

2-channel speed sensor ► GEL 2476

Sensor with current output or
voltage output (standstill voltage)

Technical information

SENSORLINE



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-	DL	HL						
Electrical Data													
Supply voltage V_S	reverse battery protected 10 to 30 V DC												
Current consumption per channel I_S (no load)	$\leq 30 \text{ mA}$												
Output signal (short circuit-proof)	Square-wave signals												
Output signal level high ⁽¹⁾	$\geq V_S - 1.8 \text{ V}$	$\geq V_S - 1.8 \text{ V}$		$\geq V_S - 1.0 \text{ V}$									
Output signal level low ⁽¹⁾	$\leq 1.5 \text{ V}$			$\leq 1.0 \text{ V}$									
Output current per channel	$\leq 20 \text{ mA}$												
Input frequency at target wheel	0 to 25 kHz												
Output frequency	0 to 25 kHz												
Duty cycle (depends on measuring scale and air gap)	$50\% \pm 5\%$												
Phase shift	typ. 90°	–	–	typ. 90°									
Slew rate (2 m cable)	$\geq 10 \text{ V} / \mu\text{s}$												
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	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 whhel	$\geq 10 \text{ mm}$ (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 +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	E-	V-
Electrical Data							
Supply voltage V_S			reverse battery protected				
	10 to 30 V DC		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⁾		≥ V_S - 1.0 V		≥ 14 mA			
Output signal level low ⁽¹⁾		≤ 1.0 V			typ. 7 mA		
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% ± 5%		50% ± 10%			
Phase shift			typ. 90°				
Slew rate (2 m cable)	≥ 10 V / μs	≥ 6 V / μs; $R_B = 560 \Omega$			≥ 4 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 whhel		≥ 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⁾	$\geq V_S - 1.8$ V		
Output signal level low ⁽¹⁾	≤ 1.5 V ⁽²⁾	≤ 1.5 V ⁽²⁾	
Output current per channel	≤ 10 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)	≥ 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	2.0		
Permissible air gap (for module m) ⁽³⁾	0.2 to 3.0 mm		
Width of target whhel	≥ 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 +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		

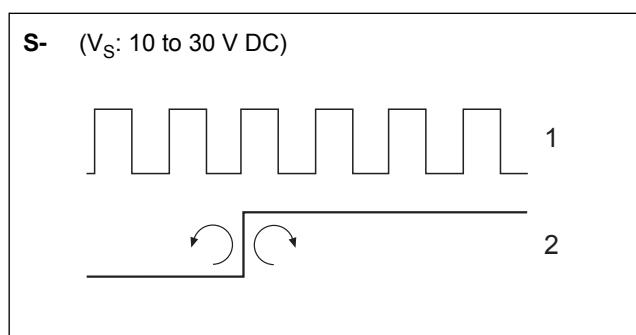
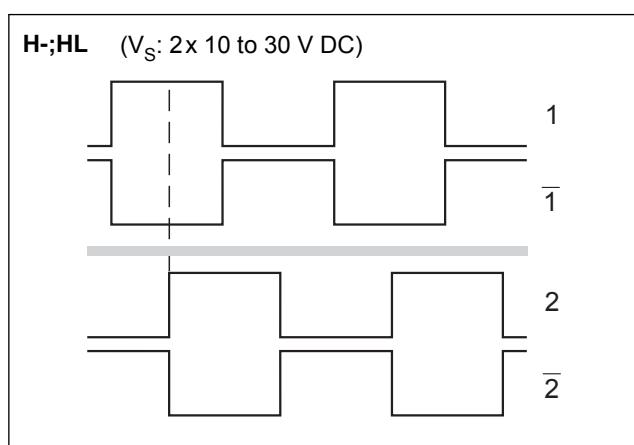
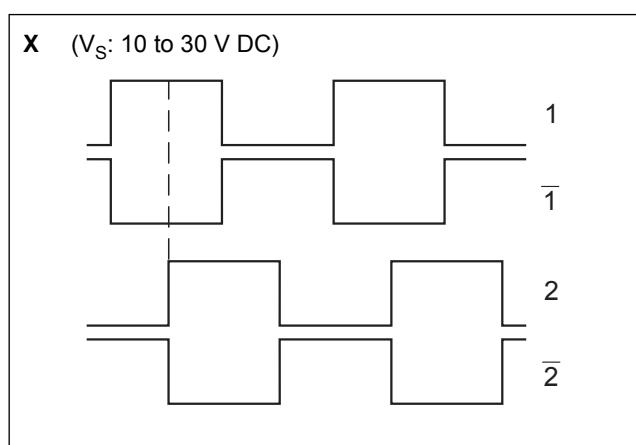
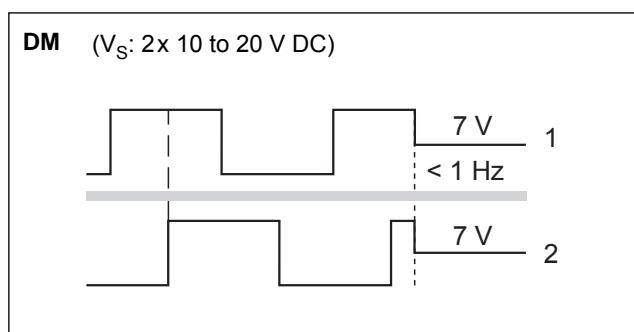
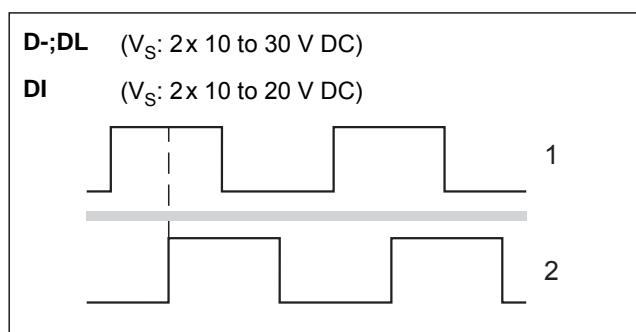
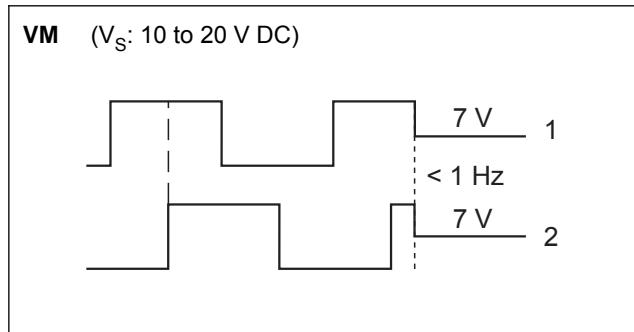
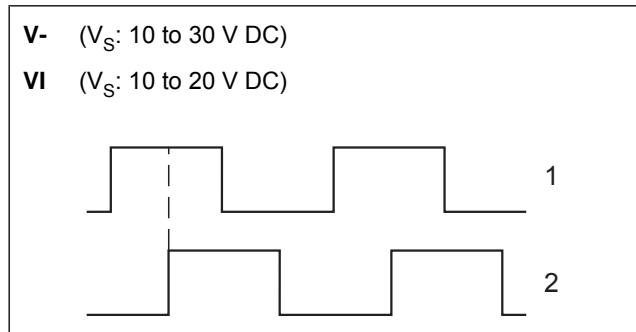
(1) Output signal level depends on output current and temperature

(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

Signal pattern



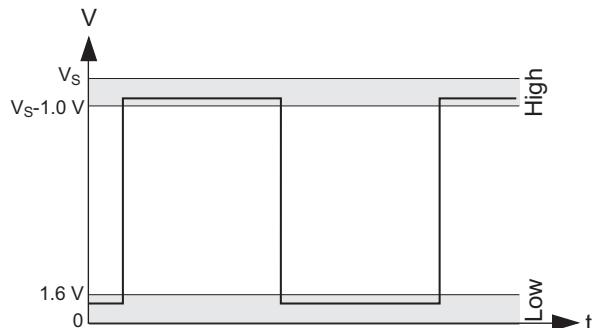
Explanation

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

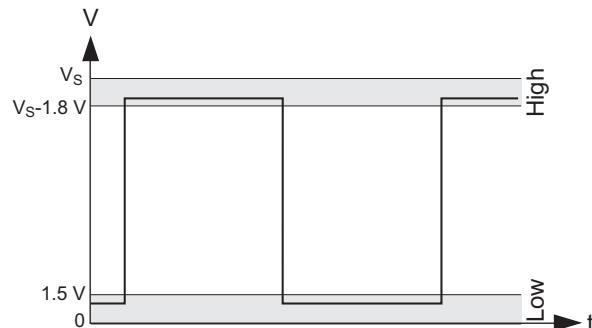
⁽¹⁾ with reduced current consumption

Signal level

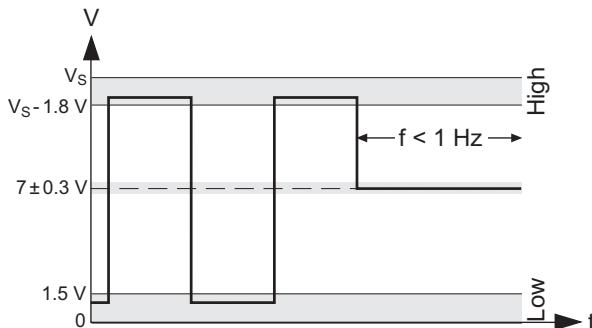
Voltage output S-, V-, X-



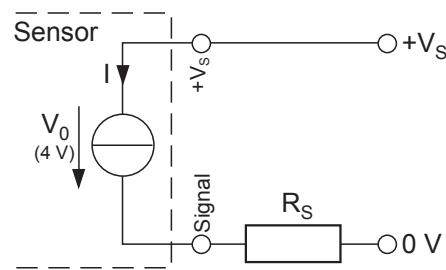
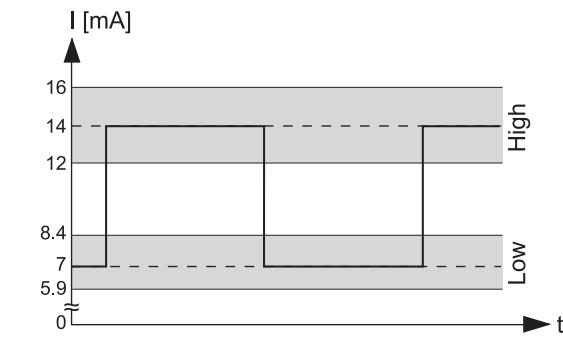
Voltage output D-, H-, DL-, HL



Voltage output DM, VM



Current output DI, VI



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

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

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

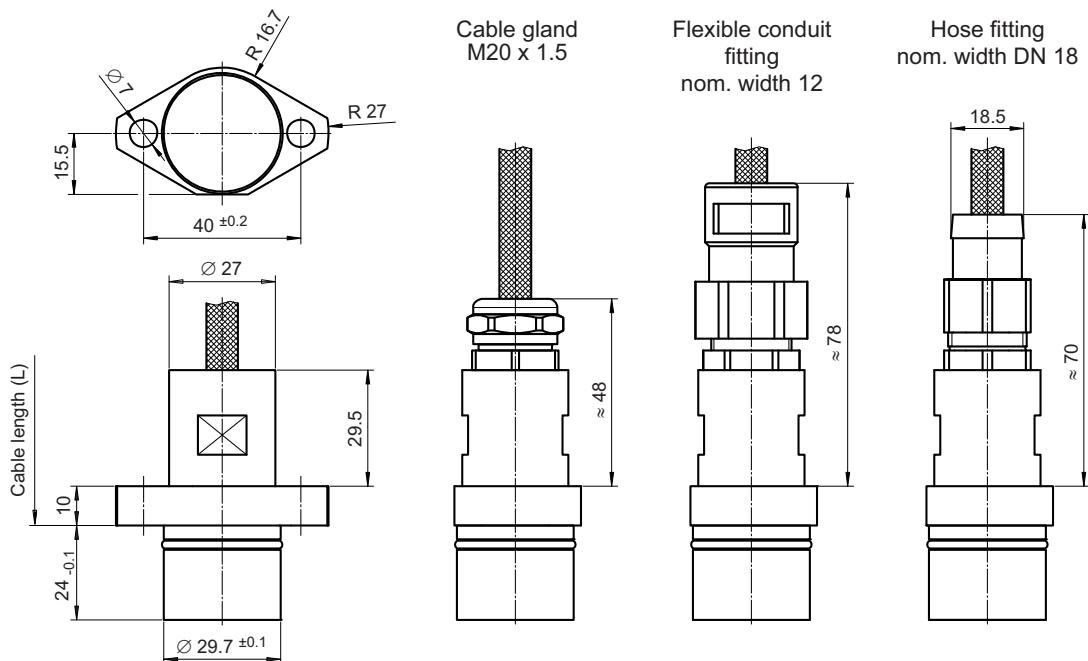
Electrical connection, Dimensions

Electrical connection

Signal	D-	H-	S-	E-	V-	X-	DI	VI	DL	HL	DM	VM	EM
Channel 1	ye		ye		ye	ye	ye	bl		bl	ye		ye
Channel 2		wh		wh	wh		wh	wh		gn	gn		wh
Channel $\bar{1}$			bk				bk				bk		
Channel $\bar{2}$				br			br					br	
GND (0 V)	bl	gr	bl	gr	bl	bl	bl			bl	gr	bl	gr
$+V_S$ (10 to 30 V DC)	rd	pi	rd	pi	rd	rd	rd			rd	pi	rd	pi
$+V_S$ (10 to 20 V DC)								rd	ye	rd			rd
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

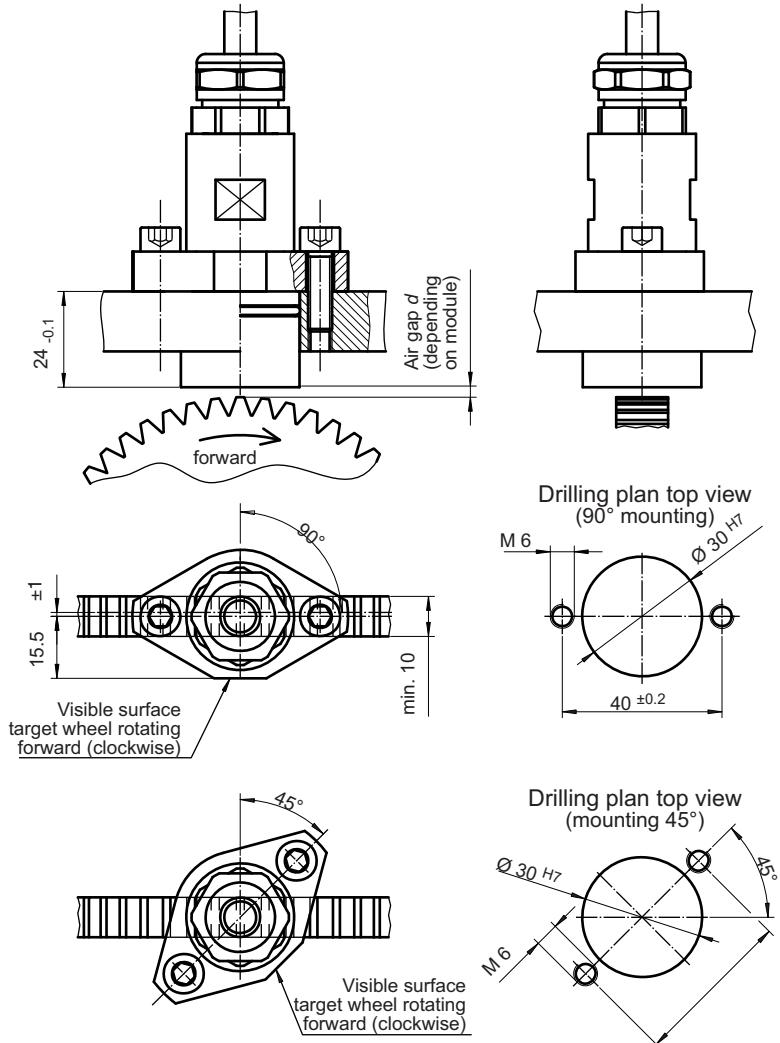
bk = black, bl = blue, br = brown, gn = green, gr = grey, or = orange, pi = pink, rd = red, vi = violet, ye = yellow, wh = white

Dimensions

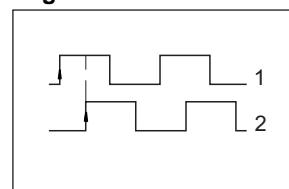


Assembly drawing

Assembly drawing



Signal for forward drive



Please observe the EMC-reference into the operating instruction!

Permissible air gap (for module m)

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

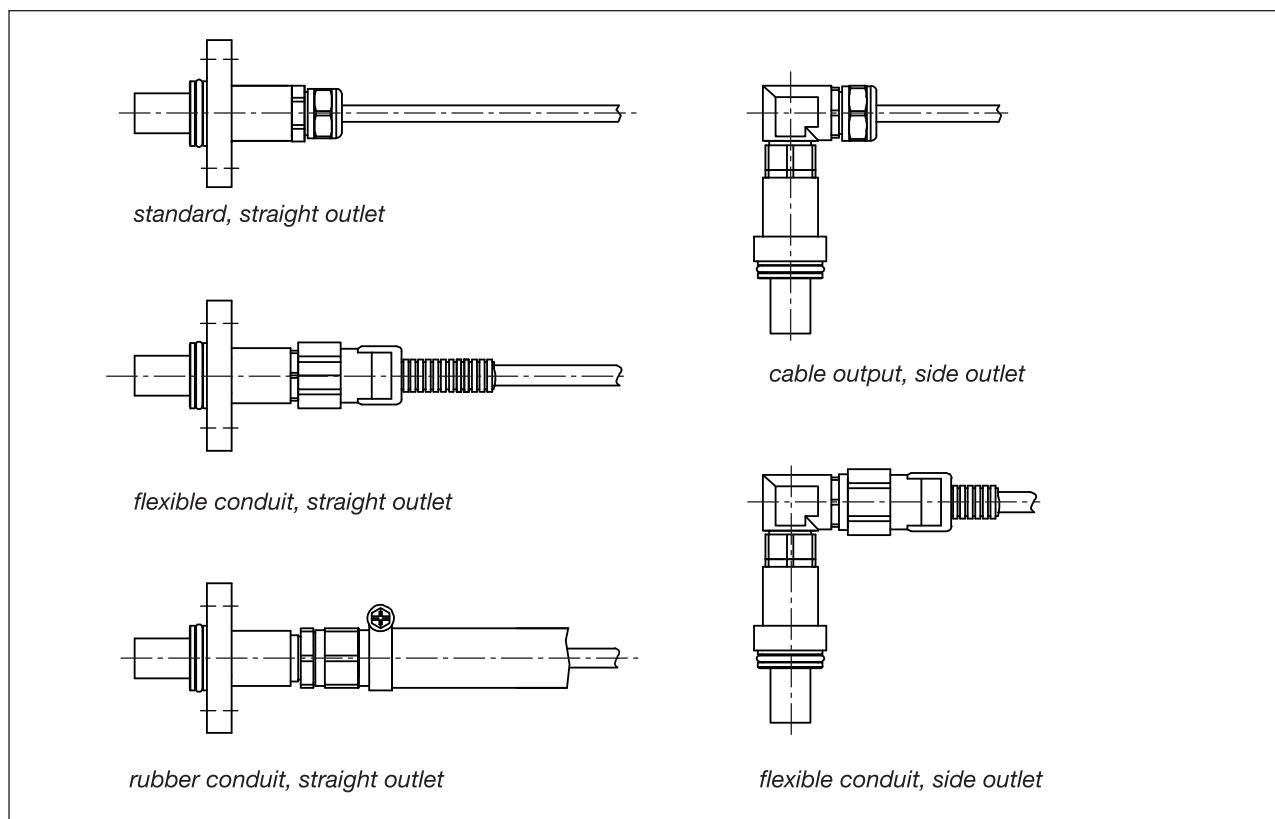
Type code GEL 2476

	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	

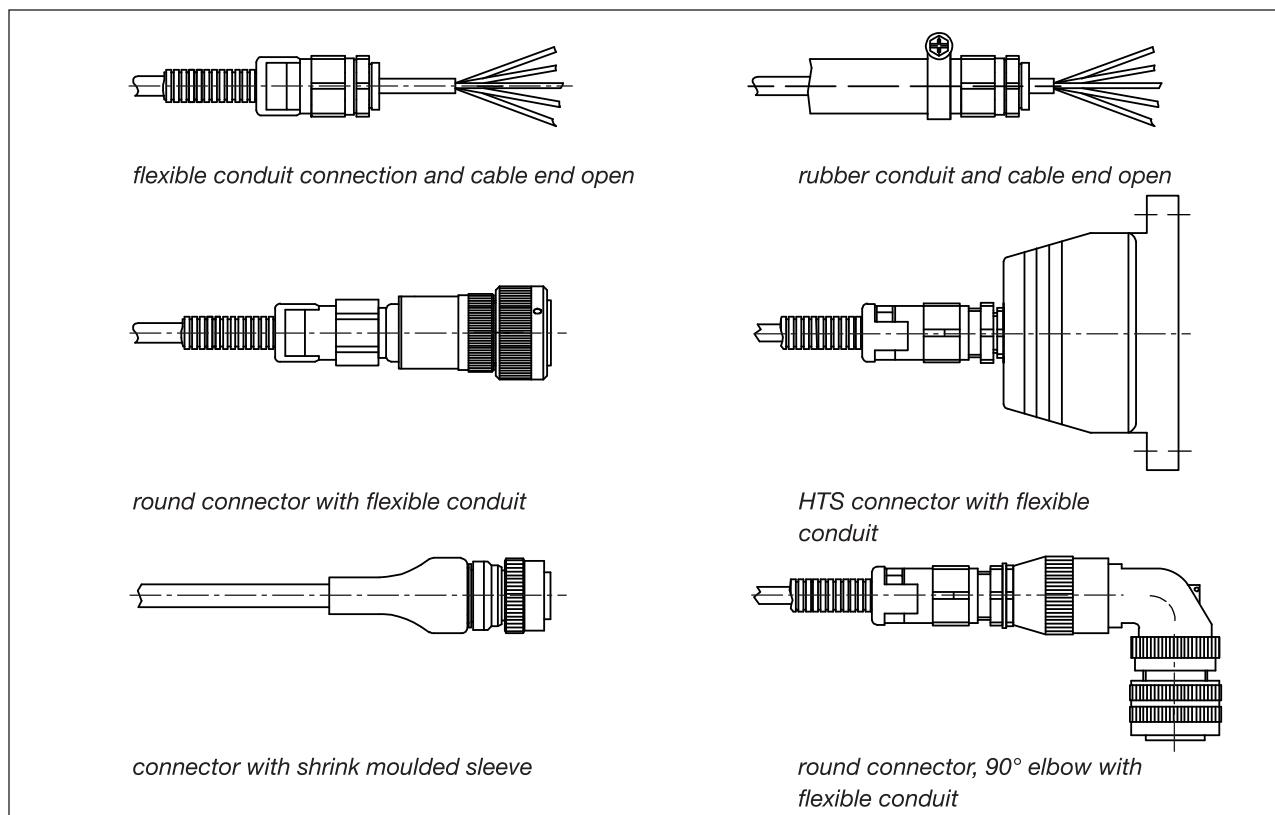
Notes: For a special customized version a Y-No. will be created. A special version 2476Yxxx is manufactured according to a drawing or application description and could differ from the technical standard specification.

Example for customized cable connections

Encoder end



Cable end



Notices

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



Lenord, Bauer & Co. GmbH
Dohlenstraße 32
46145 Oberhausen, GERMANY
Phone: +49 208 9963–0
Fax: +49 208 676292
Internet: www.lenord.de
E-Mail: info@lenord.de

Subject to technical modifications and typographical errors.
For the latest version please visit our web site : www.lenord.de.