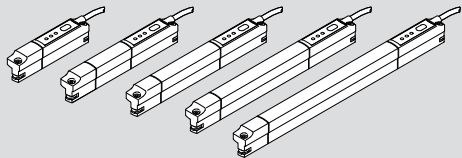


SDAT-MHS-...-SA  
Position transmitter



FESTO

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Brief instruction

8163963  
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[8163965]



8163963

Translation of the original instructions

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1 About this document

1.1 Applicable Documents

 All available documents for the product → [www.festo.com/sp](http://www.festo.com/sp).

2 Safety

2.1 Intended use

The position transmitter is intended for contactless detection of the piston position of magnetic proximity sensing drives and grippers.

- Use the position transmitter only for suitable Festo drives and grippers.
- Do not place magnetic objects in the immediate vicinity of the position transmitter.

2.2 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with electropneumatic (open-loop) control technology.

2.3 UL/CSA certification

In combination with the UL inspection mark on the product, the information in this section must also be observed in order to comply with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

| UL approval information |                                                                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Product category code   | NRKH, NRKH7                                                                                                                                  |
| File number             | E232949                                                                                                                                      |
| Considered standards    | UL 60947-1, UL 60947-5-2, CSA C22.2 No. 60947-1, CSA C22.2 No. 60947-5-2                                                                     |
| UL mark                 | <br>Ind. Cont. EQ. (Industrial Control Equipment)<br>2MD1 |

Tab. 1: UL/CSA approval information

- Technical data and environmental conditions may be subject to change in order to comply with Underwriters Laboratories Inc. (UL) certification requirements for the USA and Canada. → 10.3 Technical data for UL/CSA certification
- Only for connection to a NEC/CEC Class 2 supply.
- The device shall be supplied from an isolating transformer having a secondary listed fuse rated 1 A.

3 Additional information

- Contact the regional Festo contact if you have technical problems → [www.festo.com](http://www.festo.com).
- Accessories and spare parts → [www.festo.com/catalogue](http://www.festo.com/catalogue).

4 Product overview

4.1 Design

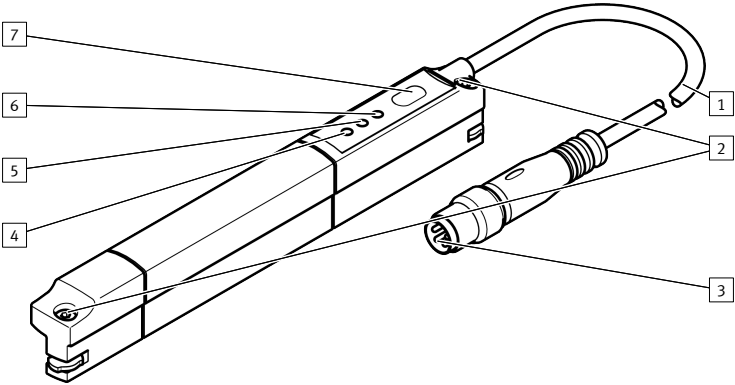


Fig. 1: Design of SDAT-MHS

- 1

Connecting cable
- 2

Retaining screws
- 3

M8 plug, rotatable
- 4

Red LED: status indicator
- 5

Green LED: ready status display
- 6

Yellow LED: switching status display
- 7

Operating key

4.2 Function

The position transmitter detects the magnetic field of the piston magnet and continuously senses the piston movement in the sensing range.

The following output signals are available:

- analogue current signal: 4 ... 20 mA
- programmable switching output: 24 V
- IO-Link communication mode

5 Mounting

5.1 Electrical installation

 WARNING

**Risk of injury due to electric shock.**

- For the electrical power supply, use only PELV circuits in accordance with IEC 60204-1/EN 60204-1 (Protective Extra-Low Voltage, PELV).
- Observe the general requirements of IEC 60204-1/EN 60204-1 for PELV circuits.
- Only use voltage sources that ensure a reliable electric separation from the mains network in accordance with IEC 60204-1/EN 60204-1.

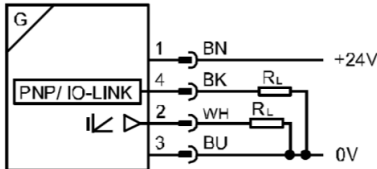


Fig. 2: Circuit diagram

| Pin | Allocation                          | Plug                                                                                  |
|-----|-------------------------------------|---------------------------------------------------------------------------------------|
| 1   | Operating voltage +24 V DC          |  |
| 2   | Analogue output 4 ... 20 mA         |                                                                                       |
| 3   | 0 V                                 |                                                                                       |
| 4   | IO-Link/switching output (C/Q line) |                                                                                       |

Tab. 2: Pin allocation of plug connection

5.2 Mechanical installation

Any mounting position can be used.

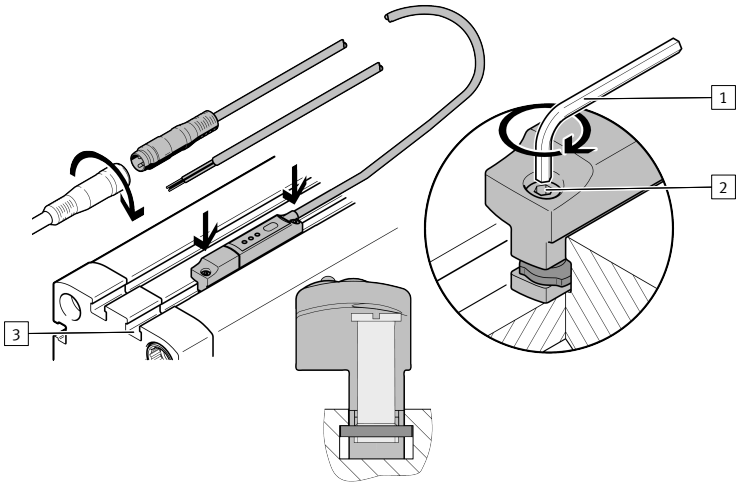


Fig. 3: Mechanical installation

- 1 Hexagon socket spanner
- 2 Retaining screw
- 3 T-slot

1. Push the position transmitter into the T-slot of the drive.
2. Move the piston to an end position of the application.
3. Push the position transmitter in the direction of the piston until the red LED goes out.
4. Hand-tighten the retaining screw.
  - Max. tightening torque: 0.5 Nm
  - Tool: internal hexagon socket key (size 1.5 mm).

6 Commissioning

6.1 Switch on the position transmitter

- Switch on the operating voltage.
  - ↪ The LEDs switch on depending on the position of the piston → Tab. 5 LED displays in normal operation.
  - ↪ The device is ready for operation.

| Parameter          | Factory setting             |
|--------------------|-----------------------------|
| Switching function | None                        |
| Switching logic    | Normally open contact (N/O) |
| Scaling            | Total sensing range         |

Tab. 3: Factory settings of the position transmitter

6.2 IO-Link Program output

The IO-Link function cannot be set with the operating keys on the device. All settings for set-up, commissioning and parameterisation are made in the higher-level controller of the IO-Link master.

6.3 Analogue output

The analogue output provides an output signal 4 ... 20 mA.

- The output signal is proportional to the path of the piston stroke in the sensing range.

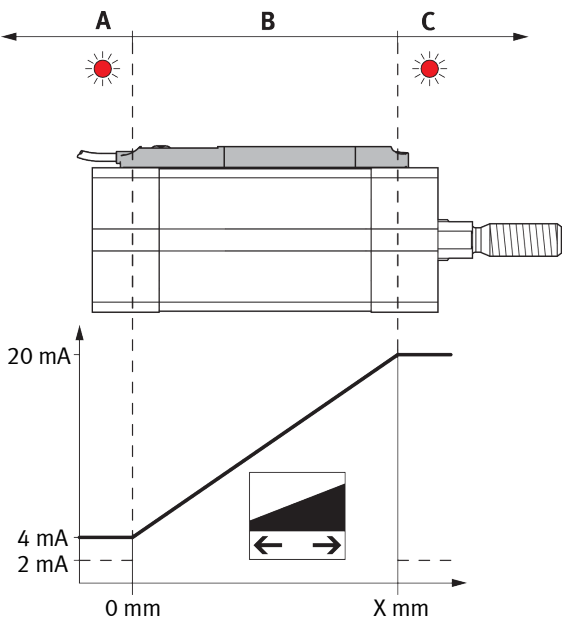


Fig. 4: Characteristic curve of the analogue output

X = maximum length of the sensing range

| Signal             | Description                                                                            | Range <sup>1)</sup> |
|--------------------|----------------------------------------------------------------------------------------|---------------------|
| 0 mA               | – IO-Link operation<br>– Error, e.g. cable break, parameter error                      | –                   |
| 2 mA               | – Piston is outside the sensing range after switching on the operating voltage         | A, C                |
| 4 mA               | – The piston has left the sensing range in the direction of the falling output current | A                   |
| > 4 mA ... < 20 mA | – Piston is within the sensing range                                                   | B                   |
| 20 mA              | – The piston has left the sensing range in the direction of the rising output current  | C                   |

1) Range Fig. 2, range A and C: red LED on

Tab. 4: Output signal of the analogue output

i

The analogue output is switched off during active IO-Link communication. The output current is 0 mA.

7 Operation

7.1 Magnetic direction detection and magnetic direction correction

During initial commissioning or after a reset to factory settings, the position transmitter outputs the signals directly using the currently detected magnetic direction.

The magnetic direction detection and, with it, the signal curve are corrected during continuing operation in the following cases:

- The position transmitter was placed in operation in a position in which it was not possible to detect a correct magnetic direction, e.g. due to ferromagnetic materials near the sensor or within the drive or gripper.
- The position transmitter was rotated 180° in the slot after the magnetic direction was detected as stable.

i

Brief error signals may be detected at the sensor output if automatic correction of the magnetic direction detection is required → 8.2 General malfunctions.

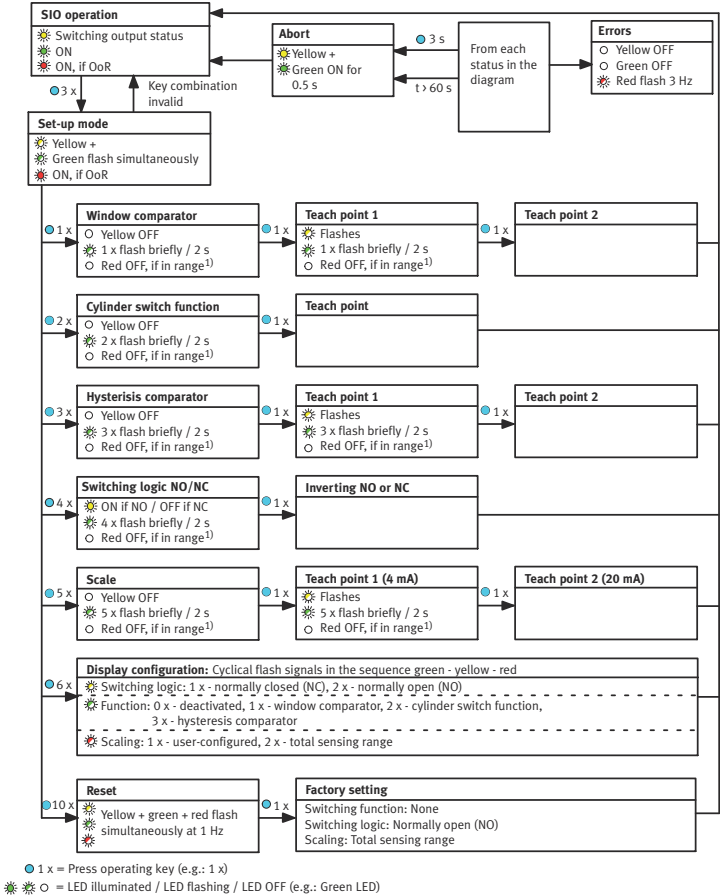
7.2 LED displays in normal operation

| LED display |       |     | Description                                                                                                                                                                    |
|-------------|-------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yellow      | Green | Red |                                                                                                                                                                                |
|             |       |     | Ready for operation: <ul style="list-style-type: none"><li>– Analogue output function or switching output operating mode.</li><li>– Piston within the sensing range.</li></ul> |
|             |       |     | Ready for operation: <ul style="list-style-type: none"><li>– IO-Link operating mode.</li></ul>                                                                                 |
|             |       |     | Ready for operation: <ul style="list-style-type: none"><li>– Switching output switched.</li><li>– Piston in the range of a programmed function.</li></ul>                      |
|             |       |     | Status indicator: <ul style="list-style-type: none"><li>– Operating key blocked.</li></ul>                                                                                     |

| LED display                                                                     |                                                                                   |                                                                                   | Description                                              |
|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------|
| Yellow                                                                          | Green                                                                             | Red                                                                               |                                                          |
|  |  |  | Status indicator:<br>– Piston outside the sensing range. |
| Red LED: on                                                                     |                                                                                   |                                                                                   |                                                          |

Tab. 5: LED displays in normal operation

### 7.3 Analogue output and switching function operation



1) Teaching of a position out-of-range (OoR) causes the red LED to flash until the magnet is back in the sensing range (in range).

Fig. 5: Settings using the operating key (menu structure)

## 8 Malfunctions

### 8.1 Diagnostics via LED

| LED display                                                                        | Possible cause                                                            | Remedy                                                                    |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Yellow                                                                             |                                                                           |                                                                           |
| Green                                                                              |                                                                           |                                                                           |
| Red                                                                                |                                                                           |                                                                           |
|  | Fault in power supply.<br>Fault in connecting cable.<br>Device is faulty. | Connect power supply.<br>Replace connecting cable.<br>Replace device.     |
|  | Hardware error.                                                           | Switch power supply on/off.<br>Replace device.                            |
|  | Short circuit or overload at the switching output.<br>Parameter error.    | Eliminate short circuit or overload.<br>Reset device to factory setting . |
|  | Communication error in IO-Link mode.                                      | Check IO-Link master.<br>Restart communication.<br>Check C/Q line.        |

Tab. 6: LED displays in case of malfunctions

## i

If the device detects an error during IO-Link operation, a status message is output at the IO-Link master. The IO-Link/switching output is not blocked.

### 8.2 General malfunctions

| Malfunction                                                                              | Cause                                               | Remedy                            |
|------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------|
| Incorrect or unexpected signals at the analogue output or with the IO-Link process data. | Drive is not suitable.                              | Use a suitable drive.             |
|                                                                                          | Device is faulty.                                   | Replace device.                   |
|                                                                                          | No power supply or impermissible operating voltage. | Maintain operating voltage range. |

| Malfunction                                                                              | Cause                                                                                                                     | Remedy                                                                                                      |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Incorrect or unexpected signals at the analogue output or with the IO-Link process data. | Short circuit or overload at the switching output.                                                                        | Eliminate short circuit or overload.                                                                        |
|                                                                                          | Magnetic object in the immediate vicinity of the position transmitter.                                                    | Do not place magnetic objects in the immediate vicinity of the position transmitter.                        |
|                                                                                          | Sensor or drive was rotated 180° after initial commissioning.                                                             | Reset to factory setting using the operating key or via IO-Link.                                            |
|                                                                                          | Incorrect or unexpected signals during initial commissioning on grippers or in attachments with ferromagnetic components. | On initial commissioning, move gripper jaws or piston within the sensing range, e.g. to both end positions. |
| Switching output does not switch in accordance with the settings.                        | Short circuit or overload at the switching output.<br>Device is faulty.                                                   | Eliminate short circuit or overload.<br>Replace device.                                                     |
| Settings cannot be edited.                                                               | Access protection is active.                                                                                              | Unblock operating key (only possible via IO-Link).                                                          |

Tab. 7: Possible malfunctions

## 9 Disassembly

- Switch off the power supply.
- Disconnect connections from the position transmitter.
- Unscrew the retaining screws → Fig. 3.
- Remove the position transmitter from the T-slot of the drive.

## 10 Technical data

## i

For the complete technical data → Operating instructions SDAT-MHS.

### 10.1 General

| SDAT-MHS-...                                         |         | 50                                                                        | 80   | 100  | 125  | 160  |
|------------------------------------------------------|---------|---------------------------------------------------------------------------|------|------|------|------|
| Conformity                                           |         | → <a href="http://www.festo.com/sp">www.festo.com/sp</a>                  |      |      |      |      |
| Note on materials                                    |         | halogen-free                                                              |      |      |      |      |
| Input signal/measuring element                       |         |                                                                           |      |      |      |      |
| Sensing range <sup>1)</sup>                          | [mm]    | 50                                                                        | 80   | 100  | 125  | 160  |
| Signal processing                                    |         |                                                                           |      |      |      |      |
| Sampling interval typ.                               | [ms]    | 1                                                                         |      |      |      |      |
| Max. traverse velocity                               | [m/s]   | 3                                                                         |      |      |      |      |
| Output, general                                      |         |                                                                           |      |      |      |      |
| Resolution of travel                                 | [mm]    | 0.05                                                                      |      |      |      |      |
| Switching output                                     |         |                                                                           |      |      |      |      |
| Switching output                                     |         | PNP                                                                       |      |      |      |      |
| Repetition accuracy of switching point               | [mm]    | 0.1                                                                       |      |      |      |      |
| Hysteresis                                           | [mm]    | ≤ 0.3                                                                     |      |      |      |      |
| Analogue output                                      |         |                                                                           |      |      |      |      |
| Analogue output                                      | [mA]    | 4 ... 20                                                                  |      |      |      |      |
| Sensitivity                                          | [mA/mm] | 0.32                                                                      | 0.20 | 0.16 | 0.13 | 0.10 |
| Typical linearity error                              | [mm]    | ±0.25                                                                     |      |      |      |      |
| Repetition accuracy                                  | [mm]    | 0.1                                                                       |      |      |      |      |
| Max. load resistance of current output               | [Ω]     | 500                                                                       |      |      |      |      |
| Electronics                                          |         |                                                                           |      |      |      |      |
| Operating voltage DC                                 | [V]     | 15 ... 30                                                                 |      |      |      |      |
| Typical signal running time                          | [ms]    | < 2                                                                       |      |      |      |      |
| Electromechanics                                     |         |                                                                           |      |      |      |      |
| Cable length                                         | [m]     | 0.3                                                                       |      |      |      |      |
| Conductor nominal cross section                      | [mm²]   | 0.1                                                                       |      |      |      |      |
| Mechanical system                                    |         |                                                                           |      |      |      |      |
| Max. tightening torque                               | [Nm]    | 0.5                                                                       |      |      |      |      |
| Information on materials – housing                   |         | PA-reinforced, polyester, high-alloy stainless steel, nickel-plated brass |      |      |      |      |
| Immission/emission                                   |         |                                                                           |      |      |      |      |
| Ambient temperature                                  | [°C]    | -25 ... +70                                                               |      |      |      |      |
| Ambient temperature with flexible cable installation | [°C]    | -20 ... +70                                                               |      |      |      |      |
| Degree of protection (to EN 60529)                   |         | IP65/IP68<br>Condition with IP68: test duration 24 h                      |      |      |      |      |

1) Type-dependent

Tab. 8: Technical data SDAT-MHS

### 10.2 IO-Link

| SDAT-MHS-...     | 50                                                                                                                              | 80 | 100 | 125 | 160 |
|------------------|---------------------------------------------------------------------------------------------------------------------------------|----|-----|-----|-----|
| Protocol version | Device V1.1                                                                                                                     |    |     |     |     |
| Profile          | Smart Sensor Profile                                                                                                            |    |     |     |     |
| Function classes | 0x8000:Identification<br>0x8001:Binary Data Channel<br>0x8002:Process Data Variable<br>0x8003:Diagnosis<br>0x8004:Teach Channel |    |     |     |     |

| SDAT-MHS-...           | 50                 | 80       | 100      | 125      | 160      |
|------------------------|--------------------|----------|----------|----------|----------|
| Communication mode     | COM3 (230.4 kbaud) |          |          |          |          |
| Process data length IN | 2 byte             |          |          |          |          |
| Port class             | A, 4-pin           |          |          |          |          |
| Device ID              | 0x000001           | 0x000002 | 0x000003 | 0x000004 | 0x000005 |

Tab. 9: Physical layer

10.3 Technical data for UL/CSA certification

| Electrical and environmental ratings UL/CSA        |                           |
|----------------------------------------------------|---------------------------|
| Input Voltage                                      | Max. 30 V DC, Class 2     |
| Input current                                      | 160 mA/max. 4.8 W         |
| Analog output                                      | 4 ... 20 mA               |
| Transistor output                                  | Max. 30 V DC, 100 mA G.P. |
| Maximum Ambient Temperature                        | 70 °C/158 °F              |
| NEMA enclosure type number (Enclosure Type Rating) | Type 1                    |

Tab. 10: Electrical data and ambient conditions UL/CSA