Info card

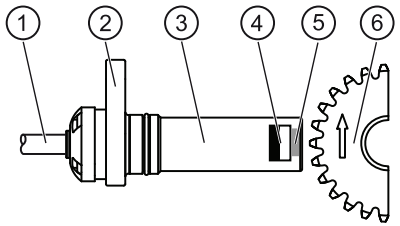
efector120
MX5 speed sensors

ifm electronic

This info card serves as a supplement to the main position sensors catalogue and to the individual data sheets. For further information and contact addresses please visit our website at **www.ifm.com.**

Operating principle of an MX5 speed sensor

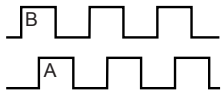
Speed sensors consist of a magnetically biased Hall sensor and integrated evaluation electronics.



1: Connection
2: Fixing lug
3: Housing
4: Magnet
5: Sensor chip
6: Toothed wheel / target (ferromagnetic)

The rotation of a ferromagnetic toothed wheel causes a change to the magnetic field, which is converted into a proportional output signal.

Speed sensors with two sensor chips (two outputs) can evaluate the direction of rotation in addition to the rotational speed.



Glossary of important terms

Output function	Positive switching: positive output signal (to L-) Negative switching: negative output signal (to L+)
Rated insulation voltage	DC units with protection class III: 60 V DC
Rated short-circuit current	For short-circuit-proof units: 100 A
Rated impulse withstand voltage	DC units with protection class III: 60 V DC: 0.8 kV (≙ overvoltage category II)
Power-on delay time	The time the sensor needs to be ready for operation after application of the operating voltage (in the millisecond range).
Operating voltage	The voltage range in which the sensor functions reliably. A stabilised and smoothed direct voltage should be used! Take into account residual ripple!
Utilisation category	DC units: DC-13 (control of solenoids)
Short-circuit protection	ifm sensors which are protected against excessive current by means of a pulsed short-circuit protection. The inrush current of incandescent lamps, electronic relays and low resistance loads may cause this protection to cut in and turn the sensor off!
Air gap	Area above the sensing face in which the sensor reacts to the rotation of ferromagnetic toothed wheels.

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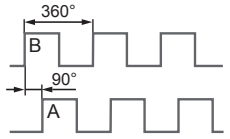
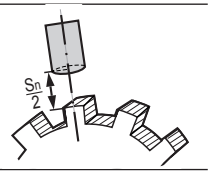
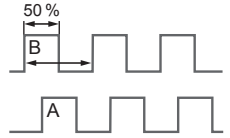
Standard target	Toothed wheel with a specific module. When using two-channel speed sensors, the phase shift depends on the toothed wheel module used. Material: steel.
Phase shift	Two equal signals are phase-shifted when their period durations match, whereas the times of their zero crossings do not. 
Product standard	IEC 60947-5-2
Leakage current	Current for the internal supply of 2-wire units; also flows through the load when the output is blocked.
Switch point drift	The shifting of the switch point owing to changes in the ambient temperature.
Switching frequency	Damping with ferromagnetic toothed wheel at half S_n. 
Current consumption	Current for the internal supply of 3-wire DC units.
Pulse/pause ratio	Ratio of pulse duration to period duration 
Degree of soiling	Inductive proximity sensors are designed for degree of soiling 3.
Toothed wheel module	Dimension for the size of the teeth of gear wheels. This is defined as the quotient circular pitch p and circle constant π. $m = \frac{p}{\pi} = \frac{d}{z}$ When using two-channel speed sensors, the phase shift depends on the module used. m: Module p: Pitch (distance to neighbouring teeth) d: Diameter of the toothed wheel z: Number of teeth

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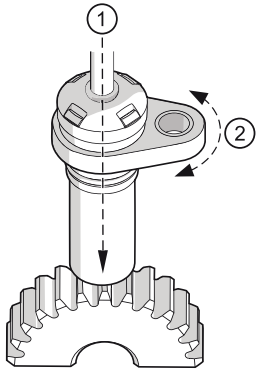
Installation conditions

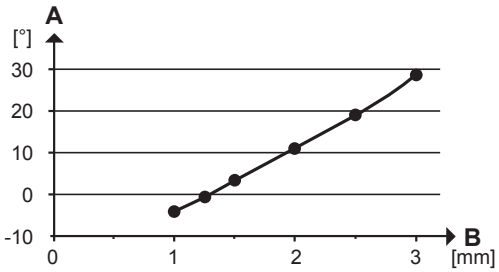
The following needs to be observed in order to achieve the phase position indicated in the data sheet for two-channel speed sensors:

- ► Install the sensor axially to the direction of rotation (1)
- ► Use the toothed wheel module in accordance with the data sheet

By turning the fixing lug (2), the phase shift can also be set to toothed wheels with a different module.



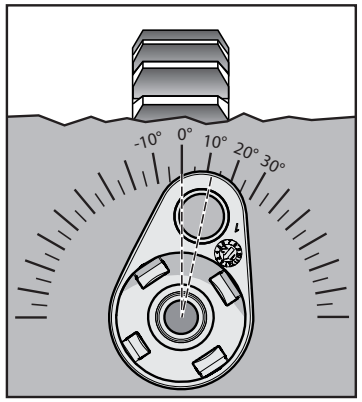
Mechanical angle of twist for 90° phase shift



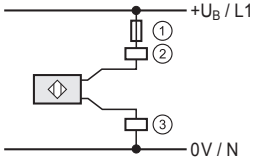
A: Angle of twist

B: Toothed wheel module

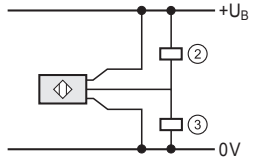
A	-4	0	3	11	20	30
B	1	1.25	1.5	2	2.5	3



Connection systems



Two-wire technology
(negative **or** positive switching)



Three-wire technology
(negative or positive switching)

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Configuration of cables and connectors

Colours: BK: black, BN brown, BU: blue, WH: white

Standard configuration for 3-wire DC:

		Cable	Terminal chamber	US-100 plug
L+		BN	1 / 3	Pin 1 / BN
L–		BU	2 / 4	Pin 3 / BU
Output		BK	X	Pin 2 / WH Pin 4 / BK

Pin configuration of the US-100 connectors (view onto the plug at the unit)

Pin 4: BK
Pin 1: BN

Pin 3: BU
Pin 2: WH

For the cable and the pin configuration as well as the unit data of special versions please refer to the wiring diagrams in our main catalogue for position sensors.