

### User manual

## SMK, SML, SMH

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### Description

This manual describes products of the SMK, SML, SMH series. The purpose of these sensors is to measure linear or angular displacements on industrial machines and automation systems. The measurement system includes a magnetic tape and a magnetic sensor. The tape has alternating magnetic north/south poles are magnetized at a certain distance called the pole pitch. As the sensor is moved along the magnetic tape (or magnetic ring), it detects the displacement and produces an output signal equivalent to that of an incremental encoder or a linear scale. The flexibility of the tape allows it to be used for both linear and angular applications.

The sensor has to be matched with the appropriated magnetic tape (see chap. 2.1).

### 1 – Safety summary

We strongly recommend carefully reading this user manual and following the installation guidelines:

- Sensor head should be installed as close as possible to your control unit.
- Always use shielded cables and twisted if possible.
- Avoid running the sensor cable near high voltage power cables (e.g. drive cables).
- Install EMC filters on sensor power supply if needed.
- Avoid mounting sensor head near capacitive or inductive noise sources such as relays, motors, and switching power supplies.

Connect according to the supplied pin-out.

### 2 – Identification

The sensor can be identified by the label's data (ordering code, serial number). This information is listed in the delivery document. All technical features according to the ordering code are shown on the catalogue.

#### 2.1 Sensor and tape combinations

Sensor	Magnetic tape
SMK	MT50
SML	MT32
SMH	MT40

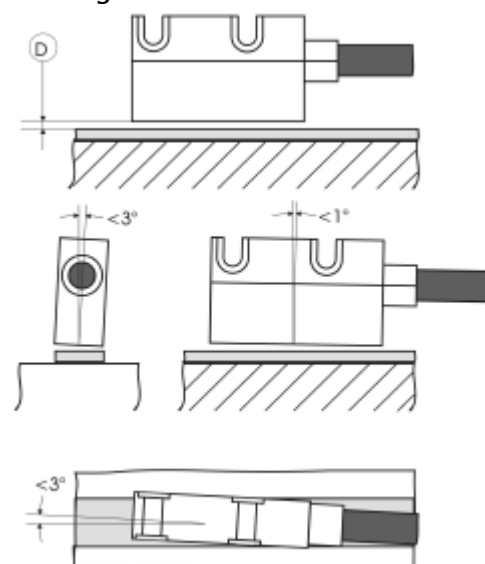
### 3 – Installation

Install the product according to the protection level provided.

Protect the system against knocks, friction, solvents, temperatures under  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ) and over  $+70^{\circ}\text{C}$  ( $+158^{\circ}\text{F}$ ).

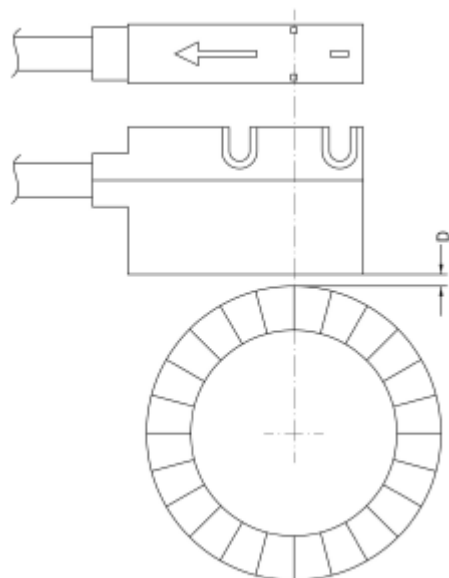
Be sure that the system is mounted where hard or sharp objects (e.g. metal chips) do not come into contact with the magnetic scale and the bottom of the sensor head. If these conditions cannot be avoided provide a wiper or pressurized air.

#### 3.1 Mounting tolerances



Sensore	Gap Sensor/Magnetic tape (D)
SMK	4,0 mm
SML	2,0 mm
SMH	2,0 mm

## 3.2 Mounting position with magnetic rings

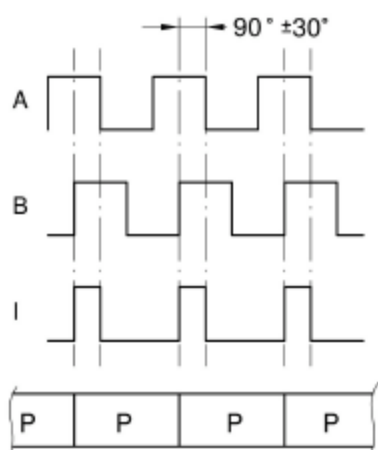


Sensore	Gap Sensor/Magnetic ring (D)
SMK	4,0 mm
SML	2,0 mm
SMH	2,0 mm

For mounting tolerances refer to paragraph 3.1

## 4 – Output signals

With ordering code "N" the output signal "I" is not available.



As the sensor is moved along the magnetic tape, it detects the displacement and produces an output signal equivalent to that of an incremental encoder or a linear scale. The signal output is proportional to the measuring speed and to the displacement of the sensor. Resolution after quadrature (4 edge reading) can be determined by the ordering code on the sensor.

## 5 – Electrical connections

Output	Colour
A	yellow
/A	blue
B	green
/B	orange
0	white
/0	grey
GND	black
+Vdc	red

\* see ordering code

"1" = +5Vdc ± 5%

"2" = +10Vdc +30Vdc

Note: All sensors have AquadB and inverted signals.

A = A signal

/A = inverted A signal (or complementary signal)

All our magnetic sensors can have A, /A, B, /B, 0, /0 output signals. We recommend always connecting the inverted signals if the receiving device will accept them. Otherwise the outputs should to be insulated.

**ATTENTION:** connecting /A, /B, or /0 together, to +Vdc or 0Vdc may cause permanent damage to the sensor.

### 5.1 Specifications of the cable

Wires : 6 x 0.14mm<sup>2</sup> + 2 x 0.24mm<sup>2</sup>

Screening : Copper

External Ø : Ø 5.2 mm ± 0.2 mm (Ø 0.2 in ± 0.01in)

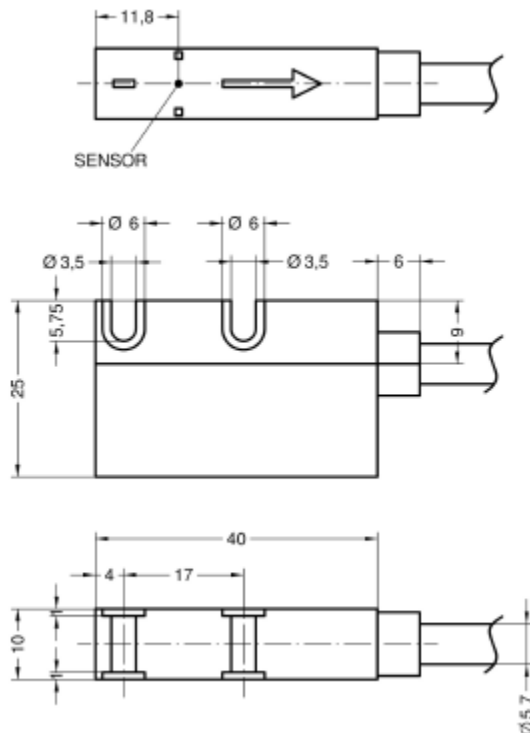
Impedance : 6 x 145 Ω, 2 x 87 Ω

### Notes:

- While connecting, power must be switched OFF;
- Check correct connections before switching ON;
- We recommend that the sensor head be mounted as far as possible from any capacitive or inductive noise source such as motors, relays and switching devices;
- Avoid routing the sensor cable near high voltage power cables in order to reduce influences of electric noise;
- Only use shielded cables and wire with a cross section between 0,14mm<sup>2</sup> and 0,5 mm<sup>2</sup>
- The shield of the cable and 0Vdc wire should be connected to ground (GND);

- Electric noise sources should be linked with noise suppression filters;
- Total length of connection cable from sensor to receiving device should not exceed 50 m (55').

## 6 – Dimensional drawing



## 7 – Maintenance

The magnetic measurement system doesn't need any particular maintenance but as with all precision devices it must be handled with care. From time to time we recommend the following operations:

- Check the gap between sensor and magnetic tape along the measuring length. Wear of the machine may increase the tolerances.
- The surface of the magnetic tape should occasionally be cleaned using a soft cloth to remove dust, chips, moisture etc.

## 8 – Troubleshooting

The following list shows some typical errors that occur during installation and operation of the magnetic measurement system.

### Problem:

The system doesn't work (no pulse output):

- The tape or sensor has been mounted incorrectly (the active part of the tape doesn't face the sensor's active side).
- A magnetic piece or tape is in between the sensor and the tape. Only non-magnetic materials are allowed between sensor and tape.
- The sensor touches the tape because tolerance gap between sensor and tape are not observed. Check sensor's active side if damaged.
- The sensor has been damaged by short circuit or wrong connection.

### Problem:

The measured values are inaccurate:

- The gap between sensor and tape is not observed along the total measurement length.
- The connection cable runs near to high voltage cable or shield is not connected correctly.
- The max. counting frequency of your receiving device is too low.
- A section of the magnetic tape has been damage mechanically or magnetically along the measuring length
- The measuring error is caused by torsion of the machine structure. Check parallelism and symmetry of machine movement.