

SISTO-SK-i.310
Intelligent Actual-position Feedback Unit

Operating Manual



Legal information/Copyright

Operating Manual

Original operating manual

All rights reserved. The contents provided herein must neither be distributed, copied, reproduced, edited or processed for any other purpose, nor otherwise transmitted, published or made available to a third party without the manufacturer's express written consent.

Subject to technical modification without prior notice.

© 2025-01-21

Contents

	Glossary	5
1	General	6
	1.1 Principles	6
	1.2 Contact data	6
	1.3 Target group	6
	1.4 Other applicable documents	6
	1.5 Symbols	6
	1.6 Key to safety symbols/markings.....	7
2	Safety.....	8
	2.1 General.....	8
	2.2 Intended use	8
	2.2.1 Prevention of foreseeable misuse	8
	2.3 Personnel qualification and training	9
	2.4 Consequences and risks caused by non-compliance with this manual.....	9
	2.5 Safety awareness.....	9
	2.6 Safety information for the operator/user.....	9
	2.7 Safety information for maintenance, inspection and installation	10
	2.8 Unauthorised modes of operation	10
3	Transport/Storage/Disposal	11
	3.1 Checking the condition upon delivery.....	11
	3.2 Transport.....	11
	3.3 Storage/preservation.....	11
	3.4 Disposal.....	11
4	Description	12
	4.1 SISTO-SK-i.310	12
	4.2 Design details	12
	4.3 Variants	12
	4.4 Materials.....	12
	4.5 Function.....	13
	4.6 Auxiliary energy supply failure.....	13
	4.7 Design.....	14
	4.8 Ordering key.....	15
	4.9 Name plate	15
	4.10 Scope of delivery.....	16
	4.11 Dimensions and weights.....	16
5	Technical data.....	17
	5.1 Permissible ambient conditions.....	17
	5.2 Standards and technical codes / directives	17
	5.3 Displacement/position measurement system	17
	5.4 Technical data of SISTO-SK-i.310 24 V.....	17
	5.5 Additional technical data of SISTO-SK-i.310 with solenoid valve	18
	5.6 Pneumatic connection	19
	5.7 Dimensions and weights.....	20
	5.7.1 Mechanical data.....	20
6	Assembly / Installation	21
	6.1 General information/Safety regulations	21
	6.2 Installation instructions	22
	6.2.1 Mounting the actual-position feedback unit onto the process valve	23
	6.2.1.1 Mounting the actual-position feedback unit onto the SISTO-C LAP.520 valve actuator	23

6.2.1.2	Mounting the actual-position feedback unit onto the SISTO industrial valve (SISTO-16/-20/-KB)	23
6.2.1.3	Mounting the actual-position feedback unit onto linear valves from other manufacturers	23
6.2.2	Electrical installation	24
6.2.3	Pneumatic installation (for actual-position feedback unit with solenoid valve only)	24
6.3	Exchanging the adapter kit	25
6.4	Mounting onto linear valves from other manufacturers	25
7	Commissioning/Start-up	26
7.1	Prerequisites for commissioning/start-up	26
7.2	Performing initialisation	27
8	Maintenance and Cleaning	28
8.1	Maintenance	28
8.2	Cleaning	28
9	Shutdown / Removal	29
9.1	Resetting the actual-position feedback unit to factory settings	29
9.2	Shutdown	29
9.3	Measures to be taken for shutdown	29
9.4	Removing the actual-position feedback unit	29
10	Trouble-shooting	30
11	Accessories	32
11.1	Set comprising programming magnet, Allen key and lanyard	32
12	Declaration of Incorporation	33
12.1	Declaration of Incorporation of Partly Completed Machinery	33
13	EU Declaration of Conformity	34
13.1	EU Declaration of Conformity	34
	Index	35

Glossary

24 V

Communications system with discrete digital inputs and digital outputs

AS-i

AS interface (abbreviation for Actuator Sensor interface) – standard interface for field bus communication for connecting actuators and sensors in accordance with IEC 62026-2.

AZ actuator

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

DI

Digital input, binary input

DO

Digital output, binary output

IO-Link

Communications system for connecting intelligent sensors and actuators to an automation system in accordance with the IEC 61131-9 standard.

LAP

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

MD

Diaphragm diameter, numeric designation of the diaphragm size

MV

Solenoid valve

OF actuator

Opening spring = pneumatic piston actuator, fail-open (spring-to-open / air-to-close)

SF actuator

Closing spring = pneumatic piston actuator, fail-close (air-to-open / spring-to-close)

1 General

1.1 Principles

This operating manual is valid for the type series and variant 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

SISTO Armaturen S.A.
 Complaint Management
 18, rue Martin Maas
 L-6468 Echternach
 Luxembourg

Tel.: +352 32 50 85-1

Fax: +352 32 89 56

Email: info@sisto-aseptic.com

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 documents

Table 1: Overview of other applicable documents

Document	Contents
Type series booklet 8676.5	Description of SISTO-SK-i.310
Operating manual 0570.822	Operating manual of SISTO-C diaphragm valves
SISTO catalogue 8652.10	Sterile Processes catalogue









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. 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.
	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.
	Warning: Strong magnetic field In conjunction with one of the signal words this symbol indicates a hazard involving magnetic fields and identifies information about protection against magnetic fields.
	Warning for persons with pacemaker In conjunction with one of the signal words this symbol indicates a hazard involving magnetic fields and identifies special information for persons with a pacemaker.



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.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- 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.
- Instructions and information attached to the actual-position feedback unit, the respective valve and the accessories must always be complied with and kept in a perfectly legible condition at all times.
- 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.

2.2 Intended use

- The SISTO-SK-i.310 actual-position feedback unit signals and controls (optional) the position of pneumatic valve actuators.
- Only operate actual-position feedback units which are in perfect technical condition.
- The actual-position feedback unit must only be operated within the operating limits described in the other applicable documents.
- Consult the manufacturer about any other modes of operation not described in the product literature.
- The actual-position feedback unit's cover must not be removed.

2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the product literature regarding pressure, temperature, etc.
- Observe all safety information and instructions in this manual.
- Do not supply the following fluids to the actual-position feedback unit's air supply connections:
 - Liquids
 - Solids-laden fluids
 - Aggressive fluids
 - Combustible fluids
- Never use the actual-position feedback unit in potentially explosive atmospheres.
- Prevent any moisture ingress into the actual-position feedback unit's housing.
- The actual-position feedback unit's housing must not be subjected to mechanical loads.
- When laying the power cables and the existing pneumatic lines, ensure that forces are not transmitted to the actual-position feedback unit.

- Protect the actual-position feedback unit from sources of radiation (e.g. sun).
- Protect the actual-position feedback unit against vibrations.
- Regularly check that the electrical and pneumatic connections and the connection to the pneumatic valve actuator are properly fitted.

2.3 Personnel qualification and training

- All personnel involved must be fully qualified to install, operate, maintain and inspect the product this manual refers to.
- 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 product must always be supervised by specialist technical personnel.

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

- Non-compliance with this operating manual 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:
 - Hazard to persons by thermal and mechanical effects
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices

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 actual-position feedback unit including valve is intended for use in areas which cannot be accessed by unauthorised persons. Operation of the valve 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.
- Ensure that the system and system section are in a safe state that allows safe operation of the valve.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the actual-position feedback unit and 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.
- Shut down the systems before performing work on the actual-position feedback unit and the valve.
- Ensure that the recognised safety regulations and technical rules are complied with when planning assignments and operating the equipment.
- When taking the actual-position feedback unit out of service always adhere to the procedure described in the operating manual.
- 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 7, Page 26)

2.8 Unauthorised modes of operation

- The actual-position feedback unit is operated outside the limits stated in the operating manual.
- The actual-position feedback unit is not operated in accordance with the intended use.

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

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.

If the actual-position feedback unit has been ordered as a unit together with a pneumatic valve actuator, the actual-position feedback unit will be supplied mounted to the pneumatic valve actuator.

3.2 Transport

Take suitable precautions to prevent damage during transport.

Dispose of the transport packaging in accordance with the respective disposal regulations/environmental protection regulations.

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 actual-position feedback unit must ensure that, even after a prolonged period of storage, its function is not impaired.
- For this reason, the actual-position feedback unit must be stored in its original packaging in a dry, dark and dust-free location.
- The storage room temperature must be between +10 °C and +30 °C.

3.4 Disposal

1. Dismantle the actual-position feedback unit.
2. Separate and sort the materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
3. Dispose of materials in accordance with local regulations or in another controlled manner.

4 Description

4.1 SISTO-SK-i.310



Fig. 1: SISTO-SK-i.310

4.2 Design details

- Compact actual-position feedback unit for mounting on linear valves
- Electrical connection via M12 plug
- Continuous valve travel recording via non-contact, wear-free measurement system
- Open/closed position feedback and fault status via digital output
- Status indication and position indication via high-visibility LEDs
- Pneumatic actuator control via integrated pilot valve (optional)

4.3 Variants

Process interfaces

24 V

IO-Link¹⁾

AS-i¹⁾

Control

- Actual-position feedback unit
- Actual-position feedback unit with integrated 3/2-way solenoid valve for decentralised process automation
 - SF or OF actuator: 1 solenoid valve
 - AZ actuator: 2 solenoid valves

4.4 Materials

Table 4: Overview of available materials

Description	Material	Material number
Lower housing section	Plastic, black	PA66-GF30
Housing cover	Plastic, transparent	PA6
Electrical connection	X2CrNiMo17-12-2	1.4404

¹ Expected to be available from the third quarter of 2025

4.5 Function

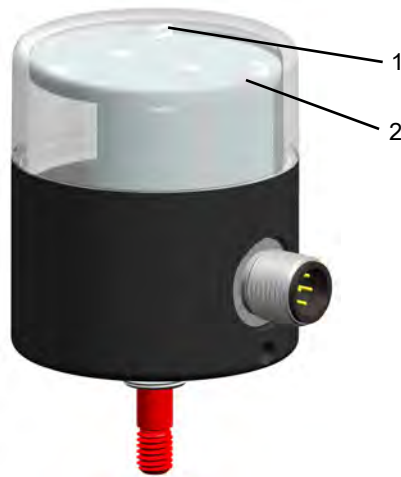


Fig. 2: Indicator and operating elements of SISTO-SK-i.310

1	High-visibility LED	2	Magnetic sensor for on-site initialisation
---	---------------------	---	--

Table 5: Colour code of high-visibility LED

Colour code of high-visibility LED	Operating status
Orange	Valve position, open
Green	Valve position, closed
Red	Fault
White	Initialising
Blue	Not initialised

The SISTO-SK-i.310 actual-position feedback unit signals and controls the position of pneumatically actuated linear valves (optional).

The actual-position feedback unit signals the valve position (open or closed) visually by means of coloured high-visibility LEDs and electrically via digital outputs.

User-friendly setting of limit positions and fast commissioning by automatic initialisation in situ or via a process control system.

The optional integrated solenoid valve can be used to control the process valve via the actual-position feedback unit's electric interface.

The actual-position feedback unit analyses the valve position via an integrated microcontroller. The valve position is recorded digitally via a non-contact displacement/ position measurement system (Hall effect sensor).

4.6 Auxiliary energy supply failure

A valve fitted with an SK-i with integrated solenoid valve and actual position feedback adopts the actuator's fail-safe position in the event of a control air supply failure or power supply failure:

- SF actuator = Closed
- OF actuator = Open
- AZ actuator = Undefined

The limit positions saved during initialisation are retained even in the event of a power failure. Once the power supply and control air supply are re-established, the actuator/ valve assembly adopts the operating status currently requested via the process interface.

4.7 Design

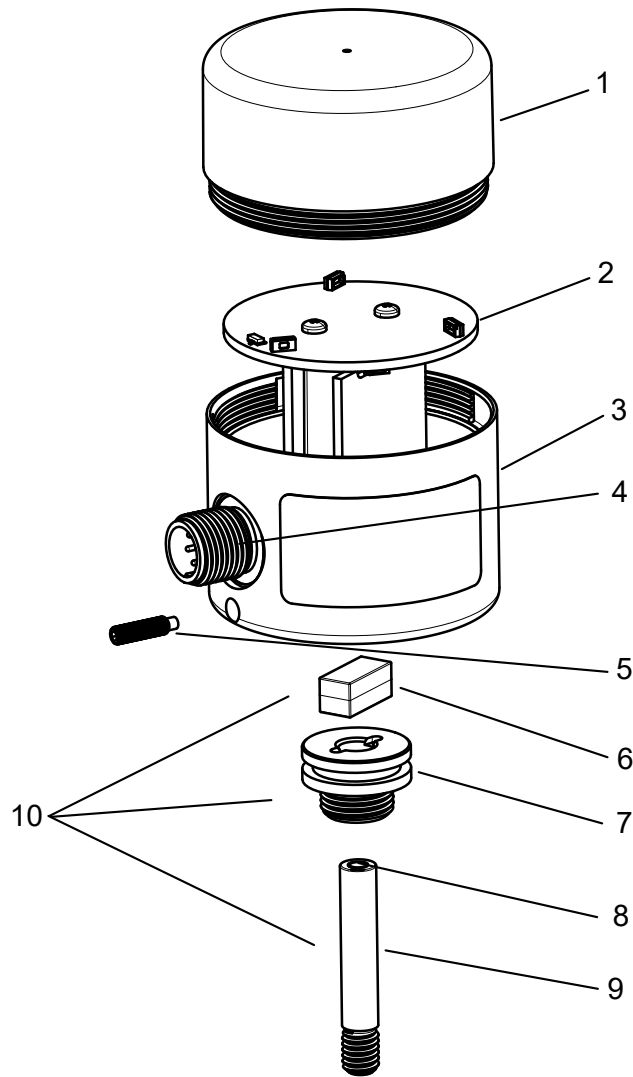


Fig. 3: SISTO-SK-i.310 design

Number	Description	Material
1	Housing cover	PA6
2	Electronic unit	-
3	Lower housing section	PA66GF30
4	Electrical connection	A2
5	M3 grub screw	A2
6	"Target" magnet	NdFeB
7	Adapter M12/M18	POM
8	"Driver" magnet	NdFeB
9	Rod M6	PA
10	Adapter kit	-

Not listed: NBR sealing elements

4.8 Ordering key

	3	1	0	24	0M	30	00	01
Ordering example: SK-i.	3	1	0	24	0M	30	00	01
Product generation	3							
Housing material								
Plastic		1						
Interface								
24 V				24				
IO-Link ²⁾				IO				
AS interface ²⁾				AS				
Control								
0 MV					0M			
1 MV (SF/OF)					1M			
2 MV (AZ)					2M			
Size								
Standard (stroke: 30 mm)						30		
High (stroke: 60 mm)						60		
Approval								
EU							00	
Design								
SISTO-C LAP.520 MD 30 - MD 65								01
SISTO-C LAP.520 MD 92- MD 115 K100								02
SISTO-C LAP.520 MD 115 K160								03
SISTO-C LAP.520 MD 168								04
SISTO-C LAP.520 MD 202								05

4.9 Name plate



Table 6: Name plate

Manufacturer's mark	SISTO
Type series / model	SK-i.310
Part number (PN)	42.....
Serial number (SN)	xxxxxx
Connection data	e.g. 24 V DC
Maximum current input	e.g. max. 80 mA
CE conformity marking	CE

² Expected to be available from the third quarter of 2025

4.10 Scope of delivery

- SK-i.310
- Adapter kit
- Operating manual

4.11 Dimensions and weights

For dimensions and weights refer to the Technical Data section. (⇒ Section 5.7, Page 20)

5 Technical data

5.1 Permissible ambient conditions

Table 7: Permissible ambient conditions

Characteristic	Value
Permissible operating temperature	-20 °C to +60 °C
Relative humidity	Max. 80 % (non-condensing)
Environment	Use inside buildings
Altitude	Up to 2000 m (MSL)
Installation position	Any
Enclosure to EN 60529	IP65 (with closed cover only)
Appliance class to EN 61140	Appliance class III (protection by extra-low voltage)

5.2 Standards and technical codes / directives

Standards

Enclosure to EN 60529	IP65
Safety class to EN 61140	Safety class III

Directives

EMC Directive	2014/30/EU
RoHS Directive	2011/65/EU
Machinery Directive	2006/42/EG

5.3 Displacement/position measurement system

Table 8: Displacement/position measurement system

Characteristic	Value
Measurement principle	Hall effect sensor
Measuring range	0 - 32 mm/0 - 62 mm

5.4 Technical data of SISTO-SK-i.310 24 V

Table 9: Electrical data of SISTO-SK-i.310 24 V

Characteristic	Value
Electrical connection	8-pin M12 round plug connector
Supply voltage [V]	24 +/- 10 %
Current input [mA]	80
Duty ratio	100 %
Digital outputs	24 V, max. 100 mA, short-circuit-proof <ul style="list-style-type: none"> ▪ Open ▪ Closed ▪ Fault
Digital inputs	24 V, low: 0 - 3 V, high: 18 - 24 V <ul style="list-style-type: none"> ▪ Remote initialisation

Table 10: Pin assignment of SISTO-SK-i.310 24 V

Plug	Pin	Assignment
	1	+ 24 V
	2	DO Open
	3	0 V
	4	DO Closed
	5	DI Teach-in
	6	DI Solenoid valve ³⁾
	7	DO Fault
	8	Not used

5.5 Additional technical data of SISTO-SK-i.310 with solenoid valve

Table 11: Electrical data

Characteristic	Value
Current input [mA]	140
Additional digital input	24 V, low: 0 - 3 V, high: 18 - 24 ▪ Solenoid valve

Table 12: Pneumatic data

Characteristic	Value
Threaded port	Internal thread M5
Flow rate [$l_N/min.$]	19
P max. [bar]	8

SISTO-SK-i.310 with solenoid valve is suitable for compressed air as control fluid in accordance with ISO 8573-1.

Table 13: Quality class of air as control fluid

	Operation above 0 °C	Operation down to -20 °C
Quality class	5.4.3	5.3.3
Filter	40 μm	40 μm
Oil concentration	$\leq 1 \text{ mg}/\text{m}^3$	$\leq 1 \text{ mg}/\text{m}^3$
Dew point	$\leq +3 \text{ }^\circ\text{C}$	$\leq -20 \text{ }^\circ\text{C}$

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

³⁾ With integrated solenoid valve only

5.6 Pneumatic connection

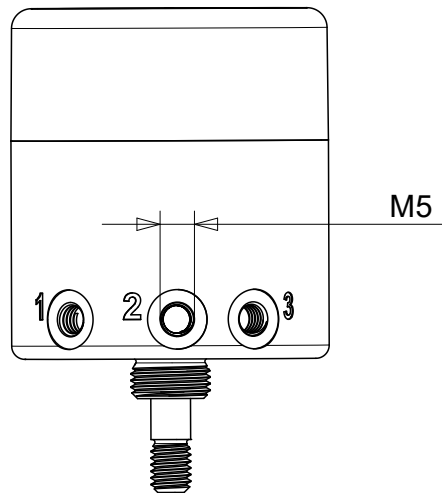


Fig. 4: Pneumatic connection of SK-i.310

Table 14: Terminal configuration

Connection	Assignment	Connection
1	Air supply	
2	Actuator	
3	Air outlet	

5.7 Dimensions and weights

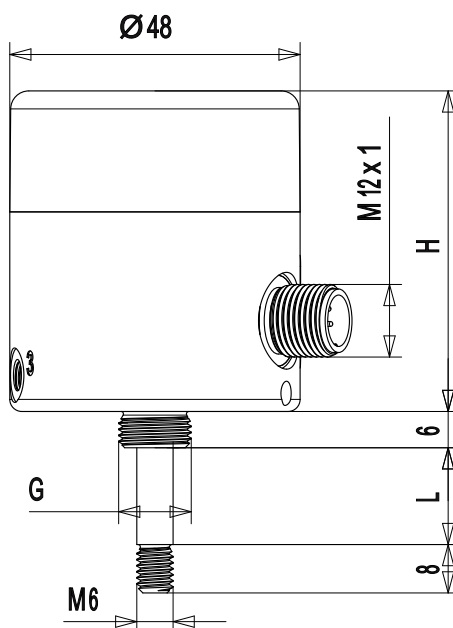


Fig. 5: SISTO-SK-i.310

5.7.1 Mechanical data







Table 15: Dimensions table of SISTO-SK-i.310


Valve actuator	SISTO-C LAP.520				
Order code for mounting options ⁴⁾	01	02	03	04	05
Diaphragm diameter	30 - 65	92 - 115	115 K160	168	202
Adapter thread G	M12 x 1			M18 x 1	
Max. stroke L	16	30	36	56	67,5
Rod length [mm]	28	46	52	72	83,5
Size [mm]	30			60	
Height H [mm]	53			83	
Diameter [mm]	48				
Weight [kg]	0,07			0,08	

⁴ Further mounting variants available on request

6 Assembly / Installation


6.1 General information/Safety regulations


	<p>⚠ DANGER</p> <p>Use in potentially explosive atmospheres Explosion hazard!</p> <ul style="list-style-type: none"> ▶ Never use the actual-position feedback unit in potentially explosive atmospheres.
	<p>⚠ DANGER</p> <p>Magnetic radiation Malfunction of or interference with pacemakers or implanted defibrillators due to permanent magnets ("target" magnet / "driver" magnet)! Interference with magnetic data carriers, electronic devices, components and instruments!</p> <ul style="list-style-type: none"> ▶ Persons wearing such devices must maintain a sufficient safety distance.
	<p>CAUTION</p> <p>Magnetic attraction When handling the "target magnet", strong acceleration can occur due to magnetic attraction of objects in the vicinity!</p> <ul style="list-style-type: none"> ▶ Maintain a sufficient safety distance. ▶ Take special care when handling permanent magnets.
	<p>CAUTION</p> <p>Loss of function Damage to the pneumatic unit!</p> <ul style="list-style-type: none"> ▶ The following fluids must not be supplied to the actual-position feedback unit's air supply connections: ⇒ No liquids ⇒ No aggressive fluids ⇒ No solids-laden fluids ⇒ No combustible fluids
	<p>CAUTION</p> <p>Risk of damage</p> <ul style="list-style-type: none"> ▶ The cover of SK-i.310 must not be removed.
	<p>NOTE</p> <p>When using the actual-position feedback unit in a humid environment, ensure that moisture can run off and does not penetrate the housing. The actual-position feedback unit's housing must not be subjected to mechanical loads. When laying the power cables and the existing pneumatic lines, ensure that forces are not transmitted to the actual-position feedback unit.</p>

	NOTE
	<p>Regularly check that the electrical and pneumatic connections and the connection to the pneumatic valve actuator are properly installed.</p>

The operator is responsible for the safety of the system into which the actual-position feedback unit is integrated.

6.2 Installation instructions

	⚠ WARNING
	<p>Improper assembly / installation Risk of injury!</p> <ul style="list-style-type: none"> ▷ Assembly / installation must only be performed by qualified personnel using suitable tools. ▷ Shut down the system before performing work on the SISTO-SK-i.310 actual-position feedback unit. ▷ Before returning the unit to service, observe all instructions on commissioning/start-up. (⇒ Section 7, Page 26)

	CAUTION
	<p>Incorrect mounting or connection Incorrect commissioning/start-up!</p> <ul style="list-style-type: none"> ▷ Check whether the actual-position feedback unit has been properly mounted onto the valve actuator. ▷ Prior to commissioning/start-up, check whether the electrical and pneumatic connections have been properly connected.

The installation must be carried out carefully and in accordance with the following instructions.

6.2.1 Mounting the actual-position feedback unit onto the process valve

6.2.1.1 Mounting the actual-position feedback unit onto the SISTO-C LAP.520 valve actuator

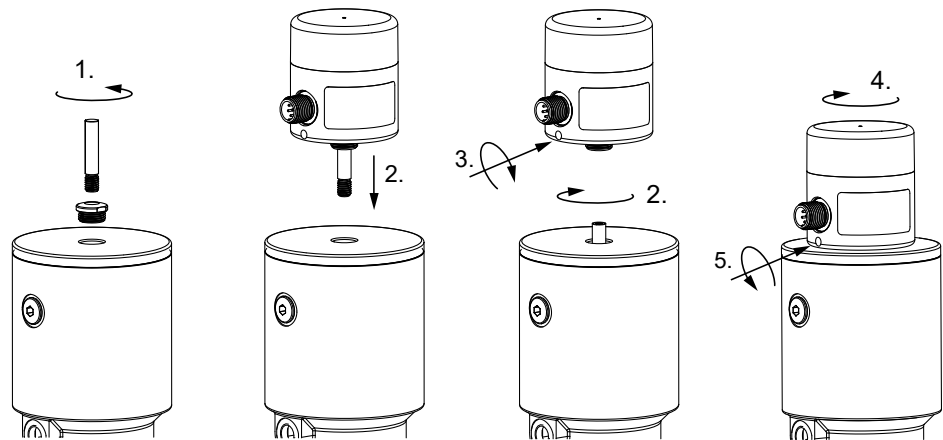


Fig. 6: Individual installation steps

1. Remove the guide bush and the position indicator from the pneumatic valve actuator.
2. Pull the (magnetically coupled) rod (⇒ Fig. 3) out of the actual-position feedback unit and screw it into the valve actuator's piston rod.
3. Screw in the lateral grub screw (max. 1 Nm) to secure the adapter to the actual-position feedback unit.
4. Screw the actual-position feedback unit into the valve actuator's thread M12/M18 (accessory) until it will not go any further, and tighten it slightly. This re-establishes the magnetic connection between the rod and the integrated "target" magnet.
5. Undo the lateral grub screw by one turn so that the actual-position feedback unit can be freely positioned. This prevents the actual-position feedback unit from being removed unintentionally.

6.2.1.2 Mounting the actual-position feedback unit onto the SISTO industrial valve (SISTO-16/-20/-KB)

Mounting is performed in the same way as described in (⇒ Section 6.2.1.1, Page 23) .

- Screw the rod into the thread of the valve actuator's piston rod.
- Screw the adapter (⇒ Fig. 3) into the valve actuator's thread M12/M18 (accessory).

6.2.1.3 Mounting the actual-position feedback unit onto linear valves from other manufacturers


The actual-position feedback unit can be mounted onto valves from other manufacturers upon request.

Unless described otherwise in separate instructions, mounting is performed in the same way as per (⇒ Section 6.2.1.1, Page 23) .

- Screw the rod into the thread of the actuator's piston rod.
- Screw the adapter (⇒ Fig. 3) into the actuator's thread (accessory).

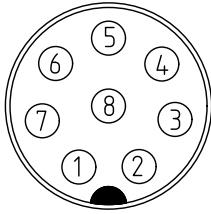
The safety instructions in the Safety section also apply. (⇒ Section 2.7, Page 10)

6.2.2 Electrical installation


	<p>⚠ DANGER</p>
	<p>Use in potentially explosive atmospheres Explosion hazard!</p> <p>▷ Never use the actual-position feedback unit in potentially explosive atmospheres.</p>

1. Check the supply voltage and the voltage of the digital inputs.
2. Fit the M12 socket to the M12 plug on the actual-position feedback unit by exerting slight pressure and screw it in place. Watch the correct position of the misplug protection feature.

Table 16: Pin assignment of SISTO-SK-i.310 24 V

Plug	Pin	Assignment
	1	+ 24 V
	2	DO Open
	3	0 V
	4	DO Closed
	5	DI Teach-in
	6	DI Solenoid valve ⁵⁾
	7	DO Fault
	8	Not used


6.2.3 Pneumatic installation (for actual-position feedback unit with solenoid valve only)

	<p>⚠ WARNING</p>
	<p>Danger due to pressure Risk of injury!</p> <p>▷ Prior to undoing the air supply connections, release the pressure from the supply line, vent the line and secure it against refilling.</p>

SK-i.310 actual-position feedback units with integrated solenoid valve(s) are supplied with pre-fitted tube connections (for pneumatic tubing with an outside diameter of 6 mm).

Take the following steps prior to commissioning/start-up:

- Connect supply air port 1 (⇒ Fig. 4) with the compressed air supply system available on site.
- Connect actuator port 2 (⇒ Fig. 4) with the control air port of the pneumatic actuator.
- Optional: Replace the silencer in threaded port 3 (⇒ Fig. 4) with a tube connector if the exhaust air is to be released via an exhaust line.
- Check that all pneumatic connections are correct and tight.

	<p>CAUTION</p>
	<p>Reducing the flow rate on vent connection port 3 Increased pressure in the upper housing section</p> <p>▷ Do not use chokes or similar devices in vent connection port 3.</p> <p>▷ Ensure that the vent lines are unpressurised at all times.</p> <p>▷ Connect the vent lines without transmitting any stresses or strains and avoid any kinks.</p>

⁵ With integrated solenoid valve only

6.3 Exchanging the adapter kit

The SISTO SK-i.310 actual-position feedback unit is supplied (as per ordering key) with an adapter kit that matches the specified valve size.

If the actual-position feedback unit is to be used for another actuator size, the adapter kit can be exchanged.

Alternative adapter kits can be obtained from SISTO Armaturen S.A.

Perform the following steps to exchange the adapter kit:

- Observe the measures to be taken for shutdown. (⇒ Section 9.3, Page 29)
- Undo the M3 x 12 grub screw by two turns. (⇒ Fig. 3)
- Remove the rod with "target" magnet and adapter from the actual-position feedback unit.
- Insert a new rod with "target" magnet and new adapter into the actual-position feedback unit.
- Secure the M3 x 12 grub screw.
- Pull the rod out again (max. 1 Nm) to mount the actual-position feedback unit onto the actuator.
- Screw the rod into the actuator. Screw on the actual-position feedback unit. (⇒ Section 6.2.1, Page 23)

6.4 Mounting onto linear valves from other manufacturers



NOTE

SISTO-SK-i.310 actual-position feedback units can also be mounted onto linear valves from other manufacturers upon request. Clarify technical details with SISTO Armaturen in advance.

7 Commissioning/Start-up

7.1 Prerequisites for commissioning/start-up






	<p>! WARNING</p> <p>Automatic valve movement during initialisation Risk of injury and hazard to the production process!</p> <ul style="list-style-type: none"> ▸ The valve is opened and closed during commissioning. This procedure is automatic for variants with integrated solenoid valve. It must therefore be ensured that no hazardous situation can occur as a result.
	<p>CAUTION</p> <p>Incorrect mounting or connection Incorrect commissioning/start-up!</p> <ul style="list-style-type: none"> ▸ Check whether the actual-position feedback unit has been properly mounted onto the valve actuator. ▸ Prior to commissioning/start-up, check whether the electrical and pneumatic connections have been properly connected.
	<p>NOTE</p> <ul style="list-style-type: none"> ▸ If the actual-position feedback unit is supplied mounted onto a SISTO valve, the complete assembly is ready for operation at a control pressure of 5.5 to 6 bar (without operating pressure). ▸ If the actual-position feedback unit is supplied without the valve, it must be initialised once for proper operation.
	<p>NOTE</p> <p>Incorrect initialisation</p> <ul style="list-style-type: none"> ▸ When initialising the unit, always ensure that no operating fluid pressure is present at the process valve. ▸ Start initialisation with the process valve in the fail-safe position (NO/NC).
	<p>NOTE</p> <p>Re-initialisation is recommended if</p> <ul style="list-style-type: none"> ▸ the available control pressure in the system has been changed, ▸ the mechanical limit positions have been changed.



Fig. 7: High-visibility LED (1) / magnetic sensor for in-situ initialisation (2)

7.2 Performing initialisation

1. Switch on the power supply.
 - After the supply voltage has been switched on, the device boots up for approx. 5 seconds. The LED flashes in the warning colour yellow.
2. The valve actuator must be in the fail-safe position.
3. Start initialisation:
 - **In situ using a programming magnet:** Hold the programming magnet against the magnetic sensor for at least 2 seconds. When the LED flashes white, remove the magnet again. (⇒ Fig. 7) (position 2)
 - **Remote initialisation via PLC:** Apply a voltage of 24 V to the teach-in input (pin 5) for at least 0.5 seconds. (⇒ Table 16)
4. Operate the valve actuator:
 - Actual-position feedback unit (0 MV): Operate the valve actuator via an external pneumatic valve.
 - Actual-position feedback unit with integrated solenoid valve (1 MV): The integrated solenoid valve is switched on automatically.
5. When the valve is operated, the actual-position feedback unit automatically detects whether the actuator is opening or closing.
 - Movement in opening direction: The LED flashes orange.
 - Movement in closing direction: The LED flashes green.
6. The valve actuator moves to the active limit position.
 - The white LED signals the detection of the limit position.
7. Move the valve actuator into the fail-safe position:
 - Actual-position feedback unit (0 MV): Switch off the external pneumatic system to move the valve actuator into the fail-safe position.
 - Actual-position feedback unit with integrated solenoid valve (1 MV): The integrated solenoid valve is switched off automatically.
8. The valve actuator moves into the fail-safe position:
 - The white LED signals the detection of the limit position.
9. Completion of initialisation:
 - The limit position is saved and signalled via the LED.
 - The alternating voltage is switched off at the Fault output (pin 7) (see pin assignment table (⇒ Table 16))
10. The actual-position feedback unit is ready for operation.

When initialised, the integrated solenoid valve can be switched via the switching input (optional).


8 Maintenance and Cleaning

8.1 Maintenance

The SISTO-SK-i.310 actual-position feedback unit is maintenance-free.

Regularly check that all electrical and pneumatic connections are properly connected.

8.2 Cleaning

	CAUTION
	<p>Aggressive flushing liquids Cleaning using a high-pressure cleaner</p> <p>Damage to the actual-position feedback unit!</p> <ul style="list-style-type: none"> ▷ The actual-position feedback unit must not be cleaned with aggressive cleaning agents or high-pressure cleaners. ▷ Always observe the enclosure type. (⇒ Section 5.2, Page 17) ▷ If there are any concerns about the resistance of the housing to a cleaning agent, please contact SISTO Armaturen.

Clean actual-position feedback units using a damp cloth.

9 Shutdown / Removal

9.1 Resetting the actual-position feedback unit to factory settings

- Hold programming magnet against the magnetic sensor for 60 seconds.
- When the LEDs flash red, remove the programming magnet.

9.2 Shutdown

	<p>! WARNING</p>
	<p>Improper shutdown/removal Risk of injury!</p> <ul style="list-style-type: none"> ▸ Shut down the systems before performing work on the actual-position feedback unit and the valve.
	<p>CAUTION</p>
	<p>Improper shutdown/removal Damage to the actual-position feedback unit!</p> <ul style="list-style-type: none"> ▸ All work on the actual-position feedback unit must only be performed by qualified personnel. ▸ Always use suitable tools to ensure that the actual-position feedback unit functions properly.
	<p>NOTE</p>
	<p>When working on electrical devices, observe the applicable accident prevention regulations and safety regulations.</p>

9.3 Measures to be taken for shutdown

- Steps to be taken prior to working on the system:
 1. Switch off the power supply.
 2. Secure the equipment against unintentional start-up.
 3. Verify that the equipment is de-energised.
 - Prior to undoing the air supply connections:
 1. Shut off the pressure supply from the supply line.
 2. Vent the line.
 3. Secure the line against refilling.

9.4 Removing the actual-position feedback unit

Removal must only be carried out when the device is shut down.
(⇒ Section 9.2, Page 29)

1. Ensure that the M3 grub screw is secured, otherwise tighten by hand (max. 1 Nm).
2. Remove the actual-position feedback unit from the valve actuator by turning it anti-clockwise.
3. Remove the rod from the valve actuator by turning it anti-clockwise.

10 Trouble-shooting

Symbol	Description
○	Off
●	On
✱	Flashing
x	Undefined

SISTO-SK-i.310 operating status

Code (IO-Link only)	Status LED	DO Open	DO Closed	DO Fault	Operating status description	Remedy
-	○	○	○	○	No supply voltage	Check the supply voltage.
-	✱ Yellow	○	○	○	Device boots up.	Wait for approx. 5 seconds.
Initialising						
W001	✱ Blue	○	○	✱	SK-i not initialised	Start initialisation.
W000	✱ White/orange	○	○	✱	Initialisation active (movement towards the open position)	-
W000	● White	○	○	✱	Initialisation (open position reached)	-
W000	✱ White/green	○	○	✱	Initialisation active (movement towards the closed position)	-
W000	● White	○	○	✱	Initialisation (closed position reached)	-
Operation						
-	✱ Orange	✱	○	○	Operation (movement towards the open position)	-
-	● Orange	●	○	○	Operation (open position reached)	-
-	✱ Green	○	✱	○	Operation (movement towards the closed position)	-
-	● Green	○	●	○	Operation (closed position reached)	-

The specified LED colour is the standard configuration. (⇒ Section 4.5, Page 13)

Error messages of SISTO-SK-i.310

Code (IO-Link only)	Status LED	DO Open	DO Closed	DO Fault	Operating status description	Remedy
E000	● Red	○	○	●	The device is not calibrated.	<ul style="list-style-type: none"> Re-start the device. Send the device to the manufacturer.
E001	● Red	○	○	●	General system error	<ul style="list-style-type: none"> Re-start the device. Send the device to the manufacturer.

Code (IO-Link only)	Status LED	DO Open	DO Closed	DO Fault	Operating status description	Remedy
E010	* Red	○	○	●	Valve travel sensor module error	<ul style="list-style-type: none"> Check whether the "target" magnet is available. Re-start the device. If the error persists, send the device to the manufacturer.
E050	* Red/white	○	○	●	Initialisation not successful (no valve movement detected within permissible time period)	<ul style="list-style-type: none"> Check the compressed air supply. Check the valve for proper functioning. Perform re-initialisation. The error is active for a time period of 5 minutes and is then automatically deleted.
E051		○	○	●	Initialisation not successful (valve not in fail-safe position within permissible time period)	
E052		○	○	●	Initialisation not successful (deviation between the start position and end position)	
E100	* Red	●/○	○/●	●	Inconsistent limit position error (valve position does not match the switching status of the integrated solenoid valve)	<ul style="list-style-type: none"> Check the compressed air supply. Check the valve for proper functioning. Perform re-initialisation.
E101	* Red/orange	○	○	●	The valve's requested limit position (open) is not reached.	
E102	* Red/green	○	○	●	The valve's requested limit position (closed) is not reached.	
E103	* Red	○	○	●	Valve position greater than saved open position	<ul style="list-style-type: none"> Check the control pressure. Perform re-initialisation.
E104	* Red	○	○	●	Valve position smaller than saved closed position (e.g. due to plastic deformation of the diaphragm)	<ul style="list-style-type: none"> Perform re-initialisation. Inspect the diaphragm.

The specified LED colour is the standard configuration. (⇒ Section 4.5, Page 13)

If there are several active errors or warnings, only the message with the highest priority is signalled. The priority of the error and warning messages corresponds to the order in the table (highest priority first).

11 Accessories

11.1 Set comprising programming magnet, Allen key and lanyard

Order number: 42504056



Fig. 8: Accessories of SISTO-SK-i.310

12 Declaration of Incorporation

12.1 Declaration of Incorporation of Partly Completed Machinery

Declaration of Incorporation within the meaning of EC Machinery Directive 2006/42/EC, Annex IIB

Manufacturer:

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

The manufacturer herewith declares for the partly completed machinery:

Actual-position feedback unit, type SK-i.310, for mounting onto linear pneumatic valve actuators

- The following essential requirements of the Machinery Directive 2006/42/EC, Annex IIB, are applicable and have been fulfilled:
 - 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6,
 - 1.2.1, 1.2.2, 1.2.3,
 - 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.3.8.1
 - 1.4.1.1, 1.4.2.1,
 - 1.5.1, 1.5.2, 1.5.3, 1.5.4, 1.5.7, 1.5.8,
 - 1.6.1, 1.6.3, 1.6.4,
 - 1.7.1.1, 1.7.1.2, 1.7.2, 1.7.4, 1.7.4.1, 1.7.4.2

The technical literature has been prepared in accordance with Annex VII, Part B.

Further applicable directives:

- **EMC Directive 2014/30/EU**
- **RoHS Directive 2011/65/EU**

Note: The partly completed machinery covered by the present Declaration of Incorporation must not be put into service until the final machinery into which it is to be incorporated is in conformity with the provisions of Directive 2006/42/EC.

Echternach, 29 November 2024



Bernd Hackenberger
Head of Design and Development

13 EU Declaration of Conformity**13.1 EU Declaration of Conformity**

Manufacturer:

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

The manufacturer herewith declares that the product:

Actual-position feedback unit, type SK-i.310, for mounting onto linear pneumatic valve actuators

- is in conformity with the provisions of the following directives as amended from time to time:
 - **2011/65/EU Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)**
 - **2014/30/EU: Electromagnetic Compatibility**

Echternach, 29 November 2024



Bernd Hackenberger
Head of Design and Development

Index**C**

Cleaning 28

Control air supply failure 13

D

Disposal 11

E

Event of damage 6

Exchanging the adapter kit 25

K

Key to safety symbols/markings 7

M

Maintenance 28

Measures to be taken for shutdown 29

N

Name plate 15

O

Ordering key 15

Other applicable documents 6

P

Performing initialisation 27

Personnel 9

Power supply failure 13

Q

Qualification 9

R

Removal 29

S

Safety 8

Safety awareness 9

Specialist personnel 9

Storage 11

T

Training 9

Trouble-shooting 30

W

Warnings 7

Warranty claims 6



SISTO Armaturen S.A.

18, rue Martin Maas • L-6468 Echternach

Tel.: +352 325085-1 • Fax: +352 328956

E-Mail: info@sisto-aseptic.com

www.sisto-aseptic.com

A KSB Company •  **KSB**