Speed sensor DSM 1
Hall sensor for contact-free speed sensing

RE 30267/01.2007 1/8

Type DSM 1

Component series: 1X


tb0120_d

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Features

- Recognition of direction of rotation
- Diagnosis signals
  - Standstill recognition
  - Critical air gap
  - Critical installation position
- Sensing also of low speeds
- Developed specifically to meet the exacting requirements of mobile applications
- Automotive quality
- Simple installation without requiring adjustment work
- Current interface
- Max. type of protection IP 67

Ordering code

DSM 1 – 10 – 1X/K35

Speed sensor = **DSM**
Series = **1**
Variant = **10**
1X = Component series
Electrical connection
K35 = Plug-in connector M12, 4-pin

Material no.: **R901150663**

Description

DSM1-10 Hall-effect speed sensors were developed specifically for use under the harsh operating conditions of mobile machinery. The sensor detects the speed signal from ferromagnetic gear wheels or punched metal sheets. Being an active sensor, it provides a signal with constant amplitude irrespective of the speed. The sensor is not only capable of recognising the direction of rotation, but offers additionally diagnosis functions such as:

- Standstill recognition,
- critical air gap and
- critical installation position.

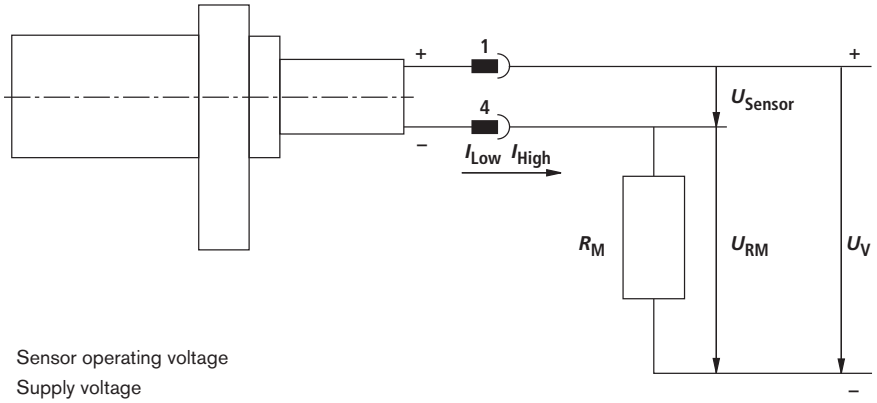
Notes

- Cables to the electronics must not be installed in the vicinity of other power cables within the device or vehicle.
- Ensure a sufficiently large distance to radio equipment.
- If electric welding is to be carried out, disconnect all connection plugs from the electronics.

Technical data (for applications outside these parameters, please consult us!)

General	
Nominal voltage	12 V
Sensor operating voltage	4.5 V to 20.0 V
Current consumption	Max. 16.8 mA
Sensor current	
I_{Low}	7 mA; ±20 %
I_{High}	14 mA; ±20 %
Signal ratio I_{High} / I_{Low}	≥ 1.9
Signal frequency	1 to 5000 Hz
Direction of rotation signal	PWM signal (see page 6)
Electromagnetic compatibility	
Strip line (DIN 11452-5) 1 MHz - 400 MHz	 200 V/m
Free field (DIN 11452-2) 200 MHz - 1 GHz	 150 V/m
Overvoltage resistance	24 V, 10 × 5 min
Polarity reversal protection	
Polarity reversal current	195 mA Provide a corresponding suppressor circuit in the control device or externally!
Vibration strength (IEC 68-2-34)	
Random vibration	0.05 g^2/Hz, 20 to 2000 Hz
Shock resistance (IEC 68-2-27)	1000 m/s^2, 6 ms 12 x in each direction (pos./neg.)
Salt spray resistance (DIN 50021-SS)	168 h
Type of protection (EN 60529)	IP 67
Operating temperature	
Sensor zone	–40 °C to +150 °C
Cable zone	–40 °C to +115 °C
Storage temperature (IEC 68-2-1 Aa, IEC 68-2-2 Ba)	–40 °C to +50 °C
Housing material	Plastic / brass
Weight	55 g
Installation position	See page 8
Measuring distance	max. 3 mm
Pressure resistance on measurement surface	5 bar

Block circuit diagram



U_{Sensor}	Sensor operating voltage
U_V	Supply voltage
U_{RM}	Signal voltage at measuring resistor
I_{Low}, I_{High}	Signal current level
R_M	Measuring resistor

A two-wire current interface is used for the transmission of signals. The sensor provides a current signal. Low current (I_{Low} = internal current consumption of the active element) is interpreted as Low signal.

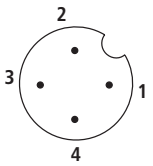
High current ($I_{High} = I_{Low} + \Delta I$; ΔI = additional current through a path in parallel to the active element) is interpreted as High signal. In the control device, measuring resistor R_M converts the current coming from the sensor into a voltage signal. The evaluation circuit recognises by the intensity of the voltage, whether a High or a Low signal is applied.

Pin assignment

System description:
Completely assembled unit consisting of

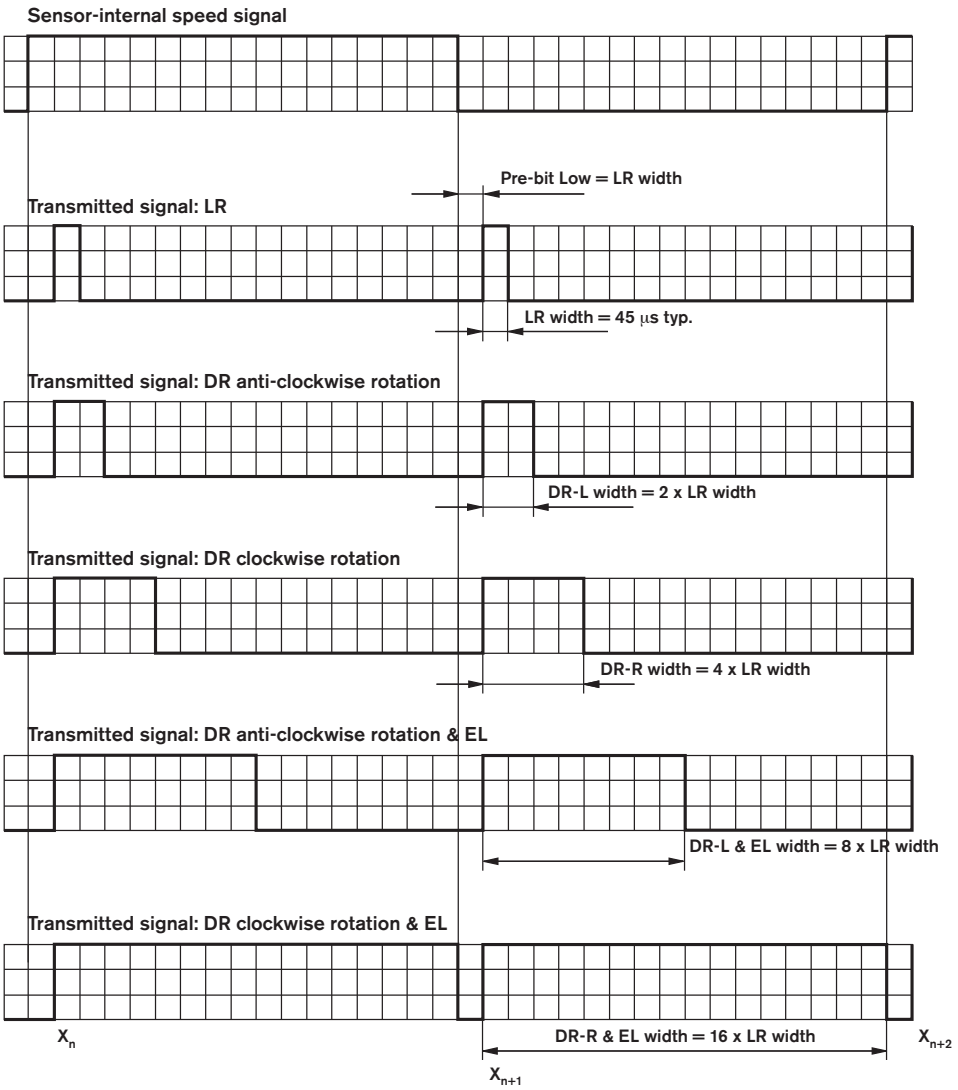
1	Speed sensor with two-wire current interface
2	Cable 2 x 0.5 mm^2, insulation material: EVA, sheath: PUR, length 450 mm
3	Sensor/actuator plug-in connector M12, 4-pin, straight connection of moulded-on design similar to Hirschmann ELST 4012 PG7

PIN 1:	Plus
PIN 2:	Free
PIN 3:	Free
PIN 4:	Minus



Output signals

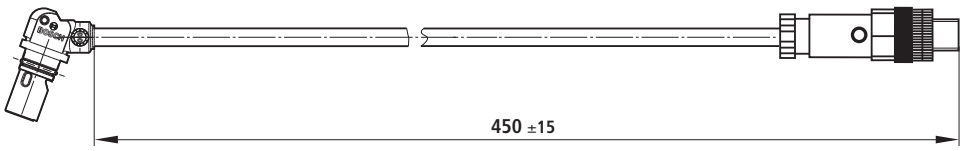
The output signal of the DSM1-10 is composed of square-wave pulses of constant amplitude, which are generated by the evaluation electronics of the DSM1-10.

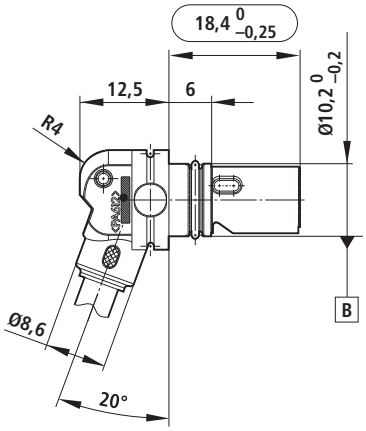


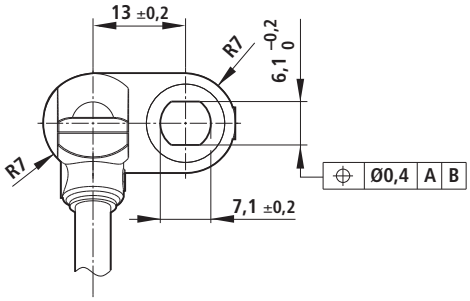
After each edge of the sensor-internal speed signal, the evaluation electronics generates a High pulse of a certain length, with the length of the High pulse being determined by the information to be transmitted. For example, the information “direction of rotation anti-clockwise” is described by a 90 ms long pulse, and the information “direction of rotation clockwise” by a 180 ms long pulse.

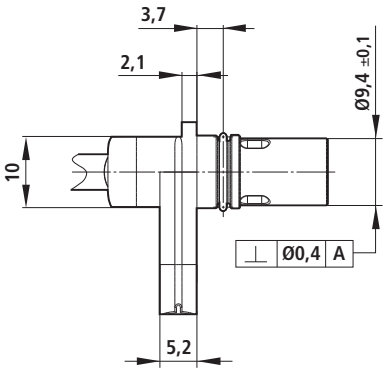
In order to ensure that the speed information can still be output with long High pulses at high speeds, a Low time (pre-bit Low) generally precedes the High pulse. So, the additional information of the signal is lost at high speeds (pulses are cut off by the Low time), but the actual speed information can be reliably output up to a maximum frequency (preceding Low time + shortest High pulse). If the air gap reserve signal (LR) is output, the other signals are suppressed (LR is dominant), i.e. above the air gap reserve threshold, neither a “direction of rotation signal” (DR) nor the signal “installation position” (EL) are output.

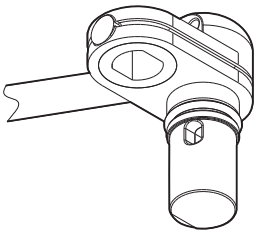
Unit dimensions







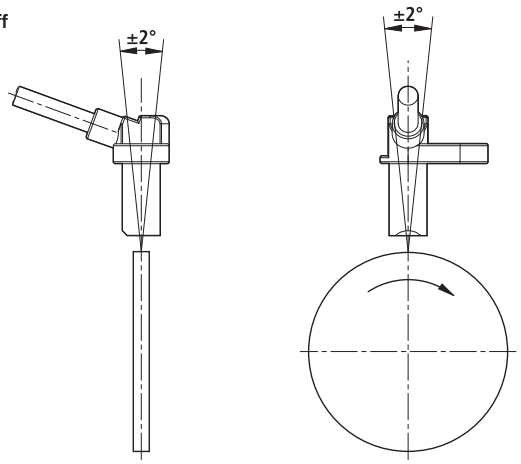




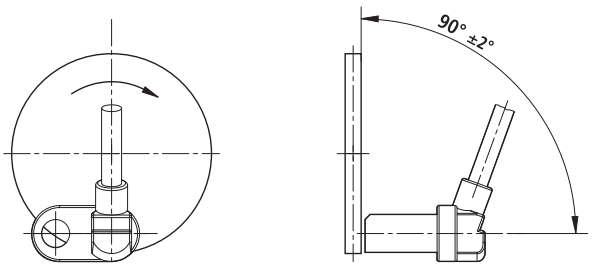
The plug-in connector comes with a clip for securing to the vehicle body. It is suitable for metal sheet thicknesses of 0.7 to 6.0 mm and cut-out diameters in the vehicle body of 6.5 to 7.0 mm.

Installation position

Radial installation / radial pick-off



Axial installation / axial pick-off



Axial installation / radial pick-off