litre]
max.	maximum
mm	Unit of measurement of length [millimetre]
µm	Unit of measurement of length [micrometre]
M	metric
Nm	Unit of measurement of work [newton metre] UNIT OF TORQUE 1 Nm = 0.737 lbft Pound-Force (lb) + Feet (ft)
PA	Polyamide
PE-LD	Low-density polyethylene

Abbreviation	Explanation
psi	British and American unit of measurement [Pound force per square inch] All pressure data expressed in [bar/psi] is assumed to be gauge pressure [barg/psig] unless explicitly specified otherwise.
SET-UP	Self-learning installation During commissioning and maintenance, the SET-UP procedure carries out all the necessary settings for the generation of messages.
a/f	Indicates the size of spanners width across flats
T.VIS	Tuchenhagen Valve Information System
V AC	Volt alternating current
V DC	Volt direct current
W	Unit of measurement of power [Watt]
TIG	Welding method Tungsten inert gas welding
Inch	Unit of measurement of length In the Anglo-American language area
Inch OD	Pipe dimension acc. to British standard (BS), Outside Diameter
Inch IPS	US pipe dimension Iron Pipe Size

Safety

Safety Note

The pig stopper is operationally reliable. It was built according to state-of-the-art standards.

Nevertheless, the pig stopper can pose dangers, especially if

- the pig stopper is not used in accordance with its intended use,
- the pig stopper is not used correctly,
- the pig stopper is operated under impermissible operating conditions.

Operator's Duties

In your capacity as operator of the facility you bear a particular responsibility for the proper and safe handling of the pig stopper in your facility. Only use the pig stopper when it is in perfect condition to prevent danger to persons and property.

These Operating Instructions contain the information you and your staff need for the safe and reliable operation during the entire service life of the pig stopper. Be sure to read these Operating Instructions carefully and ensure that the measures described here are observed.

The operator's duty of care includes planning the necessary safety measures and monitoring that these measures are observed. The following principles apply:

- Only allow qualified staff to work on the pig stopper.
- The operator must authorize the staff to carry out the relevant tasks.
- Working areas and the entire environment of the pig stopper must be neat and clean.
- The staff must wear suitable work clothing and personal protective equipment. As the operator of the facility make sure that work clothing and personal protective equipment are used.
- Instruct the staff with regard to any properties of the product which might pose a health risk and the preventative measures to be taken.
- Have a qualified first-aider on call during the operation, who can initiate the necessary first-aid measures in case of an emergency.
- Clearly define processes, lines of authority and responsibilities associated with the pig stopper. Everybody must know what to do in case of an emergency. Instruct the staff in this respect at regular intervals.
- The signs relating to the pig stopper must always be complete and legible. Check, clean and replace the signs as necessary at regular intervals.

NOTE

Carry out regular checks. This way you can ensure that these measures are actually observed.

Qualification of Staff

This section contains information about the qualifications that staff working on the pig stopper must have.

Operating and maintenance staff must

- have the necessary qualification to carry out their tasks,
- be instructed with regard to possible dangers,
- know and observe the safety instructions given in the documentation.

Only allow qualified electricians to carry out work on the electrical equipment or have a qualified electrician supervise the work.

The following minimum qualifications are required:

- Vocational training as a specialist who can work on the pig stopper independently.
- Sufficient instruction to work on the pig stopper under the supervision and direction of a qualified specialist.

Each member of staff must meet the following requirements to be allowed to work on the pig stopper:

- Personal qualification for the relevant task.
- Sufficient professional qualification for the relevant task.
- Instructed with regard to the function of the pig stopper.
- Instructed with regard to the operating sequences of the pig stopper.
- Familiar with the safety devices and their function.
- Familiar with these Operating Instructions, especially with the safety instructions and the information which is relevant for the task on hand.
- Familiar with the basic regulations with regard to occupational health and safety and accident prevention.

For work to be carried out on the pig stopper the following user groups are distinguished:

User groups

Staff	Qualifications
Operating staff	<p>Adequate instruction and sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Function of the pig stopper • Operating sequences of the pig stopper • What to do in case of an emergency • Lines of authority and responsibilities with respect to the task
Maintenance staff	<p>Adequate instruction as well as sound knowledge of the design and function of the pig stopper.</p> <p>Sound knowledge in the following areas:</p> <ul style="list-style-type: none"> • Mechanical equipment • Electrical equipment • Pneumatic system <p>Authorization with regard to safety engineering standards to carry out the following tasks:</p> <ul style="list-style-type: none"> • Setting devices into operation • Earthing of devices • Marking of devices

Supplementary Regulations

In addition to the instructions in this documentation the following also has to be observed:

- pertinent accident prevention regulations,
- generally accepted safety rules,
- national regulations applicable in the country of use,
- work and safety instructions applicable in the facility,

Instructions for the Safe Operation

Dangerous situations during the operation can be avoided by safety-conscious and proactive behaviour of the staff.

General Principles

To ensure the safe operation of the pig stopper the following principles apply:

- The Operating Instructions must be kept ready to hand at the pig stopper's place of use. They must be complete and in clearly legible form.
- Only use the pig stopper for its intended use.
- The pig stopper must be functional and in good working order. Check the condition of the pig stopper before starting work and at regular intervals.
- Wear tight-fitting work clothing for all work on the pig stopper.
- Ensure that nobody can get hurt on the parts of the pig stopper.
- Immediately report any faults or noticeable changes on the pig stopper to the person responsible.
- Observe the accident prevention regulations and all local regulations.

Installation

For installation, the following principles apply:

- Only properly qualified staff is allowed to install, assemble and set the pig stopper into operation.
- Ensure that adequate working and traffic areas are available at the place of installation.
- Observe the maximum load-bearing capacity of the installation surface.
- Observe the transport instructions and markings on the part(s) to be transported.
- Remove any nails protruding from transport crates immediately after opening the crate.
- Under no circumstances should anyone stand under a suspended load.
- During assembly, the pig stopper's safety devices might not be working effectively.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.

Commissioning/Setup Mode

For commissioning, the following principles apply:

- Take protective measures against dangerous contact voltages in accordance with pertinent regulations.
- The pig stopper must be completely assembled and correctly adjusted. All screw connections must be securely tightened. All electrical cables must be installed correctly.
- Reliably secure machine parts which have already been connected against inadvertently being switched on.
- Relubricate all lubricating points.
- Make sure lubricants are used properly.
- After conversion of the pig stopper, residual risks must be reassessed.

Setting into Operation

For setting into operation, the following principles apply:

- Only allow properly qualified staff to set the pig stopper into operation.
- Establish all connections correctly.
- The safety devices for the pig stopper must be complete, fully functional and in perfect condition. Check the function before starting any work.
- When the pig stopper is switched on, the danger zones must be free.
- Remove any liquids that have escaped without leaving residues.

Operation

For operation, the following principles apply.

- Monitor the pig stopper during the operation.
- Safety devices must not be changed, removed or taken out of service. Check all safety devices at regular intervals.
- All guards and hoods must be fitted as intended.
- The place of installation of the pig stopper must be adequately ventilated at all times.
- Structural alterations of the pig stopper are not permitted. Immediately report any changes on the pig stopper to the person responsible.
- Always keep danger zones clear. Do not leave any objects in the danger zone. Only allow persons to enter the danger zone when the machine is de-energized.
- Regularly check that all emergency stop devices are working correctly.
- Check all welds at regular intervals to prevent uncontrolled leakage of liquids.
- Do not touch pipes and components. Risk of burns.
- No contact with detachable connections, sterile steam may escape.

Shutting Down

For shutting down, the following principles apply:

- Switch off the compressed air.
- Switch off the pig stopper via the main switch.
- Padlock the main switch (if fitted) in the off position to prevent it from being switched back on. The key to the padlock must be deposited with the person responsible until the machine is restarted.
- For longer periods of standstill, observe the storage conditions, see Storage (Page 22).

Maintenance and Repair

Before starting and maintenance and repair work on the electrical devices of the pig stopper, carry out the following steps in accordance with the "5 safety rules":

- Isolate from the power supply
- Take appropriate measures to prevent switch on
- Test absence of voltage
- Earthing and short-circuiting
- Cover or safeguard any adjacent live parts.

For maintenance and repair, the following principles apply:

- Observe the intervals specified in the maintenance schedule.
- Only allow qualified staff to carry out maintenance or repair work on the pig stopper.
- Before starting any maintenance or repair work, the pig stopper must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Block access for unauthorized persons. Put up notice signs which draw attention to the maintenance or repair work going on.
- Do not climb on the pig stopper. Use suitable access aids and working platforms.
- Wear suitable protective clothing.
- Only use suitable and undamaged tools to carry out maintenance work.
- When replacing parts only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose.
- Before setting the pig cleaning station back into operation refit all safety devices as originally provided in the factory. Then check that all safety devices are working correctly.
- Make sure lubricants are used properly.
- Check pipes are firmly secured, also check for leaks and damage.
- Check that all emergency stop devices are working correctly.

Disassembly

For disassembly, the following principles apply:

- Only allow qualified staff to disassemble the pig stopper.
- Before starting disassembly, the pig stopper must be switched off and secured against being switched back on. Work may only be started once any residual energy has been discharged.
- Disconnect all power and utility lines.
- Markings, e.g. on lines, must not be removed.
- Do not climb on the pig stopper. Use suitable access aids and working platforms.
- Mark the lines (if unmarked) prior to disassembly to ensure they are not confused when re-assembling.
- Protect open line ends with blind plugs against ingress of dirt.
- Pack sensitive parts separately.
- For longer periods of standstill, observe the storage conditions, see "Storage" (Page 22).

Environmental Protection

Harm to the environment can be avoided by safety-conscious and proactive behaviour of the staff.

For environmental protection the following principles apply:

- Substances harmful to the environment must not be discharged into the ground or the sewage system.
- Always observe the pertinent regulations relating to waste avoidance, disposal and utilization.
- Substances harmful to the environment must be collected and stored in suitable containers. Clearly mark the containers.
- Dispose of lubricants as hazardous waste.

Electrical Equipment

For all work on electrical equipment, the following principles apply:



- Access to electrical equipment should only be allowed to qualified electricians. Always keep unattended switch cabinets locked.
- Modifications of the control system can affect the safe and reliable operation. Modifications are only permitted with the express permission of the manufacturer.
- After completion of all work, check that the protective devices are fully functional.

Signage

Dangerous points on the pig stopper are indicated by warning signs, prohibition signs and mandatory signs.

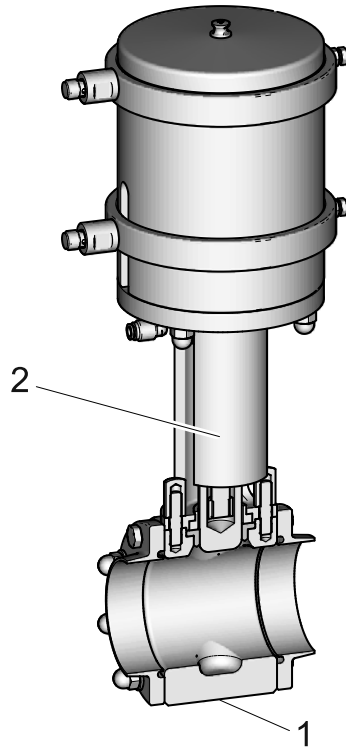
The signs and notes on the pig stopper must always be legible. Any illegible signs must be replaced immediately.

Signs on the pig stopper

Sign	Meaning
	General hazard warning
	Warning Crushing

Residual Risk

Hazard Areas



Please observe the following notes:

- In the event of malfunctions, shut down the pig stopper (disconnect from the power and air supply) and secure it against being used.
- Never reach into the lantern (2) or the flange MSTO (1) when the pig stopper is switching. Fingers can be crushed or cut off.
- Before starting any service, maintenance or repair work, disconnect the pig stopper from the power supply and secure it against inadvertently being switched back on again.
- Only allow a qualified electrician to carry out any work on the electrical power supply.
- Check the electrical equipment of the pig stopper at regular intervals. Immediately remedy loose connections and molten cables.
- If work on live parts cannot be avoided, call in a second person, who can operate the main switch in case of an emergency.
- The pig stopper has sharp edges. When transporting and assembling the pig stopper be sure to wear suitable protective gloves.

Residual Dangers

Dangerous situations can be avoided by safety-conscious and proactive behaviour of the staff and by wearing personal protective equipment.

Residual dangers on the pig stopper and measures

Danger	Cause	Measure
Danger to life	Inadvertent switch-on of the pig stopper	Effectively disconnect all components, effectively prevent switch-on.
	Electric power	Observe the following safety rules: 1 Isolate from the power supply. 2 Take appropriate measures to prevent switch on. 3 Test absence of voltage. 4 Earthing and short-circuiting. 5 Cover or safeguard any adjacent live parts.
	Spring tension in the actuator	Danger to life caused by compression spring in the actuator. Do not open the actuator but return it to GEA Tuchenhausen for proper disposal.
Danger of injury	Danger presented by moving or sharp-edged parts	The operator must exercise caution and prudence. For all work: <ul style="list-style-type: none"> • Wear suitable work clothing. • Never operate the machine if the cover panels are not correctly fitted. • Never open the cover panels during the operation. • Never reach into openings. As a precautionary measure, wear personal protective equipment in the vicinity of the pig stopper: <ul style="list-style-type: none"> • Protective gloves • Safety shoes
Environmental damage	Operating materials with properties which are harmful to the environment	For all work: <ul style="list-style-type: none"> • Collect lubricants in suitable containers. • Dispose of lubricants in accordance with the pertinent regulations.

Declaration of Incorporation

in accordance with the EC Machinery Directive 2006/42/EC

We herewith declare that this consignment contains the subsequently identified - but incomplete - machine and that putting into service is not permitted until it has been established that the machinery into which this machine is to be incorporated is in conformity with the provisions of the EC Machinery Directive.

We declare that the incomplete machine identified here complies with the "Essential Health and Safety Requirements" defined in Annex I, section 1 and section 2.1. The technical documentation is compiled in accordance with Annex VII, part B. In response to a reasoned request the relevant information will be transmitted to the appropriate national authorities.

This declaration will become invalid if any alterations are made to the machine which have not been agreed with us.

Designation of the machine:	Pig Stopper 3A
Machine type:	VARICOVER®
Relevant EC directives:	2006/42/EC
Applicable harmonized standards:	DIN EN ISO 12100

Büchen, 2013-07-11

Franz Bürmann
Managing Director

i.V. Peter Fahrenbach
Head of Development and Design

Transport and Storage

Scope of Supply

On receipt of the pig stopper check whether

- the details on the type plate correspond to the data in the order and delivery documents,
- the equipment is complete and all components are in good order.

Transport

For transport, the following principles apply:

- Only use suitable lifting gear and slings for transporting the package units/pig stoppers.
- Observe the pictograms on the package.
- Handle the pig stopper with care to avoid damage caused by impact or careless loading and unloading. The outside synthetic materials are susceptible to breaking.
- The cylinder pipe of the actuator must be protected from animal and vegetable fats.
- Only allow qualified staff to transport the pig stopper.
- Movable parts must be properly secured.
- Only use approved, fully functional load lifting devices and lifting accessories which are suitable for the intended purpose. Observe the maximum load-bearing capacities.
- Secure the pig stopper against slipping. Take the weight of the pig stopper into account and the position of the point of gravity.
- Under no circumstances should anyone stand under a suspended load.
- Take care when transporting the pig stopper. Do not grip sensitive parts of the pig cleaning station to lift or push the pig cleaning station or to support yourself. Avoid putting the unit down with a jerk.

Storage

The pig stopper or spare parts should be stored in a dry place, free of vibrations and dust. To avoid damage, leave the components in their original packaging if possible.

If, during transport or storage, the pig stopper is going to be exposed to temperatures $\leq 0^{\circ}\text{C}$, it must be dried and suitable measures be taken to protect it from damage.

NOTE

We recommend that the pig stopper should be stored at a temperature of $\geq 5^{\circ}\text{C}$ for a period of 24 hours prior to any handling (disassembling the housings / activation of actuators) so that any ice crystals formed by condensation water can melt.

Intended Purpose

Designated Use

The pig stopper is used for stopping a pig in a pipe or for holding a pig in a pig catching pipe.

NOTE

The manufacturer will not accept any liability for damage resulting from any use of the pig stopper which is not in accordance with the designated use of the valve. The risk of such misuse lies entirely with the operator of the facility.

Requirements for the Operation

The prerequisite for the reliable and safe operation of the pig stopper is proper transportation and storage as well as professional installation and assembly. Operating the pig cleaning station within the limits of its designated use also involves adhering to the operating, inspection and maintenance instructions.

Pressure Equipment Directive

The pig stopper is a piece of pressure equipment (without safety function) in the sense of the pressure equipment directive: Directive 97/23/EC. They are classified according to Annex II, article 3, section 3. In the event of any deviations, GEA Tuchenhausen GmbH will supply a special Declaration of Conformity.

Improper Operating Conditions

The operational reliability of the pig stopper cannot be ensured under improper operating conditions. Therefore avoid improper operating conditions.

Operating the pig stopper is not permitted if

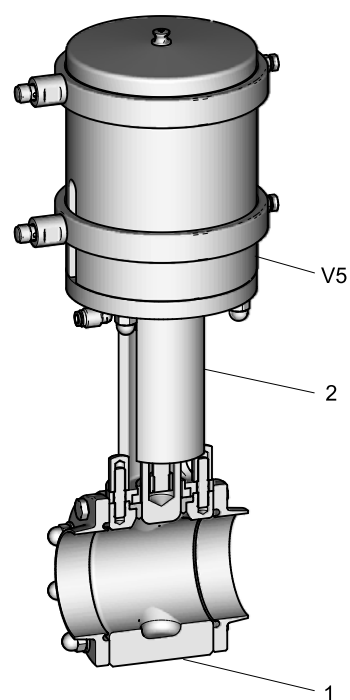
- Persons or objects are in the danger zone.
- Safety devices are not working or were removed.
- Malfunctions have been detected on the pig stopper.
- Damage has been detected on the pig stopper.
- Maintenance intervals have been exceeded.

Conversion Work

You should never make any technical modifications to the pig stopper. Otherwise you will have to undergo a new conformity process in accordance with the EC Machinery Directive on your own.

In general, only original spare parts supplied by GEA Tuchenhausen GmbH should be fitted. This ensures the reliable and economical operation of the pig stopper.

Design



No.	Designation
1	Flange MSTO
2	Lantern
E	Proximity switch holder
V5	Actuator (spring-to-close, air-to-open)

Installation and Commissioning

Notes on Installation

The pig stopper is installed in horizontal position. Care must be taken to ensure that the flange MSTO and the pipe system can drain properly.

To prevent damage, make sure that

- the pig stopper is installed in the pipe system free of tension and
- no foreign materials (e.g. tools, bolts, lubricants) are left in the system.

Pig Stopper with VARIVENT grooved flanges

This section describes the procedure to fit the pig stopper.



CAUTION

Liquids in pipes

Danger of injury due to liquid spraying out

- Therefore, before releasing any pipe connections: drain the pipe and, if necessary, clean or rinse it.
- Separate the pipe section in which the pig stopper is to be fitted from the rest of the piping system to prevent medium entering again.

Carry out the following steps:

1. Weld the grooved flanges into the pipe. Make sure the orientation of the flanges is correct.
2. Place the flange MSTO (75 mm wide) between the welded grooved flanges and secure it in the horizontal position.

✓ Done

Pneumatic Connections

Air Requirement for Opening the Pig Stopper

Air requirement for sizes 2" to 4" OD:

0.74 dm³_n/stroke (dm³_n at 1.01325 bar; at 0°C as per DIN 1343)

Establishing Hose Connections

To ensure reliable operation, the compressed air hoses must be cut exactly square.

Tools required:

- A hose cutter.

Carry out the following steps:

1. Shut off the compressed air supply.
2. Use the hose cutter to cut the pneumatic hoses square.
3. Push the air hose into the air connector on the actuator.
4. Re-open the compressed air supply.

✓ Done

Adjusting the Proximity Switches at the Actuator



DANGER

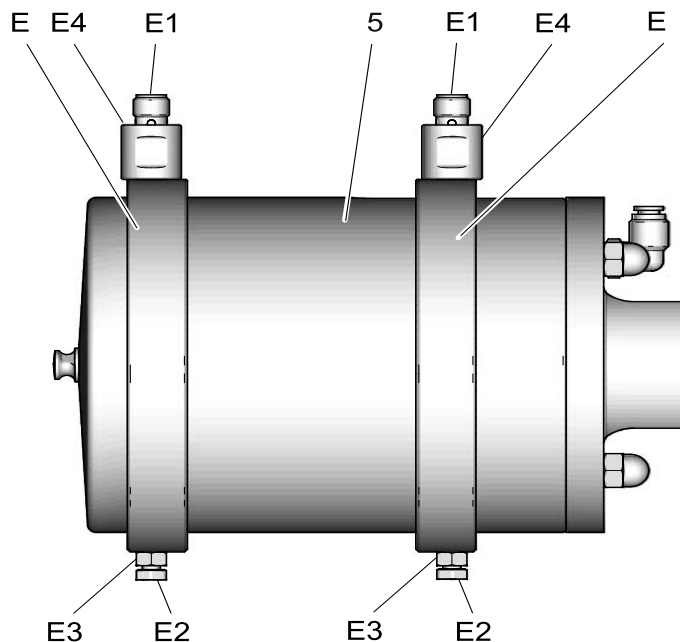
Live parts

Electrical shock can result in serious personal injury or death.

- Only allow properly qualified staff to carry out work on the electrical equipment.
- Prior to establishing electrical connections check the maximum permissible operating voltage.

Carry out the following steps:

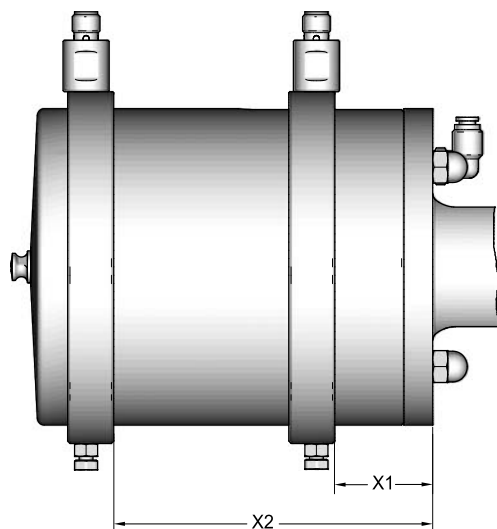
1. Screw the threaded bushing (E4) onto proximity switch (E1).
2. Screw the proximity switches (E1) into the proximity switch holders (E).



3. Push the proximity switch holders (E) onto the cylinder pipe (5) from below or top and adjust them in accordance with the table "Position of the Proximity Switch Holders" (Page 28).
4. Secure the proximity switch holders with the screw (E2) and lock them into place with the nut (E3).
5. Screw in the proximity switches (E1) as far as they will go and secure them with the lock nut.
 - There should be no visible gaps and thread.

✓ Done

Position of the Proximity Switch Holders



Position of the Proximity Switch Holders

Nominal width	X1	X2
2"	68.5	136
2.5"	56.0	136
3"	43.0	136
4"	18.5	136

Commissioning

Requirement

- Before starting commissioning carry out the following steps:



CAUTION

Crushing hazard

Your fingers can be crushed.

→ Do not put your hand into the flange MSTO or into the open lantern.

Carry out the following steps:

1. Make sure that there are no foreign materials in the system.
2. Activate the pig stopper once by applying compressed air and check the appropriate feedback position.
3. Clean the pipe system prior to the first product run.
4. During commissioning, regularly check all sealing points for leaks. Replace defective seals.

✓ Done

Cleaning and Passivation

Cleaning



CAUTION

Risk of burns due to hot cleaning media and sterile steam

The pipes and components can become very hot.

→ Do not touch pipes and components.

All parts in contact with product must be cleaned at regular intervals. Always observe the safety data sheets issued by the cleaning agent manufacturers. Only use cleaning agents which do not cause damage to the seals and the inner parts of the pig stopper. When the pipe is cleaned, the cleaning medium also flows through and cleans the flange MSTO.

With respect to the cleaning method and parameters like detergents, temperatures, times and intervals, the component manufacturer can merely make recommendations but cannot provide any generally applicable details. Method and parameters should be determined and defined by the operator in accordance with the relevant process.

The cleaning effect must be checked regularly by the operator!

Actuate the pig stopper during cleaning so that the piston rod can be cleaned completely.

Cleaning Process Examples

Typical Cleaning Parameters in Dairy Operations

Example of a two-phase cleaning process:

- Sodium hydroxide and combination products based on sodium hydroxide in concentrations from 0.5% to 2.5% at 75°C to 80°C.
- Phosphoric acid or nitric acid and combination products based on these acids in concentrations from 0.3 to 1.5% at approx. 65°C.

Example of a cleaning operation in one cleaning step:

- Formic acid and combination product based on formic acid at 85°C.

Typical Cleaning Parameters in Breweries

Example of a two-phase cleaning process:

- Sodium hydroxide and combination products based on sodium hydroxide in concentrations from 1% to 4% at approx. 85°C.
- Phosphoric acid or nitric acid and combination products based on these acids in concentrations from 0.3 to 1.5% at 20°C.

The cleaning effect depends on the following factors:

- Temperature
- Time
- Mechanics
- Chemicals
- Degree of soiling.

These factors can be combined in such a way as to make an optimal cleaning result probable.

Passivation

Before commissioning a plant, passivation is commonly carried out for long pipes and tanks. Pig stoppers are usually excepted from this.

Passivation is typically performed using nitric acid (HNO_3) at approx. 85°C at a concentration in the 4 to 6% range and a contact time of 6 to 8 hours.

Malfunctions

In the event of malfunctions immediately deactivate the pig stopper and secure it against inadvertent reactivation. Malfunctions may only be remedied by qualified staff, who must observe the safety instructions.

Malfunction	Cause	Remedy
Pig stopper does not work	Fault in the control system	Check the system configuration
	No compressed air or pressure too low	Check the compressed air supply Check air hoses for free passage and air tightness
	Fault in the electrical system	Check actuation / external controller and routing of electrical lines
	Solenoid valve defective	Replace the solenoid valve
Actuator moving too slowly	O-rings in the actuator dry (friction losses)	Grease O-rings
Leakage in the area of the flange MSTO	O-rings defective	Disassemble the pig stopper Replace the O-rings
Leakage in the lantern	Sealing ring defective	Replace the sealing ring

Maintenance

Inspections

Between the maintenance periods, the pig stopper must be checked for leakage and proper function.

Product Contact Seals

Carry out the following steps:

- ➔ Regularly check:
 - Stem seal between flange MSTO and lantern
 - O-rings in the VARIVENT grooved flanges

✓ Done

Pneumatic Connections

Carry out the following steps:

1. Check the operating pressure at the pressure reducing and filter station.
2. Regularly clean the air filter in the filter station.
3. Check that the air hoses sit firmly in the air connections.
4. Check the lines for kinks and leaks.
5. Check the solenoid valves for proper function.

✓ Done

Electrical Connections

Carry out the following steps:

1. Check that the cap nut on the cable gland is tight.
2. Check that the cable connections are firmly secured.
3. Check the solenoid valves for proper function.
4. Check that the proximity switches are connected correctly.

✓ Done

Maintenance Intervals

To ensure the highest operational reliability of the pig stoppers, all wearing parts should be replaced at intervals.

The actual maintenance intervals can only be determined by the user since they depend on the operating conditions, for instance:

- daily period of use,
- switching frequency,
- type and temperature of the product,
- type and temperature of the cleaning solution,
- ambient conditions.

Maintenance Intervals

Applications	Maintenance Intervals (guideline values)
Media at temperatures of 60 °C to 130 °C 140 °F to 266 °F	approx. every 3 months
Media at temperatures of < 60 °C (< 140 °F)	approx. every 12 months

Removing the Pig Stopper

Requirement

- Make sure that during maintenance and repair work no process is in operation in the area concerned.



CAUTION

Risk of burns due to hot cleaning media and sterile steam

The pipes and components can become very hot.

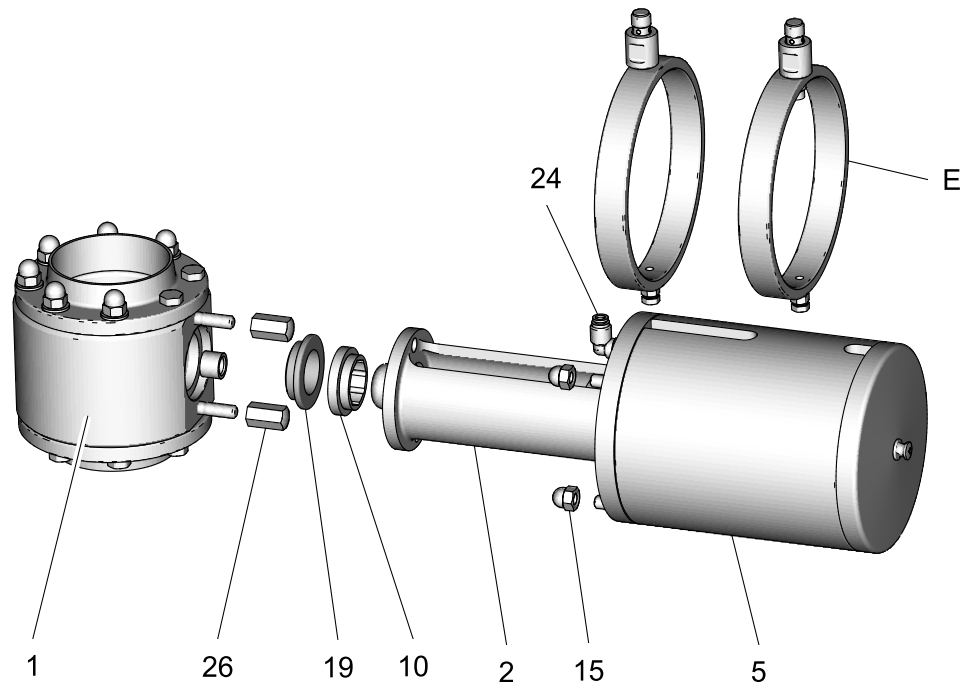
- Allow the pipe to cool before removing the pig stopper.
- Shut off the flange MSTO and the pipe.

Carry out the following steps:

1. Drain all pipe system elements that lead to the pig stopper and, if necessary, clean or rinse them.
2. Shut off the control air supply.
3. Disconnect the power supply.
4. Remove the pig stopper and the flange MSTO from the pipe section if possible.

✓ Done

Disassembling the Pig Stopper



CAUTION

Risk of burns due to hot cleaning media and sterile steam

The pipes and components can become very hot.

→ Allow the pipe to cool before disassembling the pig stopper.



CAUTION

Spring tension

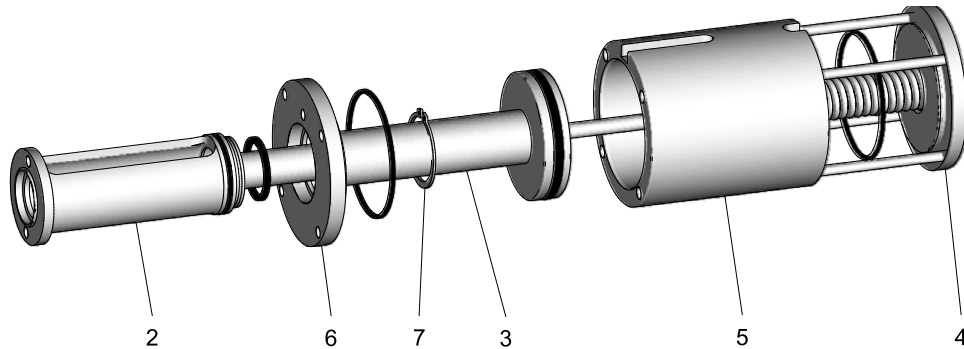
Your fingers can be crushed.

→ Do not put your hand into the flange MSTO or into the open lantern (2).

Carry out the following steps:

1. Actuate the actuator via air connection (24).
2. Release and remove both nuts (26).
3. Slowly depressurize the actuator via (24) and detach the air supply.
4. Pull the actuator out of the flange MSTO (1).
5. Remove the sealing ring (19) and bearing (10) from the lantern.
6. Unscrew the 4 cap nuts (15) and pull the actuator parts out of the lantern (2).
7. Release the proximity switch holders (E) and slide them off from the cylinder pipe (5).

8. Pull the rod (3) out of the cylinder pipe (5).



9. Slide off the cylinder pipe (5) from the threaded rods on the cylinder cover (4).
 → All seals on the actuator are now accessible!
10. Use pliers to remove the snap ring (7) and lift off the cylinder bottom (6) from the lantern (2).
 → The seals in the lantern are now accessible.
- ✓ The pig stopper has been completely dismantled.

Maintenance

Cleaning the Pig Stopper

IMPORTANT NOTE

The shaft of the rod (3) is a precision area.
 Damage to this part can result in malfunctions.
 → Handle the pig stopper with care!

IMPORTANT NOTE

Damage to the pig stopper
 Damage to the pig stopper can result in a malfunction.
 → Observe the safety information sheets issued by the detergent manufacturers!
 → Only use detergents which are non-abrasive and not aggressive towards stainless steel.

Carry out the following steps:

1. Disassemble the pig stopper, see "Disassembling the Pig Stopper" (Page 35).
2. Carefully clean the individual parts.

3. Carefully clean the proximity switches and screws.

✓ Done

Lubricating Seals and Threads



CAUTION

Damage to seals and threads

Damage to seals and threads can result in a malfunction.

- Ensure that an adequate film of lubricant is applied.
- For product contact seals only use suitable greases and oils.
- Observe the safety information sheets issued by the lubricant manufacturer!

Carry out the following steps:

1. Lightly grease the thread.
2. Grease all seals – including the O-rings at the top and bottom of the actuator piston rod – very thinly.

✓ Done

NOTE

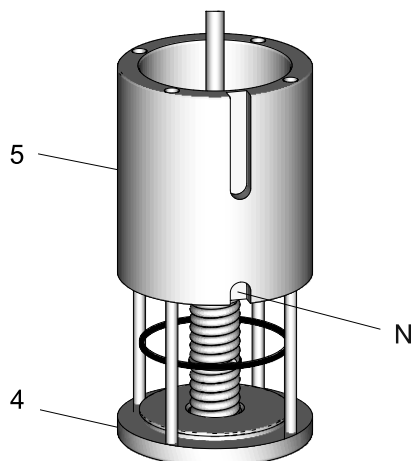
GEA Tuchenhausen recommends Rivolta F.L.G. MD-2 and PARALIQ GTE 703. These lubricants are approved for foodstuff and are resistant to beer froth. They have the NSF-H1 (USDA H1) registration. PARALIQ GTE 703 can be ordered from GEA Tuchenhausen under part no. 413-064, and Rivolta F.L.G. MD-2 can be ordered under part no. 413-071.

A Manufacturer's Declaration for these products can be obtained from GEA Tuchenhausen if required. A thin film of grease is required on the seals to ensure the proper function of the fittings. It reduces friction and extends the service life of the seals. This is absolutely harmless from a health and hygienic point of view.

Assembling the Pig Stopper

Assemble the pig stopper in the reverse order of disassembly. Observe the notes and instructions given in the following sections when doing so.

Mounting the cylinder tube



Carry out the following steps:

➔ Push the cylinder tube (5) so that the shorter groove pointing toward the lantern (4).

✓ Done

Adjusting the Proximity Switches at the Actuator

For adjusting the proximity switches at the actuator see "Adjusting the Proximity Switches at the Actuator" (Page 27).

Torques for the screws

Tighten the screws on the pig stopper to the torques specified in the table.

Tightening torques required

Torques		Nm	lbft
Screws	M8	22	16.2
Screws	M10	45	33

Checking the Function of the Actuator

Adjusting the stroke

Carry out the following steps:

1. Drive actuator with compressed air.
2. Check the stroke of the actuator, see "Table Stroke of the pig stopper" (Page 39).

✓ Done

Stroke

Table Stroke of the pig stopper

Nominal width	Stroke (mm)
Inch OD	
2"	56.5
2.5"	69
3"	82
4"	106.5

The recommended stroke speed is 0.3 m/s.

Disposal

General Notes

Dispose of the machine at the end of its life cycle in an environmentally friendly manner. Observe the statutory waste disposal regulations applicable at the place of installation.

The pig stopper is made of the following materials:

- Metals
- Synthetic materials
- Electronic parts
- Lubricants containing oil and grease

Separate the different materials and dispose of them correctly sorted. Also observe the instructions regarding disposal in the operating instructions for the individual components.

Disposing of the Cylinder Cover cpl. (incl. Spring Package) of the Pig Stopper



DANGER

The spring forces in the actuator can be as much as 2000 N.

The pre-stressed spring can cause serious personal injury or death.

- Never open the cylinder cover cpl.
- GEA Tuchenhausen accepts unopened cylinder cover cpl. and arranges for proper disposal free of charge.

Carry out the following steps:

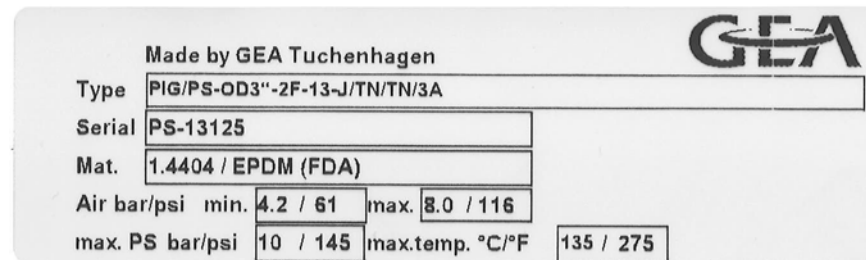
1. Remove the cylinder cover cpl.
2. Safely pack the cylinder cover cpl. and send it to GEA Tuchenhausen GmbH.

✓ Done

Technical Data

Type Plate

The type plate clearly identifies the pig stopper.



Type plate of the pig stopper

The type plate provides the following key data:

Key data of the pig stopper

Type	Pig Stopper 3A
Serial	Serial number
Material	1.4404 (AISI316L)/EPDM (FDA)
Control air pressure bar/psi	min. 4.2 (61); max. 8.0 (116)
max. Product pressure bar/psi	10.0 (145)
max. Temperature °C/°F	135 (275)

Technical Data

Refer to the following tables for the key technical data of the pig stopper:

Technical data: Pig stopper

Designation	Description
Size	2 to 4" OD
Material of product contact parts	Stainless steel 1.4404
Material of product contact seals	EPDM/FKM/HNBR
Installation position	Horizontal to allow draining of residues
Product pressure	up to 2.5" OD: max. 16 bar (232 psi) from 3" OD: max. 10 bar (145 psi)

Technical data: Ambient temperatures

Designation	Description
- Pig stopper	0 to 45 °C (32 to 113 °F), standard < 0 °C (32 °F): use control air with a low dew point. Protect the piston rod against freezing.
- Proximity switch	-30 to +85 °C (-22...185 °F)
- Cylinder pipe of the actuator	-20 to +50 °C (-4...122 °F)
Product temperature and operating temperature	Depending on the sealing material

Technical data: Compressed air supply

Designation	Description
Air hose	
- Metric	Material PE-LD Outside dia. 6 mm Inside dia. 4 mm
- Inch	Material PA Outside dia. 6.35 mm Inside dia. 4.3 mm
Control air pressure	4.2 bar (61 psi) max. 8 bar (116 psi)
Control air	acc. to ISO 8573-1:2001
- Solid particle content:	Quality class 6 Particle size max. 5µm Particle density max. 5 mg/m ³
- Water content:	Quality class 4 max. dew point +3°C If the unit is used at higher altitudes or at low ambient temperatures, the dew point must be adapted accordingly.
- Oil content:	Quality class 3, preferably oil free max. 1 mg oil in 1m ³ air

Resistance of Sealing Materials

The resistance of sealing materials depends on the type and temperature of the medium conveyed. The exposure time can adversely affect the service life of the seals. The sealing materials comply with the regulations of FDA 21 CFR 177.2600 or FDA 21 CFR 177.1550.

Resistance:

- + = good resistance
- o = reduced service life
- – = not resistant

Table Resistance of Sealing Materials

Medium	Temperature	Sealing material (general operation temperature)		
		EPDM -40...+135 °C -40...+275 °F	FKM -10...+200 °C +14...+392 °F	HNBR -25...+140 °C -13...+284 °F
Caustics up to 3%	up to 80 °C (< 176 °F)	+	o	+
Caustics up to 5%	up to 40 °C (< 104 °F)	+	o	o
Caustics up to 5%	up to 80 °C (< 176 °F)	+	–	–
Caustics at more than 5%		o	–	–
Inorganic acids up to 3%	up to 80 °C (< 176 °F)	+	+	+
Inorganic acids up to 5%	up to 80 °C (< 176 °F)	o	+	o
Inorganic acids up to 5%	up to 100 °C (< 212 °F)	+	+	–
Water	up to 80 °C (< 176 °F)	+	+	+
Steam	up to 135 °C (< 275 °F)	+	o	o
Steam approx. 30 min	up to 150 °C (< 302 °F)	+	o	–
Fuels/hydrocarbons		–	+	+
Product with a fat content of max. 35 %		+	+	+
Product with a fat content of more than 35 %		–	+	+
Oils		–	+	+
* depending on the installation position				

Pipe Ends

Dimensions for Pipes in Inch OD

Inch OD	Outside diameter	Wall thickness	Inside diameter	Outside diameter acc. to BS 4825 Part 1
2"	50.8	1.65	47.6	x
2.5"	63.5	1.65	60.2	x
3"	76.2	1.65	72.9	x
4"	101.6	2.11	97.38	x

Tools

Tool	Part no.
Open end spanner, a/f 6-7	408-030
Open end spanner, a/f 8-10	408-032
Open end spanner, a/f 12-13	408-034
Open end spanner, a/f 14-17	408-045
Open end spanner, a/f 16-18	408-183

Lubricants

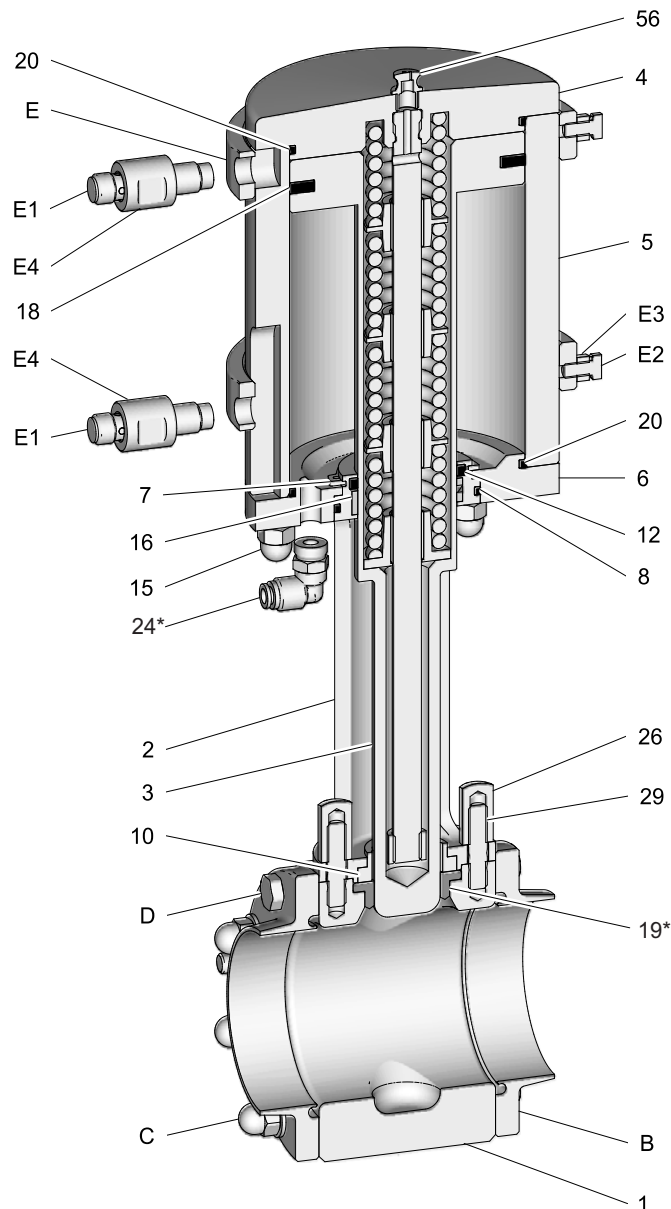
Lubricants	Part no.
Rivolta F.L.G. MD-2	413-071
PARALIQ GTE 703	413-064

Weights

Size	Weight (kg)
2" OD	11
2.5" OD	11.5
3" OD	12
4" OD	14

Spare Parts Lists

Pig Stopper MSTO 3A



Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
	Pig stopper MSTO cpl.		228-000230	228-000231	228-000232	228-000233
1	Flange MSTO	1.4404	228-000225	228-000227	228-000228	228-000229
2	Lantern MSTO	1.4301	228-000221	228-000221	228-000221	228-000221
3	Rod MSTO	1.4404	228-000220	228-000220	228-000220	228-000220



Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
4	Cylinder cover MSTO cpl.	1.4301	228-000219	228-000219	228-000219	228-000219
5	Cylinder pipe MST	PVDF	228-000167	228-000167	228-000167	228-000167
6	Cylinder bottom MSTO	1.4305	228-000222	228-000222	228-000222	228-000222
7	Snap ring	1.4122	917-215	917-215	917-215	917-215
8	O-ring	NBR	930-073	930-073	930-073	930-073
10	Bearing MSTO	PVDF	228-000226	228-000226	228-000226	228-000226
12	O-ring	NBR	930-984	930-984	930-984	930-984
15	Cap nut	1.4301	912-004	912-004	912-004	912-004
16	Guide ring	Turcite	935-112	935-112	935-112	935-112
18	K-ring	NBR	930-679	930-679	930-679	930-679
19	Sealing ring	EPDM FKM HNBR	924-085 924-083 924-313	924-085 924-083 924-313	924-085 924-083 924-313	924-085 924-083 924-313
20	O-ring	NBR	930-505	930-505	930-505	930-505
24	Elbow screw-in plug connector G1/8"- 6/4	Brass, nickel- plated	933-475	933-475	933-475	933-475
	Elbow screw-in plug connector G1/8"- 6.35	Brass, nickel- plated	933-979	933-979	933-979	933-979
26	Hex nut	A2-70	912-047	912-047	912-047	912-047
29	Stud screw	1.4301	903-024	903-024	903-024	903-024
56	Vent screw	PP	221-004311	221-004311	221-004311	221-004311
Accessories						
B	VARIVENT grooved flange	1.4404	2" OD	2.5" OD	3" OD	4" OD
			2x 752-720	2x 752-721	2x 752-722	2x 752-723
	O-ring	EPDM FKM	2x 930-559	2x 930-560	2x 930-319	2x 930-561
			2x 930-571	2x 930-572	2x 930-666	2x 930-573
	Connection material MSTO cpl.	--	228-135.25	228-135.26	228-135.27	228-135.28
C	Hex screw	A2-70	4x 901-358	6x 901-358	6x 901-358	6x 901-359
	Hex nut	A2-70	4x 912-004	6x 912-004	6x 912-004	6x 912-005
D	Hex screw	A2-70	--	4x 901-046	4x 901-046	4x 901-092
E	Proximity switch holder MST 100	1.4301	228-000172	228-000172	228-000172	228-000172
E1	Proximity switch	1.4301	505-103	505-103	505-103	505-103
E2	Screw	1.4301	901-017	901-017	901-017	901-017



Item	Designation	Material	2" OD	2.5" OD	3" OD	4" OD
E3	Nut	1.4301	910-013	910-013	910-013	910-013
E4	Threaded bushing	1.4301	228-000251	228-000251	228-000251	228-000251

* The sealing ring item 19 and the elbow screw-in plug connector item 24 are not included in the pig stopper MSTO cpl. and must be ordered separately.

** The connection material for the pig stopper MSTO cpl. contains items C and D.

Dimension Sheets

Pig Stopper 3A

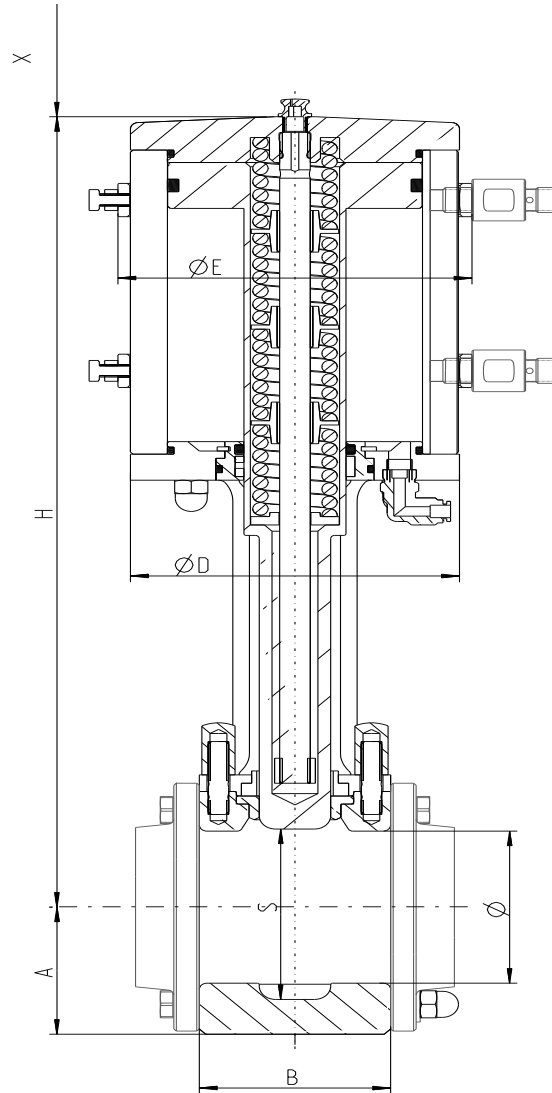


Table of dimensions

Dimension	2" OD	2.5" OD	3" OD	4" OD
A	48.5	55	61	78
B	75	75	75	75
Ø	47.5	60	73	97.5
D	129	129	129	129
E	139	139	139	139



Table of dimensions (Cont.) (Cont.)

Dimension	2" OD	2.5" OD	3" OD	4" OD
H	367	373	379.5	392
Free space (X)	50	50	50	50
Stroke (S)	56.5	69	82	106.5



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