

User manual

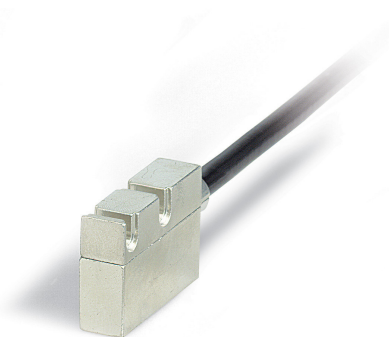
SHDx

Description

This manual describes the products of the SHDx series. The purpose of these sensors is to measure linear or angular displacements on linear motors 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, 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).



Chapters


- 1 Safety summary
- 2 Identification
- 3 Mounting recommendations
- 4 Electrical connections
- 5 Output signals
- 6 Maintenance
- 7 Troubleshooting

1 - Safety summary

Safety

- observe the professional safety and accident prevention regulations applicable to your country during device installation and operation;
- installation has to be carried out by qualified personnel only, without power supply and stationary mechanics parts;
- the device must be used only for the purpose appropriate to its design;
- high current, voltage and rotating parts can cause serious or fatal injury.

Electrical safety

- switch OFF the voltage before connecting the device;
- connect according to the chapter "Electrical connections";
- according to the 89/336/CEE norm on electromagnetic compatibility, following  precautions must be taken:
 - before handling and installing, discharge electrical charge from your body and tools which may come in touch with the device;
 - power supply must be stable without noise, install EMC filters on device power supply if needed;
 - always use shielded and twisted cables if possible;
 - avoid cables runs longer than necessary;
 - avoid running the signal cable near high voltage power cables;
 - mount the device as far as possible from any capacitive or inductive noise source, shield the device from noise source if needed;
 - minimize noise by connecting shield and device housing to ground (GND). Make sure that ground (GND) is not affected by noise.

Mechanical safety

- install according to the chapter "Mounting instructions" with stationary mechanics parts;
- do not disassemble the device;
- do not tool the device;
- do not subject the device to knocks or shocks;
- protect the system against solvents and substances damaging it;
- respect the environmental characteristics of the product;
- be sure that the system is mounted where hard or sharp objects (e.g. metal chips) do not come into contact with the magnetic tape and the bottom of the sensor head. If these conditions cannot be avoided provide a wiper or pressurized air.

2 - Identification

The sensor can be identified by the label's data (ordering code, serial number). This information is listed in the delivery document. The technical features of the product can be determined by the ordering code.

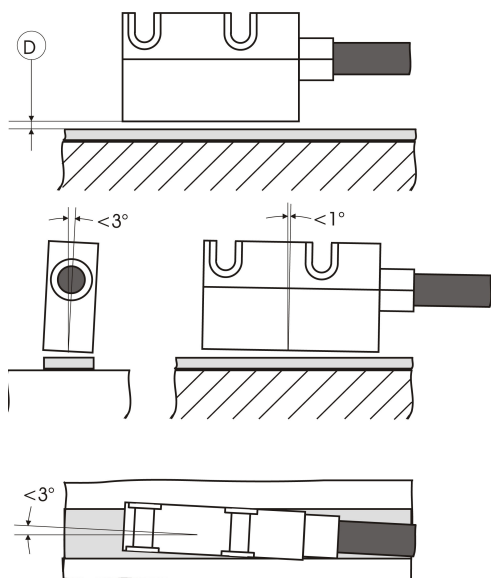
2.1 Sensor and tape combinations

Sensor	Magnetic tape
SHD1	MT10
SHD2	MT20
SHD5	MT50

3 - Mounting instructions

Make sure that mechanical installation meets the system's requirements of planarity and parallelism between sensor and tape. (see figure). Avoid contact between the parts. Sensor can be fixed by means of two M3 screws over the buttonholes.

ATTENTION: the active side of magnetic tape (black side), however installed, has to face the active part of magnetic sensor ("scale side").



Sensor	Max. gap Sensor/Tape (D)	Gap Sensor/Protection profile (D)
SHD1	0,1 - 0,4 mm	0,1 - 0,2 mm
SHD2	0,1 - 1,0 mm	0,1 - 0,7 mm
SHD5	0,1 - 2,0 mm	0,1 - 1,7 mm

4 - Electrical connections

Colour	Function
Yellow	A
Blue	/A
Green	B
Orange	/B
White	0
Grey	/0
Black	GND
Red	+Vdc *

* see ordering code

Examples

SHD2-L-1-... +Vdc = +5Vdc \pm 5%

SHD5-Y-2-... +Vdc = +10Vdc +30Vdc

NOTE:

All sensors have 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 accepts them. If not each output should be insulated separately.

ATTENTION:

Connecting /A, /B, or /0 together, to +Vdc or 0Vdc may cause permanent damage to the sensor.

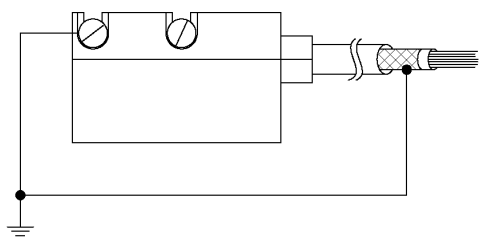
4.1 Specifications of the cable

Wires : 6 x 0.14mm² + 2 x 0.24mm²
 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

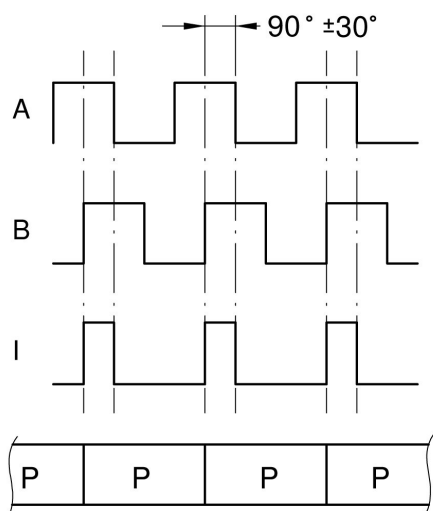
Total length of connection cable from sensor to receiving device should not exceed 50 m (55');

4.2 GND connections

Minimize noise by connecting shield and device housing to ground (GND). Make sure that ground (GND) is not affected by noise.



5 - Output signals



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. Index signals are sent once per pole for the duration of a measuring resolution increment. In connection with these signals and external sensors (e.g. proximity switches), a unique reference point can be produced.

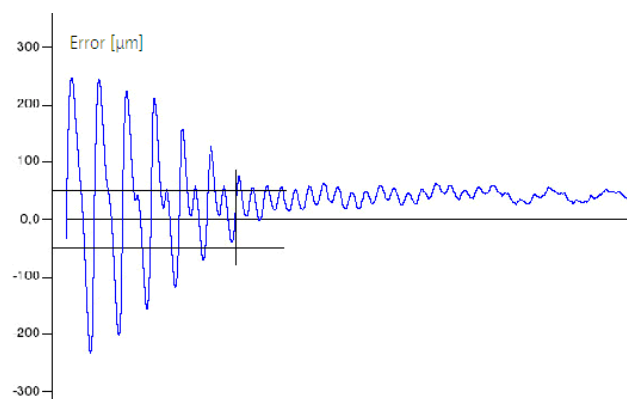
5.1 Automatic offset and gain adjustment

SHD sensors have a specific Teach-in algorithm which allows an automatic offset and gain adjustment.

To perform the process the sensor has to move over a number of magnetic poles (max. 20, typically 6).

SHD sensors have an integrated glitch filter to cut unwanted pulses which may cause counting errors at the following electronics.

Automatic adjustment of an SHD5 device:



Sensor	Displacement for automatic adjustment	
	typical	max
SHD1	6mm	20mm
SHD2	12mm	40mm
SHD5	30mm	100mm

6 - 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.

7 - 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. See chap. 6.
- 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.

Man. Vers.	Description
1.0	1st issue



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