

PCE Process Control Electronic GmbH

Specification sheet

Rotational direction and speed sensor



1. Specification

The speed sensor is capable of determining the rotational direction and speed of direct current motors in a non-contact manner. The sensor consists of a sensor element in a 10mm stainless steel case and measuring electronics in an aluminium case for top hat rail mounting.

Operational capabilities:

1. Speed sensor at a USB interface
 - Supply via regulated 5V supply from a USB interface
 - Bidirectional communication via a serial interface
2. Speed sensor at an RS-232 interface
 - Supply via external 12V source
3. Speed sensor at a programming adapter

2. Bidirectional communication via a serial interface

Asynchronous serial interface:

Baud rate	9600
Data bits	8
Parity	none
Stop bits	1
Flow control	none

3. Communication protocol: PC (master) sensor (slave)

Data exchange between master device and slave consists of 4 bytes in both directions. Instructions can be arranged in the following groups:

3.1. Data input and output (type of motor)

3.1.1 Writing the number of motor poles into sensor EEPROM

Master:	STX	0x41	Number of poles	NUL
Slave:	STX	NUL	NUL	Error

3.1.2. Reading the current number of poles from sensor EEPROM

Master:	STX	0x42	NUL	NUL
Slave:	STX	Number of poles	NUL	Error

3.2. Setting (compensating the base magnetic field without motor)

3.2.1. Automatic zero adjustment

Master:	STX	0x47	NUL	NUL
Slave:	STX	Adjustment value	NUL	Error

3.3. Calibration (DSP conversion factor for editing the determination of speed)

3.3.1. Reading the DSP conversion factor

Master:	STX	0x4E	NUL	NUL
Slave:	STX	Factor	NUL	Error

3.3.2. Writing the DSP conversion factor

Master:	STX	0x6F	Factor	NUL
Slave:	STX	NULL	NUL	Error

3.4. Measurement

3.4.1. Determining the motor speed (determination takes <1s)

Master:	STX	0x43	NUL	NUL
Slave:	STX	Speed LOW	Speed HIGH	Error

3.4.2. Determining the motor speed, fine (determination takes approx. 4.5s)

Master:	STX	0x4D	NUL	NUL
Slave:	STX	Speed LOW	Speed HIGH	Error

3.4.3. Reading the electromagnetic level, dynamic (motor is rotating)

Master:	STX	0x44	NUL	NUL
Slave:	STX	Level LOW	Level HIGH	Error

3.4.4. Reading the electromagnetic level, static (motor is not rotating)

Master:	STX	0x45	NUL	NUL
Slave:	STX	Level LOW	Level HIGH	Error

3.4.5. Determining the rotational direction (starting the motor, execution after command)

Master:	STX	0x48	NUL	NUL
Slave:	STX	Direction	NUL	Error

3.5. Sensor ID data (writing the sensor identification data into EEPROM)

3.5.1. Reading the sensor serial number LOW

Master:	STX	0x49	NUL	NUL
Slave:	STX	Byte0	Byte1	NUL

3.5.2. Writing the sensor serial number LOW

Master:	STX	0x69	Byte0	Byte1
Slave:	STX	NUL	NUL	NUL

3.5.3. Reading the sensor serial number HIGH

Master:	STX	0x4A	NUL	NUL
Slave:	STX	Byte2	Byte3	NUL

3.5.4. Writing the sensor serial number HIGH

Master:	STX	0x6A	Byte2	Byte3
Slave:	STX	NUL	NUL	NUL

3.5.5. Reading the sensor hardware / software version number

Master:	STX	0x4B	NUL	NUL
Slave:	STX	HW no	SW no	
		NUL		

3.5.6. Writing the sensor hardware / software version number

Master:	STX	0x4B	HW no	SW no
Slave:	STX	NUL	NUL	NUL

4. Measurement properties

No of motor poles	Max speed (rpm)	Accuracy of speed measurement (rpm)
2	30000	+300
5	19500	+200
8	12500	+150
10	8700	+120
12	7500	+100
14	6500	+90
16	5600	+80
18	5000	+70

5. Calibration

5.1. Zero adjustment

Automatic adjustment compensates the base magnetic field and must be executed without motor. In case the base magnetic field cannot be compensated or if a motor happens to be nearby, the sensor will display an error message.

5.2. Measurement accuracy

Measurement accuracy can be corrected via a DSP conversion factor.

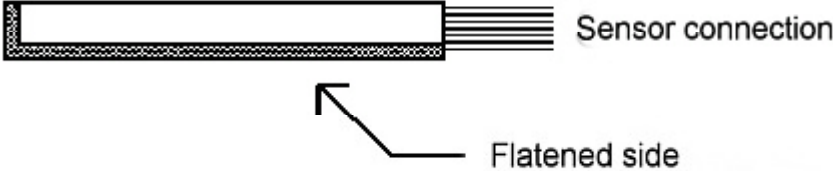
5.3. Positioning

A correct sensor position above the motor is an important prerequisite for reliable measurement.

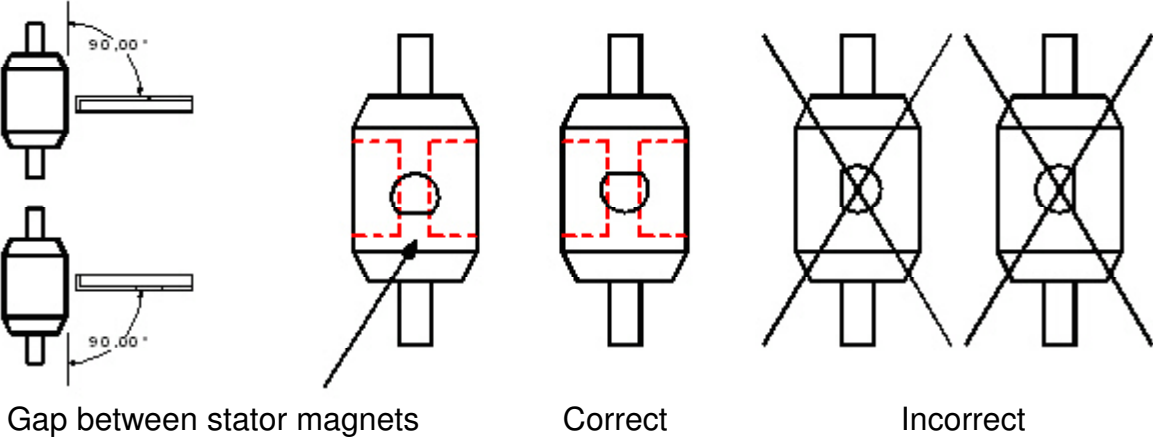
The sensor must be positioned in the gap between the stator magnets, see drawing.

The following positions ensue for the different types:

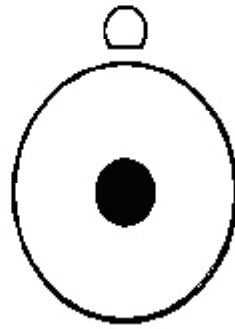
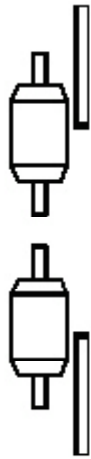
5.3.1 Representation of speed sensor



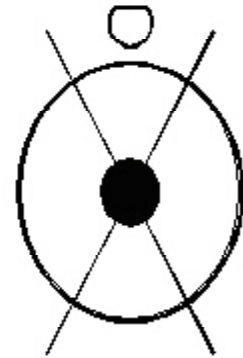
5.3.2 Positioning of the sensor



5.3.3 Positioning of sensor DRHZ 180



Correct



Incorrect

Please note: The position of the sensor towards the motor must be taken care of.

Correct determination of the speed is possible in the gap between the stator magnets only.

6. Measurement

6.1 Rotational direction

The function “determining the rotational direction” applies to the motor being stopped. After that the motor is to be started within 5 seconds. If this time is exceeded or if the sensor is in a wrong position, an error message will be displayed.

6.2 Motor speed

The function “determining the motor speed” requires approx. 1s for measurement and DSP processing. The result will be rounded to 10 (rpm).
If the motor speed cannot be determined, the sensor will display an error message.

7. Dimensions of the sensor head

Thread	M10 x 0.75
Length	40 mm

8. Ordering information

Speed sensor 90° - DRHZ 90
Speed sensor 180° - DRHZ 180

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