2-channel speed sensor

Sensor with integrated pulse multiplication

GEL 2477

Technical information

Version 2024-01-29

Description

The GEL 2477 is based on the tried and tested principle of scanning ferromagnetic measuring scales. Unlike other speed sensors, however, the GEL 2477 operates internally with much more precise raw signals. The integrated pulse multiplication thus allows output of a rotational speed signal with a higher number of pulses than the measuring scale would natively allow. This higher number of pulses allows control and measuring tasks to be performed more dynamically due to much shorter intervals between two measured values. This allows better control of the exacting start-up process in high load situations, particularly in traction applications. Energy efficiency and ride comfort benefit from higher pulse rates. The rolling detection dynamics also increase with a higher numbers of pulses.

Features

- Target wheel module: 1.00
  (module 2.00 is also possible for factor 2)
- Temperature range -40 °C to +120 °C
- Degree of protection IP 68
- in accordance with DIN EN 50155:2022-06

Advantages

- Installation compatible with commercially available speed sensors
- Interface compatible with existing HTL inputs
- Higher energy efficiency due to more accurate traction control
- Better ride comfort due to lower torque ripple
- Can also be used in existing designs as a retrofit without adapting the mechanical parts and the control system
- Space saving/weight optimized measuring scales with a constant number of pulses

Field of application

- Rail vehicles
  - Traction monitoring
  - Rolling detection
  - Anti-slip protection
  - Motor speed

Do you have special requirements regarding flange shape, shaft length, number of channels, cable protection, cable outlet, connector assembly or EMC concept?
Then talk to us. Our experts can design the optimal solution for your application from an extensive modular system and will be pleased to advise you how to customize your solution in the most cost-efficient way.
Write to support@lenord.de or call +49 208 9963-215.

Right to technical changes and errors reserved.

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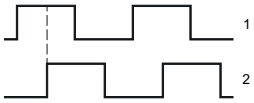
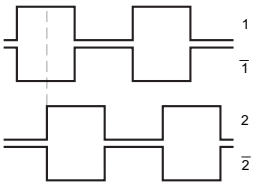
Technical data

Pulse multiplication	Factor 02	Factor 04	Factor 08
Electrical data			
Supply voltage U_B (reverse polarity protected)	10 to 30 V DC		
Current consumption per channel I_B (without load)	≤ 50 mA		
Output signal (short-circuit-proof)	Square-wave signals		
Output signal level High (1)	≥ U_B - 1.5 V		
Output signal level Low (1)	≤ 1.0 V		
Output current per channel	≤ 20 mA		
Frequency range (output)	0 to 50 kHz	0 to 100 kHz	
Duty cycle(2)	50 % ± 20 %		
Phase offset	typ. 90°		
Mechanical data			
Sensor tube material	Stainless steel		
Flange material	Stainless steel		
Weight sensor (2 m cable, without connector)	500 g		
Shock resistance	DIN EN 61373:2011-04 cat. 3		
Cable			
Connection	Outlet straight, flying lead		
Cable length	≤ 100 m		
Screening note	Cable screen is connected directly or, as an option, capacitively in the sensor		
Environmental testing			
Working and operating temperature	-40 °C to +120 °C		
Storage temperature	-40 °C to +120 °C		
Dielectric strength	500 V AC/750 V DC (DIN EN 50155:2022-06)		
Electromagnetic compatibility	DIN EN 50121-3-2:2017-11		
Vibration resistance	DIN EN 61373:2011-04 cat. 3		
Degree of protection (sensor without cable gland)	IP 68		
MTTF value	2,000,000 h at 55 °C		
Requirements for the target wheel			
Material	Ferromagnetic steel		
Tooth form	Involute gear teeth as per DIN 867, (others upon request)		
Width	≥ 10 mm (smaller upon request)		
Module	1.00; 2.00	1.00	
Air gap	typ. 0.7 mm (0.4 to 1.0 mm)		

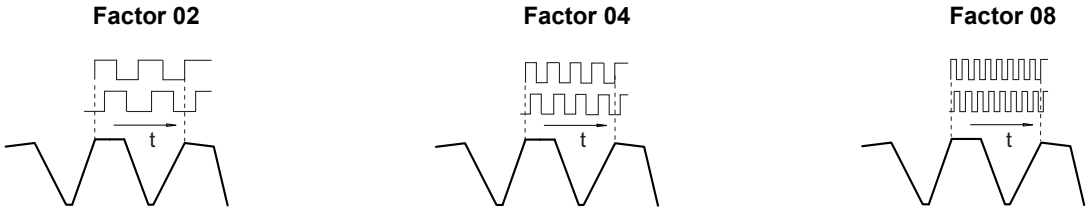
(1) depending on output current and temperature
(2) depending on target wheel and air gap

Output signals and connection

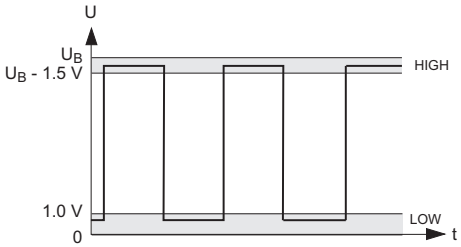
Signal pattern

Output signals		Supply voltage	Pulse diagram
E	1 channel	10 to 30 V DC	
V	2 channels, 90° phase offset	10 to 30 V DC	
X	2 channels, 90° phase offset, with inverse signals (only for module 1.00)	10 to 30 V DC	

Output signals with pulse multiplication



Output signal level



Pin assignment

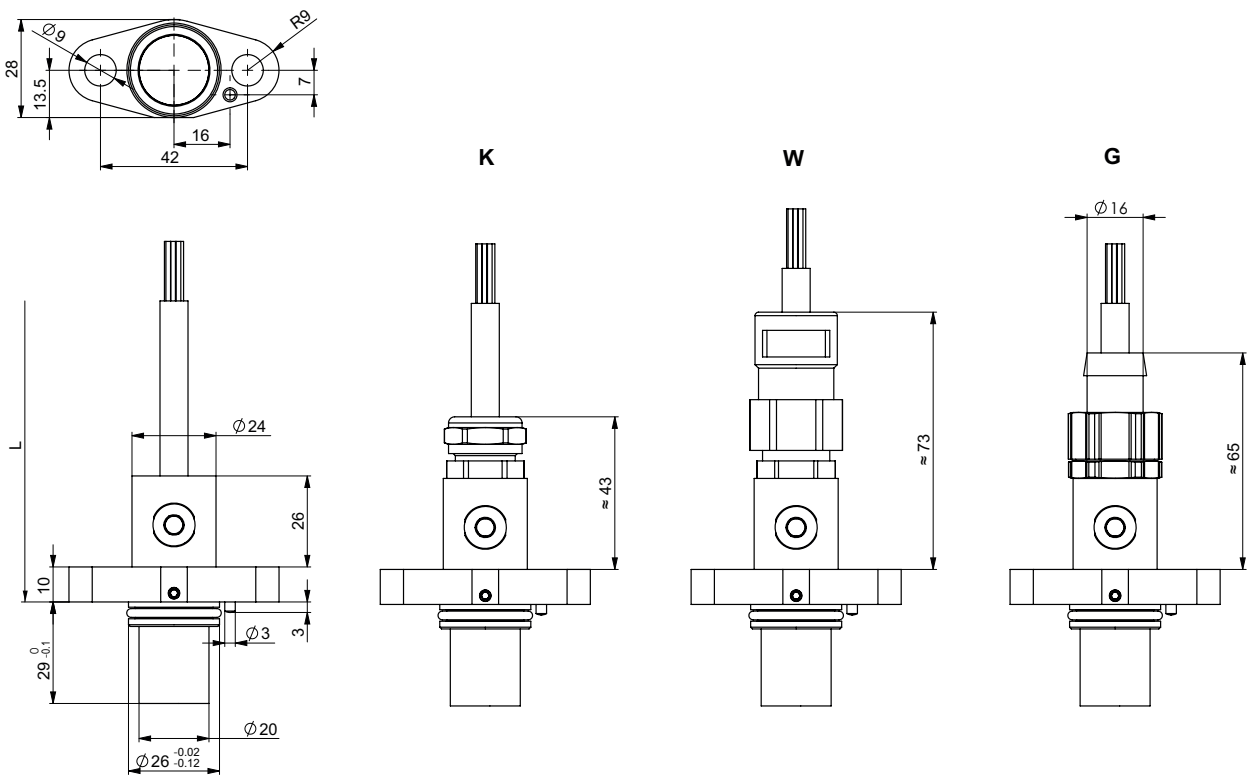
Signal	E	V	X
Channel 1	YE	YE	YE
Channel 2		WH	WH
Channel 1 inverse		-	BK
Channel 2 inverse		-	BN
GND (0 V)	BU	BU	BU
$+U_B$	RD	RD	RD
Cables/Screens[1]	1 / 1	1 / 1	1 / 1
Core identifier: **BK** black, **BN** brown, **BU** blue, **RD** red, **WH** white, **YE** yellow			
Cable data			
Cable	halogen-free, screened[2]		
Cable diameter	5.4 ± 0.2 mm		6.5 ± 0.3 mm
Cable cross section	4 x 0.5 mm²		6 x 0.5 mm²
Minimum bending radius static/dynamic	16 mm / 27 mm		20 mm / 33 mm

(1) Screen connection as per type code
(2) Specification upon request

Technical drawings

All dimensions in mm, general tolerance DIN ISO 2768 mK

Dimensional drawing



L Cable length as per type code

1 (O-ring 21 x 2.5 mm: NBR)

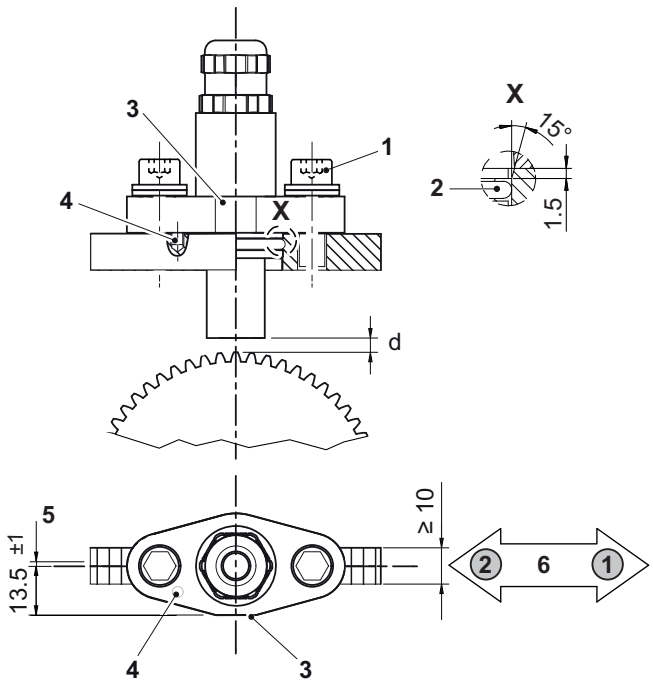
Cable outlet as per type code:

K Cable gland

W Flexible conduit connection nominal width DN 12

G Rubber sleeve connection piece nominal width DN 12

Assembly drawing



X Insertion chamfer

d Air gap (1)
typ. 0.7 mm (0.4 to 1.0 mm)

1 Fastening screw
(recommended: M8 x 20
DIN EN ISO 4762)

2 Sealing ring

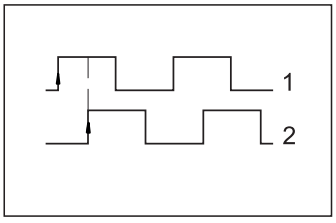
3 Visible surface(2)

4 Index pin

5 Axial offset

6 Direction of rotation of target wheel
(forward)

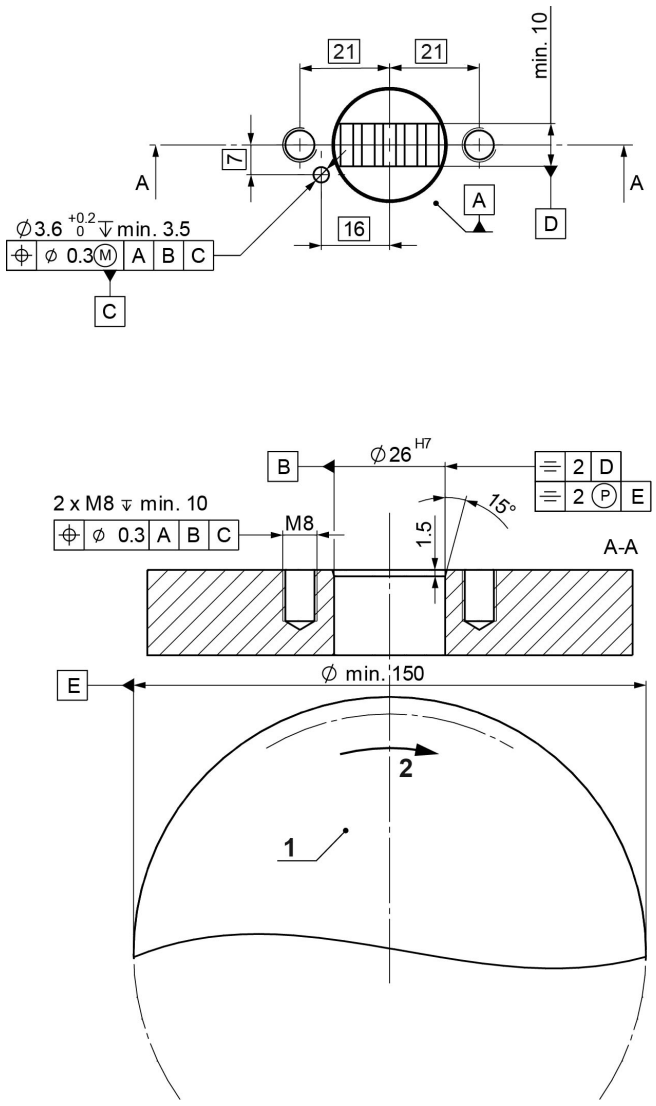
Signal for forward travel



(1) depending on signal pattern and module

(2) Looking at the visible surface, the signals are output forward when the target wheel rotates clockwise.

Hole pattern



1 target wheel
2 directions of rotation

Type code

Type code GEL 2477

	Signal pattern						
	E	1-channel square-wave signals					
	V	2-channel square-wave signals with 90° phase offset					
	X	2-channel square-wave signals with 90° phase offset and their inverse signals (for signal pattern X only)					
		Module m					
		100	Module 1.00				
		200	Module 2.00				
			Cable screen				
			L	Connected directly to the sensor housing			
			C	Connected capacitively to the sensor housing			
				Factor			
				02	Multiplication factor 2		
				04	Multiplication factor 4		
				08	Multiplication factor 8		
					Cable outlet		
					K	Cable gland	
					W	Flexible conduit connection	
					G	Rubber sleeve connection	
						Cable length L	
						000	Cable length in cm
							Tailoring
							N Standard design
							S Special design
2477	_	_ _ _	_	_ _	_	_ _ _	_

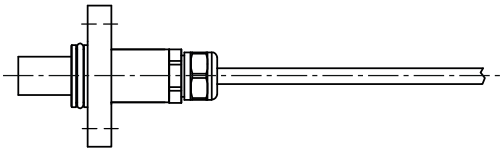
Accessories

ZB247XM8 (2 screws M8 x 20 EN ISO 4762 with washer and spring washer)

Note: A Y-number is assigned for a customer-specific special version. A special design 2477Yxxx is manufactured according to drawing or application description and may deviate from the standard technical specifications.

We can manufacture according to your specifications:

Examples for the sensor side, preferred types



Standard, cable outlet straight

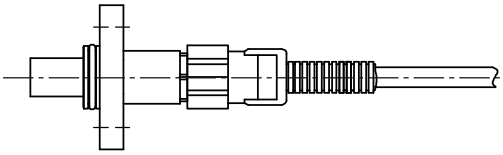
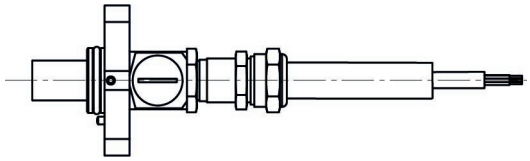
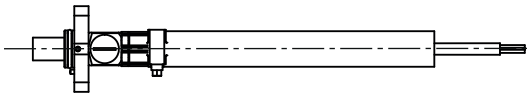


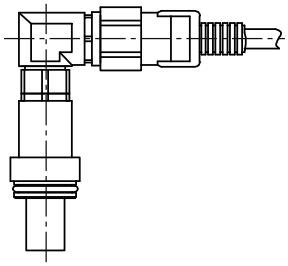
ABB flexible conduit, cable outlet straight
Type XPCST –12BG



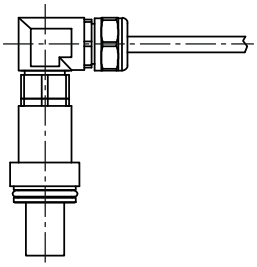
Anaconda Sealtite, cable outlet straight
Type HFX-V0 348.010.1 5/16”



EATON hose, cable outlet straight
Type EC 045-8

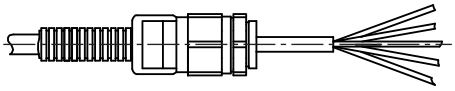


Cable outlet with 90° angle and flexible conduit

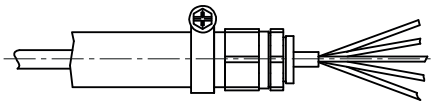


Cable outlet with 90° angle

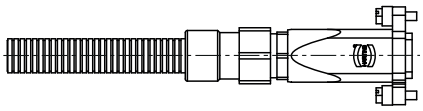
Examples for the flying lead, preferred types



Flexible conduit and flying lead



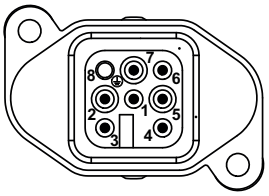
Rubber sleeve and flying lead



Flexible conduit with Harting connector HAN HPR

Pin assignment

Harting connector HAN HPR for E-, V- and X-signals, preferred type

Pin assignment	Pin	E	V	X
	1	$+U_{B1}$	$+U_{B1}$	$+U_{B1}$
	2	GND1	GND1	GND1
	3	Channel 1	Channel 1	Channel 1
	4	-	Channel 2	Channel 2
	5	-	-	Channel 1 inverse
	6	-	-	Channel 2 inverse
	7	-	-	-
	8	Screen	Screen	Screen

If you decide to have our speed sensors assembled with cable protection and connectors, we recommend using the preferred types shown in the figure. The required materials are field-tested in large quantities and are always in stock This guarantees the fastest delivery times with the best material availability and the lowest prices due to large purchasing volumes.
If you need help in finding the product you need, please contact our internal sales team at support@lenord.de or call +49 208 9963-215.