

2-channel speed sensor

▶ GEL 2476

Sensor with current output or voltage output (standstill voltage)

SENSORLINE

▶ **LENORD+BAUER**

Technical information

Version 03.10



General

- ▶ Application approved speed sensor based on magnetic measurement principle
- ▶ Maintenance- and wear-free operation due to non-contact measurement of rotation
- ▶ Suitable for ferromagnetic target wheels
- ▶ Safe detection of slow rotation from 0 Hz without pulse loss and for high-speed rotation up to 25 kHz
- ▶ Two channels shifted by 90° provide the direction of rotation
- ▶ Robust and compact stainless steel housing suitable for harsh application
- ▶ Constant duty output signals
- ▶ Customized cable fittings

Features

- ▶ Modul target wheel 1.00 to 3.50
- ▶ Measuring range 0 Hz to 25 kHz
- ▶ Temperature range -40 to +120°C
- ▶ Protection class IP 68
- ▶ Type testing according to EN 50155

Advantages

- ▶ Current output signals unsusceptible to electromagnetic disturbances
- ▶ Cable break monitoring by current output or voltage output with standstill voltage
- ▶ Maintenance-free due to significant measuring distance (air gap up to 3 mm)
- ▶ 45° mounting position possible

Fields of application

- ▶ Rail vehicles
 - Traction control
 - Anti-slip
 - Anti-skid
- ▶ Automation
 - Measurement of speed and positions at gears, motors and roller

Technical data

Signal pattern	D-	H-	S-	E-	V-
Electrical Data					
Supply voltage V_S	reverse battery protected 10 to 30 V DC				
Current consumption per channel I_S (no load)	≤ 30 mA				
Output signal (short circuit-proof)	Square-wave signals				
Output signal level high ⁽¹⁾	≥ $V_S - 1.8$ V		≥ $V_S - 1.0$ V		
Output signal level low ⁽¹⁾	≤ 1.5 V		≤ 1.0 V		
Output current per channel	≤ 20 mA				
Input frequency at target wheel	0 to 25 kHz				
Output frequency	0 to 25 kHz				
Duty cycle (depends on measuring scale and air gap)	50% ± 5%				
Phase shift	typ. 90°		–	–	typ. 90°
Slew rate (2 m cable)	≥ 10 V / μs				
Electromagnetic compatibility	Rail vehicles (EN 50121-3-2) Industrial applications (EN 61000-6-1 to 4)				
Isolation strength	500 V AC (EN 60439-1)				
Mechanical Data					
Module m of target wheel	1.00 / 1.25 / 1.50 / 1.75 / 2.00 / 2.25 / 2.50 / 3.50				
Permissible air gap (for module m) ⁽²⁾	0.2 to 3.0 mm				
Width of target wheel	≥ 10 mm (smaller ones upon request)				
Form of target wheel	Involute gear as per DIN 867, rectangular gear 1:1 or slotted disk (on request)				
Material of target wheel	Ferromagnetic steel				
Operating and ambient temperature	-40 °C to +120 °C				
Storage temperature	-40 °C to +120 °C				
Protection class	IP 68				
Vibration resistance	EN 61373 Cat. 3				
Shock resistance	EN 61373 Cat. 3				
Type test	EN 50155				
Housing material of sensor	Stainless steel				
Weight of sensor (2 m cable)	650 g				

(1) Output signal level depends on output current and temperature

(2) Please observe the permissible air gap table in this document

Technical data

Signal pattern	X-	DI	VI	DL	HL
Electrical Data					
Supply voltage V_S	10 to 30 V DC	reverse battery protected 10 to 20 V DC		10 to 30 V DC	
Current consumption per channel I_S (no load)	≤ 30 mA	< 12 mA			
Output signal (short circuit-proof)	Square-wave signals				
Output signal level high ⁽¹⁾	$\geq V_S - 1.0$ V	≥ 14 mA		$\geq V_S - 1.8$ V	
Output signal level low ⁽¹⁾	≤ 1.0 V	typ. 7 mA		≤ 1.5 V	
Output current per channel	≤ 20 mA	≤ 16 mA		≤ 10 mA	
Input frequency at target wheel	0 to 25 kHz			0.004 to 20 kHz	
Output frequency	0 to 25 kHz			0.004 to 20 kHz	
Duty cycle (depends on measuring scale and air gap)	50% \pm 5%			50% \pm 10%	
Phase shift	typ. 90°				
Slew rate (2 m cable)	≥ 10 V / μ s	≥ 6 V / μ s; $R_B = 560 \Omega$		≥ 4 V / μ s	
Electromagnetic compatibility	Rail vehicles (EN 50121-3-2) Industrial applications (EN 61000-6-1 to 4)				
Isolation strength	500 V AC (EN 60439-1)				
Mechanical Data					
Module m of target wheel	1.00 / 1.25 / 1.50 / 1.75 / 2.00 / 2.25 / 2.50 / 3.50				
Permissible air gap (for module m) ⁽²⁾	0.2 to 3.0 mm				
Width of target wheel	≥ 10 mm (smaller ones upon request)				
Form of target wheel	Involute gear as per DIN 867, rectangular gear 1:1 or slotted disk (on request)				
Material of target wheel	Ferromagnetic steel				
Operating and ambient temperature	-40 °C to +120 °C				
Storage temperature	-40 °C to +120 °C				
Protection class	IP 68				
Vibration resistance	EN 61373 Cat. 3				
Shock resistance	EN 61373 Cat. 3				
Type test	EN 50155				
Housing material of sensor	Stainless steel				
Weight of sensor (2 m cable)	650 g				

(1) Output signal level depends on output current and temperature

(2) Please observe the permissible air gap table in this document

Technical data

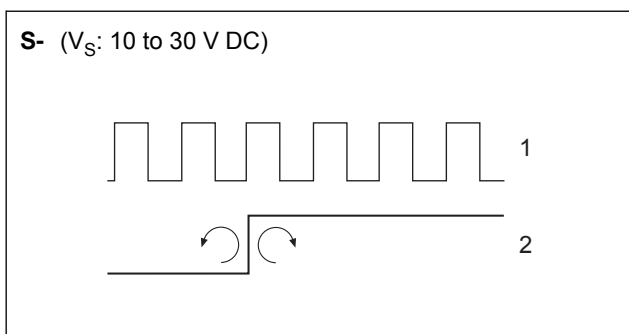
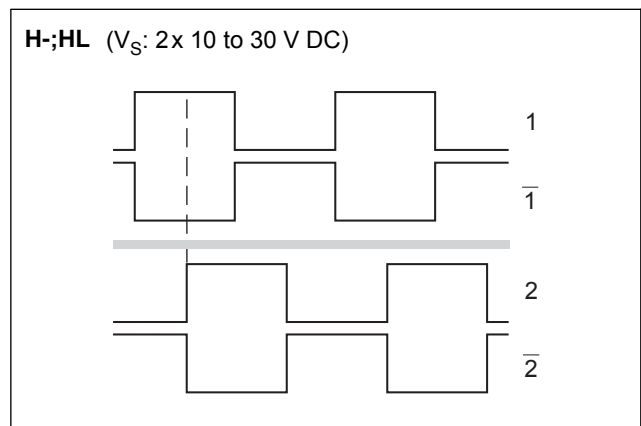
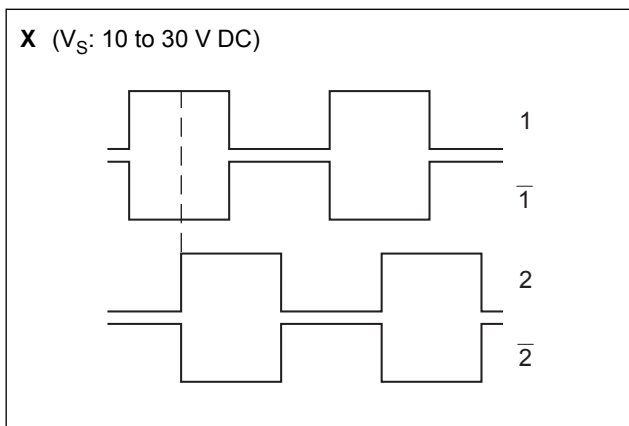
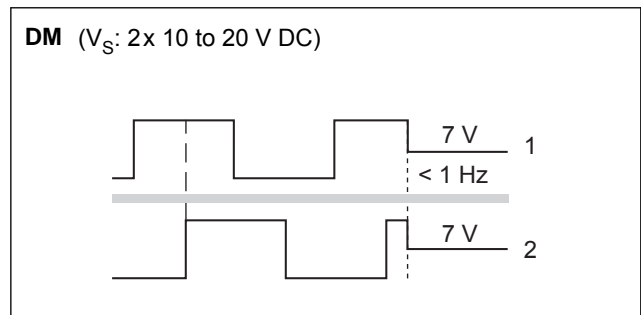
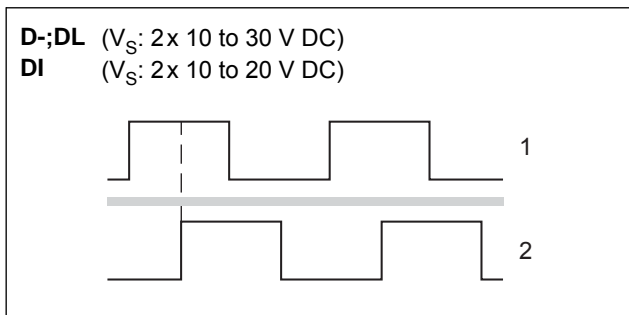
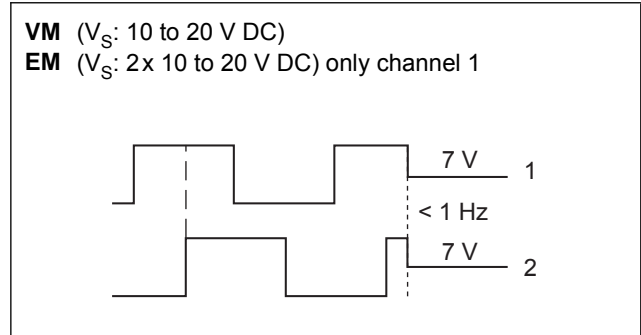
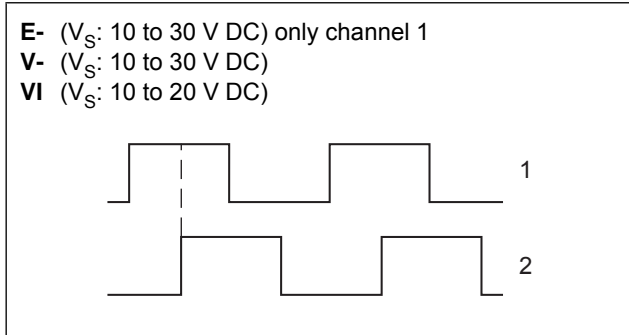
Signal pattern	DM	VM	EM
Electrical Data			
Supply voltage V_S	reverse battery protected 10 to 20 V DC		
Current consumption per channel I_S (no load)	< 12 mA		
Output signal (short circuit-proof)	Square-wave signals		
Output signal level high ⁽¹⁾	$\geq V_S - 1.8 \text{ V}$		
Output signal level low ⁽¹⁾	$\leq 1.5 \text{ V}^{(2)}$		
Output current per channel	$\leq 10 \text{ mA}$		
Input frequency at target wheel	0.001 to 8kHz		
Output frequency	0.001 to 8kHz		
Duty cycle (depends on measuring scale and air gap)	50% \pm 10%		
Phase shift	typ. 90°		–
Slew rate (2 m cable)	$\geq 4 \text{ V} / \mu\text{s}$		
Electromagnetic compatibility	Rail vehicles (EN 50121-3-2) Industrial applications (EN 61000-6-1 to 4)		
Isolation strength	500 V AC (EN 60439-1)		
Mechanical Data			
Module m of target wheel	2.0		
Permissible air gap (for module m) ⁽³⁾	0.2 to 3.0 mm		
Width of target wheel	$\geq 10 \text{ mm}$ (smaller ones upon request)		
Form of target wheel	Involute gear as per DIN 867, rectangular gear 1:1 or slotted disk (on request)		
Material of target wheel	Ferromagnetic steel		
Operating and ambient temperature	-40 °C to +85 °C		
Storage temperature	-40 °C to +120 °C		
Protection class	IP 68		
Vibration resistance	EN 61373 Cat. 3		
Shock resistance	EN 61373 Cat. 3		
Type test	EN 50155		
Housing material of sensor	Stainless steel		
Weight of sensor (2 m cable)	650 g		

(1) Output signal level depends on output current and temperature

(2) 7 V \pm 0,3 V at frequencies < 1 Hz \pm 0,3 Hz

(3) Please observe the permissible air gap table in this document

Signal pattern

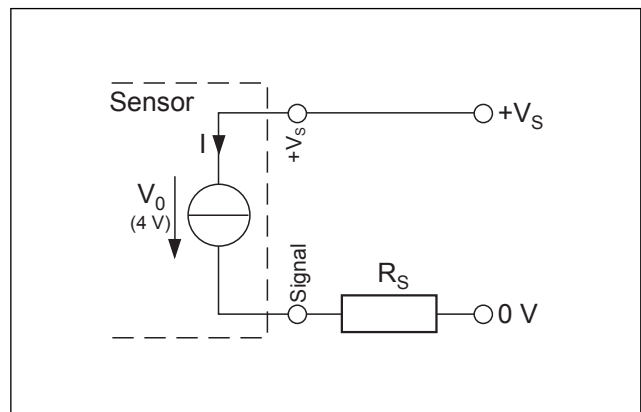
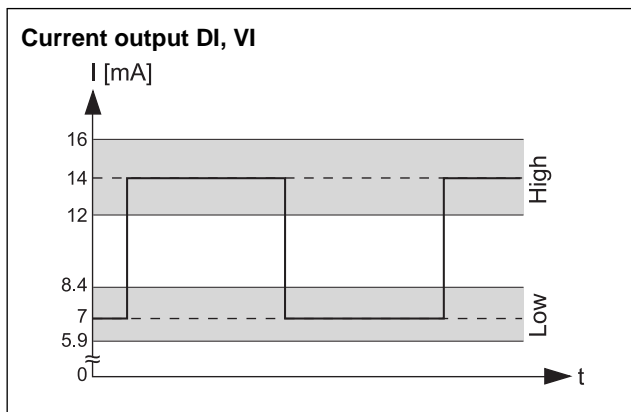
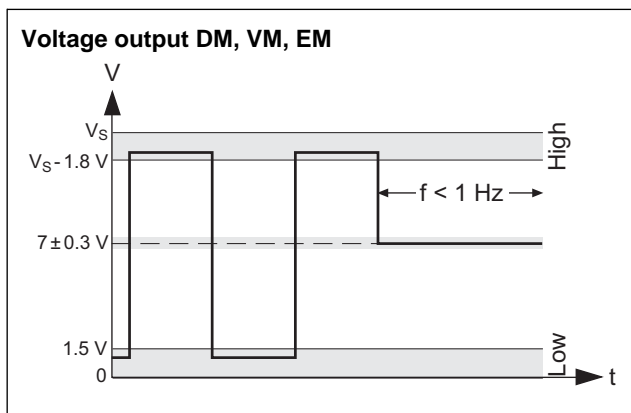
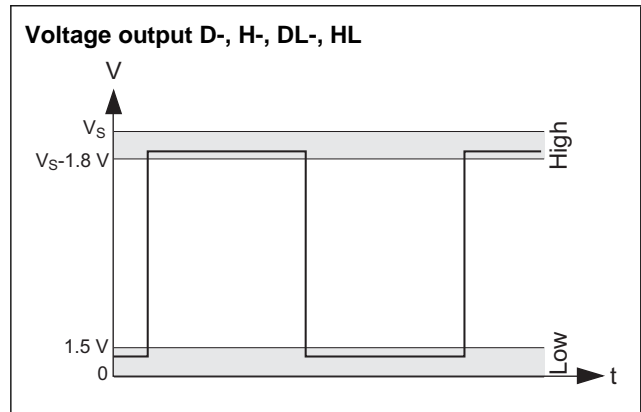
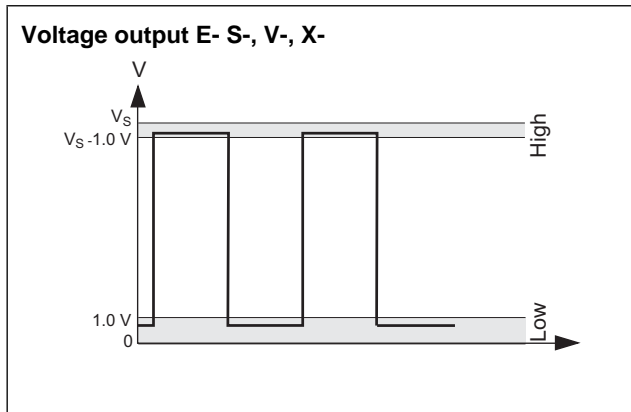


Explanation

- x- = voltage output
- xI = current output
- xL = voltage output (low current)⁽¹⁾
- xM = voltage output (standstill voltage)
- 1, 2 = channel 1, channel 2
- $\bar{1}$, $\bar{2}$ = inverse channel 1; inverse channel 2
- = galvanically isolated
- V_S = supply voltage

⁽¹⁾ with reduced current consumption

Signal level



When using the current output, the resistor to be connected must not exceed a specific value:

$$R_{B,max} = (V_S - 4 \text{ V}) / I_{max}$$

with $V_S = 10 \text{ to } 20 \text{ V DC}$ and $I_{max} = 16 \text{ mA}$

Example for $V_S = 15 \text{ V}$:

$$R_{B,max} = 11 \text{ V} / 16 \text{ mA} = 690 \Omega$$

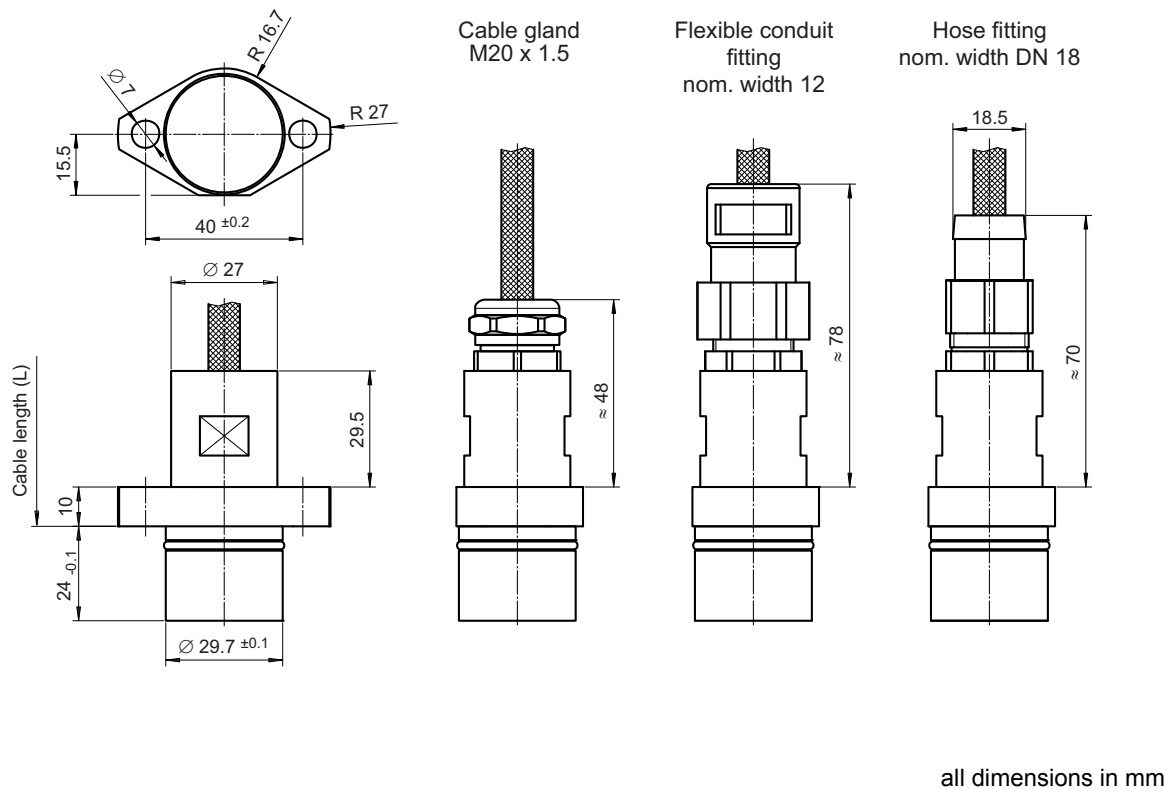
Electrical connection, Dimensions

Electrical connection

Signal	D-	H-	S-	E-	V-	X-	DI	VI	DL	HL	DM	VM	EM
Channel 1	ye	ye	ye	ye	ye	ye	bl	bl	ye	ye	wh	bl	wh
Channel 2		wh	wh	wh	wh	wh	gn	gn	wh	wh	gn	wh	
Channel 1̄			bk			bk				bk			
Channel 2̄				br		br				br			
GND (0 V)	bl	gr	bl	gr	bl	bl			bl	gr	bl	gr	bk
+V _S (10 to 30 V DC)	rd	pi	rd	pi	rd	rd			rd	pi	rd	pi	
+V _S (10 to 20 V DC)							rd	ye	rd			rd	or
Cable / Screen	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	2/2	1/1	1/1

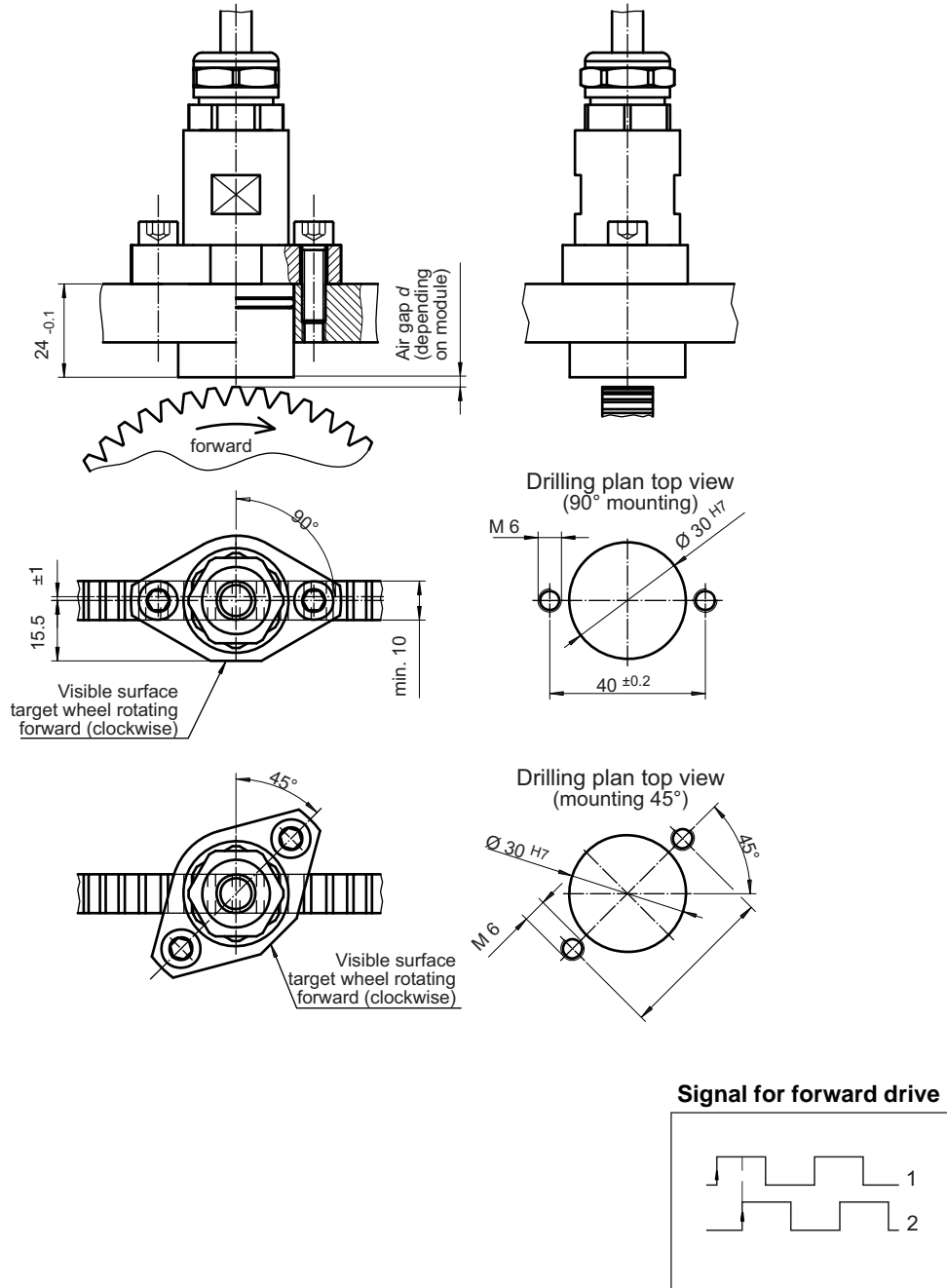
bk = black, bl = blue, br = brown, gn = green, gr = grey, or = orange, pi = pink, rd = red, vi = violet, ye = yellow, wh = white

Dimensions



Assembly drawing

Assembly drawing



Please observe the EMC-reference into the operating instruction!

Permissible air gap (for module m)

	D-	H-	S-	E-	V-	X-	DI	VI	DL	HL	DM	VM	EM
m = 1.0				0.2 to 1.4 mm					0.2 to 0.9 mm				
m = 1.5				0.2 to 1.8 mm					0.2 to 1.5 mm				
m = 2.0				0.2 to 2.2 mm					0.2 to 2.0 mm		0.2 to 2.2 mm		
m = 2.5				0.2 to 2.8 mm					0.2 to 2.2 mm				
m = 3.5				0.2 to 3.0 mm					0.2 to 2.8 mm				

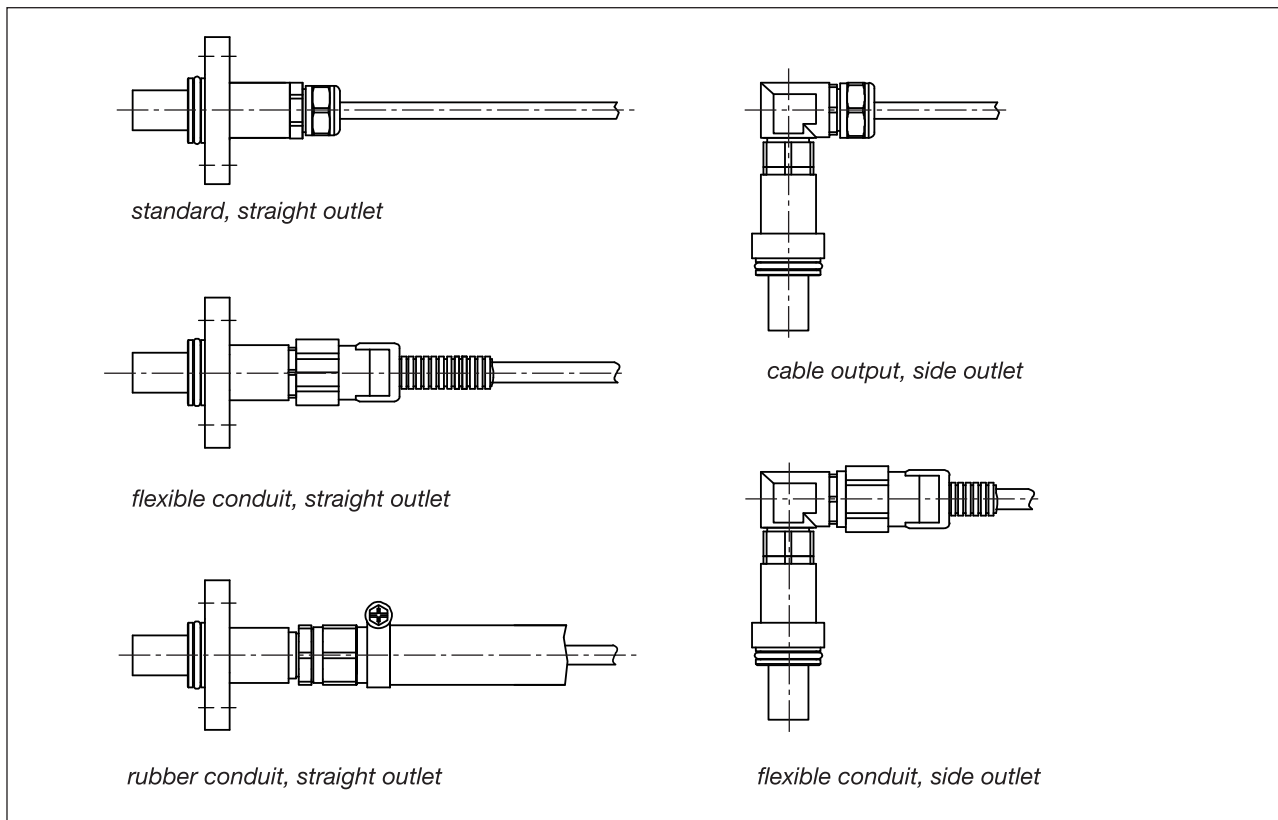
Type code GEL 2476

Signal pattern	
E	1-channel square-wave signals
S	1-channel square-wave signals with direction signal
V	2-channel square-wave signals shifted by 90°
X	2-channel square-wave signals shifted by 90° and their inversed signals
D	2-channel square-wave signals shifted by 90°, galvanically separated
H	2-channel square-wave signals shifted by 90° and their inversed signals, galvanically separated
Signal output	
-	Voltage
I	Current (with signal patterns V and D only)
L	Voltage, with reduced current consumption (with signal patterns D and H only)
M	Standstill monitoring voltage 7 V (with signal patterns E, V and D for module 2.00 only)
Module M	
100	Module 1.00
125	Module 1.25
150	Module 1.50
.	
.	
.	
350	Module 3.50
Cable screening	
L	Connected to sensor housing
P	Not connected to sensor housing
Cable outlet	
K	Screwed cable gland
W	Flexible tube fitting
G	Rubber tube adapter
Mounting position	
A	90°
B	45°
Cable length L	
xxx	cm cable length
Costumising	
N	Standard version
S	Special version
2476	

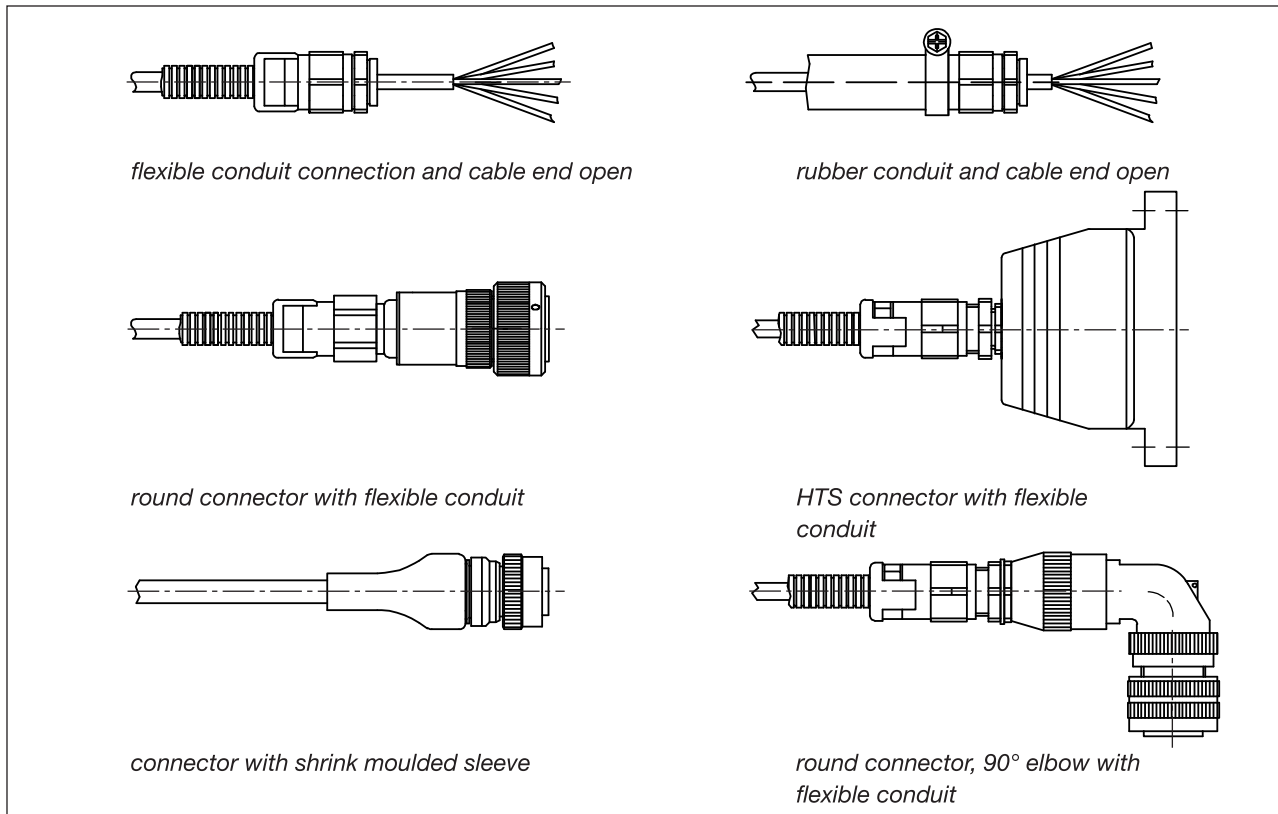
Notes: For a special customized version a Y-No. will be created. A special version 2476Yxxx is manufactured according to a drawing or application description and could differ from the technical standard specification.

Example for customized cable connections

Encoder end



Cable end



We have agencies in:

Austria

Belgium

Canada

China

Czech Republic

Denmark

Finland

France

Germany

Great Britain

Israel

Italy

Korea

Malaysia

Netherlands

Norway

Portugal

Sweden

Switzerland

Spain

Turkey

USA



... automates motion.

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Subject to technical modifications and typographical errors.
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