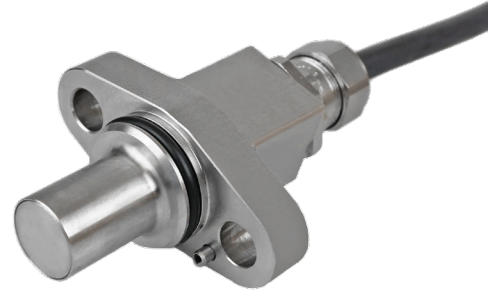


Type FAH52 non-contact single- and double-channel speed sensor, Hall effect, with flange housing and stainless steel sensor rod



Scanning type	Non-contacting
Measuring method	Hall principle
Frequency range	0 ... 25,000 Hz
Supply voltage	9 ... 32 VDC
Scanning object	Ferromagnetic materials
Protection class	Housing: IP66/IP68/IP69 Connector: IP66/IP68 Conductor with XGT protective tube: IP69
Material	Flange: Stainless steel
Measuring channels	1 or 2 measuring channels
Output signal and signal type	2 square wave signals or 2 square wave signals + 1 status signal (standstill or direction of rotation) or 2 square wave signals + 2 inverted square wave signals
Output stage	Voltage output: push-pull output stage Current output: current regulation
Options	Inverted output signals, output signals galvanically isolated; status signal for recognising standstill or direction of rotation



Speed Sensor FAH52

Area of application

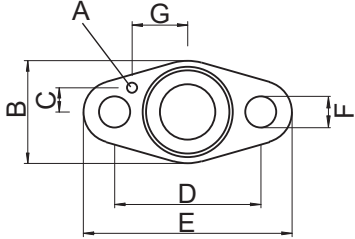
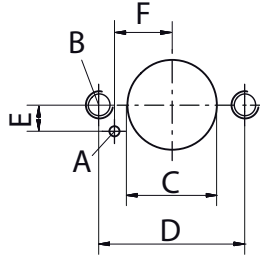
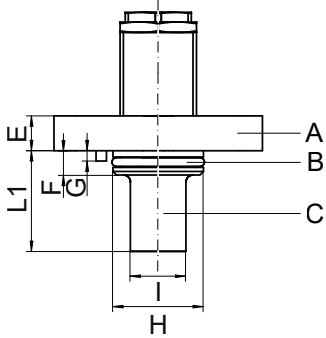
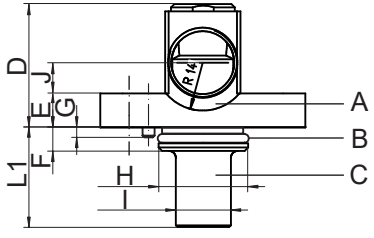
Type FAH[.]52 speed sensors are used particularly in transport technology and in plant construction and machinery. They usually detect the rotational speed of ferromagnetic of gears (made of steel, for example). In addition, they can be used to detect the movements of ferromagnetic parts, such as those of:

- Gears with various tooth shapes
- Screw heads
- Bores, cutouts, grooves
- Pulse bands in the case of smooth shafts (accessory)

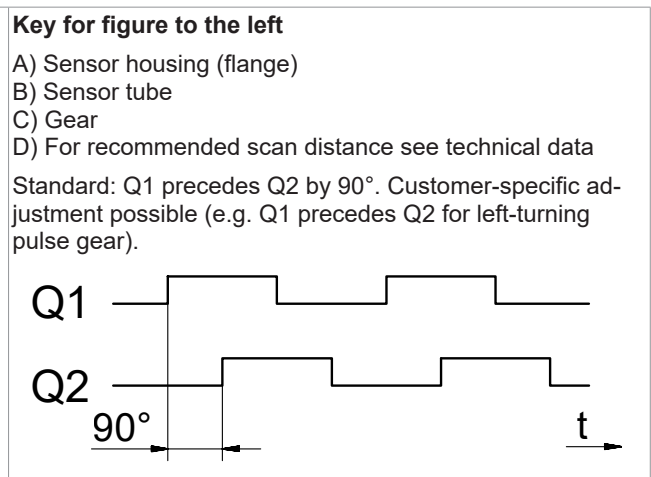
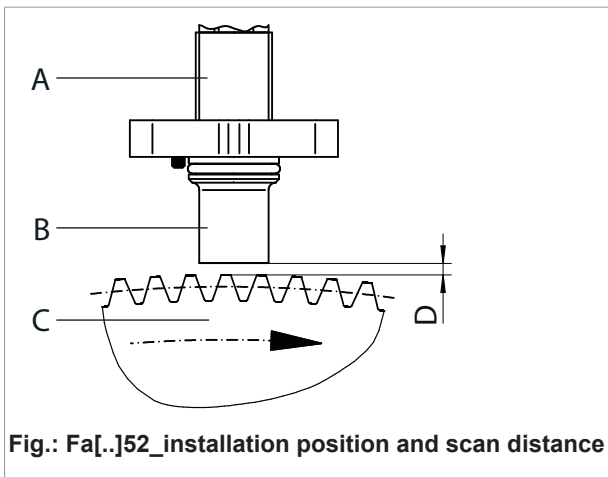
Features

- Robust and high quality housing: IP69 pressure-tight and individually tested at 5 bar (for details see technical data)
- Measuring channels can be galvanically isolated in a housing as a voltage signal or current output signal respectively
- Excellent vibration and shock resistance
- High degree of EMC immunity for difficult electrical environment
- Straight or lateral conductor outlet, available with conductor protection system
- Individual tests for electrical safety, wiring and functioning are carried out at the factory
- Particularly suitable for transport technology due to its design and type testing in accordance with EN 50155

Dimensioned drawings and installation diagrams

 <p>Fig.: FA[...].52_Front_view_dimension</p>	<p>Key for figure to the left</p> <ul style="list-style-type: none"> A) Fixing pin 3 mm (defines installation position) in accordance with ISO 8752-3 B) Length 29 mm C) Length 7 mm D) Length 42 mm E) Length 60 mm F) $\varnothing 9^{-0.5}$ mm G) Length 16 mm
 <p>Fig.: Bore hole for FA[...].52_top_view</p>	<p>Key for figure to the left</p> <ul style="list-style-type: none"> A) Fixing pin 3 mm (defines installation position) in accordance with ISO 8752-3, bore: $\varnothing 4$ mm, bore depth 5 mm B) Threaded bore M8 C) $\varnothing 26^{H10}$ mm D) Length 42 ± 0.2 mm E) Length 7 mm F) Length 16 mm <p>Recommended fastener: Hexagon socket head cap screw ISO 4762 M8x20 with spring washer.</p>
 <p>Fig.: Fa[...].52_straight connector outlet</p>	<p>Key for figure to the left</p> <ul style="list-style-type: none"> A) Stainless steel flange B) O-ring 21 x 2.5 mm C) Stainless steel sensor tube D) Length 50...78 mm (depending on connector) L1) Nominal length L1 (see part code) E) Length 10 mm F) Length 7 mm G) Length 3 mm H) $\varnothing 26^{d10}$ mm I) $\varnothing 16$ mm
 <p>Fig.: Fa[...].52_lateral connector outlet</p>	<p>Key for figure to the left</p> <ul style="list-style-type: none"> A) Stainless steel flange B) O-ring 21 x 2.5 mm C) Stainless steel sensor tube D) Length 36 ± 1 mm (with $L1 \geq 39$ mm) Length 46 ± 1 mm (with $L1 < 39$ mm) L1) Nominal length L1 (see part code) E) Length 10 mm F) Length 7 mm G) Length 3 mm H) $\varnothing 26^{d10}$ mm I) $\varnothing 16$ mm J) Length 9 mm

Installation position and distance from scan object; definition of the direction of rotation


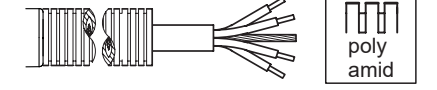

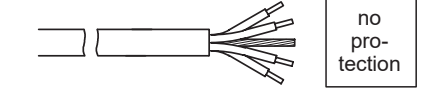


Custom configurations

To find the best solution for your use case and achieve optimal installation conditions, we offer a wide range of tailored adjustments:

- Custom flange geometry, e.g. sensor tube length
- Customer-specific connector cable design (cross-section, ready-to-use cable length)
- Freely selectable connector plug
- Custom adjustment of status output: detection of outage or direction of rotation (clockwise or anticlockwise)
- Signal output: Voltage signal or current signal
- Detected frequency range
- Effectiveness of the conductor protection

Conductor protection types

 <p>The diagram shows a cable with a rubber tube and textile reinforcement. Labels include 'rubber' and 'textile' with a plus sign between them.</p>	<p>Rubber protective tube with textile fibre reinforcement – flexible in the case of mechanical force, resistant against rockfall</p>	<p>XGT</p>
 <p>The diagram shows a cable with a corrugated polyamide pipe. Label includes 'poly amid'.</p>	<p>Corrugated polyamide pipe – protects against moderate mechanical force, e.g. occasional rockfall</p>	<p>XP</p>
 <p>The diagram shows a cable with a 2-layer FRNC sheath. Label includes '2-layer FRNC sheath'.</p>	<p>Reinforced cable sheath - additional FRNC jacket in case of mechanical stress or adverse climatic conditions (e.g., temperature fluctuations)</p>	<p>XV</p>
 <p>The diagram shows a cable with no conductor protection. Label includes 'no protection'.</p>	<p>No conductor protection – applications without rockfall or other mechanical force</p>	<p>X</p>

Signal outputs in speed sensors with Hall principle

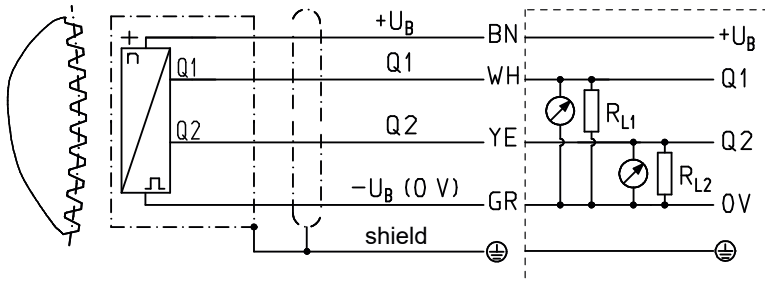
Unless stated otherwise, the sensors mentioned here have voltage signal outputs.

Type	Signal outputs	Signal waveform
FAH52 FAHJ52	A square wave signal; FAH: Voltage signal output FAHJ: Current signal output	
FAHZ52	Two square wave signals, Q2 to Q1 phase offset by 90°	
FAHS52	Two square wave signals, Q2 to Q1 phase offset by 90°, and <ul style="list-style-type: none"> • a direction of rotation signal • or a stillstand signal • or a 7 V status level of Q1 and Q2 during outage (~medium voltage) • or a 7 V status level of Q1 and Q2 during outage (~medium voltage) and an additional stillstand signal output 	Direction of rotation: Stillstand signal: Medium voltage: Medium voltage + stillstand signal:
FAHI52 FAHD52	Two galvanically isolated square wave signals Q2 to Q1 phase offset by 90°, type FAHD with voltage signal output, type FAHI with current signal output	
FAHQ52	Two square wave signals + two inverted square wave signals, Q1 to Q2 and Q1 to Q2 phase offset by 90°	

Types of signal output

Voltage signal output

The voltage signal output is designed to be a push-pull output stage. At a high level, the signal output is internally switched to the positive power supply in a low-resistance manner; at a low level, the signal output is internally switched to the negative power supply in a low-resistance manner. The sensor can therefore be operated as both a source and a sink, which allows a high interference immunity to be achieved under any operating conditions.



In this example, the cable shield is connected to the sensor housing

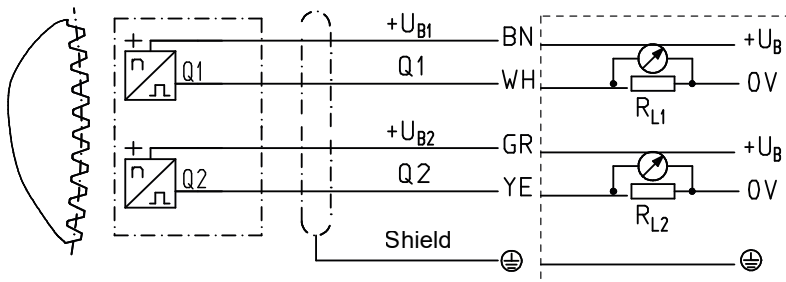
Example for external connection

Example of connector: FAHZ with shield support

Current signal output

The current signal output is designed as a double conductor loop. The sensor regulates the current flow in a loop on the basis of the switch state (high or low). The current applied is not dependent on the electrical resistors in the conductor path. Current signal outputs have an extremely high immunity against electromagnetic interference, as induced voltages have almost no effect on the current flow applied. Furthermore, conductor interruptions in this signal type can be easily and reliably detected. For this reason, this signal type is preferable for applications with high safety requirements.

The evaluation of the current signal is carried out through, for example, the voltage drops at a load resistor. Our current signal outputs can be operated both with a load resistor in the conductor path of the positive supply voltage (+UB, high side load) and in the conductor path of the negative connector (Q; low side load).



In the example shown: Shield is not connected to sensor housing

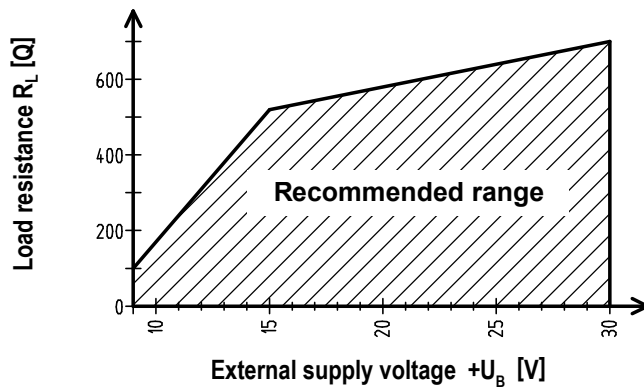
Example for external connection

Example of connector: FAHI with low side load

Load resistor range of the current signal output

The recommended load resistance R_L depends on the external supply voltage $+U_B$. By default, the sensors are designed for the following load resistance range:

$9\text{ V} \leq +U_B \leq 15\text{ V}: R_L \leq 68,67 \frac{\Omega}{\text{V}} \cdot +U_B [\text{V}] - 518\ \Omega$
$15\text{ V} \leq +U_B \leq 30\text{ V}: R_L \leq 12,53 \frac{\Omega}{\text{V}} \cdot +U_B [\text{V}] + 324\ \Omega$



Fax current signal load resistor diagram

Technical data

Electrical connection	
Supply voltage	FAH52, FAHZ52, FAHS52, FAHQ52: 9 ... 32 VDC FAHD52: 2 x 9 ... 32 VDC FAHI52: 9 ... 30VDC FAHJ52: 2 x 9 ... 30VDC
Nominal voltage	FAHZ52, FAHS52, FAHQ52, FAHJ52: 15 VDC FAHD52, FAHI52: 2 x 15 VDC
Current consumption	FAHZ52, FAHS52, FAHQ52, FAHD52: < 20 mA (without output signal current) FAHI52: 2 x 8.2 mA / 14.4 mA (depending on signal level) FAHJ52: 1 x 8.2 mA / 14.4 mA
Reverse voltage protection	Yes
Over voltage protection	Yes
Connection	Cable end, customer-specific connectors, cf. customer drawing Cable end, customer-specific connectors, cf. customer drawing
Recommended conductor length	< 100 m
Conductor cross-section	Standard: 0.33 mm ² , shielded

Electrical output	
Measuring channels	FAHZ52, FAHQ52: 2 measuring channels FAHS52: 2 measuring channels and status channel for rotation direction detection FAHD52, FAHI52: 2 galvanically isolated measuring channels FAH52, FAHJ52: 1 measuring channel
Output signal and signal type	FAHZ52, FAHI52, FAHD52: 2 square wave signals FAHS52: 2 square wave signals, 1 status signal FAHQ52: 2 square wave signals not inverted, 2 square wave signals inverted FAH52, FAHJ52: 1 square wave signal
Output stage	Voltage output: push-pull output stage Current output: current regulation
Continuous short circuit protection	Yes
Galvanic isolation	Types FAHD and FAHI only
Output level Low	Sensors with voltage signal output: Per output: ≤ 0.8 V @ 15 VDC, 10 mA, 24 °C Sensors with current signal output: Per output: 8.2 mA +/- 4% @ 15 VDC, RL = 475 Ω, 24°C
Output level High	Sensors with voltage signal output: Per output: ≥ +UB - 1.6 V @ 15 VDC, 10 mA, 24°C Sensors with current signal output: Per output: 14.4 mA +/- 4% @ 15 VDC, RL = 475 Ω, 24°C
Output current (sink)(voltage output only)	Per output: max. -50 mA ¹
Output current (load)(voltage output only)	Per output: max. 50 mA ¹
Internal resistance Ri	Sensors with voltage signal output: 45 Ω
Rise time	Voltage signal output: ≥ 10 V/μs; current signal output: ≥ 1 mA/μs
¹ The total of the output currents may not exceed 100 mA.	

Signal acquisition		
Measuring method	Hall principle	
Type of Frequency	Standard	F0
Frequency range	0.2 ... 20,000 Hz	0 ... 25,000 Hz
Scanning object	Ferromagnetic materials, Gear wheel: module m1 to m3 (other sizes on request) Tooth width > 7 mm (spur gear DIN 867) Bore: $\varnothing \geq 5$ mm, bridge ≥ 2 mm, depth ≥ 4 mm Groove: ≥ 4 mm, bridge ≥ 2 mm, depth ≥ 4 mm	
	optimised for scanning measurement objects with symmetrically interrupted surfaces, e.g., gears and impulse wheels	optimised for scanning objects with asymmetrically interrupted surfaces e.g. B. holes, screw heads and grooves Output signal is issued faithfully according to the mechanical edges of the scanning object Ideal for standstill detection and monitoring
Scanning object - distance	0,2 ... 3 mm; recommended $1,0 \pm 0,5$ mm for m1,5 ... m3 $0,7 \pm 0,4$ mm @ m1...m1,25	
Scanning object	Ferromagnetic materials	
Duty cycle	50% \pm 10%	
Phase shift	$90^\circ \pm 10\%$ @ m1.5...m3 $90^\circ \pm 15\%$ @ m1...m1.25	

Environmental influences	
Operating temperature	-40 ... +120 °C
Storage temperature	Recommended: -25 ... +70 °C; max.: -40 ... +105 °C (max. limit values within 30 days per year @ relative humidity 5...95%)
Protection class	Housing: IP66/IP68/IP69 Connection: IP66/IP68; only -XGT: IP69
Vibration resistance	IEC 61373, 30 g @ 10...500 Hz (Random)
Shock resistance	IEC 60068-2-27, 100 g @ 6 ms
Climatic test	IEC 60068-2-1/-2/-30
EMI - HF immunity	IEC 61000-4-2, Lev. 3 (EMI - ESD) IEC 61000-4-3, 10 V/m (RF - field) IEC 61000-4-4, Lev. 3 (EMI - Burst) IEC 61000-4-5, Lev. 2 (EMI - Surge) IEC 61000-4-6, 10 Veff (RF - cabled) IEC 61000-6-2 IEC 60553, 3 Veff (LF - cabled)
Emitted interference	IEC 61000-6-4, EN 55011
Insulation	500 VAC, 50 Hz @ 1 min (≥ 2 kV for FAH[...] upon request)
Further standards	EN 50155, EN 50121-3-2, EN 55016 EMC A

Mechanical properties	
Material	Flange: stainless steel Measuring surface: stainless steel
Mounting	Via flange mounting
Length	See customer drawing
Installation position	Preset with direction of rotation definition, with position pin defined
Weight	≥ 190 g (depending on connection)
Pressure resistance	5 bar (measuring area)

Type code

Part code structure										
FA	H	Z	52-	11-	S	X	07-	Appendage	Example: FAHZ52-11-SX07-M30S0	
Measuring principle										
Measuring principle extension										
Model and material										
Nominal length L1 of the sensor tube										
Connector outlet										
Electrical connection										
Jacket length										
Design/shield/appendage etc.										

FAH[..]52 part code										
Measuring principle	H	Hall								
Measuring principle extension	Z	1 Output signal (voltage)								
	D	2 Output signal (voltage), galvanic coupling								
	I	2 Output signal (voltage), galvanically isolated								
	J	2 Output signal (current), galvanically isolated								
	J	1 Output signal (current)								
	S	2 Output signal (voltage), galvanic coupling with status output (e.g. direction of rotation detection, desired definition specific to customer)								
	Q	4 Output signal (voltage), galvanic coupling								
Design, material		52-	Flange, stainless steel sensor tube							
Nominal length		11-	L1 = 29 mm							
Connector output			No identifier: straight connector outlet							
		S	Lateral connector output							
Electrical connection		X	Conductor end standard (without protective tube)							
		XV	Reinforced cable sheath with additional FRNC jacket							
		XGT	Conductor end, protective tube, reinforced with textile fibre braiding							
		XP	Conductor end, protective tube, polyamide							
Sheath length		05-	Sheath length 2.0 m, halogen-free							
		07-	Sheath length 5.0 m, halogen-free							
		08-	Sheath length 7.5 m, halogen-free							
		09-	Sheath length 10.0 m, halogen-free							
Module (sensor leaves factory preconfigured for specified module size)			No identifier: module m2							
		M10	Module m1							
		M12	Module m1.25							
		M15	Module m1.5							
		M25	Module m2.5							
		M30	Module m3							
Shield/appendage			No identifier: Frequency type "Standard"							
		F0	Frequency range starting at 0 Hz							
		S0	Shield NOT applied to sensor housing							
FA	__	__	__	-	__	__	__	__	__	__
										Example: FAHZ52-11-X07

Customer-specific types

If you don't find anything suitable among our standard types, we'll be happy to develop a tailored solution with you to meet your requirements (-P types). They also meet the abovementioned standards thanks to our type-approved modular kits.