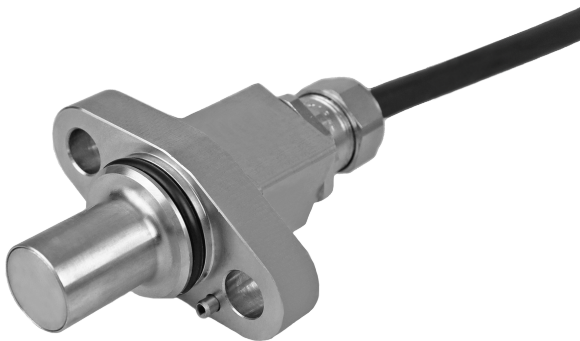


FAHU52

3-/4-channel speed sensor with stainless steel flange housing, Hall



Product Features

- Typical applications: Rail Technology (Light & Heavy Rail) and Special Machinery (Mining)
- Frequency measurement with ferromagnetic scan objects using the Hall-effect principle
- Lifecycle-cost optimised: Wear- and maintenance-free due to non-contact scanning, high durability due to robust design
- Robust design for risk-free installation and extreme environmental conditions
- Up to 4 galvanically isolated measuring channels in one sensor, with voltage and/or current output signals

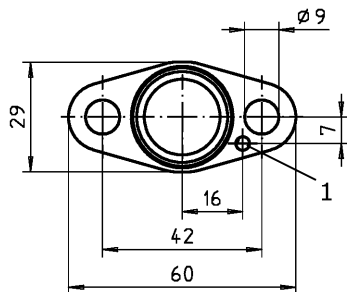
Technical Specifications

Frequency range	0 Hz ... 25,000 Hz
Signal type	Square wave signal as voltage or current output
Measuring channels	4 measuring channels
Output signal	4 square wave signals
Degree of protection	IP66, IP68, IP69
Hazard level	HL1 ... HL3
Material	Stainless steel
Mounting	Flange housing with screw connections on both sides



Dimensions, connections and drawings

Installed dimensions

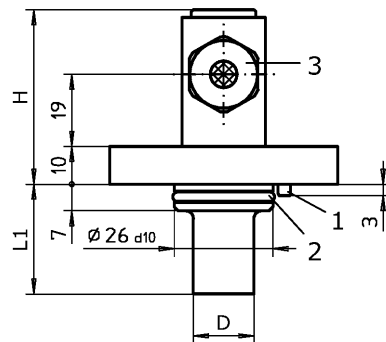
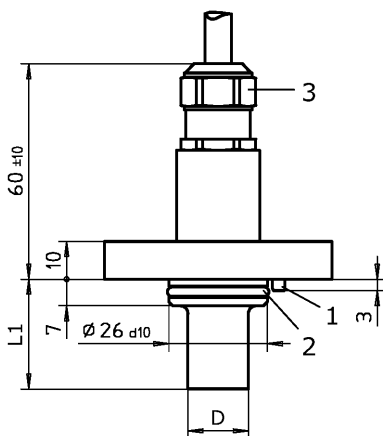


- 1 Locating pin ISO 8752-3
- 2 O-ring 21x2.5
- 3 Connection outlet
- L1 Nominal length
- D Sensor tube diameter
- H Nominal height

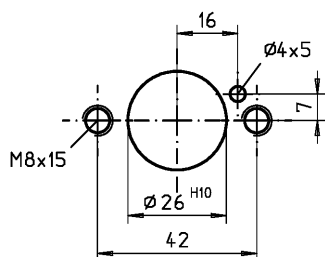
Dimensions in mm are nominal values unless a tolerance is specified.

Detailed information on dimensions and geometry is contained in our customer drawings, which are available from our sales department upon request.

Connection outlet straight, lateral

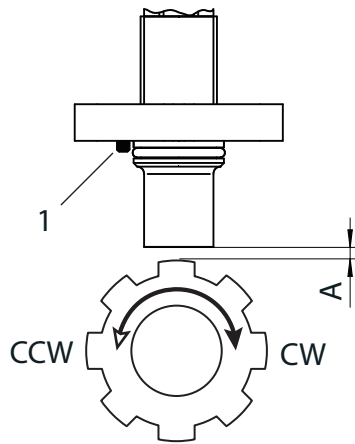


Drilling pattern (view from above)



Recommended fastening:
Hexagon socket screw ISO 4762 M8x20 with plain washer ISO 7089-8

Installation position, definition of the direction of rotation

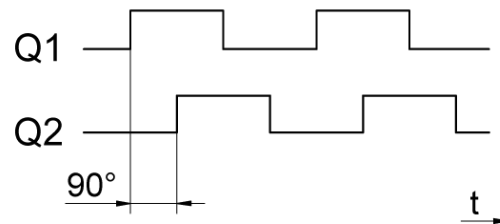


A: Air gap

1: Locating pin

The marking must be aligned with the direction of rotation of the gear wheel. The torsion of the flange housing must not exceed $\pm 15^\circ$.

When aligning the locating pin as shown, the following applies:

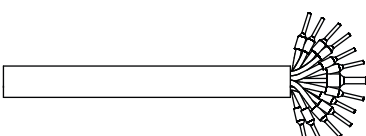


In the case of a clockwise direction (CW), Q1 precedes Q2.

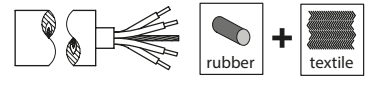
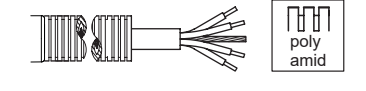
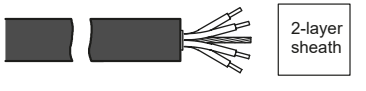
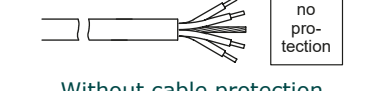
In the case of a counter-clockwise direction (CCW), Q1 follows Q2.

Connection

Cable, core assignment

12-core cable Ø 8 mm with cable gland IP66, IP68					
	Core	U01	U11	U21	U02
	BN	+U _{B1}	+U _{B1}	+U _{B1}	+U _{B1}
	GN	-U _{B1} (0 V)	n.c.	-U _{B1} (0 V)	-U _{B1} (0 V)
	WH	Q1	Q1	Q1	Q1
	YE	Q2	Q2	Q2	Q2
	GY	-U _{B2} (0 V)	n.c.	-U _{B2} (0 V)	-U _{B2} (0 V)
	PK	+U _{B2}	+U _{B2}	+U _{B2}	+U _{B2}
	BU	Q3	Q3	Q3	Q3
	RD	+U _{B3}	+U _{B3}	+U _{B3}	+U _{B3}
	BK	-U _{B3} (0 V)	n.c.	n.c.	-U _{B3} (0 V)
	OG	Q4	Q4	Q4	Q4
	VT	+U _{B4}	+U _{B4}	+U _{B4}	n.c.
	TQ	-U _{B4} (0 V)	n.c.	n.c.	n.c.
	S	Shield	Shield	Shield	Shield
	Core	U12	U22	U23	U03
	BN	+U _{B1}	+U _{B1}	+U _{B1}	+U _{B1}
	GN	n.c.	-U _{B1} (0 V)	n.c.	-U _{B1} (0 V)
	WH	Q1	Q1	Q1	Q1
	YE	Q2	Q2	Q2	Q2
	GY	n.c.	n.c.	-U _{B2} (0 V)	-U _{B2} (0 V)
	PK	+U _{B2}	+U _{B2}	+U _{B2}	+U _{B2}
	BU	Q3	Q3	Q3	Q3
	RD	+U _{B3}	+U _{B3}	+U _{B3}	n.c.
	BK	n.c.	n.c.	-U _{B3} (0 V)	n.c.
OG	Q4	Q4	Q4	Q4	
VT	n.c.	n.c.	n.c.	n.c.	
TQ	n.c.	n.c.	n.c.	n.c.	
S	Shield	Shield	Shield	Shield	
Core	U13	U24			
BN	+U _{B1}	+U _{B1}			
GN	n.c.	-U _{B1} (0 V)			
WH	Q1	Q1			
YE	Q2	Q2			
GY	n.c.	n.c.			
PK	+U _{B2}	+U _{B2}			
BU	Q3	Q3			
RD	n.c.	n.c.			
BK	n.c.	n.c.			
OG	Q4	Q4			
VT	n.c.	n.c.			
TQ	n.c.	n.c.			
S	Shield	Shield			

Cable protection

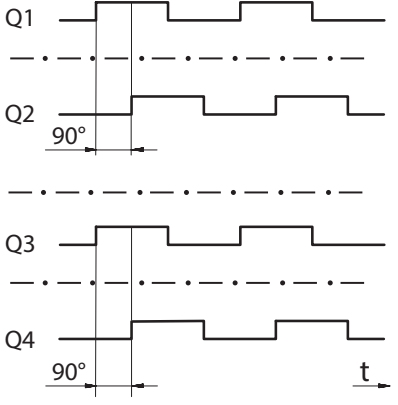
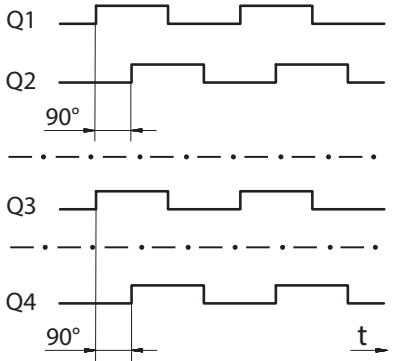
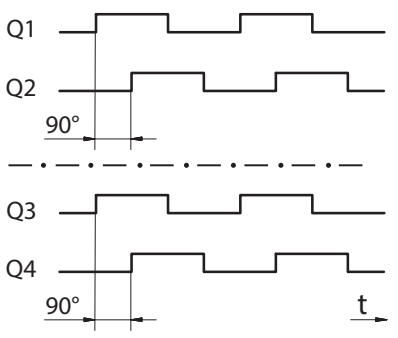
Type		Application and properties	Environmental resistance	
XGT	 <p>Rubber protective hose reinforced with textile braid</p>	Unprotected outdoor area with extreme environmental exposure (IP66, IP68, IP69) Excellent resistance to stone chipping, abrasive sand, icing, etc. Robust against high-pressure jet water.	Mechanics	+++
			Weather conditions	+++
			Polar cold	++
			UV and ozone	+++
XP	 <p>Multilayer polyamide corrugated conduit</p>	Unprotected outdoor area with severe environmental exposure (IP66, IP68) Robust against stone chipping, for example. Flexible with excellent reverse bending resistance	Mechanics	++
			Weather conditions	+++
			Polar cold	++
			UV and ozone	+++
XV	 <p>Reinforced silicone cable sheath</p>	Unprotected outdoor area with severe environmental exposure (IP66, IP68) Robust against stone chipping, for example. Flexible with excellent reverse bending resistance, even at extremely low temperatures.	Mechanics	++
			Weather conditions	+++
			Polar cold	+++
			UV and ozone	++
X	 <p>Without cable protection</p>	Protected indoor and outdoor areas with moderate environmental exposure (IP66, IP68)	Mechanics	+
			Weather conditions	++
			Polar cold	+
			UV and ozone	++

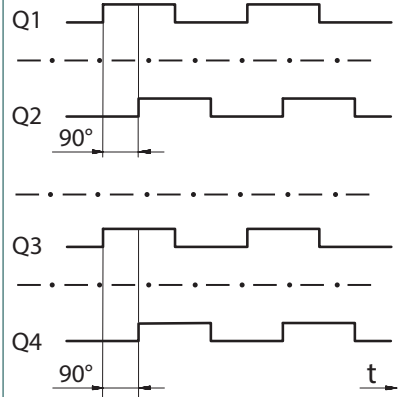
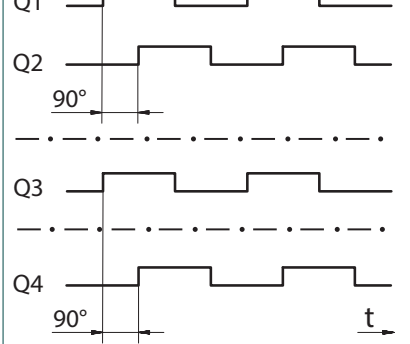
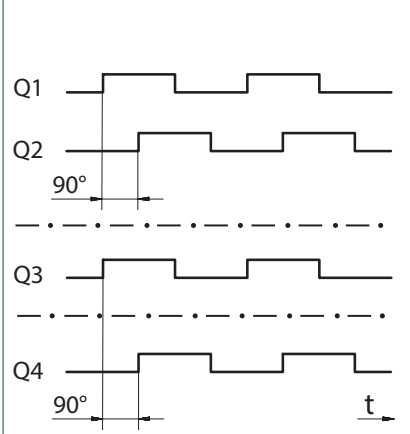
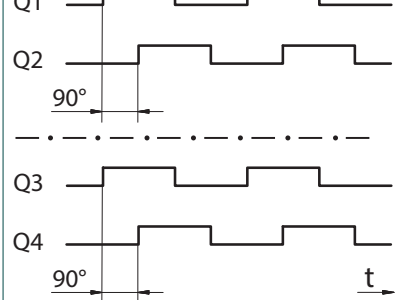
Custom configurations

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 cable design (cross-section, ready-to-use cable length)
- Freely selectable plug
- Signal output: Voltage signal or current signal

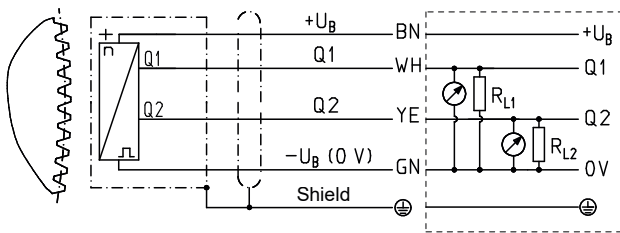
Signal output FAHU52

Type	Signal outputs	Signal waveform
FAHU52[..]-U01	Four galvanically isolated square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Type -U01: Voltage output Type -U11: Current output	
FAHU52[..]-U11		
FAHU52[..]-U02	Two square wave signals + two galvanically isolated square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Type -U02: Voltage output Type -U12: Current output	
FAHU52[..]-U12		
FAHU52[..]-U03	Two galvanically isolated measuring systems each with two square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Type -U03: Voltage output Type -U13: Current output	
FAHU52[..]-U13		

Type	Signal outputs	Signal waveform
FAHU52[..]-U21	Four galvanically isolated square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Q1, Q2 with voltage output Q3, Q4 with current output	
FAHU52[..]-U22	Two square wave signals + two galvanically isolated square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Q1, Q2 with voltage output Q3, Q4 with current output	
FAHU52[..]-U23	Two square wave signals + two galvanically isolated square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Q1, Q2 with current output Q3, Q4 with voltage output	
FAHU52[..]-U24	Two galvanically isolated measuring systems each with two square wave signals, Q1 to Q2 and Q3 to Q4 phase shift by 90° Q1, Q2 with voltage output Q3, Q4 with current output	

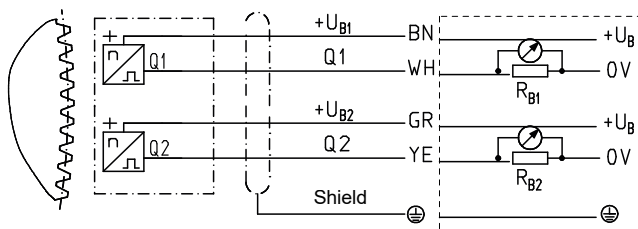
Types of signal output

Voltage output



1: Example of connection with connected shield
In this example, the cable shield is connected to the sensor housing

Current output



2: Example of connection with low-side load
In the example, the cable shield is NOT connected to sensor housing.

The voltage output is designed to be a push-pull output stage. At high level, the signal output is internally switched to the positive operating voltage $+U_B$ with low impedance. At low level, the signal output is internally switched to the negative operating voltage 0 V with low impedance.

The sensor can thereby be operated both as a source and a sink. As a result, high immunity is achieved in all operating conditions.

The measuring circuit is designed in two-wire technology. The sensor regulates the current flow in a measuring circuit based on the switch state (high or low). The "load-independent" current is not dependent on the electrical resistance in the measuring circuit (two-wire loop).

The current output exhibits an extremely high immunity to electromagnetic interference, as this has almost no effect on the "load-independent" current. Furthermore, a conductor interruption 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 current signal is evaluated by the voltage drop across a measuring resistor in the measuring circuit. Our current output can be operated with either a measuring resistor connected to the positive operating voltage $+U_B$, (high-side load), or a measuring resistor connected to the negative operating voltage 0 V (low-side load).

Technical data

Electrical connection	
Supply voltage	9 V ... 32 V DC for all measuring channels with voltage signal 9 V ... 30 V DC for all measuring channels with current signal
Nominal voltage	15 V DC each measuring channel
Galvanic isolation	Varies per type, see section output signal
Current consumption	< 10 mA (per measuring channel with voltage signal)
Reverse voltage protection	Yes
Overvoltage protection	Yes
Short circuit protection	Yes
Recommended cable length	< 100 m
Cable	Cross-section 0.33 mm ² , shielded

Electrical output	
Measuring channels	4 measuring channels
Output signal	4 square wave signals
Output driver	Voltage signal output: push-pull output stage Current signal output: current regulation
Output level High	Sensors with voltage signal output: ≥ +U _B - 1.6 V at 15 V DC, 10 mA Sensors with current signal output: 14 mA +/- 10% at 15 V DC, R _B = 470 Ω
Output level Low	Sensors with voltage signal output: Per output: ≤ 0.8 V at 15 V DC, 10 mA Sensors with current signal output: 7 mA + 20% at 15 V DC, R _B = 470 Ω
Output current	Voltage signal output: Load max. 50 mA, Sink max. 50 mA ¹
Internal resistance Ri	Sensors with voltage signal output: 45 Ω
Output load RB	Current output: max. 500 Ω at 15 V DC, max. 620 Ω at 24 V DC; min. 30 Ω
Slew rate	Voltage output: ≥ 10 V/μs Current output: ≥ 1 mA/μs

¹ The total of the output currents may not exceed 100 mA.

Signal detection	
Measuring principle	Hall-effect principle
Frequency range	0 Hz ... 25,000 Hz
Scan object	Ferromagnetic metal Gear wheel: according to DIN 867, Module ² m1 ... m3, width ≥ 7 mm Bore hole: Ø ≥ 5 mm, web ≥ 2 mm, depth ≥ 4 mm Groove: Ø ≥ 4 mm, web ≥ 2 mm, depth ≥ 4 mm
Air gap	Permitted: 0.2 mm ... 3 mm Recommended: 1.0 mm +/- 0.5 mm with m1.5 ... m3 0.7 mm +/- 0.4 mm with m1 ... m1.25
Duty cycle	50% +/- 10%
Phase shift	90° ± 10 % with m1.5 ... m3 90° ± 15 % with m1 ... m1.25

² larger modules available on request

Environmental influences	
Operating temperature	-40 °C ... +120 °C
Storage temperature	Recommended: -25 °C ... +70 °C (RH 5% ... 95%) Permitted: -40 °C ... +120 °C
Degree of protection	EN 60529: IP66, IP68, IP69 (See also "Connection" section)
Vibration resistance	IEC 60068-2-6: 5 g, 20 Hz ... 300 Hz (Sine) IEC 60068-2-64: 30 g rms, 10 Hz ... 500 Hz (Random) ³
Shock strength	IEC 60068-2-27: 100 g, 6 ms ³
Climatic test	IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-30
Immunity	IEC 61000-4-2: CD 6 kV, AD 8 kV (ESD) IEC 61000-4-3: 20 V/m ... 2 GHz, 10 V/m ... 6 GHz (HF - Field) IEC 61000-4-4: 2 kV (Burst) IEC 61000-4-5: 0.5 kV L-L, 1 kV L-PE 1 kV L-L 42 Ω, 2 kV L-PE 42 Ω (Surge) IEC 61000-4-6: 10 Veff (HF - conducted) IEC 60945: 3 Veff
Emission	EN 55011: class A
Insulation strength	Withstand voltage: 500 V AC, 50 Hz, 1 min, (up to 2.5 kV on request) Insulation resistance ≥ 100 MΩ at 500 V DC
Hazard level	EN 45545-2: HL1 ... HL3
Other standards	EN 50155, EN 50121-3-2, EN 61373 Cat. 3 IEC 61000-6-2, IEC 61000-6-4, EN 55016

³ only for connection X## cable

Mechanical properties	
Material	Stainless steel
Mounting	Flange housing with screw connections on both sides
Nominal length	L1 = 29 mm (20 mm ... 100 mm on request)
Pressure strength	5 bar (measuring surface)

Type code

Part code structure									
FA	HU	52 -	11 -	S	XV	05 -	M10	U01	Example: FAHU52 - 11 - SXV05 - M10U01
	Type								
	Design and material								
	Nominal length								
	Connection outlet								
	Connection								
Connection length									
Addition									

Type	HU	4 output signals, galvanically isolated							
Design and material	52	Flange, stainless steel sensor tube							
Nominal length	11	L1 = 29 mm							
Connection outlet		Without code: straight cable outlet							
	S	Lateral cable outlet							
Connection	X	Cable							
	XV	Cable with reinforced cable sheath							
	XP	Cable with corrugated conduit							
	XGT	Cable with protective tubing, textile reinforced							
Connection length*	05	Length 2.0 m							
	07	Length 5.0 m							
	09	Length 10.0 m							
Addition	M10	Module m1							
	M12	Module m1.25							
	M15	Module m1.5							
		Without code: Modul m2							
	M25	Module m2.5							
	M30	Module m3							
		Without code: shield attached to the sensor housing							
	S0	Shield not attached to the sensor housing							
Uxx	Output signal variants (xx see table below)								
FA	_	__ -	__ -	_	__	__ -	__	__	Example: FAHU52 - 11 - X07 - U01

*Length specification applies for X, XV to the sheath of the cable, for XP, XGT to corrugated conduit or protective hose.

Code Output signal variant	
U01	Four galvanically isolated output signals (voltage)
U11	Four galvanically isolated output signals (current)
U02	Two output signals + two galvanically isolated output signals (voltage)
U12	Two output signals + two galvanically isolated output signals (current)
U03	Two galvanically isolated measuring systems, each with two output signals (voltage)
U13	Two galvanically isolated measuring systems, each with two output signals (current)
U21	Four galvanically isolated output signals (Q1, Q2 voltage; Q3, Q4 current)
U22	Two output signals + two galvanically isolated output signals (Q1, Q2 voltage; Q3, Q4 current)
U23	Two output signals + two galvanically isolated output signals (Q1, Q2 current; Q3, Q4 voltage)
U24	Two galvanically isolated measuring systems, each with two output signals (Q1, Q2 voltage; Q3, Q4 current)

Note:

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.

Imprint/Disclaimer

Noris Automation GmbH
Muggenhofer Str. 95
90429 Nuremberg
Germany

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