Non-contacting speed sensor type FA54 with aluminium flange and stainless steel sensor tube

Scanning type	Non-contacting
Measuring principle	Hall principle
Frequency range	0 ... 20,000 Hz *
Supply voltage	9 ... 32 VDC
Scanning object	Ferromagnetic materials
Protection class	Housing: IP66/IP68 Connection: IP66/IP68
Material	Flange: Aluminium Measuring area: Stainless steel
Length	See customer drawing
Mounting	Via flange mounting
Measuring channels	1 or 2 measuring channels
Output signal and signal type	1 square wave signal or 1 square wave signal + 1 inverted square wave signal or 2 square wave signals or 2 square wave signals + 1 status signal or 2 square wave signals + 2 inverted square wave signals
Options	Inverted output signals; galvanically isolated output signals; status signal for direction of rotation detection

* Type –S: 0.2 … 20,000 Hz

Approvals in preparation

Speed sensor FA54

Application range

Speed sensors type series FA54 are compact and robust flange sensors with type approval from all common ship class societies. They are suitable for scanning ferromagnetic objects, such as toothed wheels, bolt heads, drillings/boreholes, gaps, grooves or impulse bands.

The different sensor variants allow measurements with up to two measuring channels and up to four output signals for measurement of frequencies from 0 to 20 kHz. Thus, they are suitable for standstill detection and for rotational direction detection by using phase shifted signals. Different sensor tube lengths and connection outlets as well as your tailor-made solution on request enable an adaptation to almost any application. Do not hesitate to contact our technical sales team (sales@noris-group.com) and ask for a quotation.

Special features

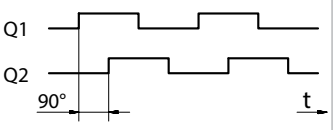
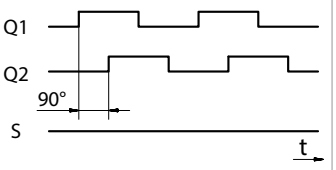
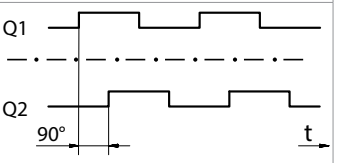
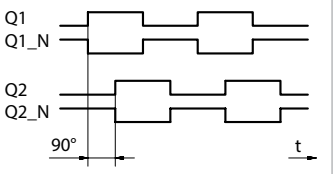
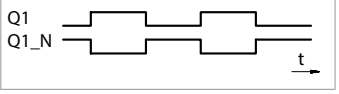
- Robust and high quality housing: IP68 pressure-tight
- Excellent vibration and shock resistance
- High degree of EMC immunity for difficult electrical environment
- Connection outlet straight or lateral; with protective tubing on request
- Up to four output signals, on request available with one status signal for rotational direction detection, on request with two galvanically isolated output signals
- Due to its design and its approvals especially suitable for shipbuilding industry

Measuring principle

Hall principle

A field of a magnet generates a constant voltage in the Hall elements. Ferromagnetic objects with an interrupted surface cause the Hall voltage to change as they pass the Hall elements. The frequency of the change of the Hall voltage is proportional to the speed of movement (rotational speed). The speed sensor converts this change into an electric signal.

Overview speed sensors FA[..]54

Type	Measuring principle	Signal outputs	Signal form
FAH54	Hall	One square wave signal	
FAHZ54		Two square wave signals, Q2 to Q1 is 90° phase shifted	
FAHS54	Hall	Two square wave signals, Q2 to Q1 is 90° phase shifted, one rotation direction signal	
FAHD54	Hall	Two galvanically isolated square wave signals, Q2 to Q1 is 90° phase shifted	
FAHQ54	Hall	Two + Two inverted square wave signals, Q1 to Q2 and Q1_N to Q2_N are 90° phase shifted	
FAHY54	Hall	Two square wave signals, Q1_N inverted to Q1	

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Dimensions, connections and drawings

Dimensions and mounting drawing

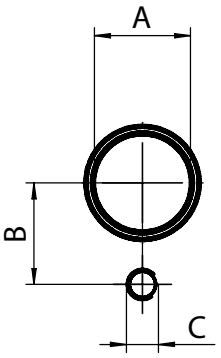

Fig.: Borehole for FA[..]54_Top view

Explanation to the left illustration

A) Ø 18^{H9}
B) Length $19^{\pm 0.2}$ mm
C) M6

Recommended fixing: Hexagon socket screw DIN912 M6x20 with spring washer.

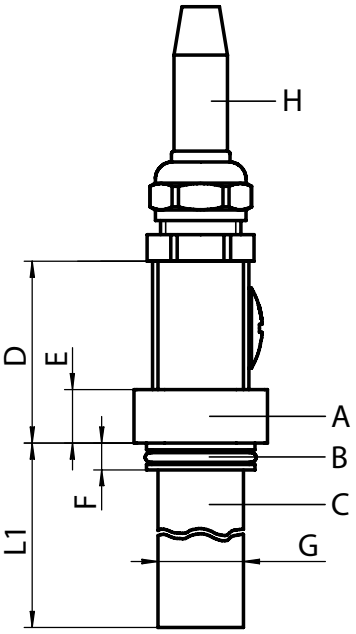

Fig.: FA[..]54_Straight connection outlet

Explanation to the left illustration

A) Flange: Aluminium
B) O-ring 17.17 x 1.78 mm
C) Sensor tube: Stainless steel
D) Length 34 mm
L1) Nominal length L1 (see type code)
E) Length 10 mm
F) Length 5 mm
G) Ø 16 mm
H) Bend protection

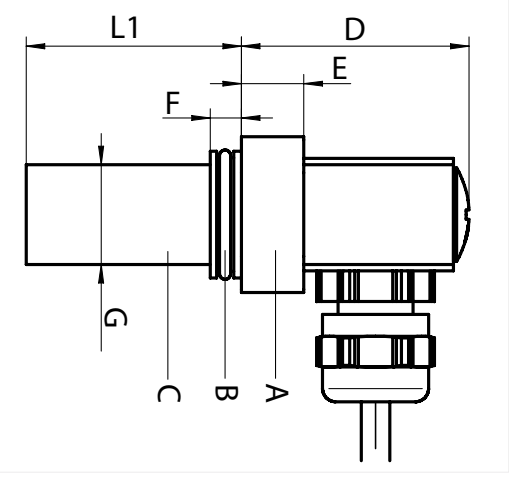

Fig.: FA[..]54_Bottom connection outlet

Explanation to the left illustration

A) Flange: Aluminium
B) O-ring 17.17 x 1.78 mm
C) Sensor tube: Stainless steel
D) Length 36.5mm
L1) Nominal length L1 (see type code)
E) Length 10 mm
F) Length 5 mm
G) Ø 16 mm

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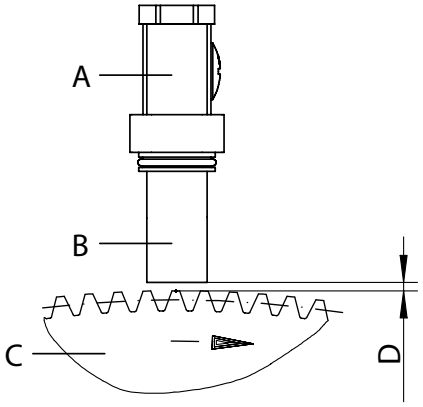
Mounting position and scan object distance



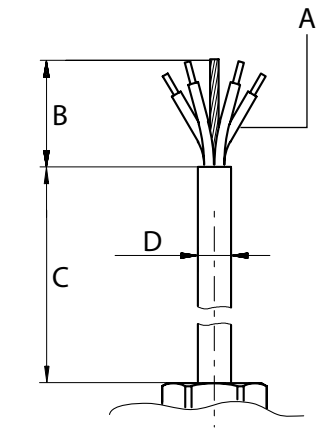
Explanations to the left illustration

A) Sensor housing (flange)
B) Sensor tube
C) Toothed Wheel
D) Recommended distance from scanning object see technical data

Connection cables and pin assignment

Connection type -X	FAH54 FAHZ54 FAHY54	FAHS54	FAHD54	FAHQ54
Cable with 4 wires	X	-	-	-
Cable with 6 wires	-	X	X	X

Connection cable type -X for sensors with 4 connecting wires



Explanation to the left illustration

A) Wires 4 x 0.33 mm^2 halogen-free
B) Length 80 $^{\pm 10}$ mm
C) Length K1 ± 5% (K1 see customer drawing)
D) Diameter 4.6 $^{\pm 0.2}$ mm

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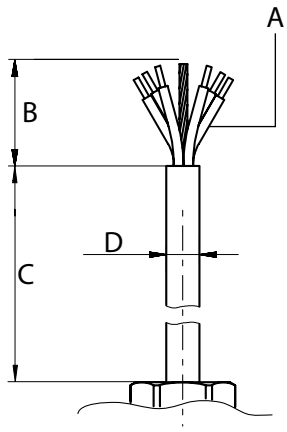
Connection cable type -X for sensors with 6 connecting wires



Explanation to the left illustration

A) Wires 6 x 0.33 mm² halogen-free
B) Length 80 $^{\pm 10}$ mm
C) Length K1 ± 5% (K1 see customer drawing)
D) Diameter 7 $^{\pm 0.5}$ mm

Connection assignment for type FA[..] with one output signal

Colour	Explanation
Brown	U_S +
Green	U_S - (0V)
White	Signal Q1
Yellow	Not connected
Shield	Ground

Connection assignment for type FA[..]Z

Colour	Explanation
Brown	U_S +
Green	U_S - (0V)
White	Signal Q1
Yellow	Signal Q2
Shield	Ground

Connection assignment for type FA[..]S

Colour	Explanation
Brown	U_S +
Green	U_S - (0V)
White	Signal Q1
Yellow	Signal Q2
Grey	Status output for direction of rotation detection
Pink	Not connected
Shield	Ground

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Connection assignment for type FA[..]D

Colour	Explanation
Brown	Sensor 1: U_{S1} +
Green	Sensor 1: U_{S1} - (0V)
White	Sensor 1: Signal Q1
Pink	Sensor 2: U_{S2} +
Grey	Sensor 2: U_{S2} - (0V)
Yellow	Sensor 2: Signal Q2, 90° phase shift to Q1
Shield	Ground

Connection assignment for type FA[..]Q

Colour	Explanation
Brown	U_S +
White	Q1
Grey	Q1_N, inverted to Q1
Yellow	Q2, 90° phase shift to Q1
Pink	Q2_N inverted to Q2, 90° phase shift to Q1_N
Green	U_S - (0V)
Shield	Ground

Connection assignment for type FA[..]Y

Colour	Explanation
Brown	U_S +
White	Q1
Yellow	Q1_N, inverted to Q1
Green	U_S - (0V)
Shield	Ground

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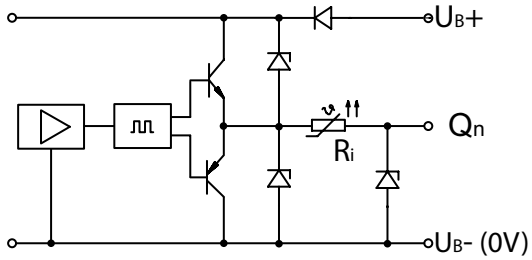
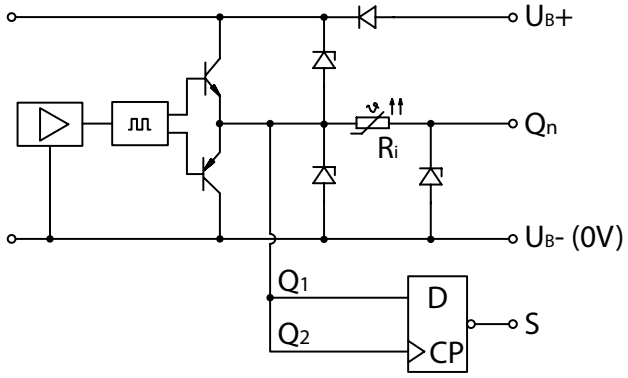
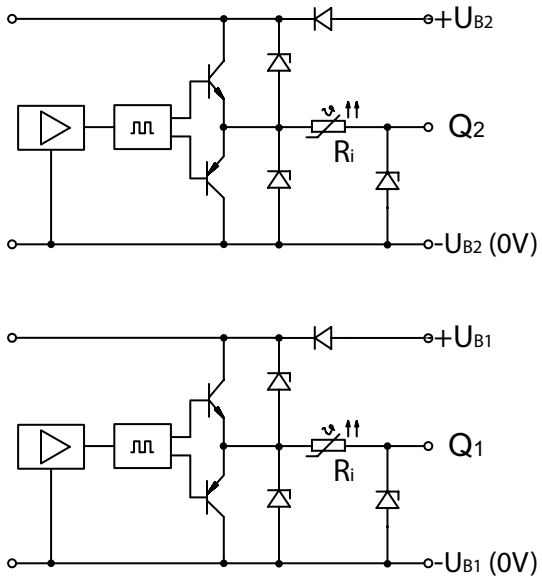
Elementary circuit diagram FAH54, FAHZ54



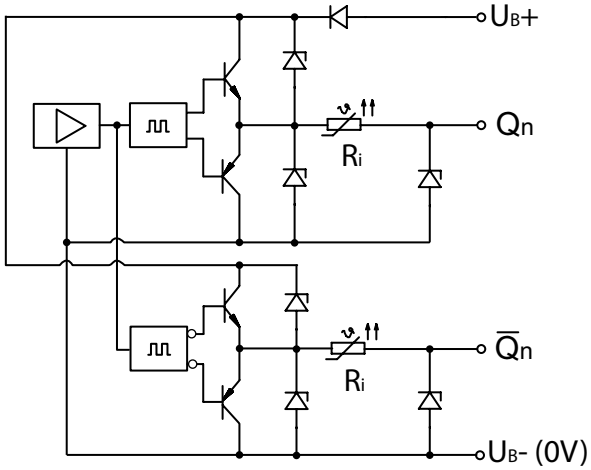
Elementary circuit diagram FAHS54



Elementary circuit diagram FAHD54



Elementary circuit diagram FAHQ54, FAHY54



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General technical data

Electrical connection	
Supply voltage	*See specific technical data*
Nominal voltage	*See specific technical data*
Current consumption	*See specific technical data*
Reverse voltage protection	Yes
Over voltage protection	Yes
Connection	Cable end, customized connections acc. customer drawing
Recommended cable length	< 100 m
Used cable cross section	0.33 mm^2, shielded

Electrical output	
Measuring channels	*See specific technical data*
Output signal and signal type	*See specific technical data*
Output stage	Push-pull amplifier
Continuous short circuit protection	Yes
Galvanic isolation	*See specific technical data*
Output level Low	≤ 0.8 V @ 15 VDC, 10 mA, 24 °C
Output level High	≥ UB-1.6 V @ 15 VDC, 10 mA, 24 °C
Output current NPN (Sink)	Per output: max. -50 mA
Output current PNP (Load)	Per output: max. 50 mA
Internal resistance Ri	45 Ω
Rise time	≥ 10 V/µs

Signal acquisition	
Measuring principle	Hall principle
Frequency range	*See specific technical data*
Scanning object - distance	0.2 ... 3 mm; recommended: 1.0 ± 0.5 mm
Scanning object	Ferromagnetic materials Toothed wheel: Module m1 to m3; tooth face width > 7 mm (spur gear DIN867) Hole: Ø ≥ 5 mm, web ≥ 2 mm, depth ≥ 4 mm Groove: ≥ 4 mm, web ≥ 2 mm, depth ≥ 4 mm
Duty cycle	50% ± 10%
Phase shift	*See specific technical data*

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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 Connection: IP66/IP68
Vibration resistance	DIN IEC 60068-T2-6, 10 g @ 5…2000 Hz (Sine) DIN EN 61373, 30 g @ 20…500 Hz (Random)
Shock resistance	DIN IEC 60068-T2-27, 1000 m/s^2 @ 6 ms
Climatic test	DIN IEC 60068-T2-1/-2/-30
EMI - ESD	IEC 61000-4-2, Lev. 3
EMI - Burst	IEC 61000-4-4, Lev. 3
EMI - Surge	IEC 61000-4-5, Lev. 2
EMI - HF immunity	IEC 61000-4-3, 10 V/m IEC 61000-4-6 (RF - conducted), 10 Veff IEC 60553 (AF - conducted), 10 Veff
Emitted interference	CISPR 16-1, CISPR 16-2 EMC2
Insulation voltage	500 VAC, 50 Hz @ 1 min (≥ 2kV for FAH[..] type on request)
Further standards	DIN EN 50155, DIN EN 45545

Mechanical properties	
Material	Flange: Aluminium Measuring area: Stainless steel
Mounting	Via flange mounting
Length	See customer drawing
Installation position	Preset with mounting holes
Weight	≥ 190 g (depending on connection)
Pressure resistance	5 bar (measuring area)

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Specific technical data

Technical data for electrical connection and output

Sensors with one output signal

FAH[..]	
Supply voltage	9 ... 32 VDC
Nominal voltage	15 VDC
Current consumption	< 20 mA (without output current PNP)
Measuring channels	1 measuring channel
Output signal and signal type	1 square wave signal
Frequency range	0 ... 20,000 Hz

Sensors with two output signals (galvanically connected)

	FAHZ[..]	FAHY[..]
Supply voltage	9 ... 32 VDC	9 ... 32 VDC
Nominal voltage	15 VDC	15 VDC
Current consumption	< 20 mA (without output current PNP)	< 20 mA (without output current PNP)
Measuring channels	2 measuring channels	1 measuring channel
Output signal and signal type	2 square wave signals	1 square wave signal, 1 inverted square wave signal
Galvanic isolation	No	No
Frequency range	0 ... 20,000 Hz	0 ... 20,000 Hz

Sensors with two galvanically isolated output signals

FAHD[..]	
Supply voltage	2 x 9 ... 32 VDC
Nominal voltage	2 x 15 VDC
Current consumption	2 x < 10 mA (without output current PNP)
Measuring channels	2 galvanically isolated measuring channels
Output signal and signal type	2 square wave signals
Galvanic isolation	Yes
Frequency range	0 ... 20,000 Hz

Sensors with two output signals and status output

FAHS[..]	
Supply voltage	9 ... 32 VDC
Nominal voltage	15 VDC
Current consumption	< 20 mA (without output current PNP)
Measuring channels	2 measuring channels and status channel for rotation direction detection
Output signal and signal type	2 square wave signals, 1 status signal
Galvanic isolation	No
Frequency range	0.2 ... 20,000 Hz

Sensors with two output signals und two inverted output signals

FAHQ[..]	
Supply voltage	9 ... 32 VDC
Nominal voltage	15 VDC
Current consumption	< 20 mA (without output current PNP)
Measuring channels	2 measuring channels
Output signal and signal type	2 square wave signals not inverted, 2 square wave signals inverted
Galvanic isolation	No
Frequency range	0 ... 20,000 Hz

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Type code

Type code structure										
FA	**H**	**Z**	**54-**	**11-**	**S**	**X**	**07-**	**M30-**	**S0**	**Example: FAHZ54-11-SX07-M30-S0**
	Measuring principle									
		Measuring principle supplement								
			Construction type and material							
				Nominal length L1 of the sensor tube						
					Connection outlet					
						Electrical connection				
							Sheath length			
								Module		
									Shield / Addition	

Type code FAH[..]54									
Measuring principle	**H**	Hall							
Measuring principle supplement			Without code: 1 output signal						
		Z	2 output signals (voltage), galvanically connected						
		D	2 output signals (voltage), galvanically isolated						
		Y	2 output signals (current), galvanically connected, 2nd signal inverted						
		S	2 output signals (voltage), galvanically connected with status output (e. g. rotation direction detection)						
		Q	4 output signals (voltage), galvanically connected						
Construction type and material			**54-**	Flange, aluminium sensor tube					
Nominal length				**11-**	L1 = 29 mm				
				12-	L1 = 57 mm				
				13-	L1 = 32,2 mm				
				14-	L1 = 44,5 mm				
				15-	L1 = 34,5 mm				
					Further lengths on request				
Connection outlet						Without code: straight cable outlet			
					S	Lateral cable outlet			
					R	90° angled cable outlet			
Electrical connection						**X**	Cable end standard (without protective tubing)		
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								**M10-**	Module m1
								M12-	Module m1.25
								M15-	Module m1.5
									Without code: Module m2
								M25-	Module m2.5
								M30-	Module m3
Shield									Without code: Shield attached to the sensor housing
								S0	Shield not attached to the sensor housing
FA	_ _	_ _	_ _-	_ _-	_ _	_ _	_ _-	_ _-	_ _	**Example: FAHZ54-11-X07 (Preferred type)**

Special types

If our standard types do not correspond with your expectations, we are pleased to develop a special solution together with you.

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