

SISTO-C HV, SISTO-C LAP
SISTO-C Accessories
SISTO-B

Operating Manual



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Operating Manual

Original operating manual

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Glossary

ATEX 2014/34/EU

The acronym ATEX is the French abbreviation for explosive atmospheres: "Atmosphère explosible". The ATEX product directive 2014/34/EU lays down rules to be met by equipment and protective systems intended for use in potentially explosive atmospheres in the European Union (EU).

EW

Drain angle = angle of body to pipe enabling the fluid to drain completely.

HV

SISTO-C diaphragm valve with handwheel

HV.510

SISTO-C diaphragm valve with plastic handwheel

HV.514/.524

SISTO-C diaphragm valve with handwheel, locking device and padlock

HV.516/.526

SISTO-C diaphragm valve with handwheel and stem extension

HV.518/.528

SISTO-C diaphragm valve with handwheel and inductive open/closed-position limit switch

HV.519/.529

SISTO-C diaphragm valve with handwheel and pneumatic fail-safe action

HV.520

SISTO-C diaphragm valve with stainless steel handwheel

HV.523

SISTO-C diaphragm valve with handwheel and locking device (MD 168 and MD 202)

LAP

Pneumatic piston actuator, available in versions AZ, OF and SF

LAP.520

SISTO-C diaphragm valve with pneumatic piston actuator made of stainless steel

LAP.525

SISTO-C diaphragm valve with pneumatic piston actuator, with full and partial opening

LAP.530

SISTO-C diaphragm valve with pneumatic piston actuator made of hard anodised aluminium

LAP-AZ

LAP-AZ = OPEN/CLOSE = double-acting piston actuator (air-to-open / air-to-close)

LAP-OF

LAP-OF = opening spring = pneumatic piston actuator, fail-open (spring-to-open / air-to-close)

LAP-SF

LAP-SF = closing spring = pneumatic piston actuator, fail-close (air-to-open / spring-to-close)

Machinery Directive 2006/42/EC (MD)

Directive 2006/42/EC stipulates generally applicable essential safety and health requirements.

MD

Diaphragm diameter, numeric designation of the diaphragm size

Pressure Equipment Directive 2014/68/EU (PED)

The 2014/68/EU Directive sets out the requirements to be met by pressure equipment intended to be placed on the market in the European economic area.

QM system

Quality management system to DIN EN ISO 9001

1 General

1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

In the event of damage, immediately contact SISTO Armaturen to maintain the right to claim under warranty.

1.2 Contact data

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www.sisto-aseptic.com

1.3 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

1.4 Other applicable documentation

Table 1: Overview of other applicable documents

Document	Contents
Type series booklet	Description of the valve
General assembly drawing ¹⁾	Sectional drawing of the valve
Sub-supplier product literature ²⁾	Operating manuals and other product literature for the accessories
Reference in operating manual 8676.81 ³⁾	Operating manual: SK-i LED/SK-i AS-i LED Intelligent Actual-position Feedback Unit
SISTO catalogue 8652.10	"Sterile Processes" catalogue

Observe the relevant manufacturer's product literature for the accessories.

1.5 Symbols


Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇨	Cross-references

¹ If included in agreed scope of supply; otherwise refer to the type series booklet.







² If included in agreed scope of supply

³ This product is described in a separate operating manual.

Symbol	Description
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

1.6 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	Explosion protection This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EU Directive 2014/34/EU (ATEX).
	General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.



2 Safety

All the information contained in this section refers to hazardous situations.

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- When assembling components from various manufacturers, the operating manuals of the individual components must also be complied with.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
 - Manufacturer
 - Nominal pressure
 - Nominal size
 - Year of construction
 - Valve body material
- The operator is responsible for any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.
- The operator is responsible for ensuring compliance with all local regulations not taken into account.
- Design, manufacture and testing of the valve are subject to a QM system to DIN EN ISO 9001 as well as to the current European Pressure Equipment Directive 2014/68/EU (PED) and, if applicable, the current Machinery Directive 2006/42/EC (MD).
Compliance with these requirements is based on normal, static loading, e.g.
 - Flow velocities typical of the fluid handled
 - Typical temperature gradients
- The valve is not designed for use in systems handling unstable fluids. Should loads and operating conditions deviate from normal operation, this must be specified by the ordering party. This includes temperature, pressure, special corrosive, chemical or abrasive influences, etc. Suitable measures will be prepared and suggested. Such measures may influence the following:
 - Material selection
 - Wall thickness allowance
 - Variants
- For any queries and repeat orders indicate the following if possible:
 - Name of type series / design variant
 - Order number
 - Year of construction
 - Part number

2.2 Intended use

- Only operate valves which are in perfect technical condition.
- Do not operate the valve in partially assembled condition.
- Only use the valve for fluids specified in the product literature. Take the design and material variant into account.
- Only operate the valve within the operating limits described in the other applicable documents.
- The valve's design and rating are based on predominantly static loading in accordance with the codes applied. Consult the manufacturer if the valve is subjected to dynamic loads or any other additional influences.
- Consult the manufacturer about any other modes of operation not described in the product literature.
- Do not use the valve as a foothold.
- The accessories and the variants described are intended for use with type series SISTO-C of diaphragm valves HV.520 and diaphragm valves with piston actuator LAP.520/530.

Pneumatic actuators from SISTO are suitable for the control fluid compressed air in accordance with ISO 8573-1.

Table 4: Quality class of control fluid air

	Operation above 0 °C	Operation down to -10 °C
Quality class	5.4.4	5.3.4
Filter	40 µm	40 µm
Oil concentration	5 mg/m ³	5 mg/m ³
Dew point	+3 °C	-20 °C

For determining the required air quality consider the specifications of all components used in the system.

2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding temperature, etc.
- Observe all safety information and instructions in this manual.

2.3 Personnel qualification and training

- All personnel involved must be fully qualified to transport, install, operate, maintain and inspect the product this manual refers to and be fully aware of the interaction between the valve and the system.
- The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.
- Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.
- Training on the valve must always be supervised by specialist technical personnel.

2.4 Consequences and risks caused by non-compliance with this manual

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
 - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices

- Hazard to the environment due to leakage of hazardous substances

2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

2.6 Safety information for the operator/user

The valves are intended for use in areas which cannot be accessed by unauthorised persons. Operation of these valves in areas accessible to unauthorised persons is only permitted if appropriate protective devices are fitted at the site. This must be ensured by the operator.

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain any leakage of hazardous fluids (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)
- To be considered for system planning: SISTO diaphragm valves are designed in such a way that any rupture of the diaphragm will be indicated by fluid handled escaping from a leakage indication hole in the bonnet or from the stem protection below the handwheel.
- For design variants with re-pluggable leakage indication hole/opening in fully sealed diaphragm valves contact the manufacturer.
- Guards for live components must be regularly checked for any damage. The valve must never be operated without appropriate protection.

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the valve require the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the valve during standstill only.
- The valve body must have cooled down to ambient temperature.
- The pressure in the valve body must have been released and the valve must have been drained.
- When taking the valve out of service always adhere to the procedure described in the manual.
- Decontaminate valves which handle fluids posing a health hazard.
- Protect the valve body and body bonnet/cover from any impacts.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 23)

2.8 Unauthorised modes of operation

- The valve is operated outside the limits stated in the operating manual.
- The valve is not operated in accordance with the intended use.

2.9 Information on explosion protection



Always observe the information on explosion protection given in this section when operating the product in potentially explosive atmospheres.



Safety

This symbol indicates safety measures which must be specially observed when using valves in potentially explosive atmospheres to EU Directive ATEX 2014/34/EU to prevent personal injury and damage to property.

- Prevent impermissible modes of operation at all times. Exceeding the specified temperature limits is not permitted.
- In potentially explosive atmospheres, the operator shall install and operate exclusively explosion-proof equipment.

Installation

- Valves used in potentially explosive atmospheres must be covered by the system's potential equalisation.
- For use in potentially explosive atmospheres, the spring area of pneumatic piston actuators has to be connected to an explosion-proof air reservoir.

Operation

- The surface temperature at the valve body corresponds to the temperature of the fluid handled. Responsibility for compliance with the specified fluid temperature (operating temperature) always lies with the plant operator. The maximum permissible fluid temperature depends on the temperature class to be complied with.
- Heating up of the valve components by sun exposure or ambient temperature must be prevented.
- Prevent other than normal loads (such as external forces and moments).

Servicing/Maintenance

- The operator is responsible for servicing and maintenance work. This work must be performed such that no source of ignition (e.g. electrostatic discharge, mechanically generated sparks) is caused.
- Perfect sealing to atmosphere, at the body as well as at the various seals, must be checked by the operator at regular intervals, using a special maintenance schedule for example.
- Prevent dust and dirt deposits on the valve surface.
- Always use a damp cloth for cleaning plastic surfaces or plastic-coated surfaces in order to prevent electrostatic charging.
- Use original SISTO spare parts only.
- To prevent thermite reactions for actuators made of aluminium, rule out contact with iron oxides. In addition, protect the valve against mechanical impacts.

Marking

- Since valves are components which do not have their own potential source of ignition, they are not covered by Directive 2014/34/EU and must therefore not be marked "ATEX".

If the instructions laid down for safety, installation, operation and maintenance/servicing are not complied with, proper operation of the valve within the meaning of Directive 2014/34/EU is not ensured. In this case, the valves must not be installed in potentially explosive atmospheres. Defective valves must never be operated in potentially explosive atmospheres.

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

Unless otherwise agreed, valves are supplied ready for operation.


1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify the supplying dealer and the insurer about the damage in writing immediately.

3.2 Transport

Take suitable precautions to prevent damage during transport.

Ensure sufficient stability. Use standard-compliant transport equipment.

The connection ports are closed with suitable material (caps, plugs, covers).

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Improper transport</p> <p>Overload</p> <ul style="list-style-type: none"> ▷ Use the lifting lugs provided. ▷ The valves must never be suspended by the handwheel or by the mounted pneumatic actuator. ▷ Transport valves with actuators by means of ropes attached to the line connection ports, taking into account the centre of gravity.
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3.3 Storage/preservation

If commissioning is to take place some time after delivery, the following measures are recommended for storage:

Storage and/or temporary storage of the valves must ensure that even after a prolonged period of storage the valves' function is not impaired.

The storage room temperature must be between +10 °C and +30 °C.

For storing a valve which has already been operated, observe the measures to be taken for shutdown. (⇒ Section 6.2, Page 26)

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Incorrect storage</p> <p>Damage due to dirt, corrosion, humidity and/or frost!</p> <ul style="list-style-type: none"> ▷ Close the valve using little force and store in the closed position. ▷ Store the valve in a frost-proof room with a constant level of atmospheric humidity. ▷ Store the valve in a dust-free environment, e.g. use suitable caps or film for protection. ▷ Protect the valve from contact with solvents, lubricants, fuels or other chemicals. ▷ Store the valve in a vibration-free environment.
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3.4 Return to supplier

1. Drain the valve as described in the manual.
2. Flush and clean the valve, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the valve has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen also neutralise the valve and blow through with anhydrous inert gas to ensure drying.
4. When returning valves used for handling Fluids in Group 1 always complete and enclose a certificate of decontamination.
Indicate any safety measures and decontamination measures taken.



NOTE

If required, a blank certificate of decontamination can be downloaded from the following web site: www.ksb.com/certificate_of_decontamination

3.5 Disposal



WARNING

Fluids handled, consumables and supplies which are hot or pose a health hazard
Hazard to persons and the environment!

- ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled.
- ▷ Wear safety clothing and a protective mask if required.
- ▷ Observe all legal regulations on the disposal of fluids posing a health hazard.

1. Dismantle the valve.
Collect greases and other lubricants during dismantling.
2. Separate and sort the valve materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
 - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Description of the Valve

4.1 Product information

4.1.1 Product information as per Regulation No. 1907/2006 (REACH)

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see <https://www.ksb.com/en-global/company/corporate-responsibility/reach>.

4.1.2 Product information as per Pressure Equipment Directive 2014/68/EU (PED)

The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Groups 1 and 2.

4.1.3 Product information as per Directive 2014/34/EU (ATEX)

Valves without electrical components do not have a potential internal source of ignition and can be used in potentially explosive atmospheres, Group II, category 1 (zones 0+20), category 2 (zones 1+21) and category 3 (zones 2+22) to ATEX 2014/34/EU. Components such as electric actuators, position switches, block terminals, solenoid valves, etc. may in certain circumstances be covered by Article 1 of Directive 2014/34/EU. They must be subjected to a conformity assessment procedure and separate evidence of compliance must be provided (e.g. EC Declaration of Conformity or manufacturer's declaration).

4.2 Marking

Table 5: General marking

Manufacturer	SISTO
Type series / model	SISTO-C/SISTO-B
Year of construction	20..
Nominal size	DN ...
Nominal pressure class or max. permissible pressure / temperature	PN ...
Material
Part No. of the upper valve section	424.....
CE conformity marking	CE

In accordance with the current European Pressure Equipment Directive (PED) valves \geq DN 32 have got a CE conformity marking.

Spring-loaded pneumatic actuators are additionally marked with a warning sign.



Fig. 1: Warning sign

4.3 SISTO-C

4.4 Design details

Design

- Soft-seated weir-type shut-off valve in straight-way pattern, Y-pattern, T-pattern and multi-port pattern, either manually operated or with pneumatic piston actuator
- Shut-off and sealing to atmosphere by completely enclosed diaphragm; no dead volumes; suitable for sterilisation
- Suitable for CIP/SIP
- Self-drain angle marked on weld ends and in marking area.
- Manufactured and tested to EN 13397
- Marked in accordance with DIN EN 19 (ISO 5209)
- Marked in accordance with ASME BPE

Variants

- Tank valves or multi-port valves⁴⁾
- Pneumatic actuators
- Limit switches
- Positioners
- Adjustable travel stop
- HV.514/.524: diaphragm valve with handwheel, locking device and padlock
- HV.516/.526: diaphragm valve with handwheel and stem extension
- HV.518/.528: diaphragm valve with handwheel and inductive Open/Closed limit switch
- HV.519/.529/SISTO-CSPV: diaphragm valve with handwheel and pneumatic fail-safe action
- HV.523: diaphragm valve with handwheel and locking device (MD168 and MD202)
- LAP.523: diaphragm valve with pneumatic piston actuator, high-temperature version for temperatures ≥ 80 °C at the actuator cylinder
- LAP.525: diaphragm valve with pneumatic piston actuator, with full and partial opening (2-stage actuator)
- LAP.526: diaphragm valve with pneumatic piston actuator with overflow function
- LAP.527: diaphragm valve with actuator with lower control pressure
- Actual-position feedback unit

Diaphragm materials

Table 6: Overview of diaphragm qualities

Diaphragm	Temperature limit [°C]
SISTO-AseptiXX EPDM	+140
SISTO-AseptiXX TFM/EPDM, bonded	
SISTO-AseptiXX TFM/EPDM, 2-piece	+160



Fig. 2: SISTO-C

⁴ For further designs refer to the "Sterile Processes" catalogue, reference No. 8652.10. More variants on request.

Surface finish

Table 7: Surface finish of wetted internal body surfaces

Internal body surfaces				
Ra [μm] ⁵⁾	Ra [μin]	ASME BPE code	Hygiene class DIN 11866	Surface treatment
6,3	250	SF0	-	Ground
3,2	125	-	-	
1,6	60	-	-	
0,8	30	SF3	H3	
0,6	25	SF2	-	
0,5	20	SF1	-	
0,4	15	-	H4	
0,8	30	-	HE3	Electropolished
0,6	25	SF6	-	
0,5	20	SF5	-	
0,4	15	SF4	HE4	
0,25	10	-	HE5	

Manually operated valve

Table 8: Overview of materials of manually operated valve

MD ⁶⁾	Type	Bonnet	Handwheel
30 - 115	HV.510	Stainless steel 1.4409	PA66-GF30
30 - 202	HV.520	Stainless steel 1.4409	Stainless steel 1.4409
280 ⁷⁾	HV	-	-

Drive

Table 9: Overview of materials of pneumatic piston actuator

MD ⁶⁾	Type	Bonnet	Piston actuator
30 - 202	LAP.520	Stainless steel 1.4409	Stainless steel 1.4409 / 1.4301
168 - 202	LAP.530	Stainless steel 1.4409	Aluminium, hard anodised
280 ⁷⁾	LAP	-	-

⁵⁾ Exact values in accordance with ASME BPE: 0.76 / 0.64 / 0.51 / 0.38 μm

⁶⁾ MD = diaphragm diameter

⁷⁾ Design as per customer specifications

4.5 Function

Version of diaphragm valve with handwheel

The diaphragm valve comprises a body 100, a functional unit (bonnet 165, stem 200, compressor 553 and diaphragm 443) as well as the actuating element (handwheel 961).

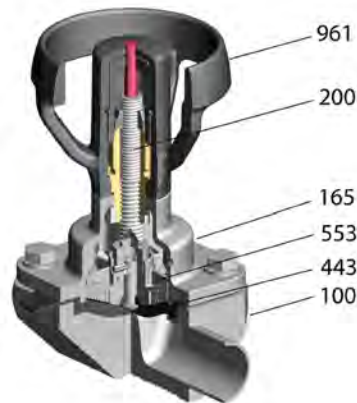


Fig. 3: SISTO-C HV.510

Version of diaphragm valve with pneumatic piston actuator

Diaphragm valves with pneumatic piston actuator are available in the following versions:

- "Fail-close" = SF
- "Fail-open" = OF
- "Double-acting" = AZ (OPEN/CLOSE)



NOTE

The valves/actuators are automatically taken to their fail-safe positions as soon as the control air is intentionally or unintentionally released. The visible moving parts of the valve (both manual and automatic actuation) also serve as position indicators for the valve.

Version of diaphragm valve SISTO-C LAP

The diaphragm valve comprises the body 100 and the functional unit (pneumatic piston actuator SF/OF/AZ). The piston actuator comprises a bonnet 165 with an M5 / G 1/8" control air port (DIN ISO 228-1), cover 160.3, compressor 553, piston rod 209, position indicator 621.3, piston 595.1, spring 950.2 and diaphragm 443.

Version of diaphragm valve SISTO-C LAP.520/.530

The diaphragm valve comprises the body 100 and the functional unit (pneumatic piston actuator SF/OF/AZ). The piston actuator comprises a bonnet 165 with an M5 control air port for MD 30-MD 40, G1/8" for MD 65-MD 202) (ISO 228-1), cover 160.3, compressor 553, piston rod 209, position indicator 621.3, piston 595.1, spring 950.2 and diaphragm 443.

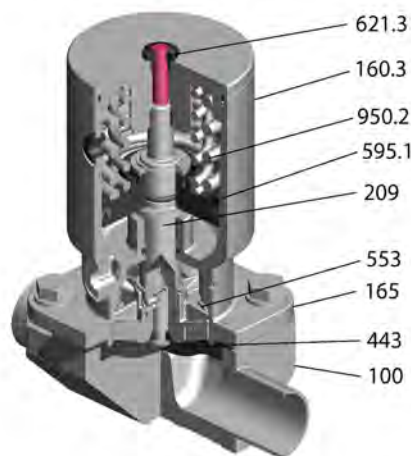


Fig. 4: SISTO-C LAP.520

Version of diaphragm valve	The diaphragm valve comprises the body 100 and the functional unit (pneumatic piston actuator SF/OF/AZ). The piston actuator comprises the bonnet 165 with a G 1/8" control air port (DIN ISO 228-1), compressor 553, piston rod 209, bottom end cap 176.1, cover 160.3, piston 595.1, spring 950.1, spring plate 484.1 and diaphragm 443.
SISTO-B	
Function	The diaphragm valves are operated by a manual actuating element (handwheel) or a pneumatic actuating element (piston actuator).
Sealing	Body 100 and bonnet 165 are connected by hexagon head bolts 901. The fluid flowing through the valve is shut off and sealed to atmosphere by diaphragm 443.

4.6 Scope of supply

The following items are included in the scope of supply:

- Valve
- Valve operating manual
- Operating manual for accessories (if applicable)





4.7 Dimensions and weights

For dimensions and weights please refer to the type series booklet.


5 Installation at Site

5.1 General information/Safety regulations

Responsibility for positioning and installing the valve lies with the consultant, the engineering contractor or the operator. Planning errors and installation errors can prevent the reliable function of the valves and pose a substantial safety hazard.



	<div data-bbox="507 414 703 459"> WARNING</div> <div data-bbox="496 477 751 508">Exposed moving parts</div> <div data-bbox="496 512 654 542">Risk of injury!</div> <ul style="list-style-type: none"> ▷ Do not touch moving components. ▷ When the equipment is in operation, perform any work with utmost caution. ▷ Take suitable precautions, e.g. provide safety covers.
	<div data-bbox="507 701 683 745"> DANGER</div> <div data-bbox="496 766 676 795">Dead-end valve</div> <div data-bbox="496 799 746 831">High-pressure hazard!</div> <div data-bbox="496 837 651 866">Risk of burns!</div> <ul style="list-style-type: none"> ▷ Protect the valve against unauthorised and/or unintentional opening. This particularly applies to abnormal operating conditions. ⇒ Escaping fluid may cause injuries.



5.2 Preparing the valve

	<div data-bbox="507 1093 587 1124">NOTE</div> <div data-bbox="496 1153 1342 1182">Remove the caps on the connection ports immediately prior to installation.</div>
---	---

5.3 Welding into the pipe

Responsibility for welding the valve into the pipe and for any heat treatment required lies with the commissioned construction company or the plant operator.

	<div data-bbox="507 1388 587 1420">NOTE</div> <div data-bbox="496 1449 1372 1507">Prior to welding the valve body into the pipe, remove the upper valve section including diaphragm.</div>
	<div data-bbox="507 1547 639 1579">CAUTION</div> <div data-bbox="496 1608 940 1637">Weld beads, scale and other impurities</div> <div data-bbox="496 1644 740 1673">Damage to the valve!</div> <ul style="list-style-type: none"> ▷ Take suitable measures to protect the valve against impurities. ▷ Protect the seat of the diaphragm. ▷ Remove any impurities from the piping. ▷ If necessary, install a strainer.

	CAUTION Incorrect welding into the pipe Damage to the valve by scorching! ▶ To prevent scorching, welding cables must not be attached to valves whose functional valve elements or valve surface have to meet specific roughness requirements.
	CAUTION Non-compliance with the max. permissible application temperature Damage to the valve! ▶ Complete the weld seam in several steps to ensure that the temperature in the middle of the body does not exceed the max. permissible application temperature.

5.4 Piping



	WARNING Impermissible piping forces Leakage from or rupture of the valve body! ▶ Connect the pipes to the valve without transmitting any stresses or strains. ▶ Take structural measures to prevent any piping forces from being transmitted to the valve. ▶ Avoid mechanical loads beyond normal levels, e.g. piping forces, moments and vibrations.
	CAUTION Painting of the piping Valve function impaired! Loss of important information provided on the valve! ▶ Protect stem and plastic components prior to applying paint. ▶ Protect printed name plates prior to applying paint.




Fig. 5: Flow direction arrow on the bottom

5.5 Installation position

The bottom of diaphragms 443 is marked with a flow direction arrow. After installation, the actual flow direction of the fluid has to match the flow direction arrow on the valve.



Diaphragm valves can be installed in any position. For 2/2 directional control valves, installation at the corresponding self-drain angle (max. tolerance -3°) is recommended (see dimensions to DIN (\Rightarrow Section 9.3, Page 38), dimensions to ISO (\Rightarrow Section 9.4, Page 39), dimensions to OD (\Rightarrow Section 9.5, Page 40), dimensions to SMS (\Rightarrow Section 9.6, Page 41)).

5.5.1 Special design

	NOTE For positioning and installing special valve designs contact the consultant, construction company or operator.
---	---

5.6 Insulation

If the valve is used for handling hot fluids, insulate it in accordance with the German energy-saving regulations.

	<div data-bbox="507 302 703 353"> WARNING</div> <div data-bbox="507 369 826 398">Cold/hot piping and/or valve</div> <div data-bbox="507 407 746 436">Risk of thermal injury!</div> <div data-bbox="518 448 746 515"><ul style="list-style-type: none">▸ Insulate the valve.▸ Fit warning signs.</div>
---	---

For any insulation fitted on the valve observe the following:

- The valve's function must not be impaired.


6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up


6.1.1 Prerequisites for commissioning/start-up


Before commissioning/start-up of the valve, ensure that the following requirements are met:

- The material, pressure data and temperature data of the valve are compatible with the operating conditions of the piping.
- The material's chemical resistance and stability under load have been checked.

	<p>CAUTION</p> <p>Weld beads, scale and other impurities in the piping Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Remove any impurities from the piping.
---	--

1. Thoroughly clean, flush and blow through all vessels, pipes and connections (especially of new installations).
2. Remove the valve's flange covers before installing it in the pipe.
3. Check that the inside of the valve is free from any foreign objects. Remove any foreign objects.


	<p>! DANGER</p> <p>Pressure surges Danger to life caused by burns, scalds or chemical burns!</p> <ul style="list-style-type: none"> ▷ Do not exceed the valve's maximum permissible pressure. ▷ The operator shall provide general safety measures for the system.
---	--

	<p>CAUTION</p> <p>Aggressive flushing liquids Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Ensure that cleaning procedure and duration match the valve body materials and seal materials when performing flushing and pickling. ▷ The responsibility for the media and method used for cleaning the piping system lies with the operator.
---	--

Functional test Check the following functions:

1. Check the shut-off function of the installed valve prior to commissioning/start-up by opening and closing the valve several times.
2. Evenly re-tighten the screwed/bolted connection between body 100 and bonnet 165 and at the mating flanges. Check the tightening torque (⇒ Section 7.3, Page 31) .
3. Prior to re-tightening the screwed/bolted connections, open the valve by approx. two full counter-clockwise handwheel turns to avoid stress or distortion.

6.1.2 Actuation/operation

	<p>NOTE</p> <p>Viewed from above, the valve is closed by turning the handwheel in clockwise direction, and opened by turning the handwheel in counter-clockwise direction. Valve variants which deviate from this rule are marked accordingly.</p>
---	---

	NOTE Diaphragm valves are normally used in either "fully open" or "fully closed" position.
	CAUTION Impermissible load Excessive wear! <ul style="list-style-type: none"> ▷ If resistance can be felt while opening or closing the valve, the valve has reached its end position and actuation must be stopped. ▷ Continued actuation may result in increased wear of the valve.
	CAUTION Use of additional levers Damage to the valve as a result of excessive forces! <ul style="list-style-type: none"> ▷ Never use additional levers to operate the valve. ▷ Only actuate handwheel-operated valves by hand.

6.1.3 Setting the travel stop

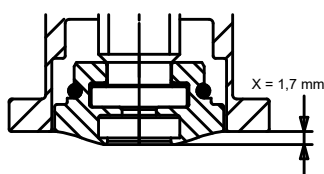


Fig. 6: SISTO-B ML 32
Overhang X in closed position

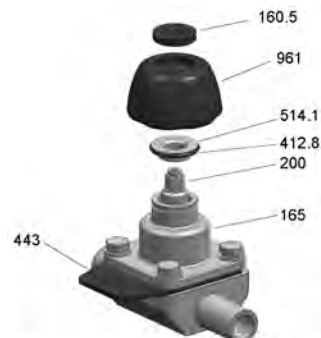


Fig. 7: SISTO-C HV Setting the closed-position travel stop

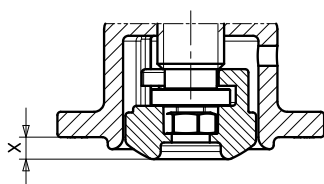


Fig. 8: SISTO-C MD 30
Overhang X in closed position (⇒ Table 10)

SISTO-C HV MD 30 SISTO-B ML 32

Diaphragm valves of the SISTO-C HV MD 30 and SISTO-B ML 32 type series are fitted with an integrated, adjustable closed-position travel stop.

Factory setting of closed-position travel stop:

Compressor 553 is set to overhang X in relation to bonnet 165. (⇒ Fig. 6) / (⇒ Fig. 8) . This setting ensures tight shut-off and protects diaphragm 443 against overloading.

Setting the travel stop:

1. Pull handwheel 961 together with cover 160.5 upward and off the stem.
2. Unscrew threaded disc 514.1.
3. Fit handwheel 961 again. Set the end position of the valve in closing direction as required.
4. Remove handwheel 961. Screw threaded disc 514.1 onto stem 200 by turning it clockwise until it abuts bonnet 165.
5. Fit handwheel 961 again on threaded disc 514.1 and stem 200.
6. Insert cover 160.5 into handwheel 961. This secures stem 200 (⇒ Fig. 7) .

SISTO-C HV.510/.520 MD 30

Diaphragm valves of the SISTO-C HV.510/.520 MD 30 type series are fitted with an integrated, adjustable closed-position travel stop.

Factory setting of closed-position travel stop:

Compressor 553 is set to overhang X in relation to bonnet 165. (⇒ Fig. 8) (⇒ Table 10) . This setting ensures tight shut-off in closed position and protects diaphragm 443 against overloading.

Table 10: Closed-position setting dimension of manually operated valves SISTO-C HV.510/.520 / SISTO-C HV

Diaphragm diameter (MD)	Overhang X in closed position (mm)
30	4,1
40	4,8
65	10,2
92	15,7
115	19,2
168	27,2
202	33,0

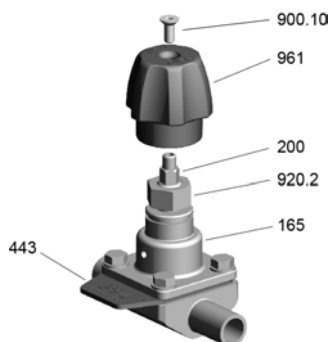


Fig. 9: SISTO-C HV.510/.520 MD 30, setting the closed-position travel stop

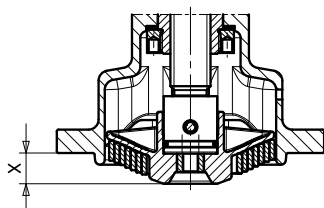


Fig. 10: SISTO-C MD 40-MD 115 Overhang X in closed position

Setting the travel stop:

1. Remove screw 900.10. Remove handwheel 961. Unscrew and remove nut 920.2.
2. Fit handwheel 961 again. Set the end position of the valve in closing direction as required.
3. Remove handwheel 961. Screw nut 920.2 onto stem 200 by turning it clockwise until it abuts bonnet 165.
4. Fit handwheel 961 again on nut 920.2 and stem 200.
5. Fit and tighten screw 900.10 in handwheel 961. This secures stem 200 (⇒ Fig. 9) .

SISTO-C HV.510/.520 MD 40 - MD 115

Diaphragm valves of the SISTO-C HV.510/520 MD 40-MD 115 type series are fitted with an integrated, adjustable closed-position and open-position travel stop.

Factory setting of closed-position travel stop:

Compressor 553 is set to overhang X in relation to bonnet 165 (⇒ Fig. 10) . This setting ensures tight shut-off in closed position and protects diaphragm 443 against overloading.

Factory setting of open-position travel stop:

Full valve travel is possible. In this position, the cylindrical section of locating sleeve 527.2 is flush with the upper edge of the inner section of handwheel 961 (⇒ Fig. 12) .



Fig. 11: Setting the open-position travel stop



Fig. 12: Locating sleeve flush with upper edge of handwheel

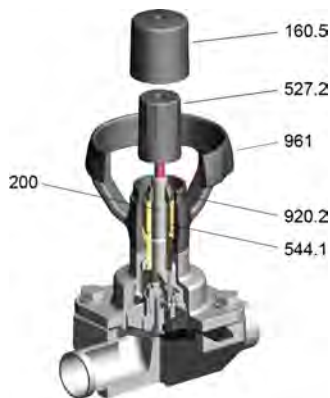


Fig. 13: SISTO-C
HV.510/.520
MD 40-MD 115
Setting the closed-position
travel stop

Setting the closed-position travel stop:

1. Remove cover 160.5. Screw locating sleeve 527.2 upwards and remove it.
2. Screw nut 920.2 upwards until the required end position of the valve in closing direction can be set.
3. Screw nut 920.2 downwards on stem 200 by turning it clockwise until it abuts threaded bush 544.1.
4. Screw on locating sleeve 527.2 until its cylindrical section is flush with the upper edge of the handwheel.
5. Fit cover 160.5 again on handwheel 961 and locating sleeve 527.2 (⇒ Fig. 13) .

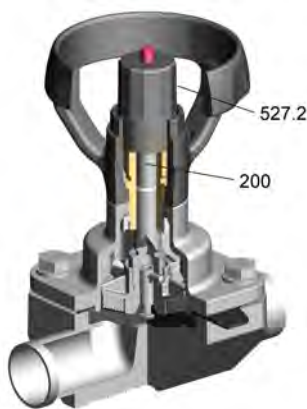


Fig. 14: SISTO-C
HV.510/.520
MD 40-MD 115
Setting the open-position
travel stop

Setting the open-position travel stop:

1. Take the valve to the required position. Turn locating sleeve 527.2 clockwise until it abuts stem 200 (⇒ Fig. 14) .
2. If applicable, observe the note on locating sleeve 527.2 regarding the travel adjustment per turn.
3. Fit cover 160.5 on handwheel 961 and locating sleeve 527.2 again.

6.2 Shutdown

6.2.1 Measures to be taken for shutdown

During prolonged shutdown periods, ensure that the following conditions are met:





1. Drain fluids which change their physical condition due to changes in concentration, polymerisation, crystallisation, solidification, etc. from the piping.
2. If required, flush the piping with the valves fully opened.

7 Servicing/Maintenance

7.1 Safety regulations

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

Always observe all safety instructions and information. For any queries contact the manufacturer.

	<div data-bbox="507 481 683 533"> DANGER</div> <p>Valve under pressure Risk of injury! Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> ▷ Depressurise the valve and its surrounding system prior to any maintenance work and installation work. ▷ If there is fluid leakage, depressurise the valve. ▷ Allow the valve to cool down until the temperature of the fluid in all valve areas in contact with the fluid is lower than the fluid's vaporisation temperature. ▷ Never vent the valve by undoing the bonnet bolting or the flange bolting between valve and pipe, or by opening the screw plugs. ▷ Use original spare parts and appropriate tools, even in emergencies.
	<div data-bbox="507 1032 703 1084"> WARNING</div> <p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard Risk of injury! Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled. ▷ Wear safety clothing and a protective mask if required. ▷ When draining the fluid take appropriate measures to protect persons and the environment. ▷ Observe all relevant laws. ▷ Decontaminate valves used in fluids posing a health hazard.

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the valve with a minimum of servicing/maintenance expenditure and work.



Never use force when dismantling and reassembling the valve.

Original spare parts are only ready for operation following assembly/installation and subsequent shell and leak testing of the valve.

7.2 Servicing/inspection

7.2.1 Maintenance

All components of diaphragm valves and diaphragm valves with pneumatic piston actuator have been designed to be largely maintenance-free. The materials of the sliding parts have been selected to ensure minimum wear.

	NOTE The operator/user is responsible for fixing appropriate inspection intervals and servicing intervals as required by the service conditions of the valve.
	NOTE On any diaphragm valve, diaphragm 443 is the highest stressed component. The diaphragm is not only subjected to mechanical stress but also to wear caused by the fluid handled. We recommend regularly checking the diaphragm at intervals to be individually stipulated depending on the operating conditions and actuation frequency, and replacing the diaphragm if necessary. To check the diaphragm, remove the upper valve section from the valve body.

7.2.2 Supervision of operation

The service life can be extended by taking the following measures:

- Checking the function by actuating the valve at least twice a year
- Lubricating the movable parts with appropriate lubricants to DIN 51825 which are suitable for the application of the valve.

7.2.3 Replacing the diaphragm

7.2.3.1 Moving the diaphragm valve into closed position

(The position indicator has to be retracted.)

1. For diaphragm valves: Turn handwheel 961 clockwise.
2. For diaphragm valves with pneumatic piston actuator, "fail-open" (OF) and "double-acting" (AZ): Apply compressed air to the upper control air port.
3. For diaphragm valves with pneumatic piston actuator, "fail-close" (SF): Release the piston actuator pressure.



Fig. 15: Moving the diaphragm valve into open position, undoing the bolts

7.2.3.2 Moving the diaphragm valve into open position

(The position indicator has to protrude.)

1. For diaphragm valves: Turn handwheel 961 counter-clockwise.
2. For diaphragm valves with pneumatic piston actuator, "fail-close" (SF) and "double-acting actuators" (AZ): Apply compressed air to the lower control air port.
3. For diaphragm valves with pneumatic piston actuator, "fail-open" (OF): Release the piston actuator pressure.



Fig. 16: Unscrewing the diaphragm

7.2.3.3 SISTO-C: Removing the diaphragm

- ✓ The notes and steps stated in (⇒ Section 7.1, Page 27) have been observed/ carried out.
 - ✓ The system is unpressurised; it has been drained and cleaned.
 - ✓ Move the diaphragm valve into open position (⇒ Section 7.2.3.2, Page 29) . The position indicator has to protrude (⇒ Fig. 15) .
1. Remove bonnet 165 by undoing (⇒ Fig. 15) hexagon head bolts 901.1.
 2. Move the diaphragm valve into closed position (the position indicator has to be retracted) (⇒ Section 7.2.3.1, Page 29) .
 3. If diaphragm 443 features a fastening thread, turn it anti-clockwise to remove it. (⇒ Fig. 16)
 4. Diaphragms 443 (MD 30 and MD 40) with suffix "N" (button): Simultaneously pull and turn on one side to easily remove diaphragm 443 from compressor 553.

7.2.3.4 SISTO-C: Installing the new diaphragm

- ✓ The contact surfaces for the diaphragm inside body 100 and bonnet 165 must be clean and dry.

1. Move the diaphragm valve into closed position. (⇒ Section 7.2.3.1, Page 29)
2. Insert support spiral 951 (from MD65) into bonnet 165. **Note:** The last, outer winding (⇒ Fig. 17) of support spiral 951 must not end on a ridge of compressor 553. (⇒ Fig. 18)

3. Remove any protection from the fastening grub screw of diaphragm 443.

4. Screw in new diaphragm 443 until it rests against compressor 553 (⇒ Fig. 19) , then back it off a maximum of 180° to ensure it is correctly aligned.

Note: Never use force to screw it in further than the stop!

Observe the flow direction arrow on the identification tongue. The ridge of the diaphragm has to be parallel to the weir of the body. (⇒ Fig. 20) This requirement must be met for the valve to provide reliable shut-off.

5. To fit bonnet 165, the diaphragm valve has to be moved into open position (the position indicator has to protrude). (⇒ Section 7.2.3.2, Page 29)

6. Place bonnet 165 onto body 100. Tighten fastening bolts 901.1 of bonnet 165 by hand.



Fig. 17: Winding end of the support spiral



Fig. 18: Compressor ridge



Fig. 19: Screwing in the diaphragm



Fig. 20: Ridge of the diaphragm

7. **Diaphragm valves:** The upper valve section remains in open position. Evenly tighten hexagon head bolts 901.1 crosswise in accordance with the tightening torques table (⇒ Section 7.3, Page 31) .
 8. **Diaphragm valves with pneumatic piston actuator (SF/OF/AZ):** Move the piston actuator into closed position. (⇒ Section 7.2.3.1, Page 29) Evenly tighten hexagon head bolts 901.1 crosswise in accordance with the tightening torques table. (⇒ Section 7.3, Page 31)
 9. Move the piston actuator back into open position (⇒ Section 7.2.3.2, Page 29) and re-check the tightening torques of hexagon head bolts 901.1 if necessary.
- Observe the required tightening torques (⇒ Section 7.3, Page 31) .

7.2.3.5 SISTO-B: Removing the diaphragm

- ✓ The notes and steps stated in (⇒ Section 7.1, Page 27) have been observed/ carried out.
 - ✓ The system is unpressurised; it has been drained and cleaned.
 - ✓ Move the diaphragm valve into open position (the position indicator has to protrude) (⇒ Section 7.2.3.2, Page 29) .
1. Undo hexagon head bolts 901.1 to dismantle bonnet 165.
 2. If diaphragm 443 features a fastening thread, turn it anti-clockwise to remove it.
 3. Diaphragms 443 (MD 30 and MD 40) with suffix "N" (button): Simultaneously pull and turn on one side to easily remove diaphragm 443 from compressor 553.

7.2.3.6 SISTO-B: Installing the new diaphragm

- ✓ The contact surfaces for the diaphragm inside body 100 and bonnet 165 must be clean and dry.
1. Move the diaphragm valve into closed position. (⇒ Section 7.2.3.1, Page 29)
 2. Insert support spiral 951 (from MD65) into bonnet 165. **Note:** The last, outer winding of support spiral 951 must not end on a ridge of compressor 553.
 3. Remove any protection from the fastening grub screw of diaphragm 443.
 4. Screw in new diaphragm 443 until it rests against compressor 553, then back it off a maximum of 180° to ensure it is correctly aligned. **Note:** Never use force to screw it in further than the stop!
Observe the flow direction arrow on the identification tongue. The ridge of the diaphragm has to be parallel to the weir of the body. This requirement must be met for the valve to provide reliable shut-off.

5. The diaphragm valve must be taken to the open position before bonnet 165 is fitted. (⇒ Section 7.2.3.2, Page 29)
6. Place bonnet 165 onto body 100. Tighten fastening bolts 901.1 of bonnet 165 by hand.
7. **Diaphragm valves:** The upper valve section remains in open position. Tighten hexagon head bolts 901.1 evenly and crosswise in accordance with the tightening torques table. (⇒ Section 7.4, Page 31)
8. **Diaphragm valves with pneumatic piston actuator (SF/OF/AZ):** Move the piston actuator into closed position. (⇒ Section 7.2.3.1, Page 29) Evenly tighten hexagon head bolts 901.1 crosswise in accordance with the tightening torques table. (⇒ Section 7.4, Page 31)
9. Move the piston actuator back into open position (⇒ Section 7.2.3.2, Page 29) and re-check the tightening torques of hexagon head bolts 901.1 if necessary.

Observe the tightening torques (⇒ Section 7.4, Page 31) .



Fig. 21: Multi-part diaphragm (TFM/EPDM) with backing ring

7.2.3.7 Installing multi-part diaphragms (TFM/EPDM) with backing ring

Align the metal backing ring used for multi-part diaphragms such that its grooved face rests against the back of the plastic diaphragm. Mounted in this way, the ring's smaller face will point towards the bonnet flange.

7.2.4 Valve reassembly

Valve reassembly shall be effected in reverse order to dismantling.



NOTE

To maintain functional reliability, new sealing elements must be used when the valve is reassembled.
After reassembly and prior to commissioning/start-up, the overhauled valves must be subjected to shell testing and leak testing to DIN EN 12266.

7.3 Tightening torques of SISTO-C

Tightening torques only apply to the valve's temperature range between +5 °C and +40 °C.

Table 11: Tightening torques of SISTO-C [Nm]

Diaphragm	Diaphragm diameter (MD)							
	30	40	65	92	115	168	202	280
EPDM	1,5	3	8	12	14	18	32	40
TFM sheet, bonded	1,5	3,5	8	12	18	-	-	-
TFM (2-piece)	2	4	10	18	30	40	60	75



7.4 Tightening torques of SISTO-B

Tightening torques only apply to the valve's temperature range between +5 °C and +40 °C.

Table 12: Tightening torques of SISTO-B [Nm]

Diaphragm	Diaphragm length (ML)												
	32	46	52	58	67	82	90	108	132	158	226	260	304
EPDM	0,8	3,5	2,5	6	8	12	15	25	30	45	30	35	50
TFM sheet, bonded	1	4	2,5	7	9	13	17	26	-	-	-	-	-
TFM (2-piece)	-	6	-	8	10	15	18	28	35	50	35	40	55

8 Trouble-shooting

	 WARNING
	<p>Improper remedial work on the valve</p> <p>Risk of injury!</p> <p>► For any work performed in order to remedy faults on the valve observe the relevant information given in this operating manual and/or the product literature provided by the accessories manufacturers.</p>

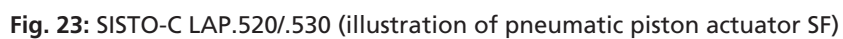
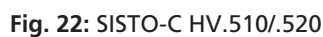
Diaphragm valves and diaphragm valves with pneumatic piston actuator made by SISTO Armaturen are robust in design. Nevertheless, malfunctions e.g. caused by maloperation, lack of maintenance or improper use cannot be ruled out completely. Have all repair and maintenance work carried out by competent personnel using suitable tools and original spare parts.

If problems occur that are not described in the following table, consultation with the SISTO Armaturen service is required.

Table 13: Trouble-shooting

Problem	Possible cause	Remedy
Leakage at the mating flanges	<ul style="list-style-type: none"> Contaminated fluid or solids in the fluid Erosion, corrosion, abrasion Excessive loads from piping forces or thermal stresses 	<ol style="list-style-type: none"> Dismantle. Clean. Replace the sealing elements.
Leakage at the bolting of body 100 and bonnet 165	<ul style="list-style-type: none"> Compressive-stress relaxation Sealing element has settled as a result of high temperature fluctuations. Impermissible pressure loads Poor maintenance Insufficient resistance of the sealing elements to temperature and fluid handled 	Retighten hexagon head bolts 901.1 in accordance with (⇒ Section 6.1.1, Page 23) .
Leakage at the stem neck or leakage indication hole caused by diaphragm rupture	<ul style="list-style-type: none"> Rupture of diaphragm 443 	Replace defective diaphragm 443. (⇒ Section 7.2.3, Page 29)
Leakage at seat/disc interface	<ul style="list-style-type: none"> Foreign matter at the weir 	Remove foreign matter from the weir and replace diaphragm 443 if necessary.
	<ul style="list-style-type: none"> Foreign matter in or on the diaphragm lip Damage to the diaphragm lip 	Remove foreign matter and replace diaphragm 443 if necessary.
	<ul style="list-style-type: none"> Stop nut 920 for closed position incorrectly adjusted 	Re-adjust stop nut 920 or replace diaphragm 443 if necessary.

9.1 General assembly drawings with list of components, SISTO-C



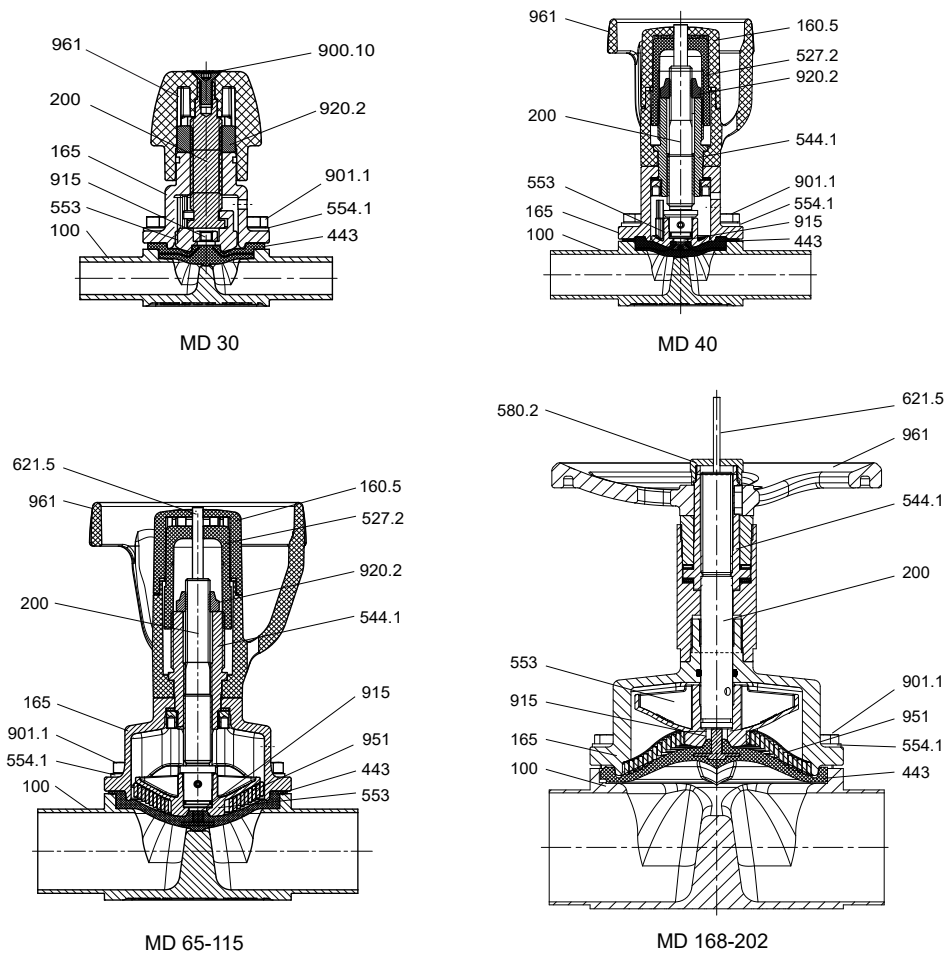


Fig. 24: SISTO-C HV

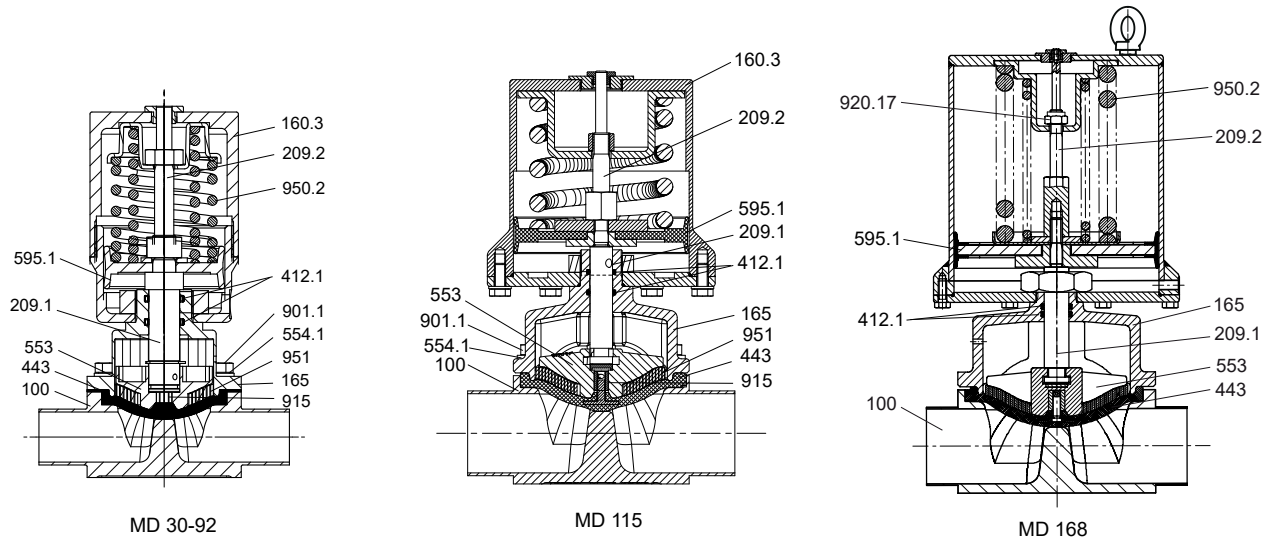


Fig. 25: SISTO-C LAP

Table 14: Overview of available materials

Part No.	Description	Material	Material number	Note
100	Body	X2CrNiMo18-14-3	1.4435/316L	Forged
132.2	Intermediate piece	X2CrNiMo17-12-2	1.4404	-

Part No.	Description	Material	Material number	Note
141.1	Cylinder	X5CrNi18-10 / X6CrNiTi18-10	1.4301/1.4541	MD 168-MD 202 Also in aluminium, hard anodised
160.5	Handwheel cover	PA66-GF30	-	-
160.9	Bearing cover	X2CrNiMo17-12-2	1.4404	-
165	Bonnet	GX2CrNiMo19-11-2	1.4409	-
176.2	Bottom end cap	X2CrNiMo17-12-2	1.4404	-
200	Stem	X2CrNiMo17-12-2 X8CrNiS18-9	1.4404/1.4305	MD 30 = 1.4404 Kolsterised
209.1	Lower piston rod	X8CrNiS18-9	1.4305	-
209.2	Upper piston rod	X8CrNiS18-9	1.4305	-
443 ⁸⁾	Diaphragm	SISTO-AseptiXX EPDM	-	FDA, CFR 21, Section 177.2600 EC 1935/2004
527.2	Locating sleeve	PA66-GF30	-	-
544.1	Threaded bush	SoMs59	-	-
553	Compressor	GX2CrNiMo19-11-2	1.4409	-
554.1	Washer	A2	-	-
580.2	Cap	X2CrNiMo17-12-2	1.4404	-
595.1 ^{8) 9)}	Piston assembly	St/NBR	-	-
621.3	Position indicator	PA	-	-
621.5	Position indicator	PA	-	-
900.10	Bolt/screw	A2	-	-
901.1	Hexagon head bolt	A2-70	-	-
915	Floating nut	A2	-	-
920.2	Nut	A2	-	-
920.17	Nut	A2	-	-
950.2	Spring	Spring steel	-	-
951	Support spiral	X5CrNi18-10	1.4301	From MD 65
961	Handwheel	PA66-GF30	-	MD 30-MD 115
		GX2CrNiMo19-11-2	1.4409	-

⁸ Recommended spare parts

⁹ We recommend having these parts replaced in our factory.

9.2 General assembly drawings with list of components, SISTO-B

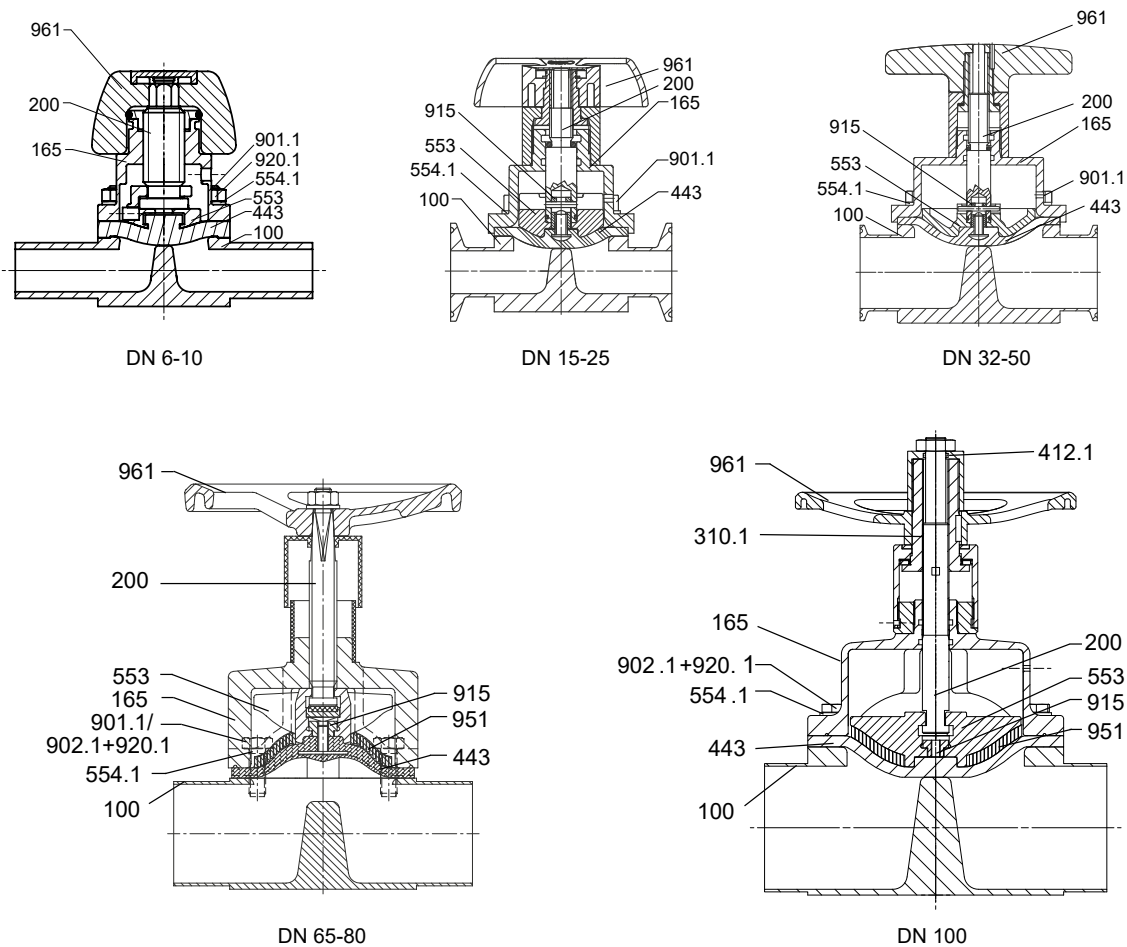


Fig. 26: SISTO-B manually operated valve

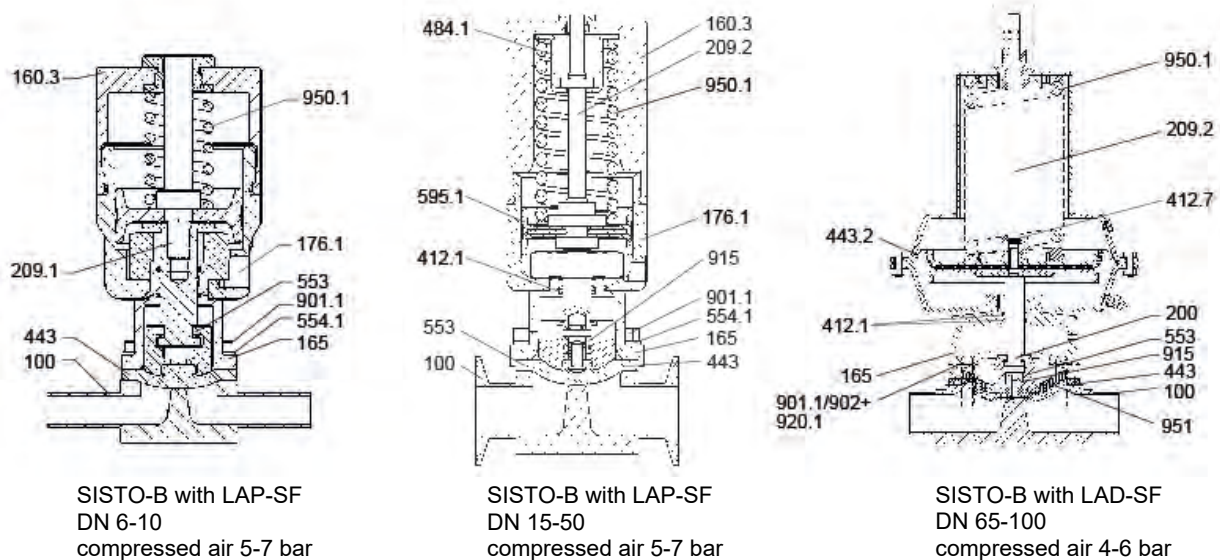


Fig. 27: SISTO-B with mounted LAP-SF / LAD-SF

Table 15: Overview of available materials

Part No.	Description	Material	Material number	Note
100	Body		316L/1.4435	Precision casting (1.4435) / forged
160.3	Cover		PA6GF30	-
165	Bonnet		316L	DN 6-DN 50, DN 100: precision casting (1.4409)
			JS-1025 / PA coating	DN 65-DN 80
200	Stem		1.4104	-
209.1	Lower piston rod		1.4404	-
209.2	Upper piston rod		1.4404	-
310.1 ¹⁰⁾ 11)	Plain bearing		Brass	-
412.1 ¹⁰⁾ 11)	O-ring		EPDM FPM/FKM	-
			NBR	-
412.7 ¹⁰⁾ 11)	O-ring		NBR	-
443 ¹⁰⁾	Diaphragm		EPDM	-
443.2 ¹⁰⁾	Diaphragm		NBR	-
484.1	Spring plate		Galvanised steel	-
553	Compressor		316L	DN 6-DN 50, DN 100 = precision casting 1.4409
			JL-1040	DN 65-DN 80
554.1	Washer		A2	-
595.1 ¹⁰⁾ 11)	Piston assembly		St/NBR	-
901.1	Hexagon head bolt		A2-70	-
902	Stud		A2-70	-
902.1	Stud		A2-70	-
915	Floating nut		A2	-
920.1	Nut		A2	-
950.1	Spring		1.4310	-
951	Support spiral		Galvanised steel	DN 65-DN 80
			1.4301	DN 100
961	Handwheel		PA6GF30	DN 6-DN 50
			JL-1030 / PA coating	DN 65-DN 100

¹⁰⁾ Recommended spare parts¹¹⁾ We recommend having these parts replaced in our factory.

9.3 Dimensions to DIN

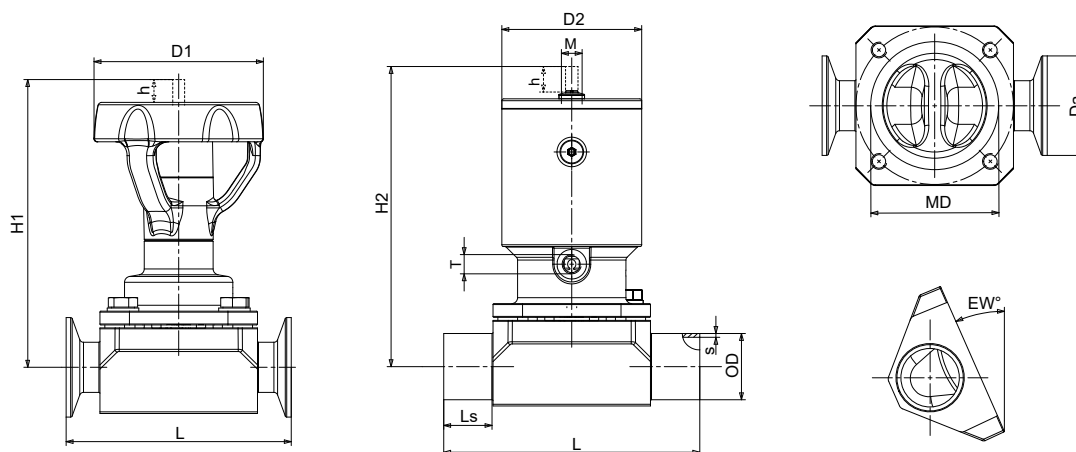


Fig. 28: Dimensions to DIN

Table 16: Dimensions and weights to DIN

DN ¹⁴⁾	Inch	MD	h [mm]	EW [°]	Manually operated valve ¹²⁾			Piston actuator ¹³⁾				Butt weld ends to DIN 11866-A			Clamps to DIN 32676-A (DIN 11866-A)		K _{vs} value [m ³ /h]			
					H1 [mm]	D1 [mm]	[kg]	H2 [mm]	D2 [mm]	[kg]	T	M	L [mm]	Ls [mm]	ODxS [mm]	L [mm]		Da [mm]		
Standard DN/MD combination																				
6	1/4	30	5	41,2	68	35	0,4	87	41	0,6	M 5	M 12x1	80	20,0	8x1,0	63,5	25,0	1,1		
8	5/16			34,6	68			87	1,8											
10	3/8			24,0	69			88	34,0						2,1					
15	1/2	40	7	21,7	116	66	0,9	103	46	0,9			115	30,0	19x1,5	88,9	34,0	5,0		
20	3/4	65	13	34,6	146	88	2,0	149	71	2,9			130	25,0	23x1,5	101,6	50,5	11,8		
25	1			24,1	148			151	29x1,5				114,3	16,5						
32	1 1/4	92	21	31,3	215	125	4,6	207	89	6,3			M 18x1	G 1/8	180	37,5	35x1,5	139,7	50,5	34,0
40	1 1/2			24,7	216			208	41x1,5											42,5
50	2	115	24	21,7	231	125	7,1	242	110	10,3					190	32,5	53x1,5	158,8	64,0	65,0
65	2 1/2	168	40	31,0	327	250	23,8	421	167	27,7/ 34,9	254	31,0			70x2,0	-	-	137,0		
80	3			21,0	336			22,8	430	26,7/ 33,9	156,0									
100	4			202	55			20,0	377	250	37,7	501			210	48,5/ 59,3	305	37,5	104x2,0	-
125	5	280	80	8,8	392	400	97,0	- ¹⁵⁾				356			63,0	129x2,0	-	-	230,0	
150	6			17,9	512			- ¹⁵⁾				414			50,0	154x2,0	-	-	490,0	
200	8			4,1	536			- ¹⁵⁾				521			103,5	204x2,0	-	-	500,0	
Compact DN/MD combination																				
20	3/4	40	7	9,6	120	66	1,0	107	46	1,0	M 5	M 12x1	115	30,0	23x1,5	-	-	4,4		
32	1 1/4	65	13	12,2	154	88	2,6	157	71	3,5			140	30,0	35x1,5	-	-	15,4		
50	2	92	21	10,0	226	125	6,5	218	89	8,2	G 1/8	M 18x1	190	42,5	53x1,5	-	-	42,4		
65	2 1/2	115	24	7,0	241	125	8,0	252	110	11,2			200	37,5	70x2,0	-	-	65,0		
100	4	168	40	10,7	351	250	30,9	445	167	34,8/42			305	56,5	104x2,0	-	-	143,0		

¹² Variant HV.510 for MD 30-MD 115, variant HV.520 for MD 168-MD 202

¹³ Variant LAP.520 for MD 30-MD 115, variant LAP.530/520 for MD 168-MD 202

¹⁴ Smaller and larger nominal sizes available on request

¹⁵ Design as per customer specifications

9.4 Dimensions to ISO

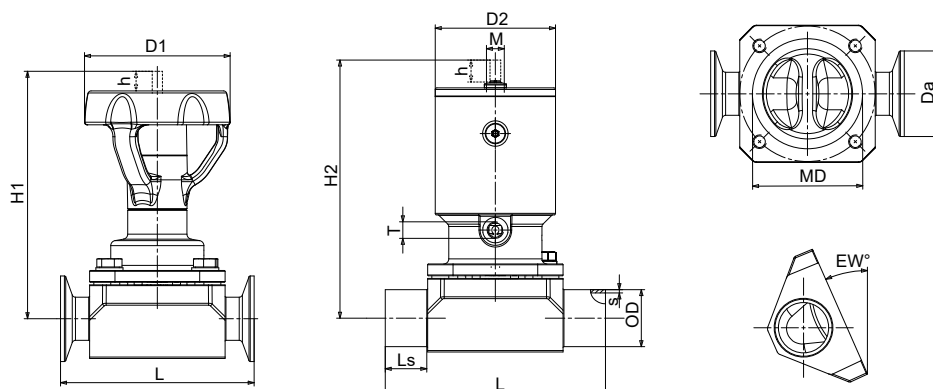


Fig. 29: Dimensions to ISO

Table 17: Dimensions and weights to ISO

DN ⁽¹⁸⁾	Inch	MD	h [mm]	EW	Manually operated valve ¹⁶⁾			Piston actuator ¹⁷⁾				Butt weld ends to DIN 11866-B (ISO 4200)			Clamps to DIN 32676-B (ISO 4200)		K _{vs} value [m³/h]		
					H1 [mm]	D1 [mm]	[kg]	H2 [mm]	D2 [mm]	[kg]	T	M	L [mm]	Ls [mm]	OD×s [mm]	L [mm]		Da [mm]	
Standard DN/MD combination																			
6	1/4	30	5	38,0	68	35	0,4	87	41	0,6	M 5	M 12×1	80	20,0	10,2×1,6	63,5	25,0	1,5	
8	5/16			23,0	69			88								13,5×1,6			2,2
10	3/8	40	7	27,7	115	66	0,9	102	46	0,9			115	30,0	17,2×1,6	88,9	25,0	4,5	
15	1/2			15,7	117			104							21,3×1,6		50,5	5,2	
20	3/4	65	13	27,1	148	88	2,0	151	71	2,9	M 12×1	M 18×1	130	25,0	26,9×1,6	101,6	50,5	14,7	
25	1			17,7	150			153							33,7×2,0	114,3		17,5	
32	1 1/4	92	21	24,4	216	125	4,6	208	89	6,3			180	37,5	42,2×2,0	139,7	64,0	43,0	
40	1 1/2			17,1	219			211							48,3×2,0			45,5	
50	2	115	24	15,6	234	125	7,1	245	110	10,3	G 1/8	M 18×1	190	32,5	60,3×2,0	158,8	77,5	69,0	
65	2 1/2	168	40	27,0	330	250	23,8	424	167	27,7/ 34,9			254	31,0	76,1×2,0	-	-	149,0	
80	3			19,6	336		22,8	430		26,7/ 33,9					88,9×2,3	-	-	161,0	
100	4	202	55	15,3	382	250	37,7	506	210	48,5/ 59,3			305	37,5	114,3×2,3	-	-	255,0	
125	5			5,4	392		47,7	- ¹⁹⁾				356	63,0	139,7×2,6	-	-	258,0		
150	6	280	80	13,7	518	400	92,0	- ¹⁹⁾				414	50,0	168,3×2,6	-	-	500,0		
200	8			0,9	543		111,0	- ¹⁹⁾				521	103,5	219,1×2,6	-	-	510,0		
Compact DN/MD combination																			
10	3/8	30	5	7,7	72	35	0,4	91	41	0,6	M 5	M 12×1	80	20,0	17,2×1,6	-	-	2,2	
20	3/4	40	7	2,8	120	66	1,0	107	46	1,0			115	30,0	26,9×1,6	-	-	4,7	
32	1 1/4	65	13	4,2	154	88	2,6	157	71	3,5			140	30,0	42,4×2,0	-	-	17,5	
50	2	92	21	4,9	226	125	6,5	218	89	8,2			190	42,5	60,3×2,0	-	-	45,7	
65	2 1/2	115	24	2,7	241	125	7,6	252	110	10,8	G 1/8	M 18×1	200	37,5	76,1×2,0	-	-	67,0	
100	4	168	40	6,3	351	250	29,8	445	167	34,8/42			305	56,5	114,3×2,3	-	-	157,0	

¹⁶ Variant HV.510 for MD 30-MD 115, variant HV.520 for MD 168-MD 202¹⁷ Variant LAP.520 for MD 30-MD 115, variant LAP.530/520 for MD 168-MD 202¹⁸ Smaller and larger nominal sizes available on request¹⁹ Design as per customer specifications

9.5 Dimensions to OD

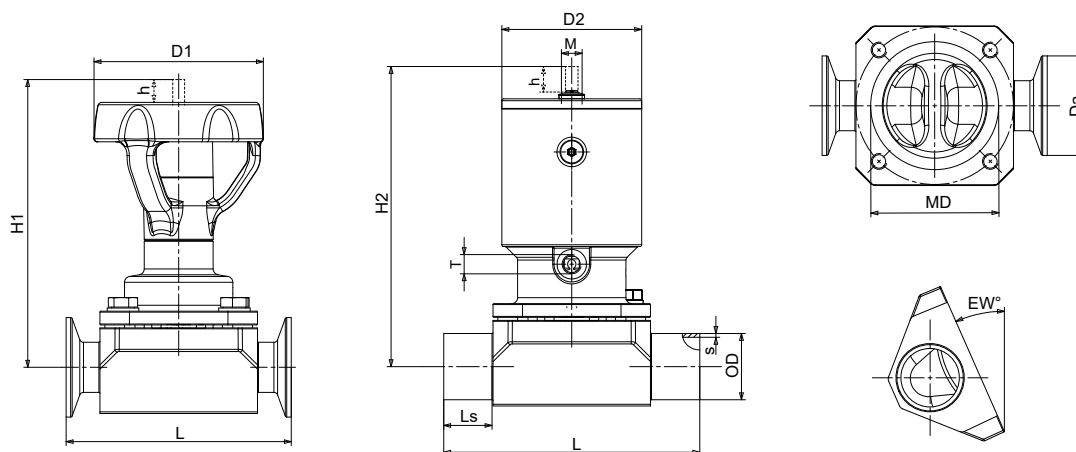


Fig. 30: Dimensions to OD

Table 18: Dimensions and weights to OD

DN ²²⁾	Inch	MD	h [mm]	EW	Manually operated valve ²⁰⁾			Piston actuator ²¹⁾				Butt weld ends to OD ASME BPE			Clamps to DIN 32676-C (OD ASME BPE)		K _{vs} value [m ³ /h]			
					H1 [mm]	D1 [mm]	[kg]	H2 [mm]	D2 [mm]	[kg]	T	M	L [mm]	Ls [mm]	ODxs [mm]	L [mm]		Da [mm]		
Standard DN/MD combination																				
6	1/4	30	5	45,8	68	35	0,4	87	41	0,6	M 5	M 12x1	80	20,0	6,35x0,89	63,5	25,0	0,6		
10	3/8			35,5	68			87										1,7		
15	1/2			26,0	69			88										2,1		
15	1/2	40	7	37,3	115	66	0,9	102	46	0,9					12,7x1,65	88,9	25,0	2,6		
20	3/4			22,2	116			103						4,9						
25	1	65	13	31,8	146	88	2,0	149	71	2,9					130	25,0	25,4x1,65	114,3	50,5	13,8
40	1 1/2	92	21	28,8	215	125	4,6	207	89	6,3					180	37,5	38,1x1,65	139,7	50,5	39,0
50	2	115	24	23,5	231	125	7,1	242	110	10,3					190	32,5	50,8x1,65	158,8	64,0	62,0
65	2 1/2				12,3		236		6,4	247				9,6					63,5x1,65	193,8
80	3	168	40	26,7	330	250	22,8	424	167	26,7/33,9	G 1/8	M 18x1	254	31,0	76,2x1,65	222,3	91,0	151,0		
100	4	202	55	20,9	377	250	37,7	501	210	48,5/59,3					305	37,5	101,6x2,11	292,1	119,0	237,0
150	6	280	80	18,8	512	400	93,4	- ²³⁾						414	50,0	152,4x2,77	-	-	490,0	
Compact DN/MD combination																				
50	2	92	21	12,0	226	125	6,5	218	89	8,2	G 1/8	M 18x1	190	42,5	50,8x1,65	-	-	42,4		
80	3	115	24	2,1	241	125	7,6	252	110	10,8					200	37,5	76,2x1,65	-	-	67,0
100	4	168	40	11,9	351	250	30,9	445	167	34,8/42					305	56,5	101,6x2,11	-	-	143,0

²⁰ Variant HV.510 for MD 30-MD 115, variant HV.520 for MD 168-MD 202

²¹ Variant LAP.520 for MD 30-MD 115, variant LAP.530/520 for MD 168-MD 202

²² Smaller and larger nominal sizes available on request

²³ Design as per customer specifications

9.6 Dimensions to SMS

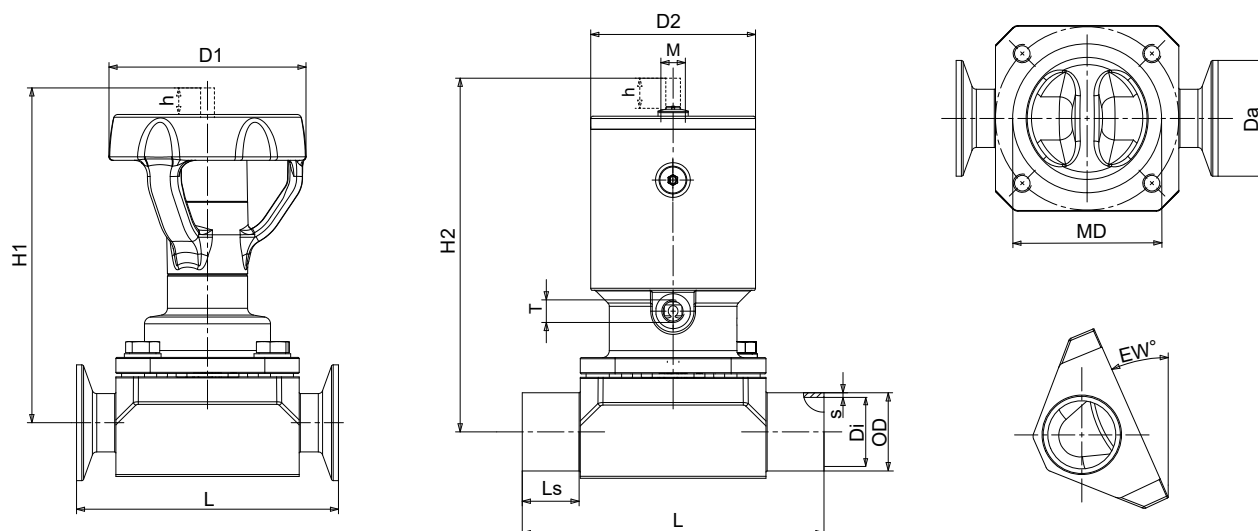


Fig. 31: Dimensions to SMS

Table 19: Dimensions and weights to SMS

DN ⁽²⁶⁾	Inch	MD	h [mm]	EW	Manually operated valve ⁽²⁴⁾			Piston actuator ⁽²⁵⁾					Butt weld ends to SMS 3008			Clamps to DIN 32676 (SMS 3008)			K _{vs} value [m ³ /h]
					H1 [mm]	D1 [mm]	[kg]	H2 [mm]	D2 [mm]	[kg]	T	M	L [mm]	Ls [mm]	OD×s [mm]	L [mm]	Da [mm]	Di [mm]	
Standard DN/MD combination																			
10	3/8	30	5	24,0	69	35	0,4	88	41	0,6	M 5	M 12×1	80	20,0	12×1,0	63,5	25,0	10,0	2,1
15	1/2	40	7	21,7	116	66	0,9	103	46	0,9			115	30,0	18×1,0	88,9	25,0	16,0	5,0
25	1	65	13	31,1	146	88	2,0	149	71	2,9			130	25,0	25×1,2	114,3	50,5	22,6	13,8
40	1 1/2	92	21	26,9	216	125	4,6	208	89	6,3			180	37,5	38×1,2	139,7	50,5	35,6	39,0
50	2	115	24	22,7	231		7,1	242	110	10,3	190	32,5	51×1,2	158,8	64,0	48,6	62,0		
65	2 1/2			12,2	236		6,4	247		9,6			63,5×1,6	193,8	77,5	60,3	71,0		
80	3	168	40	26,7	330	250	22,8	424	167	26,7/33,9			254	30,0	76,1×1,6	222,3	91,0	72,9	151,0
100	4	202	55	20,8	377		37,7	501	210	48,5/59,3	305	37,5	101,6×2,0	292,1	119,0	97,6	237,0		
Compact DN/MD combination																			
50	2	92	21	11,2	226	125	4,9	218	89	6,6	G 1/8	M 18×1	190	42,5	51,0×1,2	-	-	-	42,4
80	3	115	24	2,1	242	125	7,5	253	110	10,7			200	37,5	76,1×1,6	-	-	-	67,0
100	4	168	40	11,8	345	250	28,1	439	167	32,0/39,2			305	56,5	101,6×2,0	-	-	-	143,0

²⁴ Variant HV.510 for MD 30-MD 115, variant HV.520 for MD 168-MD 202²⁵ Variant LAP.520 for MD 30-MD 115, variant LAP.530/.520 for MD 168-MD 202²⁶ Smaller and larger nominal sizes available on request

9.7 Specifications

Butt weld ends:	DIN 11866 Series A (DIN 11850)
	DIN 11866 Series B (DIN EN ISO 1127/ISO 4200)
	DIN 11866 Series C (OD ASME BPE)
	SMS 3008
	JIS-G 3447
Clamps:	DIN 32676
	ASME BPE
	SMS 3017
	JIS-G 3447
Marking:	DIN EN 19 (ISO 5209)
	ASME BPE

10 Mounting / installing accessories and variants

10.1 General description

If a SISTO-C accessory has been ordered as a unit together with a diaphragm valve, the corresponding accessory will be supplied mounted on the diaphragm valve.

In the case of any deviations contact SISTO Armaturen.

10.2 Mechanical open-position travel stop

For use with SISTO-C diaphragm valve with pneumatic piston actuator

- SISTO-C LAP.520 SF/OF/AZ MD 30-MD 115
- SISTO-C LAP.520/.530 SF/OF/AZ MD 168-MD 202

Purpose

Travel stop for diaphragm valves with pneumatic piston actuator in opening direction.

Mounting

For a correct setting of the travel stop the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.



Fig. 32: Open-position travel stop

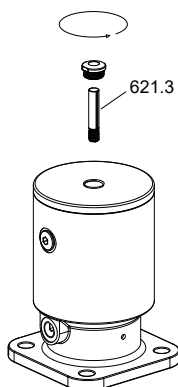


Fig. 33: Removing the cap and position indicator LAP.520/.530

Retrofitting the travel stop:

1. Remove the plastic cap of the piston actuator with an open-ended spanner (WAF13/WAF21). Unscrew and remove position indicator 621.3.
2. Screw position indicator 621.4 of the travel stop into the piston rod of the piston actuator.
3. Screw travel stop assembly 544.2/904.1 into the thread of the piston actuator. Tighten it to the specified tightening torque (⇒ Table 20) .

Table 20: Tightening torque of the open-position travel stop

Diaphragm diameter (MD)	[Nm]
30-115	50
168-202	100

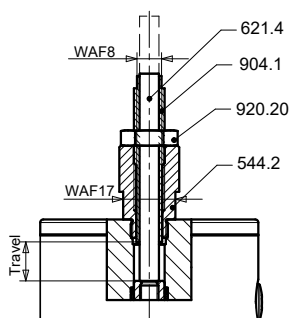


Fig. 34: Open-position travel stop MD 30-65

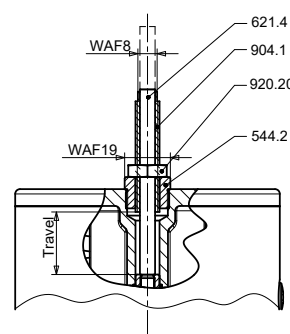


Fig. 35: Open-position travel stop MD 92-115

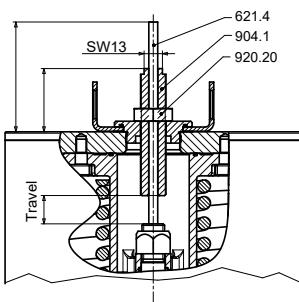


Fig. 36: Open-position travel stop MD 168-202

Setting the travel stop:

1. Move the piston actuator into closed position.
2. Undo nut 920.20.
3. Screw grub screw 904.1 into the piston actuator as far as it will go. The set valve travel equals 0 mm when the piston actuator is mounted on a body with diaphragm.
4. Set the required valve travel by backing off the grub screw (⇒ Table 21) . (Intermediate values can be derived by linear interpolation.) Finally, check the final value of valve travel.
5. Holding grub screw 904.1 in place, tighten nut 920.20 to the specified tightening torque (⇒ Table 20) .

Table 21: Open-position valve travel settings LAP.520 MD 30-MD 202

MD	Maximum valve travel [mm]	Number of turns from closed position				
		Travel = 100 %	Travel = 80 %	Travel = 60 %	Travel = 40 %	Travel = 20 %
30	5	3,3	2,7	2,0	1,3	0,7
40	7	4,7	3,7	2,8	1,9	0,9
65	13	8,7	6,9	5,2	3,5	1,7
92	21	14,0	11,2	8,4	5,6	2,8
115	24	16,0	12,8	9,6	6,4	3,2
168	45	45,0	36,0	27,0	18,0	9,0
202	60	60,0	48,0	36,0	24,0	12,0



NOTE

Position indicator 621.4 of the travel stop is delivered in maximum length and is often not flush with grub screw 904.1 in closed position.
If the closed position is to be made more visible: Mark the protruding part of position indicator 621.4 in closed position with a band or pen. The position indicator can be also shortened, so it is flush with grub screw 904.1 in closed position.



10.3 Mechanical closed-position travel stop

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SISTO-C LAP.520 SF/OF/AZ MD 30-MD 115
- SISTO-C LAP.520/.530 SF/OF/AZ MD 168-MD 202

Purpose

Travel stop for diaphragm valves with pneumatic piston actuator in closing direction.

	<p>! WARNING</p>
	<p>Without protecting tube risk of crushing injuries by moving parts Risk of injury! ▷ The diaphragm valve must only be operated when protecting tube 141 is fitted.</p>
	<p>NOTE</p>
	<p>The travel stop assembly is not available as a separate item; it can only be obtained in combination with the upper section of the diaphragm valve. It cannot be retrofitted.</p>

Mounting

For a correct setting of the travel stop the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.



Fig. 37: Closed-position travel stop

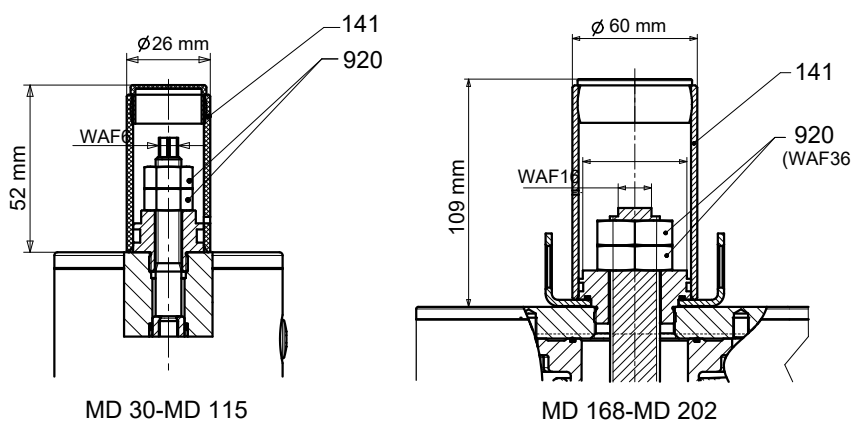


Fig. 38: Closed-position travel stop

Setting the travel stop:

Setting the travel stop

1. Remove protecting tube 141.
2. Loosen nuts 920, moving them upwards until they are freely exposed.
3. Move the piston actuator into closed position.
4. Position nuts 920 on required travel.
5. Lock nuts 920, tightening them to the tightening torque (⇒ Table 22) .
6. Fit protecting tube 141 again.

Table 22: Tightening torque of the closed-position travel stop

Diaphragm diameter (MD) [mm]	[Nm]
30 - 115	25
168 - 202	120

10.4 SK.500/.510 electrical actual-position feedback unit with inductive limit switch

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SK.500: SISTO-C LAP.520 SF/OF/AZ MD 30-MD 115
- SK.510: SISTO-C LAP.520/.530 SF/OF/AZ MD 168-MD 202

Actual-position feedback unit with higher type of protection (enclosure) available on request.

Purpose

Electrical position detection for diaphragm valves with pneumatic piston actuator via limit switches.

Mounting



Fig. 39: Electrical actual-position feedback unit SK.500/.510

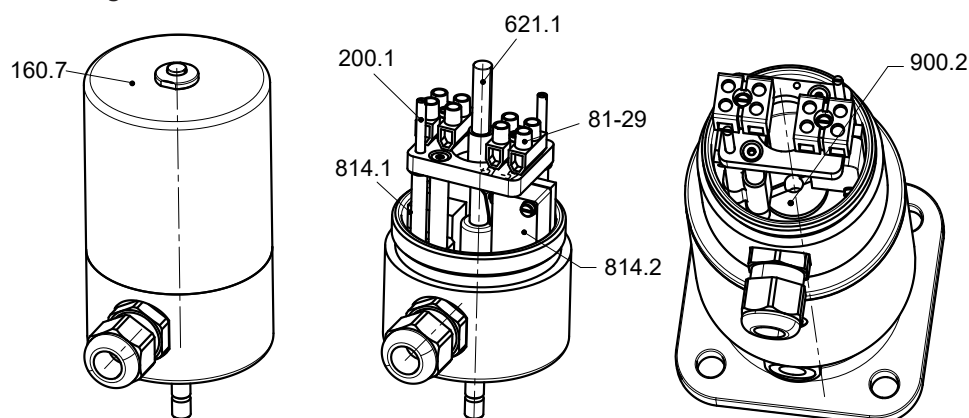


Fig. 40: Mounting and fastening the actual-position feedback unit

Setting the limit switches

To set limit switches 814.1/814.2 observe the functional principle (⇒ Table 24) .

Adjusting the actual-position feedback unit when supplied with the piston actuator:

Adjusting the actual-position feedback unit

1. Unscrew and remove cover 160.7.
2. For the fine adjustment of limit switches 814.1/814.2 turn stem 200.1 with a screwdriver.
3. Screw cover 160.7 back on.
4. Check the switching function.



NOTE

When ordering an actual-position feedback unit at a later date, indicate the diaphragm valve size and actuator size in the order.

Retrofitting an actual-position feedback unit with inductive limit switch:

For a correct setting of the accessory the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.

Retrofitting an actual-position feedback unit

1. Remove the plastic cap of the piston actuator with an open-ended spanner (WAF13/WAF21). Unscrew position indicator 621.3 (⇒ Fig. 33) .
2. Unscrew and remove cover 160.7.
3. Undo and remove the fastening screw of terminals 81-29.
4. Remove position indicator 621.1.
5. Adjust distance X of the switching flag of position indicator 621.1 (⇒ Table 23) .
6. Apply one drop of Loctite 243 to the thread of screw 900.2 of the limit switch box. Fasten it to piston actuator 809 and tighten it with a screwdriver.

7. Apply Loctite 243 to the thread of position indicator 621.1. Screw it into the piston rod of piston actuator 809. Loctite 243 thread-locking agent is not included in the scope of supply.
8. Fasten terminals 81-29 with screws again.
9. For the fine adjustment of limit switches 814.1/814.2 turn stem 200.1 with a screwdriver.
10. Screw cover 160.7 back on.
11. Check the switching function.

Factory setting for the limit switches: damped for the entire travel distance, undamped in end position.

Table 23: Setting dimensions of SK.500/.510

Box	MD	Piston actuator [mm]	Dimension X [mm]	Travel [mm]	Screw 900.2 [mm]
SK.500	30	K35	39	5	M 12 x 1
		K40			
	40	K40	39	7	M 12 x 1
		K50			
	65	K63	39	13	M 12 x 1
		K80			
	92	K80	57	21	M 18 x 1
		K100			
		K160	64		
	115	K100	57	24	M 18 x 1
K160		64			
SK.510	168	K160	92	40	M 18 x 1
		K200			
	202	K200	92	55	M 18 x 1
		KD200			

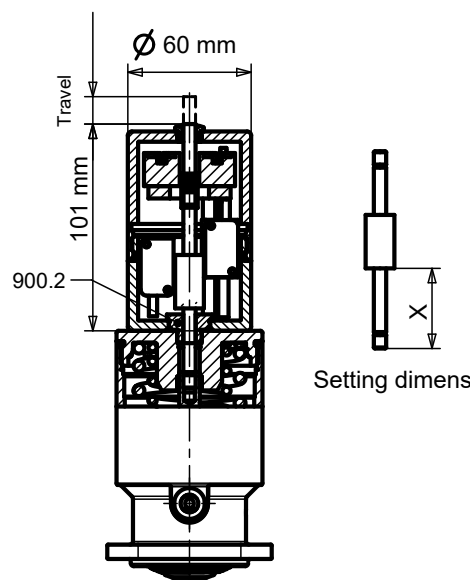


Fig. 41: Design of an SK.500/.510

Table 24: Functional principle of SK.500/.510

Limit positions covered / damped	Intermediate positions covered / damped
Inductive	Inductive
3-wire system	2-wire system

Table 25: Terminal diagram for SK.500/.510

Inductive	Inductive
3-wire system	2-wire system

10.5 SK.500/.510 electrical actual-position feedback unit with inductive limit switch and travel stop

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SK.500: SISTO-C LAP.520 SF/OF/AZ MD 30-MD 115
- SK.510: SISTO-C LAP.520/.530 SF/OF/AZ MD 168-MD 202

Purpose

Electrical position detection for diaphragm valves with pneumatic piston actuator via limit switches and open-position travel stop of the actuators.

Mounting

For a correct setting of the accessory the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.



Fig. 42: Electrical actual-position feedback unit SK.500/.510 with travel stop

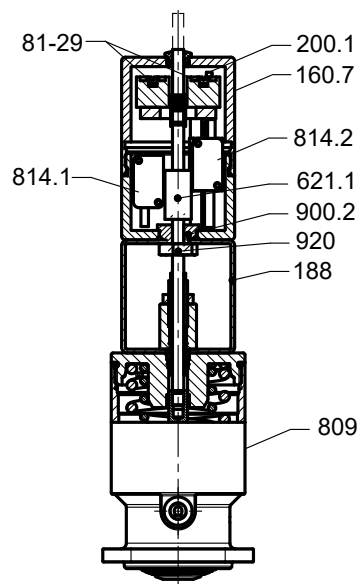


Fig. 43: Design of travel stop and actual-position feedback unit

Adjusting the travel stop and actual-position feedback unit when supplied with the piston actuator:

- Set the travel stop (⇒ Section 10.2, Page 43) .
- Adjust the actual-position feedback unit (⇒ Section 10.4, Page 46) .

Retrofitting an actual-position feedback unit with inductive limit switch and travel stop:

Retrofitting an actual-position feedback unit

1. Remove the plastic cap of piston actuator 809 with an open-ended spanner (WAF13/WAF21). Unscrew position indicator 621.3 (⇒ Fig. 33) .
2. Place fixing plate 188 on the diaphragm valve. Screw the travel stop assembly into the thread of the piston actuator. Tighten it to the specified tightening torque (⇒ Table 20) .
3. Set the travel stop (⇒ Section 10.2, Page 43) .
4. Unscrew and remove cover 160.7.
5. Undo and remove the fastening screw of terminals 81-29.
6. Remove position indicator 621.1.
7. Adjust distance X of the switching flag of position indicator 621.1 (⇒ Table 26) .
8. Place the limit switch box on fixing plate 188. Apply one drop of Loctite 243 to the thread of screw 900.2 and tighten it with a screwdriver.
9. Apply Loctite 243 to the thread of position indicator 621.1. Screw it into the piston rod of piston actuator 809. Loctite 243 thread-locking agent is not included in the scope of supply.

10. Fasten terminals 81-29 with screws again.
11. For the fine adjustment of limit switches 814.1/814.2 turn threaded stem 200.1 with a screwdriver.
12. Screw cover 160.7 back on.
13. Check the switching function.



NOTE

Optionally for diaphragm valve sizes MD 168-MD 202/SK.510 the supplied eyebolts can be used for lifting.

Table 26: Setting dimensions of SK.500/510 and travel stop

Box	MD	Piston actuator [mm]	Dimension X [mm]	Travel [mm]	Screw 900.2 [mm]
SK.500	30	K35	99	5	M 12 x 1
		K40			
	40	K40	99	5	M 12 x 1
		K50			
	65	K63	99	13	M 12 x 1
		K80			
	92	K80	117	21	M 18 x 1
		K100			
		K160	124		
	115	K100	117	24	M 18 x 1
		K160	194		
SK.510	168	K160	192	45	M 18 x 1
		K200			
	202	K200	192	60	M 18 x 1
		KD200			

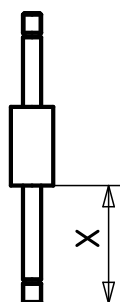


Fig. 44: Setting dimension X at mounting

Table 27: Terminal diagram for SK.500/.510

<div> <div>Open</div> </div> <div> <div>Closed</div> </div>	<div> <div>Open</div> </div> <div> <div>Closed</div> </div>
Inductive	Inductive
3-wire system	2-wire system

10.6 SK.500/.510 electrical actual-position feedback unit with mechanical limit switch

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SK.500: SISTO-C LAP.520 SF/OF/AZ MD 40-MD 115
- SK.510: SISTO-C LAP.520/.530 SF/OF/AZ MD 168-MD 202

Purpose

Electrical position detection for diaphragm valves with pneumatic piston actuator via mechanical limit switches.



NOTE

For retrofitting an actual-position feedback unit indicate the valve size and actuator size in the order.

The 3 position indicator units are adjusted to the diaphragm valve sizes (⇒ Fig. 45) .

Design

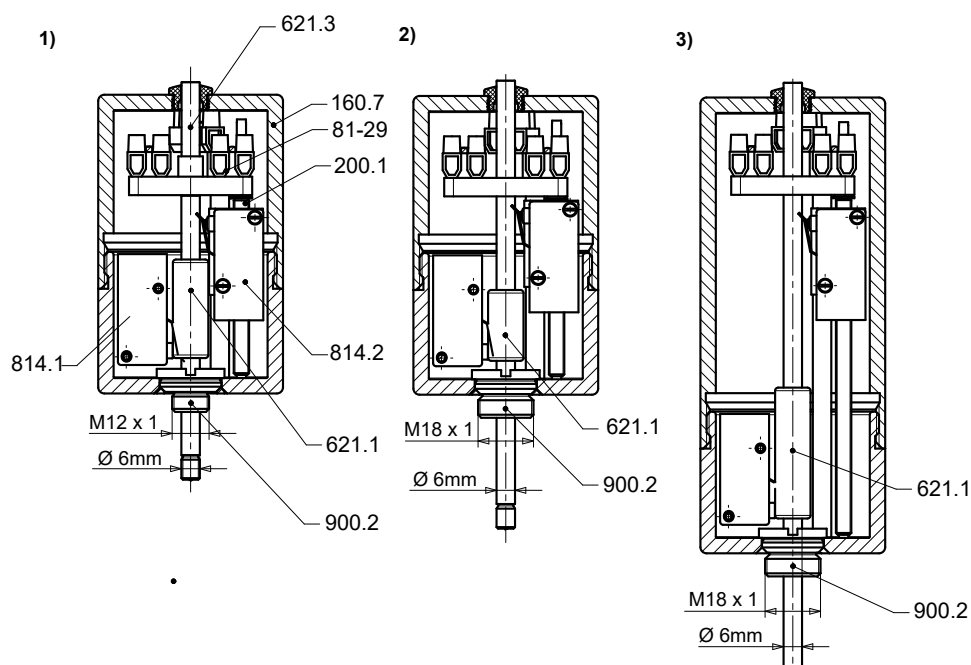


Fig. 45: Overview of SK.500/.510 actual-position feedback units with mechanical limit switch

1	SK.500 (MD 30-65)	2	SK.500 (MD 92-115)	3	SK.510 (MD 168-202)
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Adjusting the actual-position feedback unit when supplied with the piston actuator:

Adjusting the actual-position feedback unit

1. Unscrew and remove cover 160.7.
2. For the fine adjustment of limit switches 814.1/814.2 turn stem 200.1 with a screwdriver.
3. Screw cover 160.7 back on.
4. Check the switching function.

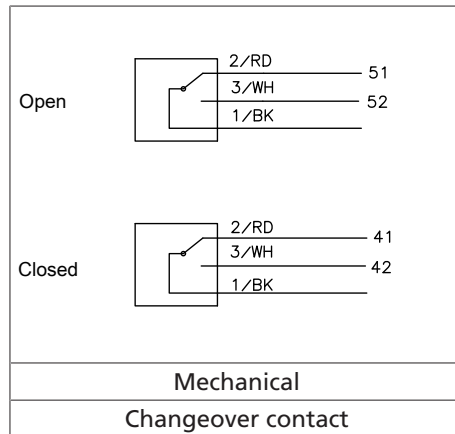
Retrofitting an actual-position feedback unit

Retrofitting an actual-position feedback unit with mechanical limit switch:

For a correct setting of the accessory the upper section of diaphragm valve must be mounted on the body as described in the operating manual.

1. Remove the plastic cap of the piston actuator with an open-ended spanner (WAF13/WAF21). Unscrew and remove position indicator 621.3.
2. Unscrew and remove cover 160.7.
3. Undo and remove the fastening screw of terminals 81-29.
4. Remove position indicator 621.1.
5. Apply one drop of Loctite 243 to the thread of screw 900.2 of the limit switch box. Fasten it to the piston actuator and tighten it with a screwdriver.
6. Apply Loctite 243 to the thread of position indicator 621.1. Screw it into the piston rod of piston actuator 809. Loctite 243 thread-locking agent is not included in the scope of supply.
7. Fasten terminals 81-29 with screws again.
8. For the fine adjustment of limit switches 814.1/814.2 turn stem 200.1 with a screwdriver.
9. Screw cover 160.7 back on.
10. Check the switching function.

Table 28: Terminal diagram for SK.500/.510



10.7 Directly mounted inductive open-position feedback unit

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SISTO-C LAP.520/.530 SF/OF/AZ MD 30-MD 202

Purpose

Actual-position feedback unit for diaphragm valves with pneumatic piston actuator.

Table 29: Inductive feedback unit

Limit switch 814	MD	Piston actuator [mm]	Connection thread [mm]	Screw 900	Adapter 825
SK.500	30	K35	M 12 x 1	X	-
		K40			
	40	K40			
		K50			
	65	K63			
	65	K80	M 18 x 1	-	X
	92	K80			
		K100			
		K160			
	115	K100			
SK.510	115	K160			
	168	K160			
		K200			
	202	K200			
		KD200			



Fig. 46: Directly mounted feedback unit

Design

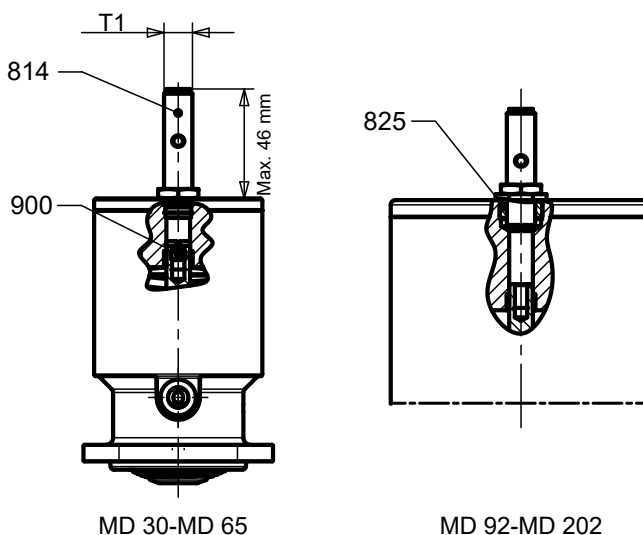


Fig. 47: Design of inductive feedback unit

Retrofitting the inductive feedback unit:

Retrofitting the inductive feedback unit

1. Remove the plastic cap of the piston actuator with an open-ended spanner (WAF13/WAF21). Unscrew position indicator 621.3 (⇒ Fig. 33) .
2. Depending on function SF/OF/AZ: Move the piston actuator to the open position.
3. For piston actuators with M12x1 connection thread fit screw 900 in the piston rod and tighten it.

4. For piston actuators with M18x1 connection thread screw adapter 825 into the piston actuator and tighten it with an open-end spanner (WAF19).
5. Screw inductive limit switch 814 into the connection thread up to screw 900 or up to the piston rod.
6. Back limit switch 814 off one turn. Verify that the LED of the limit switch is lit.
7. Tighten the fastening nut of limit switch 814 (WAF17).
8. Check the switching function again as necessary.

10.8 LAP.525 two-stage actuator

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SISTO-C LAP.525 MD 40 K50
- SISTO-C LAP.525 MD 65 K80
- SISTO-C LAP.525 MD 92-MD 115 K100

Purpose

Diaphragm valves with pneumatic piston actuator with 2 separate stroke ranges.

Table 30: Technical data

MD	Piston actuator [mm]	Fp ²⁷⁾ [N]	F1 (SF) ²⁸⁾ [N]	F2 (SF) ²⁹⁾ [N]	Weight [kg]
40	K50	1037	753	941	3
65	K80	2654	2110	2313	8
92	K100	4209	3180	3637	12
115	K100	4209	3180	3723	12,7

Table 31: Dimensions

MD	Piston actuator [mm]	SK-Box	Height incl. stroke [mm]	D [mm]	B [mm]	Travel [mm]	Air supply connection (G)
40	K50	SK.500	330	60	55	7	M5
65	K80	SK.500	450	89	80	13	G 1/8
92	K100	SK.500	505	110	105	21	G 1/8
115	K100	SK.500	500	110	125	24	G 1/8



Fig. 48: LAP.525 two-stage actuator

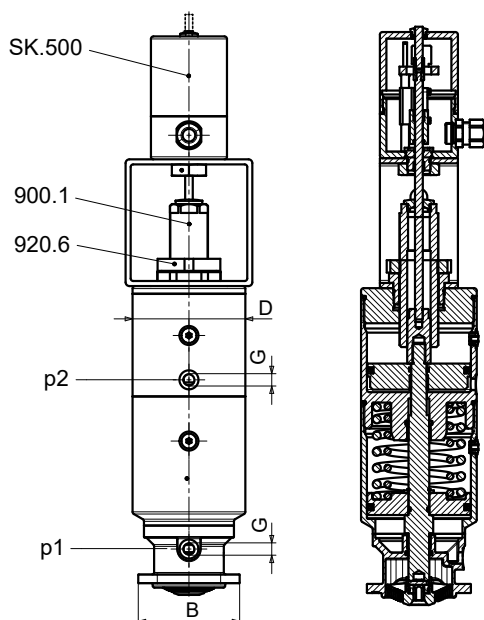


Fig. 49: Two-stage actuator

²⁷⁾ Pressure force at 5.5 bar operating pressure

²⁸⁾ Closing force

²⁹⁾ Spring force in opening direction

Function of the piston actuator, control pressure p1

- When control pressure p1 is applied, the piston actuator moves the full stroke in opening direction.
- When the pressure drops, the piston actuator moves into the closed position (fail-safe position).

Function of the piston actuator, control pressure p2

- When control pressure p2 is applied, the piston actuator moves the set partial stroke in opening direction.
- When the pressure drops, the piston actuator moves into the closed position (fail-safe position).

Function of SK.500

- The lower limit switch detects the closed position of piston actuator stroke 1 (p1) (default setting).
- The limit position of the upper limit switch can either be set to the open position of piston actuator 1 (p1) or to the open position of the limited partial stroke of piston actuator 2 (p2) (default setting).

Setting the stroke:

1. Operate piston actuator 1 (p1).
2. Undo nut 920.6 with a C-spanner to DIN 1810 – A45-50.
3. Set the required partial stroke with screw 900.1.
4. Tighten nut 920.6.
5. The upper limit switch can be set in open position to piston actuator 1 or piston actuator 2 (⇒ Section 10.4, Page 46) .

10.9 Samson 3730-X electro-pneumatic positioner

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SISTO-C LAP.520/.530 SF/OF/AZ MD 30-MD 168

Purpose

Positioner for diaphragm valves with pneumatic piston actuator.



NOTE

Observe the positioner manufacturer's operating manual included with the supply.

Design

Table 32: Interface of the positioner

Screw 900.2 [mm]	Diaphragm diameter (MD)	Piston actuator 809 [mm]
Connection M 12 x 1	30	K35
		K40
	40	K40
		K50
Connection M 18 x 1	65	K63
		K80
	92	K100
		K100
	115	K100
		K160
	168	K160
		K200

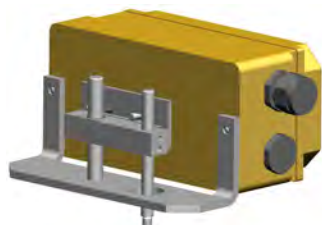


Fig. 50: Electro-pneumatic positioner

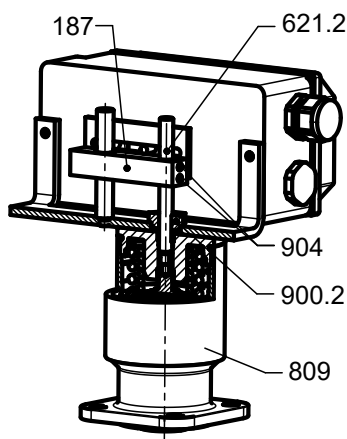


Fig. 51: Design of the positioner

Adjusting the positioner when supplied with the pneumatic piston actuator:

Adjusting the positioner

For a correct setting of the positioner the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.

1. Adjust bracket 187 so that the lever of the positioner is in a horizontal position at half the stroke distance.
2. Re-tighten grub screws 904 with an Allen key (WAF2.5).
3. Check the switching function.

Retrofitting the positioner**Retrofitting the positioner**

1. Remove the plastic cap of piston actuator 809 with an open-ended spanner (WAF13/WAF21). Unscrew position indicator 621.3 of the piston actuator (⇒ Fig. 33) .
2. Fasten the positioner to the piston actuator with screw 900.2 (WAF22).
3. Undo grub screws 904 with an Allen key (WAF2.5).
4. Apply a drop of Loctite 243 to the thread of position indicator 621.2. Screw it into the piston rod of piston actuator 809. Loctite 243 thread-locking agent is not included in the scope of supply.

10.10 Inductive feedback unit for open position and/or closed position

For use with SISTO-C diaphragm valves with pneumatic piston actuator

- SISTO-C LAP.520/.530 SF/OF/AZ MD 30-MD 202

Purpose

Actual-position feedback unit for diaphragm valves with pneumatic piston actuator. Sensor M12 x 1 for all sizes.

Design



Fig. 52: Feedback unit with limit switches

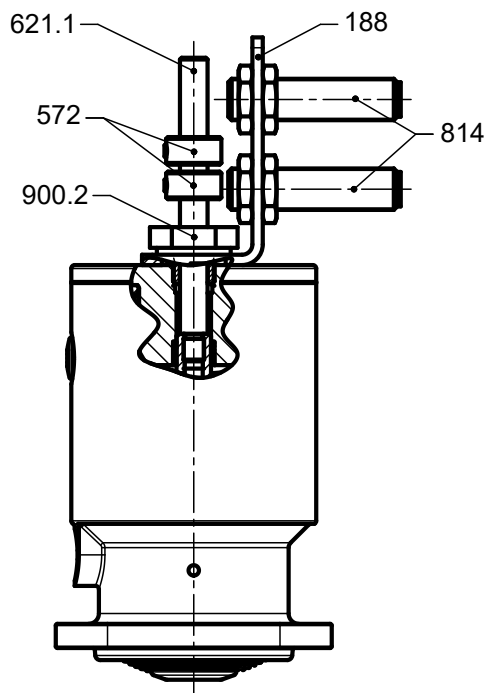


Fig. 53: Design of inductive feedback unit

Setting the limit switches:

Setting the limit switches

1. Undo the grub screw of contact pieces 572 with an Allen key (WAF2.5).
2. Set contact pieces 572 to closed position and/or open position. The sensor reacts when the green LED at the sensor lights up.
3. The distance between limit switches 814 and contact pieces 572 may have to be adjusted. This can be done by using the fastening nut of the sensors (M 12 x 1 = WAF17/M 18 x 1 = WAF24).
4. Check the switching function.

Retrofitting the feedback unit:

Retrofitting the feedback unit

1. Remove the plastic cap of the piston actuator with an open-ended spanner (WAF13/WAF21). Unscrew position indicator 621.3 (⇒ Fig. 33) .
2. Apply Loctite 243 to the thread of position indicator 621.1. Screw it into the piston rod of the piston actuator. Loctite 243 thread-locking agent is not included in the scope of supply.
3. Place fixing plate 188 with limit switch 814 on the diaphragm valve with piston actuator. Fasten it with screw 900.2 (WAF22).

11 Setting and using variants for SISTO-C diaphragm valves

11.1 Mechanical closed-position and open-position travel stop

For use with SISTO-C diaphragm valves

- SISTO-C HV.523 MD 168-MD 202

Purpose

Closed-position and open-position travel stop for diaphragm valves.

Design



Fig. 54: Open-position

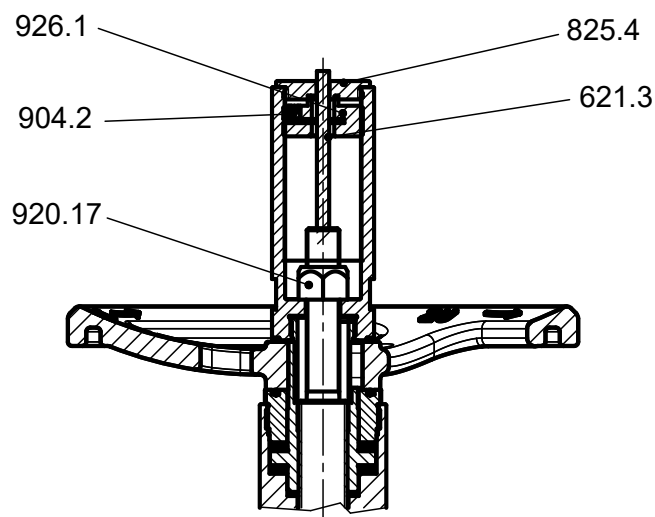


Fig. 55: Closed-position and open-position travel stop MD 168-MD 202

Setting the closed-position travel stop:

Setting the closed-position travel stop

For a correct setting of the travel stop the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.

1. Screw on adapter cover 825.4 with an open-ended spanner (WAF46).
2. Undo grub screw 904.2 with an Allen key (WAF3).
3. Unscrew position indicator 621.3 as required.
4. Unscrew prevailing torque nut 926.1 with a socket wrench (WAF15).
5. Adjust nut 920.17 (WAF24), e.g. with a socket wrench (21 x 24 DIN 896 B), to set the travel as required.

Setting the open-position travel stop:

Setting the open-position travel stop

For a correct setting of the travel stop the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.

1. Screw on adapter cover 825.4 with an open-ended spanner (WAF46).
2. Adjust prevailing torque nut 926.1 with a socket wrench (WAF15) and set the travel as required.
3. Tighten grub screw 904.2 with the Allen key (WAF3) to firmly fasten prevailing torque nut 926.1.
4. Screw in adapter cover 825.4. Tighten it with an open-ended spanner (WAF46).

11.2 Diaphragm valve with locking device

For use with SISTO-C diaphragm valves

- SISTO-C HV.514/.524 MD 40-MD 115
- SISTO-C HV.524 MD 168-202 (available on request)

Purpose

Handwheel locking device including padlock for diaphragm valves.

Design



Fig. 56: Upper section of the diaphragm valve with handwheel locking device

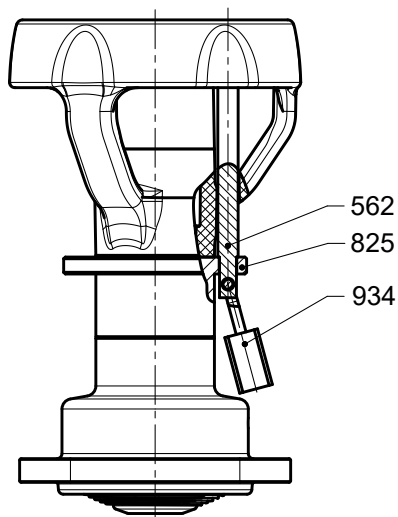


Fig. 57: Upper section of the diaphragm valve with handwheel locking device MD 40-MD 115

Fitting the locking device:

1. Remove padlock 934 and parallel pin 562.
2. Set the diaphragm valve to the required position.
3. Then insert parallel pin 562 into the hole of handwheel and adapter 825.
4. Feed padlock 934 through the radial bore of parallel pin 562 and lock it.

11.3 Diaphragm valve with stem extension

For use with SISTO-C diaphragm valves

- SISTO-C HV.516/.526 MD 40-MD 115
- MD 30 on request

Purpose

Diaphragm valve with stem extension. (Handwheel arranged higher in relation to the piping).

Design



Fig. 58: Upper section of the diaphragm valve with stainless steel handwheel and stem extension

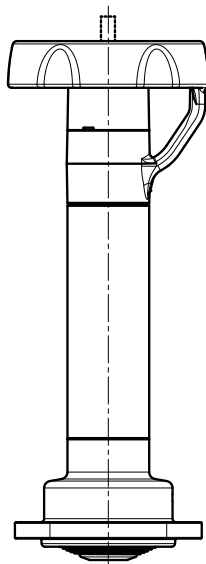


Fig. 59: Upper section of the diaphragm valve with stem extension

Function

Function see "Function of diaphragm valve with handwheel" (⇒ Fig. 3) .

11.4 Diaphragm valve with limit switches

For use with SISTO-C diaphragm valves

- SISTO-C HV.518/.528 MD 40-MD 115
- SISTO-C HV.528 MD 168

Purpose

Diaphragm valve with position detection by inductive closed-position and open-position limit switches.

Design



Fig. 60: Upper section of the diaphragm valve with limit switches

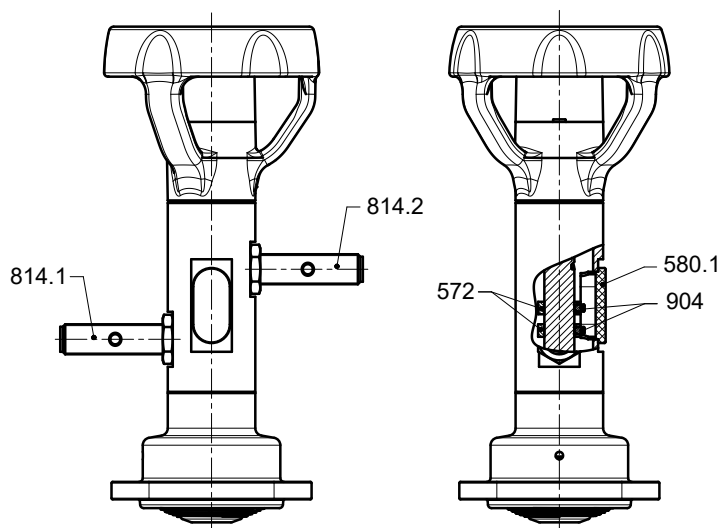


Fig. 61: Upper section of the diaphragm valve with limit switches

Setting the limit switches:

Setting the limit switches

Limit switches 814.1/814.2 are supplied set to closed position and open position. Should this setting need to be changed:

1. For a correct setting of the limit switches the upper section of the diaphragm valve must be mounted on the body as described in the operating manual.
2. Remove cap 580.1.
3. Undo grub screw 904 and position contact pieces 572 as required.
4. Tighten grub screw 904 again.
5. Check the limit switch function.

11.5 Diaphragm valve with pneumatic fail-safe action

For use with SISTO-C diaphragm valves

- SISTO-C HV.519/.529 MD 40-MD 92

Purpose

The diaphragm valve can be actuated when the pneumatic piston actuator is activated (pneumatic release).

Design



Fig. 62: Diaphragm valve with fail-safe action

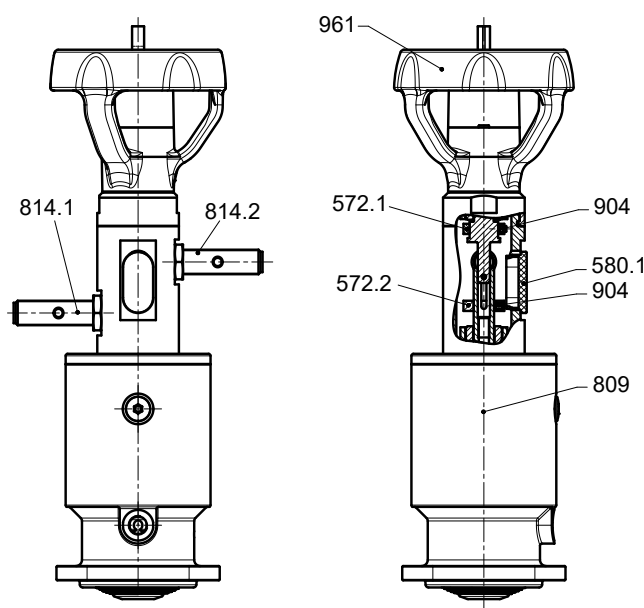


Fig. 63: Diaphragm valve with pneumatic fail-safe action

Function

- If the control pressure of the piston actuator is interrupted, the actuator moves to the closed position = fail-safe position.
- Lower limit switch 814.1 signals this position of piston actuator 809.
- To release the valve from fail-safe position, handwheel 961 has to be moved to closed position.
- Upper limit switch 814.2 signals the closed position.
- Apply pressure to the piston actuator.
- Then slowly open the diaphragm valve again with handwheel 961.
- The two limit switches are supplied set as follows:
Lower limit switch 814.1: Closed position of piston actuator 809.
Upper limit switch 814.2: Closed position of the handwheel.

Adjusting the limit switch settings:

Adjusting the limit switch settings

1. Remove cap 580.1.
2. Undo grub screw 904 with an Allen key.
3. Position contact pieces 572.1 or 572.2 as required.
4. Tighten grub screw 904 again.

12 EU Declaration of Conformity**12.1 EU Declaration of Conformity of SISTO-C/-B**

Hereby we,

SISTO Armaturen S.A.
18, rue Martin Maas
6468 Echternach (Luxembourg)

declare that **the product:**

diaphragm valves and
diaphragm valves with pneumatic actuator

SISTO-C

PN 16

DN 32-300

SISTO-B

PN 10

DN 32-100

satisfies the safety requirements laid down in the European Pressure Equipment Directive 2014/68/EU.

Suitable for:

Fluids in Groups 1 and 2

Conformity assessment procedure:

Module H

Name and address of the notified body responsible for approval and surveillance:

TÜV Rheinland Industrie Service GmbH
Zertifizierungsstelle für Druckgeräte
Am Grauen Stein
51105 Köln (Germany)


Identification number of the notified body:

0035

Valves \leq DN 25 comply with the European Pressure Equipment Directive 2014/68/EU, Article 4, Section 3. They must bear neither the CE marking nor the identification number of a notified body.

The EU Declaration of Conformity was issued in/on:

Echternach, 16 February 2023



Bernd Hackenberger
Head of Design and Development



Pascal Wagner
Head of Integrated Management Systems

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