EMERSON ST4-2P Aventics Sensor with and without IO-Link Instruction Manual

EMERSON™ **Operating instructions**

AVENTICS™ ST4-2P
Sensor with and without IO-Link

Contents hide

About this document

These instructions contain important information on the safe and appropriate installation and operation of the ST4-2P sensor.
>Read these instructions completely before working with the ST4-2P sensor. Also, see in particular g 2. For your safety.
1.1 **Related documents** The ST4-2P sensor is a system component. Also, observe the system documentation from the system manufacturer.

For your safety

The ST4-2P sensor has been manufactured according to the accepted rules of safety and current technology. There is, however, still a danger of personal injury or damage to equipment if the following general safety instructions and the warnings before the steps contained in these instructions are not complied with.
1. Read these instructions completely before working with the ST4-2P sensor.
2. Keep these instructions in a location where they are accessible to all users at all times.
3. Always include the operating instructions when you pass the ST4-2P sensor on to third parties.

2.1 Intended use

1. The ST4-2P sensor is for commercial use only.
2. Only use the ST4-2P sensor in AVENTICS handling devices with C-slot.
3. Use within the limits listed in the technical data.
   Intended use includes having read and understood these instructions, especially chapter g 2. For your safety.

2.2 Improper use
It is considered improper use when the ST4-2P sensor

- is used for any application not stated in these instructions, or
- is used under operating conditions that deviate from those described in these instructions.

2.3 Personnel qualifications
Assembly and commissioning require basic electrical and pneumatic knowledge. Assembly and commissioning may therefore only be carried out by qualified electrical or pneumatic personnel or an instructed person under the direction and supervision of qualified personnel. Qualified personnel is those who can recognize possible dangers and institute the appropriate safety measures, due to their professional training, knowledge, and experience, as well as their understanding of the relevant regulations pertaining to the work to be done. Qualified personnel must observe the rules relevant to the subject area.

2.4 Presentation of information

2.4.1 Warnings

In this documentation, there are warning notes before the steps whenever there is a risk of personal injury or damage to equipment. The measures described to avoid these hazards must be followed.

Structure of warnings

⚠**SIGNAL WORD**

Hazard type and source Consequences of non-observance Precautions

⚠**WARNING**

Possible danger to the life and health of persons. Failure to observe these notices can result in serious health consequences, including death.

⚠**CAUTION**

A possible dangerous situation. Failure to observe these notices may result in minor injuries or damage to property.

NOTICE: Possibility of damage to property or malfunction. Failure to observe these notices may result in damage to property or malfunctions, but not in personal injury.

2.4.2 Symbols

Recommendation for the optimum use of our products. Observe this information to ensure the smoothest possible operation.

2.5 The following must be observed:

2.5.1 General information

- Observe the regulations for accident prevention and environmental protection for the country where the device is used and at the workplace.
- Do not modify or convert the device.
- Only use the device within the performance range provided in the technical data.
- The ST4-2P sensor is not a safety component in terms of the Machinery Directive.
- Use a power source in compliance with IEC/DIN EN 60204-1.

2.5.2 During assembly:

- Make sure the relevant system component is without pressure or voltage before assembling the product or when connecting and disconnecting plugs.
- Protect the system against being restarted. Hang signs on the main switches that warn workers against switching the system on.
- Avoid ferritic parts in the immediate vicinity of the sensor ST4-2P.

2.5.3 During operation:

- Only commission the sensor after it has been completely assembled, as well as correctly connected and tested.

Device description

The ST4-2P sensor is a magnetic position sensor with two switching points. It is intended for end position inquiry and intermediate position detection on pneumatic cylinders. The ST4-2P sensor detects positions without any contact. Using the teach-in button, switching points can be set exactly for all piston positions. See g 5.3 Storing switching points.

Scope of delivery

- 1 set of operating instructions
- 1x sensor
- 1x hexagon screwdriver wrench size 1.3

Assembly and commissioning

⚠**WARNING**

The danger of injury if assembled under pressure! Injuries and damage to the device or system components may occur if the pressure is not switched off before beginning assembly. Make sure that the relevant system part is without pressure before you assemble the product.

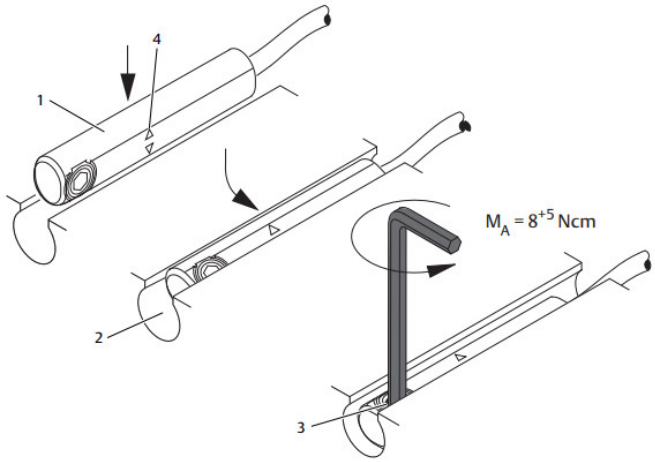


Fig. 1: Mounting the sensor

1. Sensor
2 . C-slot
3. Mounting screw
4. Center of sensor

Required tool: Hexagon screwdriver wrench size SW 1.3.

1. Set your handling device to the center of the working stroke.
2. Insert the sensor (1) from above in the center of the C-slot (2).

5.1 Mechanically adjusting the ST4-2P sensor

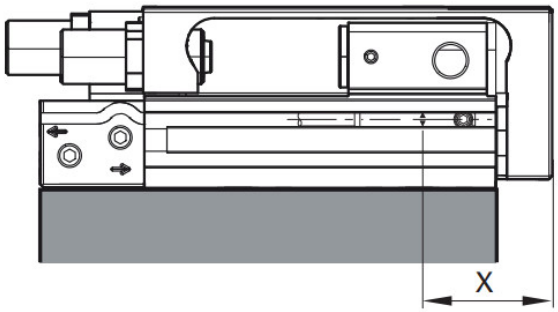
See g Fig. 1

Align the sensor to the center of the measurement range (observing the center of the sensor (4)) and tighten the mounting screw (3).Tightening torque: MA = 8 +5 Ncm.

Mechanically adjusting the ST4-2P sensor for cylinders, MSC, and RCM series

Align the center of the sensor to the center of the stroke (X) of the actuators and firmly tighten the mounting screw. Tightening torque: MA = 8+5 Ncm. Also, observe the following during assembly:

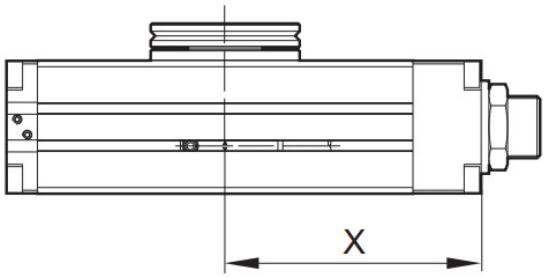
MSC series mini slides



The mini slides must be retracted. The stroke center (X) is measured from the front plate.

Stroke	**10mm**	**20mm**	**30mm**	**40mm**	**50mm**
MSC variants	Stroke center (X)	Stroke center (X)	Stroke center (X)	Stroke center (X)	Stroke center (X)
8	44	39	44	49	54
12	65	60	55	60	65
16	63	58	53	58	64
20	69	64	59	65	68
25	80	75	70	75	82

Series RCM rotary compact module



The stroke center (X) is measured from the end cover.

RCM variants	**Stroke center (X) in mm**
6	35.5
8	38.5
12	54
16	58
20	62
25	82.5

5.2 Electronically adjusting the ST4-2P sensor

1. Set your handling device to the center of the working stroke.
2. Connect the sensor to a suitable operating voltage. See g 9. Key technical data.

   The sensor must be switched on outside of any magnetic fields that could influence it.
3. Press the teach-in button 8-10 s until both LEDs flash alternately.
4. Insert the sensor (1) from above in the C-slot (2), slide the sensor into the C-slot until both LEDs are on simultaneously, and tighten the mounting screw (Tightening torque: MA = 8+5 Ncm. See g Fig. 1.

5.3 Storing switching points

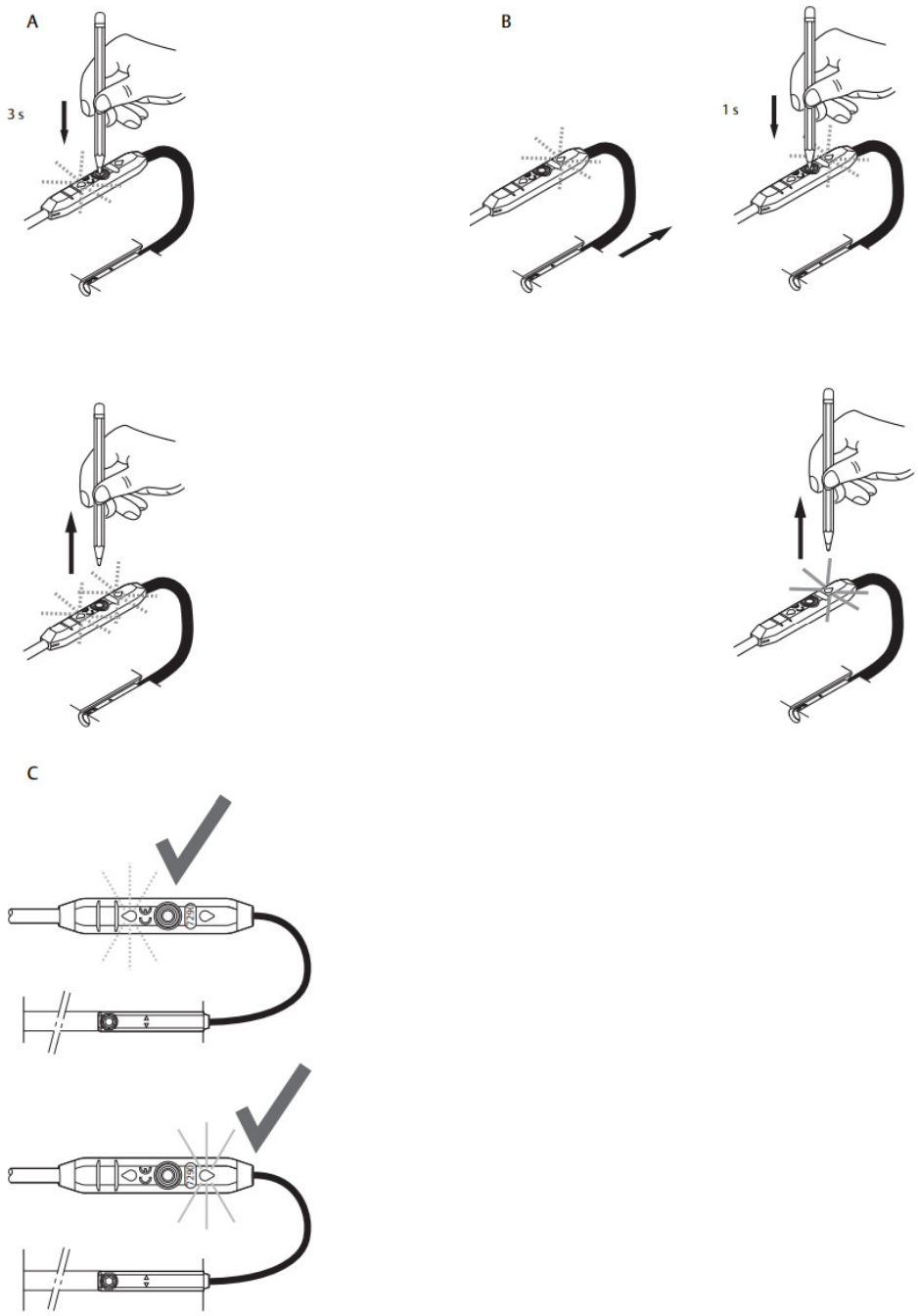


Fig. 2: Teaching in and checking the stored switching points
A Teach switching point 1
B Teach switching point 2
C Check taught-in positions

WARNING
Risk of uncontrolled actuator movements when the pneumatics are switched on! There is a danger of personal injury if the system is in an undefined state. u Put the system in a defined state before switching it on. Commissioning may only be carried out by qualified electrical or pneumatic personnel or an instructed person under the direction and supervision of qualified personnel. See g 2.3 Personnel qualifications.

1. Connect the sensor to a suitable operating voltage. See g 9. Key technicaldata.
2. Teach in the working stroke (two switching points) as follows:
3. Set the first piston position for the working stroke (switching point 1).
4. Press and hold the teach-in button for 3 seconds (A). LED 1 will flash.

Release the teach-in button. Switching point 1 is stored. LED 2 will flash (for switching point 2).
Set the second piston position for the working stroke (switching point 2) (B). Press and hold the teach-in button for 1 second (B). Switching point 2 is stored.

If the switching point is outside the detection range of the sensor, the teach-in process will be interrupted. In this case, the LED will flash in short intervals.If the teach-in process is not complete, it will be interrupted after 90 seconds (timeout). The last stored switching points will remain active.

5.4 Checking the stored switching points
See g Fig. 2

1. Move the piston to the position of switching point 1. The switching point 1 LED lights up: switching point recognized (C). LED does not light up: switching point not recognized.
2. If the switching point is not recognized, check the operating conditions and readjust.
3. Move the piston to the position of switching point 2. The switching point 1 LED goes out and the switching point 2 LED lights up: switching point recognized

(C).
If the first LED does not go out or the second LED does not light up: the switching point is not recognized.

4. If the switching point is not recognized, check the operating conditions and readjust.

Care and maintenance

The ST4-2P sensor is maintenance-free.
NOTICE Damage to the surface caused by solvents and aggressive detergents! The surfaces and seals could be damaged by solvents or aggressive cleaning agents.
Never use solvents or aggressive detergents.

1. Check the fittings and plug connections regularly.
2. Comply with the maintenance intervals and specifications for the entire system.

Disposal

Dispose of the ST4-2P sensor in accordance with the currently applicable regulations in your country.

Data for configuration with IO-Link

8.1 Physical layer

SIO mode	Yes
Min. cycle time	2.3 ms
Speed	38.4 kBaud (Com 2)
Process data width	2 bits (frame type 2.1)

8.2 Process data

The sensors with IO-Link have 2-bit process data in bit 0 and bit 1.

Access	Data	Data type	Default
R	1 byte	UINT8	0

RW	RW	RW	RW	RW	RW	RW	RW
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Q2 Bit 1	Q1 Bit 0

Bit 7 … 2: reserved
Bit 1 … 0: 0 = inactive, 1 = active

8.3 Direct parameter page

Manufacturer ID	001F hex
Product ID	ST4-2P 0021505

8.4 Service data (IO-Link)

Table 1: SPDU index

Index	Meaning Bytes	Format	Access	Example	Range	Remark
0x10	Manufacturer ID	Visible string	R	AVENTICS GmbH		Exactly 16 strings
0x12	Device ID	Visible string	R	ST4-2P	ST4-2P	Exactly 16 strings
0x15	Serial number	Visible string	R	123dez	1-2E32	
0x16	HW version number	Visible string	R	1.00		
0x17	SW version number	Visible string / 4 Byte	R	2.33		
0x18	Application-specific name	Visible string/max . 16 ByteR/W	R/W			
0x90	Teach parameter: switching point 1	UINT8, 8 Byte	R		0 … 1023	No arguments
0x91	Teach parameter: switching point 2	UINT8, 8 Byte	R		0 … 1023	No arguments
0x92	Tolerance step	UINT8, 3 Byte	R/W		1-5	
0x28	Process data state: output 1 and output 2	UINT8, 1 Byte	R		00 01 10 11	Q1, Q2 inactive Q1 active Q2 active Q1, Q2 active
0xE2	Hall signals channel A and channel B	UINT8, 4 Byte	R		0 … 1023	High Byte Low Byte

The subindex contains no data.
Table 2: SPDU system command

Index	Meaning	Format	Access	Example	Range	Remark
0x02	Teach switching point 1	UINT8	W		AxA0	Teach command SP1
	Teach switching point 2				0xA1	Teach command SP1
	Lock global key				0xA3	Deactivates teach button
	Unlock global key				0xA4	Activates teach button

The subindex contains no data.
Table 3: SPDU index error codes

Index	Subindex
0x1000	Communication error
0x5200	Buffer overflow
0x5600	Checksum error
0x5800	Illegal SPDU
0x80xx	Device-specific error
0x8000	No details
0x8023	Access denied
0x8030	Parameter value out of

Table 4: Event data

Meaning	Mode	Type	Instance	Error code
Parameter changed	Once	Info	Application	0xFF10
Communication error	Once	Error	Unknown	0xFF10

Key technical data

Measuring range	0… 50 mm
Electrical version	DC 4 (wire)
Supply voltage DC	12 … 30 V
Residual ripple	s 10 % (Based on the operating voltage)
Voltage drop	s 2.2 V
Power consumption (not actuated)	s 15 mA
Continuous current	s 100 mA
Hysteresis	1.0 mT
Reproducibility	s 0.1 mT (At a constant power supply and ambient temperature)
EMC	EN 60 947-5-2
Switch output	PNP
Output function	Make contact function
Connection type. cable Cable with plug (4-pin)	2 m PUR, 0.3 m PUR M8, M12
Interface	with/without IO-Link (depending on the version)
Degree of protection	IP67
Wire break protection	Yes
Short circuit resistance	Yes
Reverse polarity protection	Yes
Switch-on pulse suppression	Yes
Shock vibration load	30 g, 11 ms/10 … 55 Hz, 1 mm
Housing material	PA
Ambient temperature	-20 … +75 °C

Pin assignment

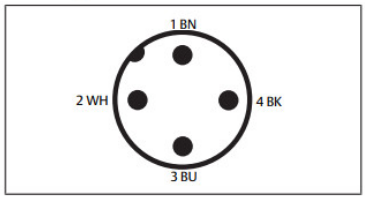


Fig. 3: Plug, M12x1, 4-pin

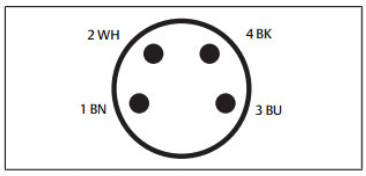


Fig. 4: Plug, M8x1, 4-pin

Table 5: Pin assignment for plugs M8x1 and M12x1

Pin	Use	Cable / wire color
1	+UB:24 V supply	Brown
2	Out 1: Switch output 1	White
3	GND: Reference potent	Blue
4	Out 2: Switch output 2 / IO-Link	Black

Dimensions

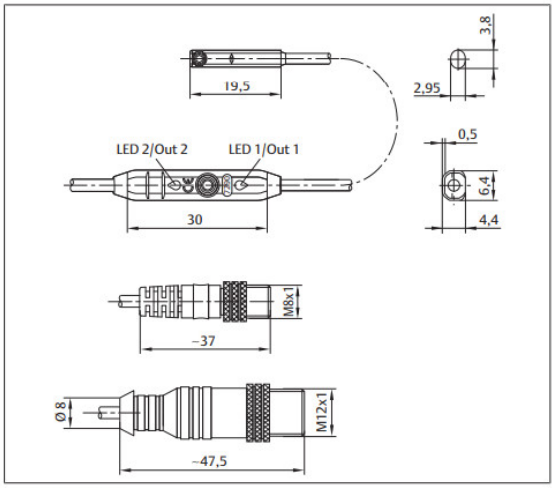


Fig. 5: Dimensions

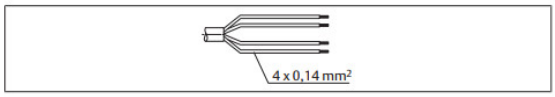


Fig. 6: Port with free wire ends

Documents / Resources

EMERSON ST4-2P Aventics Sensor with and without IO-Link [pdf] Instruction Manual
ST4-2P, Aventics Sensor with and without IO-Link, Aventics Sensor, ST4-2P, Sensor

References

- AVENTICS – Smart, reliable solutions for pneumatic automation | Emerson US
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