

# LINEAR POSITION SENSOR

## Type LPS 4.0 120 IO



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## INSTRUCTION MANUAL

### Linear Position Sensor

### Type LPS 4.0 120 IO

with analog interface 0..10V/4..20mA with IO-Link Interface  
Measuring range 0..120mm

**Thank you for purchasing an Original-SMW-AUTOBLOK Linear Position Sensor LPS 4.0.**

This **instruction manual** contains the installation, the use and the maintenance instructions of the „LPS 4.0“.

**SMW-AUTOBLOK** reserves the right to make **changes without notice**.

This **instruction manual** is a **part of the „LPS 4.0“** and must be passed to the new owner in case of sale.

This **instruction manual** **may not be** -in whole or in part- **copied** without our written agreement.



Please read the instruction manual carefully before installation and use and always follow the regulations.

Please note especially the sections which are marked with the following signs:



- Danger of injury or danger to life if instructions are not followed.
- Danger of damage to the sensor, the machine or the components.

## **Declaration of incorporation for a partly completed machinery to machine directive 2006/42/EC**

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The manufacturer: SMW-Autoblok Spannsysteme GmbH  
Wiesentalstraße 28  
88074 Meckenbeuren  
Deutschland / Germany  
Tel.: +49 (0) 7542 - 405 0

herby declares, that the following product:

Product description: Linear Position Sensor  
Type: LPS 4.0 120 IO  
Ident-No.: 208109 / 208110

Due to its concept and design as it is introduced into the market is according to the following general safety and health EU regulations.

Machine directive: 2006/42/EC  
EMI directive: 2004/108/EC

Applied harmonized norms:

Emission: EN 61000-6-3  
Immunity: EN 61000-6-2

Date: 20.06.2018

  
\_\_\_\_\_  
Signature of responsible person

## 1. Intended use

The linear positioning sensor is exclusively intended to be used as a parts of a production machine. The sensor must only be installed and operated by personal authorized and advised by the operation, that is qualified according to the valid national laws and according to the national and international regulations. Any other use is a non authorized use, and can cause hazards to health and life of persons as well as damage to material.

The sensor must only be used in perfect functioning condition. The advises of this manual must always be observed.

For any other use than the intended use or any other use than authorised by the manufacturer the operator is sole and fully responsible. Any changes carried out at the sensor must be authorised by the manufacturer and must be documented properly.

In addition to this manual all laws, norms and regulations must be observed.

## 2. Safety requirements

In order to protect the unit against fire, electric shock or potential destruction of the electronic components, it must never be exposed to rain or extreme humidity. Direct sun or heat are to be avoided as well.

## 3. Calibration, recalibration

The linear positioning sensor is adjusted and calibrated at the factory for the measuring path specified.

If the linear positioning sensor is not used as an absolute measuring system, recalibration is not necessary.

If you are in doubt, please contact the manufacturer.

A recalibration can only be carried out in the factory.

## 4. Warranty and avoiding of harms

This manual is the basis for installation, use and operation of the linear positioning sensor.

Before using the linear positioning sensor read the manual carefully. This manual must remain stored at the machine where the linear position sensor installed.

All operations described in this manual must only be carried out by capable personal authorized by the operation.

## 5. Safety

Always follow the regulations concerning safe working, protection clothes and any other protection devices to be used at the corresponding production machine.

## 6. General safety advises

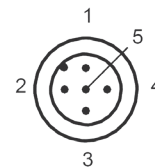
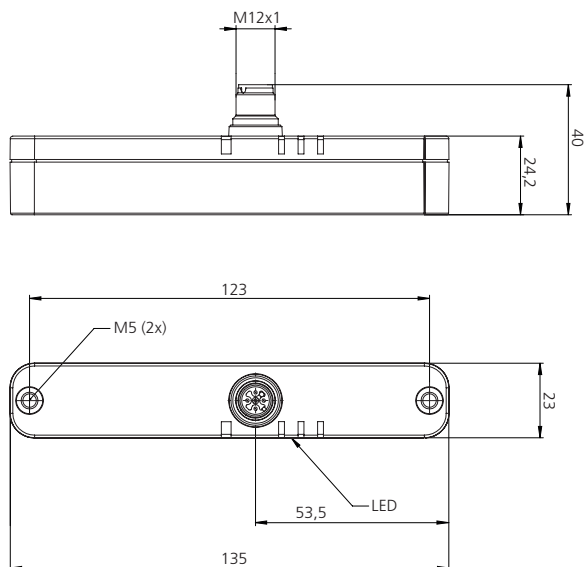
- All safety advises, national and international regulations to avoid accidents as well as company internal working and operation advises have to be observed.
- Any conditions causing hazards have to be avoided.
- Interferences that can cause hazards have to be eliminated immediately.
- Ignoring the safety instructions can cause hazards to persons, environment and / or can cause damage and will make any warranty void.
- During installation, the installation and maintenance of the linear positioning sensor all safety regulations of the machine, into which the sensor is installed, must be observed.
- Prior to any runoff this manual must read, and all safety advises must be followed.
- The manufacturer refuses any claims for problems caused by not following this manual.

## 7. Safety advises for operation

- When using the linear positioning sensor in safety relevant operations, precautions must be taken to avoid danger for personal and machine, in case of failure of the sensor. This can be done by posting safety advises on the machine or by adding safety advises to the manual of the machine. Additionally the machine maker can add suitable (mechanical) protections , to avoid any hazards. We also refer to the trouble shooting.
- The installation and run off must be carried out by qualified personal. All safety regulations for electronic installations must be observed.
- The sensor must not be opened at all!
- Before use all connections must be double checked carefully.
- Never touch the sensing surface (opposed to the plug) with sharp or tipped articles. Use a soft tissue only.

 Insufficient or improper maintenance makes any warranty from SMW-AUTOBLOK void.

 In case of problems or questions please contact SMW-AUTOBLOK directly or one of our authorized offices.



## Pin Assignment Plug M12 x 1

| Pin | Description                                                                     |
|-----|---------------------------------------------------------------------------------|
| 1   | 24V DC                                                                          |
| 2   | not used                                                                        |
| 3   | GND                                                                             |
| 4   | C/Q (data)                                                                      |
| 5   | Signal output 0-10 V (Id. No. 208110)<br>Signal output 4-20 mA (Id. No. 208109) |

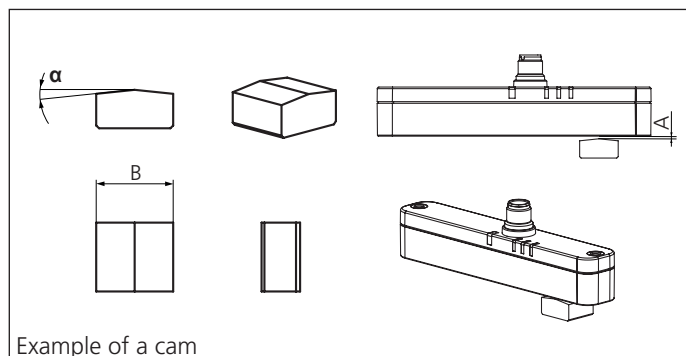
| Linear position sensor                   | LPS 4.0 120 IO                                                                                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Power supply                             | 24VDC $\pm 10\%$ @ 35mA typ. Inverse-polarity and overvoltage protection                                              |
| Interface                                | 0...10V, short-circuit-proof, load > 2kOhm (Id. Nr. 208108), 0/4...20mA, load < 500 Ohm (Id. Nr. 208107), IO Link 1.1 |
| Function monitoring                      | on error: output 0V or 0mA                                                                                            |
| Resolution                               | ca. 5mV                                                                                                               |
| Reproducibility                          | $\pm 0,1$ mm                                                                                                          |
| Linearity                                | $\pm 0,2$ mm                                                                                                          |
| Temperature drift                        | $\pm 0.25$ mm through the whole operating, temperature range, temperature engaged                                     |
| Measuring frequency                      | 33Hz                                                                                                                  |
| EMV Compatibility                        | EN61000-6-2 Immunity / EN61000-6-4 Emission                                                                           |
| Power-on phase                           | The first measuring value is available after 3 sec. approximately                                                     |
| Case dimensions                          | L x W x H; 60 x 23 x 24,5 mm                                                                                          |
| Case material                            | Plastic                                                                                                               |
| Case protection class                    | IP 67                                                                                                                 |
| Mounting                                 | via 2 M5x5 threaded holes in the bottom of the case                                                                   |
| Operation and storing temperature ranges | 0 bis 75°C                                                                                                            |
| Connections                              | 5-pin connector M12x1, male                                                                                           |

## Dimensioning Cam / Shiftring

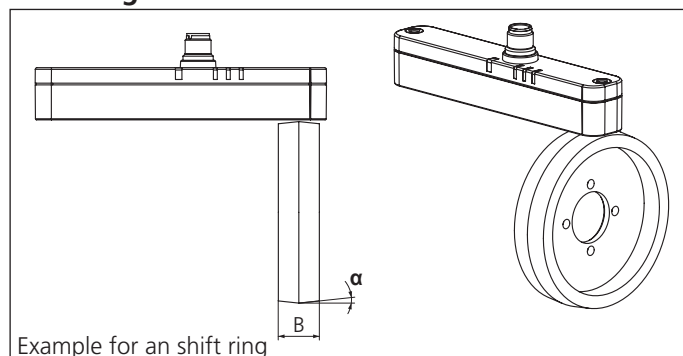
Recommended dimensions of Cams / Shiftrings:

| Dimensions                     | Info                                                                                                        |
|--------------------------------|-------------------------------------------------------------------------------------------------------------|
| Distance A = 1.0 mm $\pm$ 0.25 | A = recommended distance (inside and parallel) between the measuring surface and the Shiftring (ring shape) |
| Width B = 11 mm                | B = recommended width of the Cam or Shiftring                                                               |
| Angle $\alpha = 6^\circ$       | $\alpha$ = Angle min. $6^\circ$                                                                             |

### Cam



### Shift ring



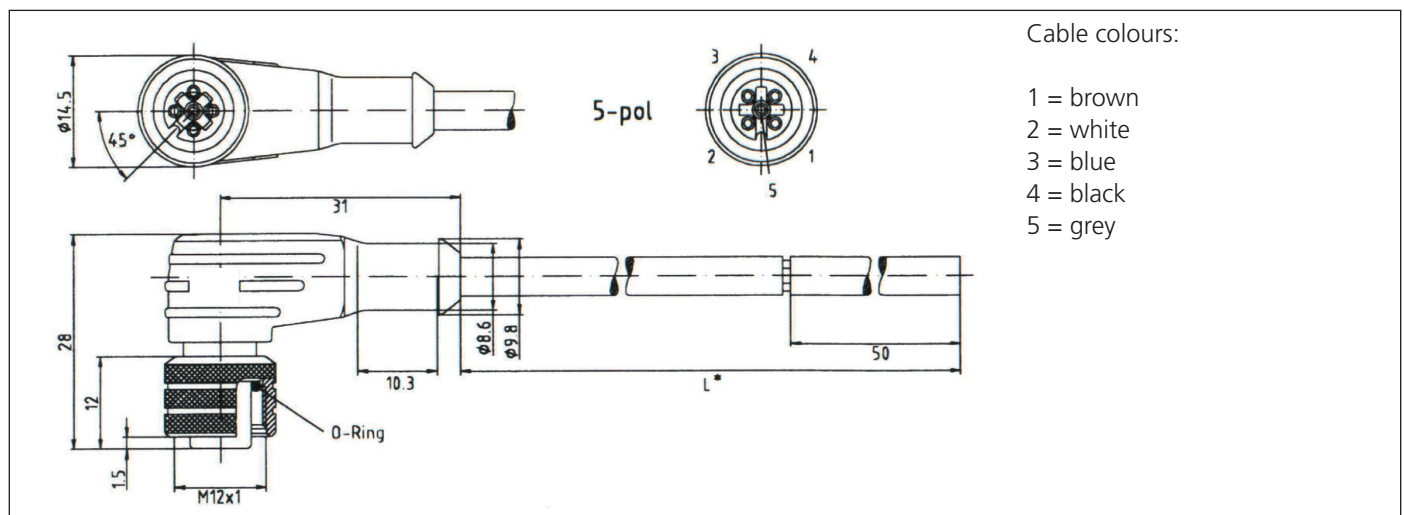
## Analog interface

The LPS 4.0 with analog signal output provides 0...10V or 4...20mA, corresponding to 0...48mm. If there is an upper or lower deviation from the measuring range or in case of an error, 0V or 0mA is output.

## Pin assignment, analog

The following pin assignment applies to the 5-pin cable connector M12x1:

| Pin | Description | Comment           | 5-pin cable |
|-----|-------------|-------------------|-------------|
| 1   | 24V DC      | +/- 10%           | brown       |
| 2   | not used    |                   | white       |
| 3   | GND         |                   | blue        |
| 4   | CQ (Data)   | must not be used  | black       |
| 5   | Signal out  | 0...10V, 4...20mA | grey        |



## Use only 5-pin shielded cable

 Use only 5-pin shielded cable. GND is used for power supply and signal. Shield connected on one side at the female connector.

## The pin assignment is binding

 The pin assignment is binding. The lead colours of the cable may vary.

### Analog connection

After the module has been assembled, the cable is connected to the PLC control via a shielded connection cable according to the pin assignment. Only 3 of the 5 wires are relevant for the user. The other two must neither be stripped nor used for any other purposes. The shield should be connected all over and possibly on both sides. Differences in the shield ground(s) are to be avoided; if need be, the shield may be connected only on one side. The securing screw of the M12 flanged connector must be tightened moderately.

### Electric power



When connecting the test sensor to power, all safety advises of the machine or of the external unit (see the corresponding manuals) have to be observed.

The connection must only be carried out by qualified personal.

### Do not lay connection cables in parallel to cables!



Do not lay connection cables in parallel to cables which could cause interferences.

### Consider cable crosssection and cable length!



Per ohm copper resistance, about 35mV offset are added to the measuring signal. Cable crosssection and cable length are to be taken into account.

## Mounting LPS 4.0

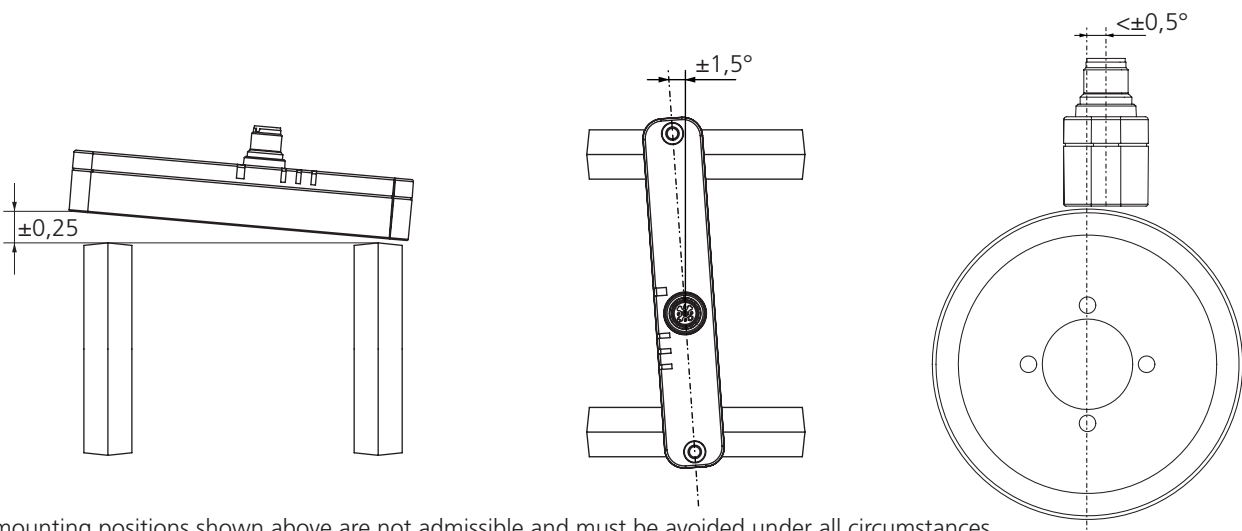
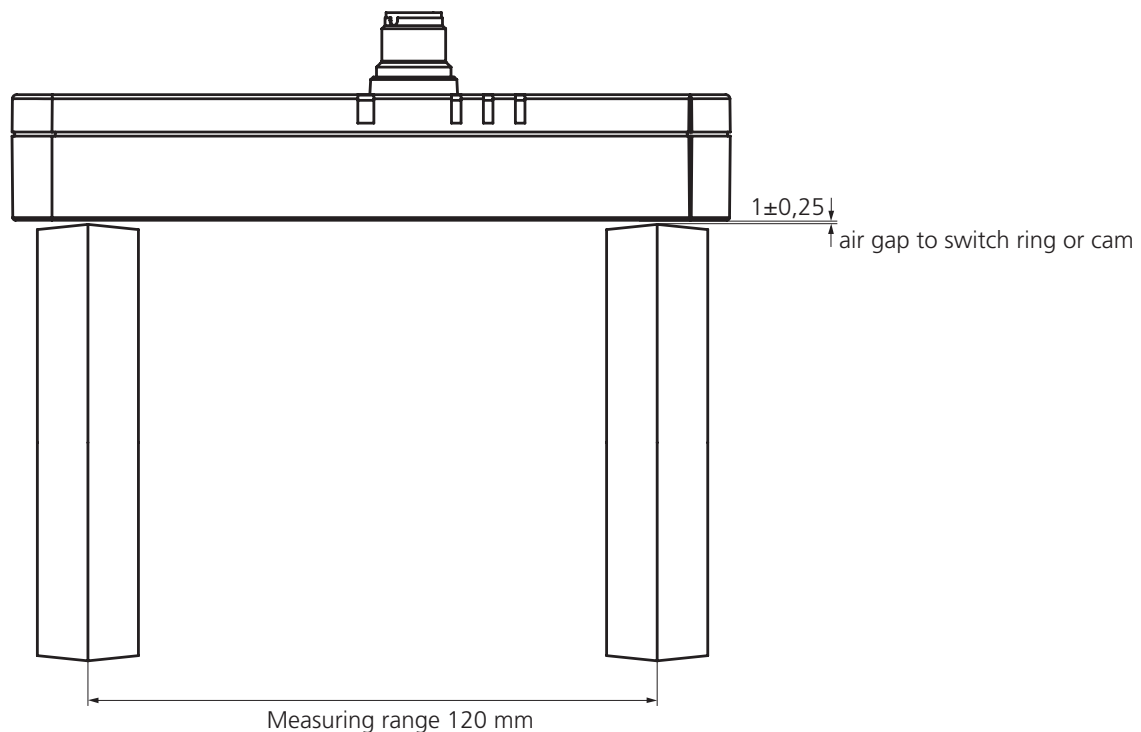
### Special care must be taken when mounting



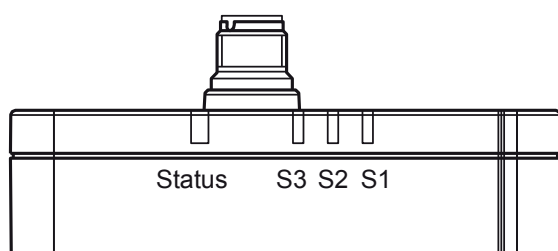
Special care must be taken when mounting the sensor module since correct mounting is decisive for the quality of the measurement signal.

### The following procedure is recommended:

- Mount the LPS 4.0 by means of a support (not contained in the delivery package).
- Set the exact distance to the switch ring (ring shape) or cam.
- Take care that the sensor module is in an exact parallel position to and is concentric with the cylinder axis.
- No minimum distance to metal surfaces has to be observed on the sides, the front and the side facing the support; a distance of 10mm must be kept towards the measuring surface opposite the support..



The mounting positions shown above are not admissible and must be avoided under all circumstances.  
LPS 4.0 scale drawing with tolerances



## Standard display behavior of LEDs

| LED    | Color  | Description                                                                                                                                                                                                                                                                                                                 |
|--------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status | Green  | On = supply voltage is OK.<br>Off = no supply voltage<br>Short flashes on and off = IO-Link communication is active                                                                                                                                                                                                         |
| Status | Red    | Flashing (approx. 4 Hz) = a short circuit to a sensor output has been detected<br><br>Pulsating flashing (approx. 0.8 Hz) = Low voltage of the supply voltage has been detected.<br><br>Note: If activated via IO-Link, On = no damping element is detected in the detection range (max. measuring range). See table below. |
| S3     | Yellow | Switching state of switching output 1:<br><br>On = switching output has switched, because a target is on the switch point or in the switching window<br><br>Off = switching output has not switched                                                                                                                         |

## Display behavior of LEDs can be activated via IO-Link

| LED                  | Color         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status               | Red           | Permanent additional information on the detection of the damping element for all product variants.<br><ul style="list-style-type: none"> <li>On = no target is detected in the detection range (max. measuring range)</li> <li>Off = a target is detected in the detection range (max. measuring range)</li> </ul> Activation via parameter „0x78, subindex 1 = no target detected (warning)“ to value „1“ or via the parameter menu, „Event configuration“ section, „No Damping Element detected (Warning)“ function set to „Enabled.“                                                                               |
| S1 ... S3 and Status | Yellow, green | Localization function<br><ul style="list-style-type: none"> <li>LEDs S1 ... S3 flashing simultaneously in yellow and the LED status in green.</li> </ul> To easily detect the sensor installed in a machine or plant, conspicuous LED flashing behavior can be activated and deactivated again via IO-Link for the sensor search. After isolating the sensor from the supply voltage, the flashing behavior is deactivated again as standard. Activation via parameter „0x7f = Locator Indication“ to value 1 or via the Diagnosis menu, „Service function“ function, indication setting set to „Locator Indication.“ |

## Input data structure

|               |          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 15            | 14       | 13  | 12  | 11  | 10  | 9   | 8   | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   |
| Positionswert |          |     |     |     |     |     |     |     |     |     |     | 0   |     |     |     |
| AD1<br>1      | AD1<br>0 | AD9 | AD8 | AD7 | AD6 | AD5 | AD4 | AD3 | AD2 | AD1 | AD0 | res | BD3 | BD2 | BD1 |

## Function

|     |                    |
|-----|--------------------|
| BD1 | Switching signal 1 |
| BD2 | Switching signal 2 |
| BD3 | Switching signal 3 |
| AD  | Position value     |

## Values

|     |      |                    |                                                          |
|-----|------|--------------------|----------------------------------------------------------|
| BDn | bool | 0                  | Switched off                                             |
|     |      | 1                  | Switched n                                               |
| AD  |      | 0... max. position | Valid position value in 1/20 mm<br>LPS 4.0 120: 0...2400 |
|     |      | 4092               | Insufficient signal quality                              |
|     |      | 4093               | Outside of the value range<br>(below the value range)    |
|     |      | 4094               | Outside of the value range<br>(above the value range)    |
|     |      | 4095               | No target                                                |

## Configuration

| BD1 switchpoint logic        | Index 0x3D Subindex 1 |                |
|------------------------------|-----------------------|----------------|
|                              | 0 (High-Active)       | 1 (Low-Active) |
| BD1 - switching signal 1:    |                       |                |
| Target outside of the limits | 0                     | 1              |
| Target within the limits     | 1                     | 0              |

| BD2 switchpoint logic        | Index 0x3F Subindex 1 |                |
|------------------------------|-----------------------|----------------|
|                              | 0 (High-Active)       | 1 (Low-Active) |
| BD2 - switching signal 2:    |                       |                |
| Target outside of the limits | 0                     | 1              |
| Target within the limits     | 1                     | 0              |

| BD3 switchpoint logic        | Index 0x400     |                |
|------------------------------|-----------------|----------------|
|                              | 0 (High-Active) | 1 (Low-Active) |
| BD3 - switching signal 3:    |                 |                |
| Target outside of the limits | 0               | 1              |
| Target within the limits     | 1               | 0              |

## IO-Link Communication and ID Parameters

| Direct Paramter Page 1 - Index 0x00 |             |                          |      |           |           |                           |                                                 |
|-------------------------------------|-------------|--------------------------|------|-----------|-----------|---------------------------|-------------------------------------------------|
| Sub                                 | Address hex | Name                     | Type | Data type | Attribute | Value                     | Comment                                         |
| <b>Communication Control</b>        |             |                          |      |           |           |                           |                                                 |
| 1                                   | 0x00        | Master Command           | R/W  | uint8     | volatile  |                           | written by master                               |
| 2                                   | 0x01        | Master cycle time        | R/W  | uint8     | volatile  |                           | written by master                               |
| 3                                   | 0x02        | Min. cycle time          | R    | uint8     | constant  | 0x17                      | 2.3 ms                                          |
| 4                                   | 0x03        | M-sequence capability    | R    | uint8     | constant  | 0x21                      | ISDU support                                    |
| 5                                   | 0x04        | Revision ID              | R    | uint8     | constant  | 0x11                      | IO-Link version 1.1                             |
| 6                                   | 0x05        | Process Data in          | R    | uint8     | constant  | 0x50                      | 16bit Pdin, SIO support                         |
| 7                                   | 0x06        | Process Data out         | R    | uint8     | constant  | 0x00                      | n/a                                             |
| <b>Identification Parameter</b>     |             |                          |      |           |           |                           |                                                 |
| 8                                   | 0x07        | IO-Link Vendor ID1 (MSB) | R    | uint8     | constant  | 0x04                      | SMW Autoblok                                    |
| 9                                   | 0x08        | IO-Link Vendor ID2 (LSB) | R    | uint8     | constant  | 0x46                      |                                                 |
| 10                                  | 0x09        | Device ID1 (MSB)         | R    | uint8     | constant  | 0x03                      | LPS 4.0 120 IO<br>208108 0-10V<br>208107 4-20mA |
| 11                                  | 0x0A        | Device ID2               | R    | uint8     | constant  | 0x2C                      |                                                 |
| 12                                  | 0x0B        | Device ID3 (LSB)         | R    | uint8     | constant  | 0xEC 0-10V<br>0xEB 4-20mA |                                                 |
| 13                                  | 0x0C        | Function ID1 (MSB)       | R/W  | uint8     | static    | 0x00                      | not used                                        |
| 14                                  | 0x0D        | Function ID2 (LSB)       | R/W  | uint8     | static    | 0x00                      |                                                 |

## IO-Link Standard Parameters

### System Command (Index 0x02)

| Value hex | Function                 |
|-----------|--------------------------|
| 0x82      | Restore Factory Settings |

### Profil ID (Index 0x0D)

| Subindex | Value hex | Function                       |
|----------|-----------|--------------------------------|
| 1        | 0x0001    | Smart Sensor Profile supported |
| 2        | 0x8000    | Device Identification          |
| 3        | 0x8001    | Binary data channel            |
| 4        | 0x8002    | Process Data Variable          |
| 5        | 0x8003    | Device Diagnosis               |

### PD input descriptor (Index 0x0E)

| Subindex | Value hex | Function      |
|----------|-----------|---------------|
| 1        | 0x10300   | SetFBool3.0   |
| 2        | 0x020C04  | UIntegerT12.4 |

### Parameters for Identification

| Index hex | Name                      | Type | Data type     |
|-----------|---------------------------|------|---------------|
| 0x10      | Vendor Name               | R    | char [18]     |
| 0x11      | Vendor Text               | R    | char [max 32] |
| 0x12      | Product Name              | R    | char [max 32] |
| 0x13      | Product ID                | R    | char [11]     |
| 0x14      | Product Text              | R    | char [max 32] |
| 0x15      | Serial Number             | R    | char [14]     |
| 0x16      | Hardware Revision         | R    | char [7]      |
| 0x17      | Firmware revision         | R    | char [7]      |
| 0x18      | Application Specific Name | R/W  | char [max 32] |
| 0xC0      | User Tag                  | R/W  | char [max 32] |

## IO-Link Device Parameter

Note:

The existing indexes for the various sensors differ according to their properties. For example, indexes for parameterizing an analog output are only available for sensors with an analog output.

| Index hex                                              | sub | Name                   | Typ | Data type | Value                                                                                              | Default | Unit    |
|--------------------------------------------------------|-----|------------------------|-----|-----------|----------------------------------------------------------------------------------------------------|---------|---------|
| <b>Switching Signal Channel 1</b> (Data Storage = yes) |     |                        |     |           |                                                                                                    |         |         |
| 0x3C                                                   | 1   | Setpoint SP1           | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 240     | 1/20 mm |
|                                                        | 2   | Setpoint SP2           | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 960     | 1/20 mm |
| 0x3D                                                   | 1   | Switchpoint Logic      | R/W | unit8     | 0: High-Active<br>1: Low-Active                                                                    | 0       |         |
|                                                        | 2   | Switchpoint Mode       | R/W | unit8     | 0x01 - Single Point<br>0x02 - Window Mode<br>0x03 - Two Point Mode<br>0x080 - Centered Window Mode | 0x80    |         |
|                                                        | 3   | Switchpoint Hysteresis | R/W | unit16    | 0: Low<br>1: Medium<br>2: High                                                                     | 0       |         |
| 0x40                                                   | 1   | Window Width           | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 20      | 1/20mm  |
|                                                        | 2   | Off Delay              | R/W | unit16    | 0...6000                                                                                           | 0       | ms      |
|                                                        | 3   | On Delay               | R/W | unit16    | 0...6000                                                                                           | 0       | ms      |
|                                                        | 4   | Error Behavior         | R/W | unit8     | 0: State Freeze<br>1: Maximum Position<br>2: High<br>3: Low                                        | 3       |         |
| <b>Switching Signal Channel 2</b> (Data Storage = yes) |     |                        |     |           |                                                                                                    |         |         |
| 0x3E                                                   | 1   | Setpoint SP1           | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 720     | 1/20mm  |
|                                                        | 2   | Setpoint SP2           | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 960     | 1/20mm  |
| 0x3F                                                   | 1   | Switchpoint Logic      | R/W | unit8     | 0: High-Active<br>1: Low-Active                                                                    | 0       |         |
|                                                        | 2   | Switchpoint Mode       | R/W | unit8     | 0x01 - Single Point<br>0x02 - Window Mode<br>0x03 - Two Point Mode<br>0x80 - Centered Window Mode  | 0x80    |         |
|                                                        | 3   | Switchpoint Hysteresis | R/W | unit16    | 0: Low<br>1: Medium<br>2: High                                                                     | 0       |         |
| 0x41                                                   | 1   | Window Width           | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 20      | 1/20mm  |
|                                                        | 2   | Off Delay              | R/W | unit16    | 0...6000                                                                                           | 0       | ms      |
|                                                        | 3   | On Delay               | R/W | unit16    | 0...6000                                                                                           | 0       | ms      |
|                                                        | 4   | Error Behavior         | R/W | unit8     | 0: State Freeze<br>1: Maximum Position<br>2: High<br>3: Low                                        | 3       |         |

| Index hex                                              | sub | Name                              | Typ | Data type | Value                                                                                              | Default | Unit    |
|--------------------------------------------------------|-----|-----------------------------------|-----|-----------|----------------------------------------------------------------------------------------------------|---------|---------|
| <b>Switching Signal Channel 3</b> (Data Storage = yes) |     |                                   |     |           |                                                                                                    |         |         |
| 0x4000                                                 | 1   | Setpoint SP1                      | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 480     | 1/20 mm |
|                                                        | 2   | Setpoint SP2                      | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 960     | 1/20 mm |
| 0x4001                                                 | 1   | Switchpoint Logic                 | R/W | unit8     | 0: High-Active<br>1: Low-Active                                                                    | 0       |         |
|                                                        | 2   | Switchpoint Mode                  | R/W | unit8     | 0x01 - Single Point<br>0x02 - Window Mode<br>0x03 - Two Point Mode<br>0x080 - Centered Window Mode | 0x80    |         |
|                                                        | 3   | Switchpoint Hysteresis            | R/W | unit16    | 0: Low<br>1: Medium<br>2: High                                                                     | 0       |         |
| 0x43                                                   | 1   | Window Width                      | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 20      | 1/20mm  |
|                                                        | 2   | Off Delay                         | R/W | unit16    | 0...6000                                                                                           | 0       | ms      |
|                                                        | 3   | On Delay                          | R/W | unit16    | 0...6000                                                                                           | 0       | ms      |
|                                                        | 4   | Error Behavior                    | R/W | unit8     | 0: State Freeze<br>1: Maximum Position<br>2: High<br>3: Low                                        | 3       |         |
| <b>Analog Output</b> (Data Storage = yes)              |     |                                   |     |           |                                                                                                    |         |         |
| 0x42                                                   | 1   | Range Limit 1                     | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 0       | 1/20mm  |
|                                                        | 2   | Range Limit 2                     | R/W | unit16    | LPS 4.0 120: 0...960                                                                               | 960     | 1/20mm  |
| 0x72                                                   | 1   | Analog Output Type                | R/W | unit8     | 0: Current<br>1: Voltage                                                                           | 0       |         |
|                                                        | 2   | Analog Output Mode                | R/W | unit8     | 0: Rising<br>1: Falling                                                                            | 0       |         |
|                                                        | 3   | Current - Lower Output Value      | R/W | unit8     | 0...200                                                                                            | 40      | 0,1mA   |
|                                                        | 4   | Current - Upper Output Value      | R/W | unit8     | 0...200                                                                                            | 200     | 0,1mA   |
|                                                        | 5   | Voltage - Lower Output Value      | R/W | unit8     | 0...100                                                                                            | 0       | 0,1V    |
|                                                        | 6   | Voltage - Upper Output Value      | R/W | unit8     | 0...100                                                                                            | 100     | 0,1V    |
|                                                        | 7   | Analog Output Error Behavior      | R/W | unit8     | 0: Output Value Freeze<br>1: Maximum Position<br>2: Error Replacement Value                        | 2       |         |
|                                                        | 8   | Current - Error Replacement Value | R/W | unit8     | 0...200                                                                                            | 0       | 0,1 mA  |
|                                                        | 9   | Voltage - Error Replacement Value | R/W | unit8     | 0...100                                                                                            | 0       | 0,1V    |

| Index hex | sub | Name | Typ | Data type | Value | Default | Unit |
|-----------|-----|------|-----|-----------|-------|---------|------|
|-----------|-----|------|-----|-----------|-------|---------|------|

#### Event Configuration (Data Storage = yes)

|      |   |                     |     |      |                           |  |  |
|------|---|---------------------|-----|------|---------------------------|--|--|
| 0x78 | 1 | No Target (Warning) | R/W | bool | 0: Disabled<br>1: Enabled |  |  |
|      | 2 | Signalfehler        | R/W | bool | 0: Disabled<br>1: Enabled |  |  |

#### Service Function (Data Storage = no)

|      |  |                    |     |       |                                               |   |  |
|------|--|--------------------|-----|-------|-----------------------------------------------|---|--|
| 0x7F |  | Indication Setting | R/W | unit8 | 0: Normal Indication<br>1: Locator Indication | 0 |  |
|------|--|--------------------|-----|-------|-----------------------------------------------|---|--|

#### Device Access Locks (Data Storage = yes)

|      |  |                          |     |      |                                                                    |   |  |
|------|--|--------------------------|-----|------|--------------------------------------------------------------------|---|--|
| 0x0C |  | Data Storage Lock (Bit1) | R/W | bool | 0: false (Data Storage activated)<br>1: true (Data Storage locked) | 0 |  |
|------|--|--------------------------|-----|------|--------------------------------------------------------------------|---|--|

#### Device Status Information (Data Storage = no)

|      |  |                        |   |            |                                             |   |  |
|------|--|------------------------|---|------------|---------------------------------------------|---|--|
| 0x24 |  | Device Status          | R | unit8      | 0: Device is OK<br>2: Out of specification  | 0 |  |
| 0x25 |  | Detailed Device Status | R | unit 8 [9] | Active Events, see IOLink 1.1-Specification |   |  |

#### Operation Information (Data Storage = no)

|      |  |                 |   |        |                                   |  |       |
|------|--|-----------------|---|--------|-----------------------------------|--|-------|
| 0xE0 |  | Operating Hours | R | unit32 | 0: 0x3FFFFFFF<br>Resolution 0,25h |  | 0,25h |
|------|--|-----------------|---|--------|-----------------------------------|--|-------|

#### User Specific Information (Data Storage = yes)

|      |  |                          |     |           |                     |  |  |
|------|--|--------------------------|-----|-----------|---------------------|--|--|
| 0x18 |  | Application Specific Tag | R/W | char [32] | Always a step ahead |  |  |
| 0xC0 |  | User Tag                 | R/W | char [32] | LPS 4.0 Series      |  |  |

#### Device Characteristics (Data Storage = no)

|      |   |                |   |        |                      |  |  |
|------|---|----------------|---|--------|----------------------|--|--|
| 0xE8 | 1 | Position Range | R | unit16 | LPS 4.0 120: 0...960 |  |  |
|      | 2 | Resolution     | R | unit16 | 50 µm                |  |  |

#### Process Data (Data Storage = no)

|      |  |                     |   |        |                            |  |  |
|------|--|---------------------|---|--------|----------------------------|--|--|
| 0x28 |  | Process Data Values | R | unit16 | See Process Data Structure |  |  |
|------|--|---------------------|---|--------|----------------------------|--|--|

#### Observation (Data Storage = no)

|      |   |                    |   |        |                                                             |  |         |
|------|---|--------------------|---|--------|-------------------------------------------------------------|--|---------|
| 0xEC | 1 | Measured Value     | R | unit16 | LPS 4.0 120: 0...960                                        |  | 1/20 mm |
|      | 2 | Signal Quality     | R | unit8  | 0: Insufficient<br>1: Acceptable<br>2: Good<br>3: Excellent |  |         |
|      | 3 | Switching Signal 1 | R | unit8  | 0: Inactive<br>1: Active                                    |  |         |
|      | 4 | Switching Signal 2 | R | unit8  | 0: Inactive<br>1: Active                                    |  |         |
|      | 5 | Switching Signal 3 | R | unit8  | 0: Inactive<br>1: Active                                    |  |         |

 Note: At parameter „0xEC“ it is only possible to read the complete parameter. Accessing of subindexes is not possible here.

## Error Codes

In case of a fault, the sensor transmits the error codes detailed in the following table. The error code consists of 2 bytes. The higher value byte, here 0x80, represents the IO-Link device as the emitter. The lower value byte represents the actual fault.

| Error                                                | Error code | Comment                                                                                        |
|------------------------------------------------------|------------|------------------------------------------------------------------------------------------------|
| Device application error                             | 0x8000     | Device application error, the required service is not operated by the sensor.                  |
| Index unavailable                                    | 0x8011     | R/W access to unavailable parameter index.                                                     |
| Unavailable subindex                                 | 0x8012     | R/W access to unavailable parameter subindex.                                                  |
| Service temporarily unavailable                      | 0x8020     | Write/read access to parameter limited by the device status is not possible.                   |
| Service temporarily unavailable—device control panel | 0x8022     | Write/read access to parameter limited by window control access to the sensor is not possible. |
| Access denied                                        | 0x8023     | Write attempt to read-only address.                                                            |
| Invalid value range, parameter                       | 0x8030     | For all R/W parameters outside of the valid value range.                                       |
| Parameter value too large                            | 0x8031     | For all R/W parameters above the valid value range.                                            |
| Parameter value too small                            | 0x8032     | For all R/W parameters beneath the valid value range.                                          |
| Parameter length is too large                        | 0x8033     | Too much data has been transmitted for the parameter (more bytes).                             |
| Parameter length is too small                        | 0x8034     | Too little data has been transmitted for the parameter (too few bytes).                        |
| Application not ready                                | 0x8082     | Device application error, the required service is not operated by the sensor.                  |

## Event Data

The sensor is capable of transmitting events that occur:

| Event             | Instance | Type    | Mode             | Event Qualifier | Event Code | Description                                  |
|-------------------|----------|---------|------------------|-----------------|------------|----------------------------------------------|
| Signal faults     | APP      | Warning | Appear/Disappear | 0xE4/0xA4       | 0x8D40     | Target is too far from the sensor.           |
| No measured value | APP      | Warning | Appear/Disappear | 0xE4/0xA4       | 0x8D41     | No target or no position detection possible. |

## Maintenance, service

The LPS 4.0 usually works without maintenance.

Any way the function should be tested in regular intervals when testing the machine tool.

### The following tests need to be carried out:

- Check the relative position of the sensor to the cam of the cylinder.
- Check if all mounting bolts are tightened correctly and check the cam of the cylinder.
- Check the switch ring.
- Check that the sensing surface has no physical damage.
- Check that there is no contamination of the sensor.

## LPS 4.0 analog

The LPS 4.0 sensor is factory set, so that the full measuring range results in a proportional signal of 0-10 Volt or 4-20 mA.

In case the sensor detects a non logical position or is out of its measuring range, it will give a 0 Volt or 0 mA output signal.

As the SPS can not identify if the 0-signal is a 0 mm signal or an error, the sensor should be adjusted mechanically so that the position "0" is out of the mechanical measuring/stroke range of the cam /switch ring of the cylinder.

## Troubleshooting

| Fault                                 | Cause                                                                                    | Remedy                                                                                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| „Status“ LED does not light up        | <b>A</b> The power supply is switched off.                                               | Check whether there is a reason why the power supply is switched off (installation or maintenance work, etc.). Switch on the power supply if appropriate. |
|                                       | <b>B</b> The plug is not connected to the connector on the sensor.                       | Connect the plug to the sensor and tighten the cap nut by hand.                                                                                           |
|                                       | <b>C</b> Wiring fault in the splitter or switch cabinet.                                 | Check the wiring carefully and repair any wiring faults.                                                                                                  |
|                                       | <b>D</b> Supply cable to the sensor is damaged.                                          | Replace the damaged cable.                                                                                                                                |
| Kein IO-Link-Verbindung zum Gerät     | <b>A</b> The C/Q communication port on the sensor is not connected to the IO-Link master | Make sure that the C/Q communication port is connected to the IO-Link master.                                                                             |
|                                       | <b>B</b> No power supply                                                                 | Check whether there is a reason for the absence of the power supply (installation or maintenance work, etc.). Switch on the power supply.                 |
| Bedämpfungselement wird nicht erfasst | <b>A</b> Sensor is too far away from the item to be detected                             | Check the mounting and, if necessary, adjust the sensor to the correct distance.                                                                          |

## Connecting Cable

Connection cables and matching connectors are not included in the delivery package.

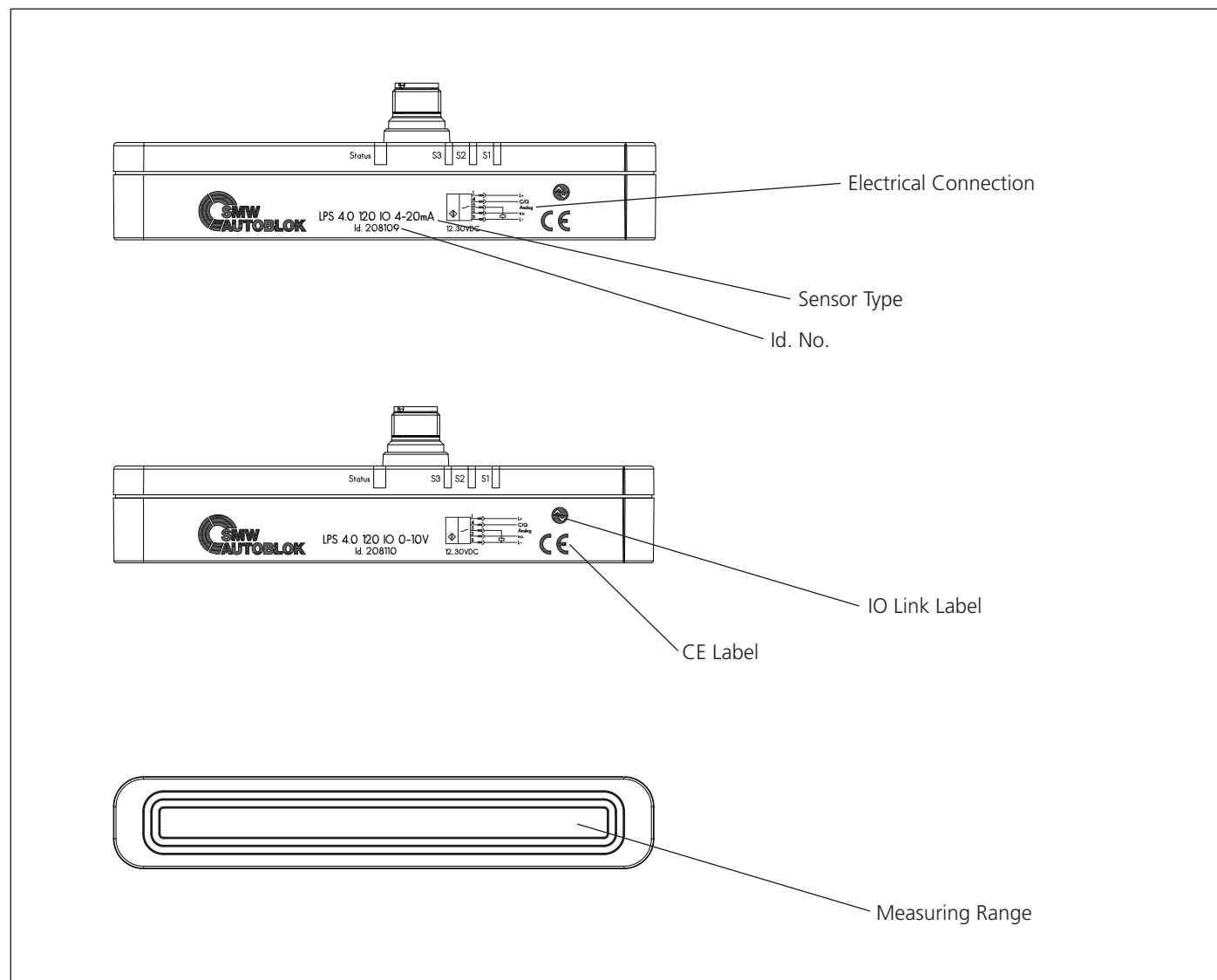
They can be ordered from (special length up to 20m on request).

The wire cross section min. 0.34 mm<sup>2</sup>.

| Description (Connecting Cable for LPS 4.0)                                             | SMW-ID-No. |
|----------------------------------------------------------------------------------------|------------|
| <b>Connecting Cable 5m straight</b><br>5m Length,<br>5-pin M12x1 connector, straight   | 208244     |
| <b>Connecting Cable 5m angled</b><br>5m Length,<br>5-pin M12x1 connector, angled       | 208247     |
| <b>Connecting Cable 10m straight</b><br>10m Length,<br>5-pin M12x1 connector, straight | 208245     |
| <b>Connecting Cable 10m angled</b><br>10m Length,<br>5-pin M12x1 connector, angled     | 208248     |
| <b>Connecting Cable 15m straight</b><br>15m Length,<br>5-pin M12x1 connector, straight | 208246     |
| <b>Connecting Cable 15m angled</b><br>15m Length,<br>5-pin M12x1 connector, angled     | 208249     |

## Typeplate / Contact

For questions on the product and place an order, please indicate the type marked on the label of the sensor type specification and part number.



Contact:

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22 SMW-AUTOBLOK

# 12 month warranty

**Product: Linear Position Sensor**

SMW-AUTOBLOK guarantees the proper function of the sensor, if use and storage are in accordance with the technical instructions of this manual.

In case the sensor does not perform properly, a repair or exchange is done, after inspecting the circumstances.

In case of a production error the sensor is repaired free of charge within the warranty period.

The warranty period is 12 month.

In order to claim warranty, the sensor must be returned in the original packaging.

The return shipment must be accompanied by a detailed trouble description.

Otherwise the manufacturer reserves the right to void any warranty claims.



# Empfangsbestätigung für die Betriebsanleitung Confirmation of receipt of the instruction manual



Hiermit bestätigt die vom Betreiber/ Anwender beauftragte Person

This certifies the operator assigned by the operating company

Herr / Frau

Mr. / Mrs.

den Erhalt der Betriebsanleitung sowie deren Inhalte, insbesondere das Kapitel Sicherheit gelesen und verstanden zu haben.

hereby confirms to have received the instruction manual and to have read and understood the content, especially the chapters concerning safety.

Bediener

Datum

Operator

Date

Betreiber / Sachbeauftragter

Datum

Operating Company /  
Authorised person

Date

Id.Nr. / Id. No.

:

Artikelbez. / Item

:

Gewicht / Weight

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Seriennr. / Serialno.

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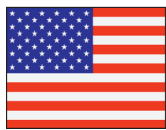
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Serialno. :

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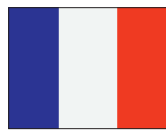
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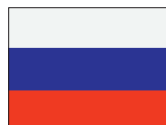
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