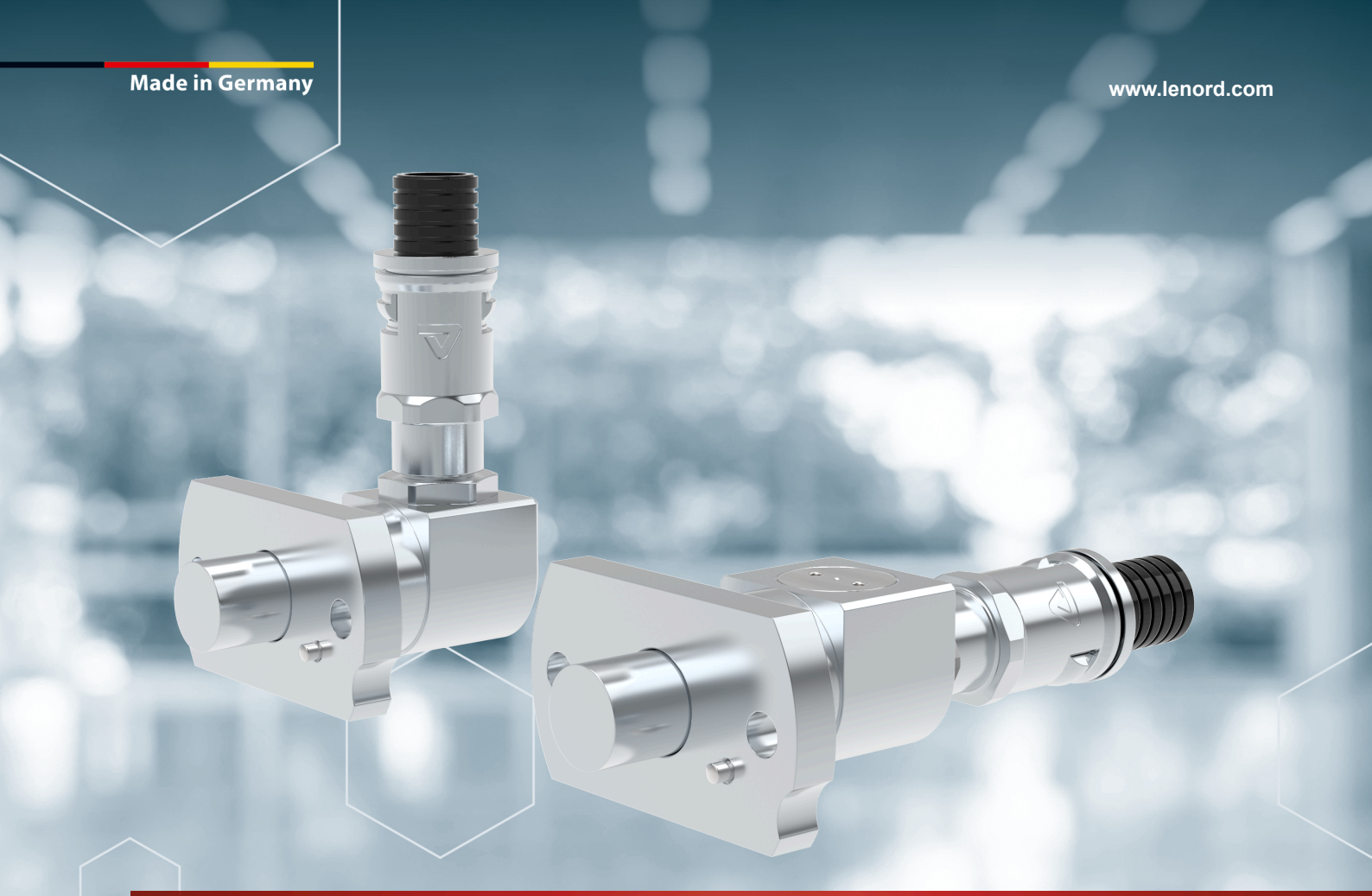
Made in Germany

www.lenord.com



Technical Information

GEL 2473

Incremental Bearingless Rotary Encoders

1-/2-Channel Hall-Effect Speed Sensor for Sensing Chain Sprockets

D-51T-2473 | Status 2026-07-07

LENORD +BAUER

Finding solutions.
Founding trust.

Motion sensors and integrated drive technology

General Information

- Maintenance- and wear-free Speed Sensor based on magnetic sensing
- Detection of measuring elements (such as target wheels or sprockets made of ferromagnetic materials)
- Reliable detection of high rotational speeds down to creeping movements (0 Hz…25 kHz)
- Most reliable rotation direction detection through evaluation of two channels
- Robust and compact stainless steel housing for use in harsh and confined applications

Features

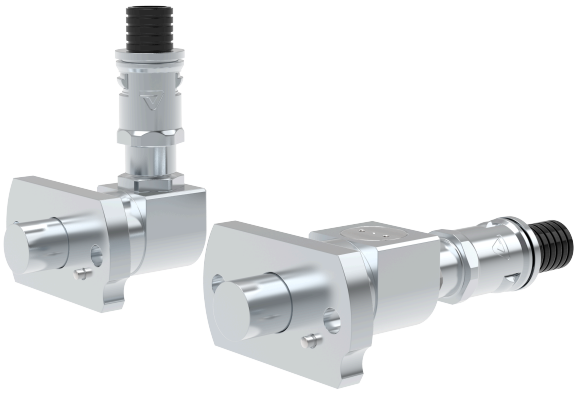
- Incremental, differential-measuring 1-/2-channel Speed Sensor based on the Hall effect
- Highest signal quality for reliable evaluation in control systems
- High EMC immunity for interference-free signal transmission in demanding industrial environments
- Configuration flexibility thanks to freely selectable cable exit, cable protection, and connector options
- Compliant with a wide range of standards and requirements for a variety of applications:
see „Technical Data - Environmental Testing“, page 5

Advantages

- Optimized lifecycle cost
- Maintenance-free and wear-resistant
- Wide range of configuration options
- Compact and robust construction type
- Easy to install
- Easy integration
- Well-suited for safety applications
- High signal quality

Do you have specific requirements regarding the flange shape, tube length, number of channels, cable protection, cable outlet, connector assembly, or the EMC design? Please contact us. Our experts can create the optimal solution for your application from an extensive modular system and will be happy to advise you on the most cost-effective custom adaptation.

support@lenord.de or +49(0)208 9963-215



Side or straight cable exit

Applications

Industry & Automation

Printing & Packaging Machines:
- Synchronization of Conveyor Belts
- Register control in printing

Automotive & Commercial Vehicles

Vehicle Drivetrains:
- RPM measurement on crankshafts and camshafts for engine control units
- Rotor position detection in electric motors (BLDC, PMSM)
- Input/output speed in the transmission for shift strategy

Vehicle Dynamics Systems:
- Wheel speed sensors for ABS/ESP
- Torque distribution in all-wheel-drive systems

Commercial Vehicles & Agricultural Machinery:
- Speed monitoring on PTOs, hydraulic pumps
- Harvesting Machinery: Conveyor screws, threshing drums

Rail Technology & Transportation

Rail vehicles:
- Wheel speed sensors for slip control and brake control
- Drive control for electric locomotives and railcars

Conveyor and cable cars:
- Speed monitoring on idler pulleys
- Synchronization of drives in multi-motor systems

Marine applications

Drive:
- Speed measurement on marine engines, turbochargers, gearboxes, and generators

Auxiliary units:
- Input/output speed measurement for slip monitoring

Energy & Utilities

Wind turbines:
- Rotor speed for power control
- Pitch adjustment (blade angle control)

Hydroelectric Power Plants / Turbines:
- Speed control for synchronization with grid frequency

Generators & emergency power systems:
- Speed measurement for frequency monitoring and load management

Building Services & Infrastructure

Elevators & escalators:
- Cabin speed and position
- Safety Systems (Emergency Stop in Case of Overspeed)

Building equipment:
- Pump and fan speeds in large HVAC systems

Logistics & Conveyor Technology

Conveyor belts:
- Speed control in distribution centers

Automated Storage Systems:
- Positioning of Storage and Retrieval Machines

Crane Systems:
- Hoist and Traverse Control

Technical Data

Signal Pattern	E-	V-	X-	D-	H-
Electrical Data					
Supply voltage U_B (reverse polarity protected)	10 ... 30 V DC				
Current consumption I_B (no load)	≤ 15 mA	≤ 25 mA			
Output signal (short-circuit-proof)	Square-wave signals				
Output signal level (High) (1)	≥ U_B - 1.0 V				
Output signal level (Low) (1)	≤ 1.0 V				
Output current per channel	≤ 20 mA				
Frequency range	0 ... 25 kHz				
Duty cycle	50% ± 20% (2)				
phase offset	–	typ. 90°			
Mechanical Data					
Sensor tube material	Stainless steel				
Flange material	Stainless steel				
Sensor weight (including 3 m cable)	Approx. 730 g Approx. 840 g (with connector)				
Environmental Testing					
The Speed Sensor complies with a wide range of standards and requirements for a variety of applications: *see „Technical Data - Environmental Testing“, page 5*					
Electrical Connection					
Connection	Cable outlet straight or side-mounted; connector as specified				
Cable Length	≤ 100 m				
Note on shielding	Cable shield directly attached to the sensor or optionally capacitively attached				

(1) Depending on output current and temperature
(2) Applies to operation at the rated air gap and with gear teeth according to DIN 867
(3) The Degree of protection on the cable outlet side depends on the cable gland or cable protection

Technical Data - Environmental Testing

Lenord+Bauer's Speed Sensors are designed for a wide range of applications. During design and manufacturing, we consistently ensure the reliability and compatibility of the Speed Sensors with a wide variety of standards, and these are continuously tested.

Through the ongoing development and optimization of sensors for a wide range of applications, Lenord+Bauer has extensive experience in this field.

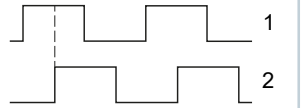
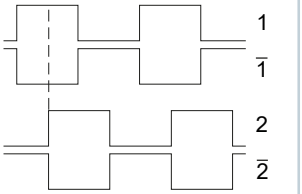
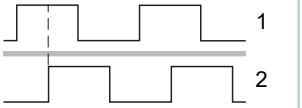
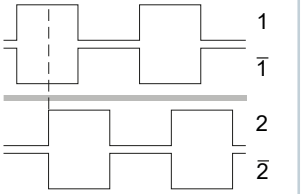
Only the minimum standards for all sensors are listed below.

If you have additional requirements regarding standards and approvals, please feel free to contact us.

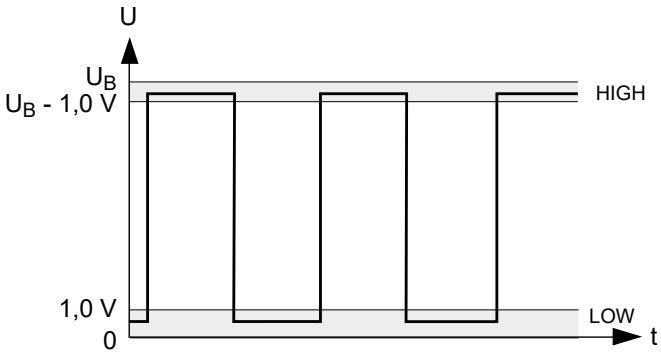
	Rail Vehicle Industry	Maritime Applications	Industrial applications
Operating and working temperature	-40 °C … +120 °C		
Storage temperature	-40 °C … +120 °C		
General Industry Standard	DIN EN 50155:2022-06	DNV-CG-0339	Depending on the application
Dielectric strength	500 V AC / 750 V DC DIN EN 50155:2022-06	DNV-CG-0339	500 V AC
Electromagnetic compatibility	DIN EN 50121-3-2:2017-11	DNV-CG-0339	IEC 61000-6-2:2016 IEC 61000-6-4:2016
Vibration Resistance	DIN EN 61373:2011-04 Cat. 3	DNV-CG-0339	IEC 60068-2-64:2008 IEC 60068-2-6:2008
Shock resistance	DIN EN 61373-2011-04 Cat. 3	DNV-CG-0339	IEC 60068-2-27:2008
Fire protection	DIN EN 45545-2:2023-12 NFPA 130 upon request	IMO 2010 FTP	Upon request
Degree of protection on the measurement side (1)	IP68		
MTTF value	> 2,000,000 h at 55 °C		

(1) The degree of protection on the cable outlet side depends on the cable gland or cable protection

Output Signals

Signal Pattern			
Output signals		**Supply voltage**	**Pulse diagram**
E-	1 channel	10 ... 30 V DC	
V-	2 channels, 90° phase offset	10 ... 30 V DC	
X-	2 channels, 90° phase offset, with inverted channels	10 ... 30 V DC	
D-	2 channels, electrically isolated, 90° phase offset	10 ... 30 V DC	
H-	2 channels, electrically isolated, 90° phase offset, with inverted channels	10 ... 30 V DC	

Output signal level – voltage output



Connection

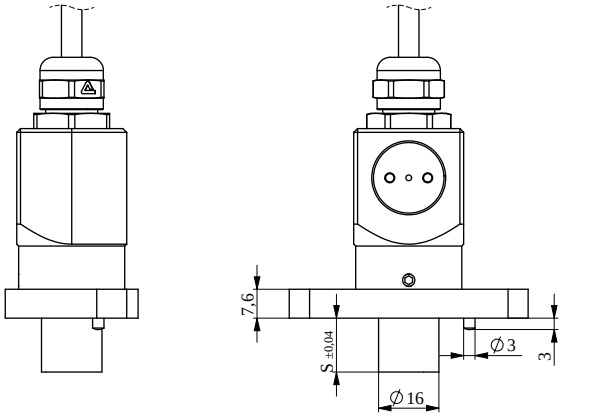
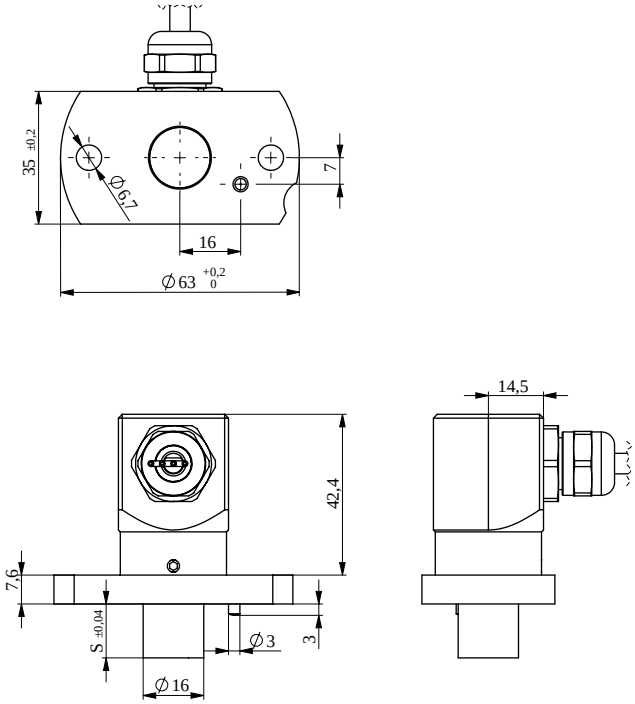
Standard Cable			
Signal Pattern	**E** and **V**	**X-**	**D-** and **H-**
Cables	halogen-free and shielded (specifications available upon request)		
Cable diameter	5.4 ± 0.2 mm	6.5 ± 0.3 mm	8.0 ± 0.3 mm
Cable cross-section	4 × 0.5 mm²	6 × 0.5 mm²	12 × 0.34 mm²
Minimum bend radius	16 mm (static) 27 mm (dynamic)	20 mm (static) 33 mm (dynamic)	24 mm (static) 40 mm (dynamic)

Pin Assignment

Follow the EMC instructions in the accompanying documents.

Flying lead							
Signal	**E-**	**V-**	**X-**	**D-**		**H-**	
Channel 1	YE	YE	YE	YE		YE	
Channel 2		GN	WH		WH		WH
Channel 1 inverted			BK			BK	
Channel 2 inverted			BN				BN
GND (0 V)	BU	BU	BU	BU	GY	BU	GY
$+U_B$	RD	RD	RD	RD	PK	RD	PK
Cables / Shields	1 / 1	1 / 1	1 / 1	1 / 1		1 / 1	
Cable shield directly attached to the sensor or capacitively attached. Wire color codes: **BK** black, **BN** brown, **BU** blue, **GY** gray, **GN** green, **PK** pink, **RD** red, **WH** white, **YE** yellow							

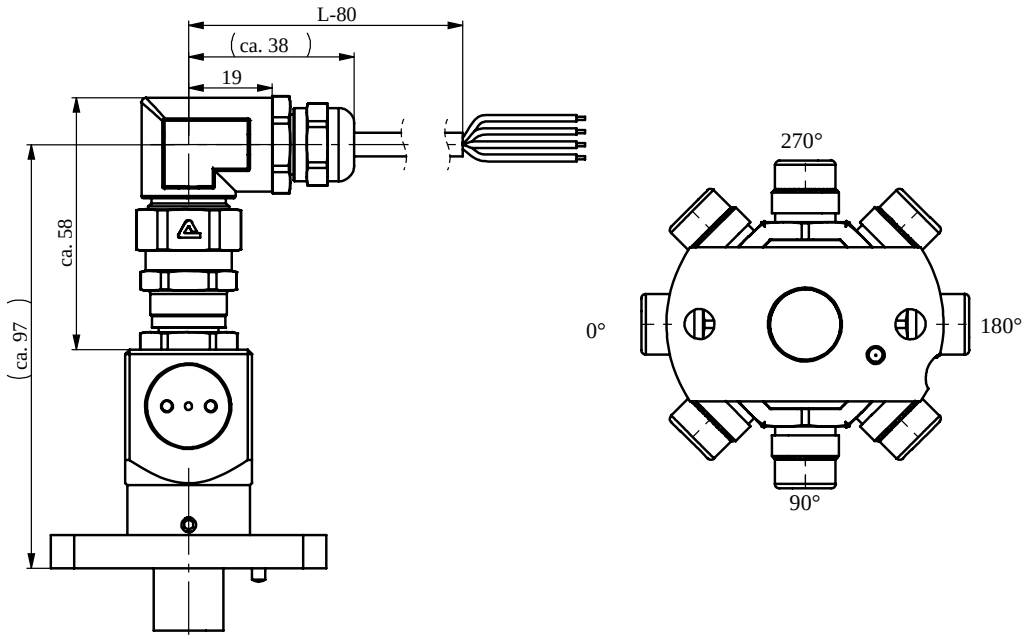
Mechanical Properties

Cable outlet	
Straight cable outlet Option **S** (see Type Code)	**Side cable outlet** Option **L** (see Type Code)
Additionally, the straight cable outlet can be connected at an angle: *„**Straight Cable Exit with Angle**“, page 9*	Additionally, the side cable outlet can be connected via an angle: *„**Side cable outlet with angle**“, page 9*
	
S Sensor tube length 14.237 or 45 mm	

Straight Cable Exit with Angle

Straight cable outlet with angle – When option **S** is selected for the cable outlet (see Type Code)

The selection can be made in 45° increments: 000°; 045°; 090°; 135°; 180°; 225°; 270°; 315° (tolerance ± 10°) (see Type Code).

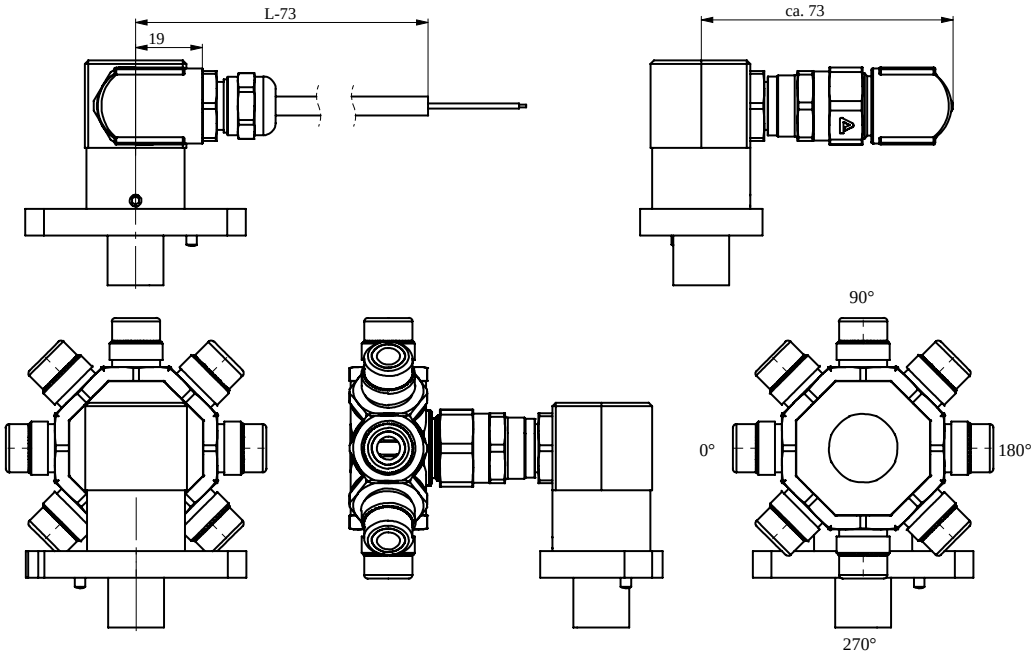


Cable length **L** is determined by the Type Code
(tolerance depends on the assembled cable length)

Side cable outlet with angle

Side cable outlet with angle – When selecting option **L** for the cable outlet (see Type Code)

The selection can be made in 45° increments: 000°; 045°; 090°; 135°; 180°; 225°; 270°; 315° (tolerance ± 10°) (see Type Code).



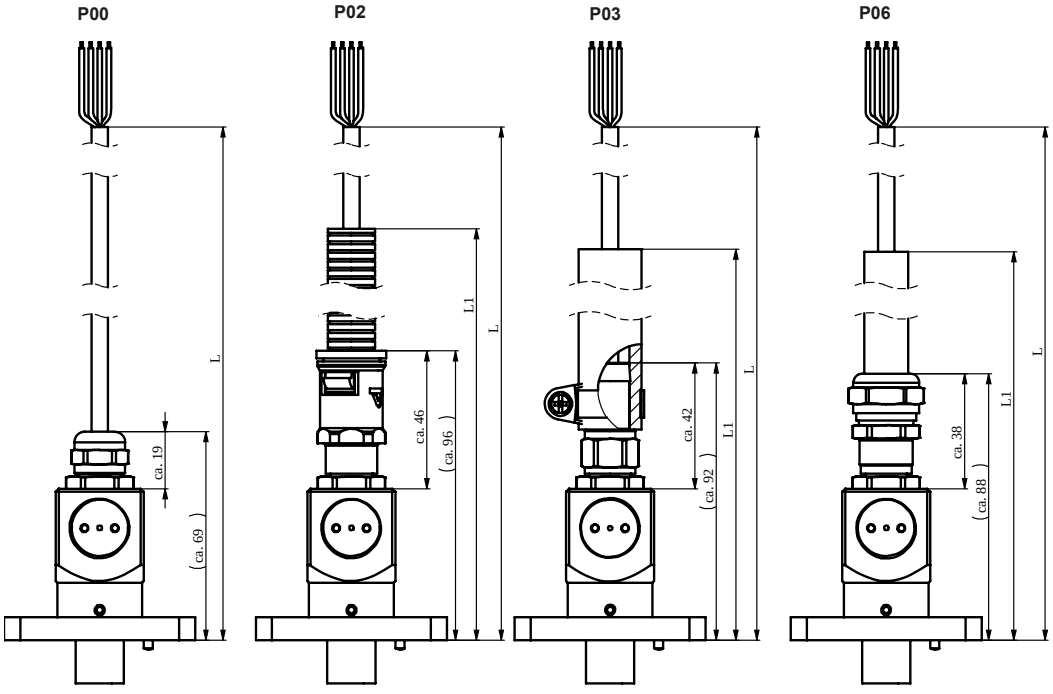
Cable length **L** is determined by the Type Code
(tolerance depends on the assembled cable length)

Cable Protection at the Cable Outlet	
The GEL 2473 can be equipped with various types of cable protection at the cable outlet, as needed.	
▪ Dimensional drawings for straight cable outlet: *„**Straight cable outlet**“, page 10* ▪ Dimension drawings for side cable outlet: *„**Side Cable Exit**“, page 11*	
Selection **P00**	Without cable protection
Selection **P02**	Corrugated tube NW12
Option **P03**	Hydraulic hose DN12
Selection **P06**	Anaconda HFXV0 5/16"

Technical Data for Cable Protection			
Option	**P02**	**P03**	**P06**
Type	Corrugated tube NW12	Hydraulic hose DN12	Anaconda HFXV0 5/16"
Material (Specifications available upon request)	Polyamide, halogen-free	Rubber compound	Hot-dip galvanized steel strip with thermoplastic coating (polyurethane)
Outer diameter	15.8 mm	19.5 ± 0.5 mm	14.4 mm
Minimum bending radius	35 mm (static) 80 mm (dynamic)	70 mm	50 mm (static) 65 mm (dynamic)

Straight cable outlet

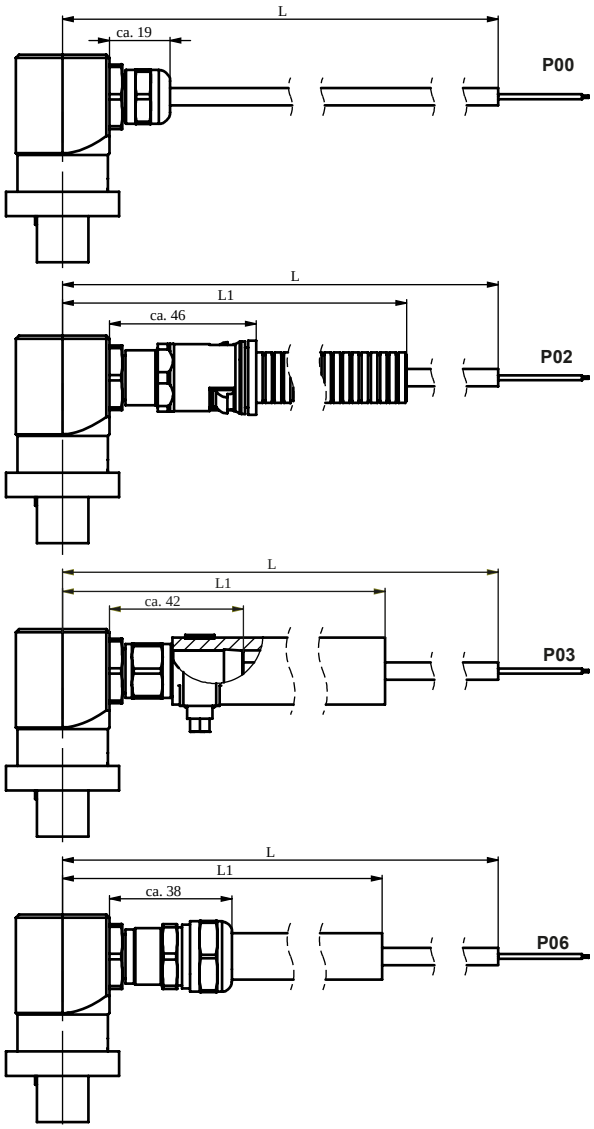
Cable protection for straight cable outlet—when option **S** is selected for the cable outlet (see Type Code)



P00	Without cable protection
P02	Corrugated tube NW12
P03	Hydraulic hose DN12
P06	Anaconda HFXV0 5/16"
L	Cable length **L** is determined by the Type Code (Tolerance depends on the assembled cable length)
L1	Protective conduit length L1; depending on the cable connection and termination, the protective conduit length L1 corresponds to the cable length L minus 100 mm

Side Cable Exit

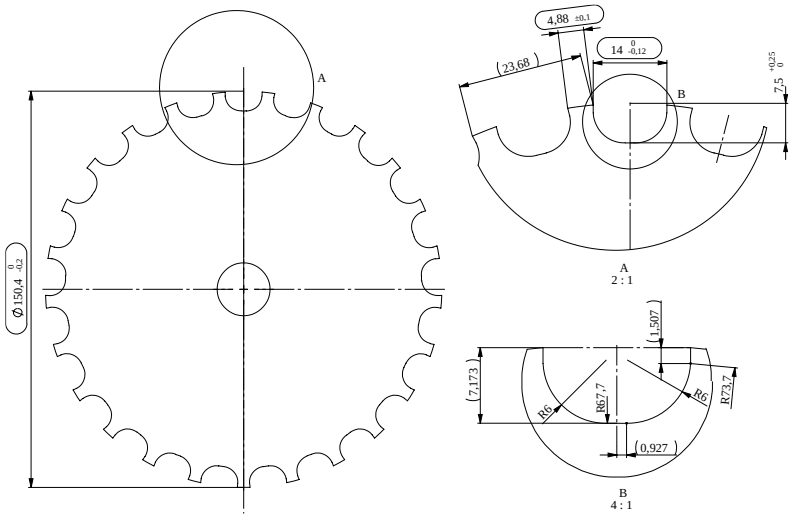
Cable protection for side cable outlet—when option **L** is selected for the cable outlet (see Type Code)



P00	Without cable protection
P02	Corrugated tube NW12
P03	Hydraulic hose DN12
P06	Anaconda HFXV0 5/16"
L	Cable length **L** is determined by the Type Code (Tolerance depends on the assembled cable length)
L1	Protective conduit length L1; depending on the cable connection and termination, the protective conduit length L1 corresponds to the cable length L minus 100 mm

Target wheel	
Requirements for the target wheel	
Material	ferromagnetic steel
Tooth Profile	▪ Involute gearing per DIN 867 (see Type Code) ▪ Rectangular teeth, typically 1:1 (other ratios available upon request)
Width	≥ 10 mm (smaller widths available upon request)
Module m	The selection can range from 1.00 to 3.50 (see Type Code)
Air gap (nominal air gap)	*„Air Gap Table“, page 13*

Special-tooth sprocket	
Type Code selection **M45** (see Type Code)	M=6.1; steel, special-design sprocket



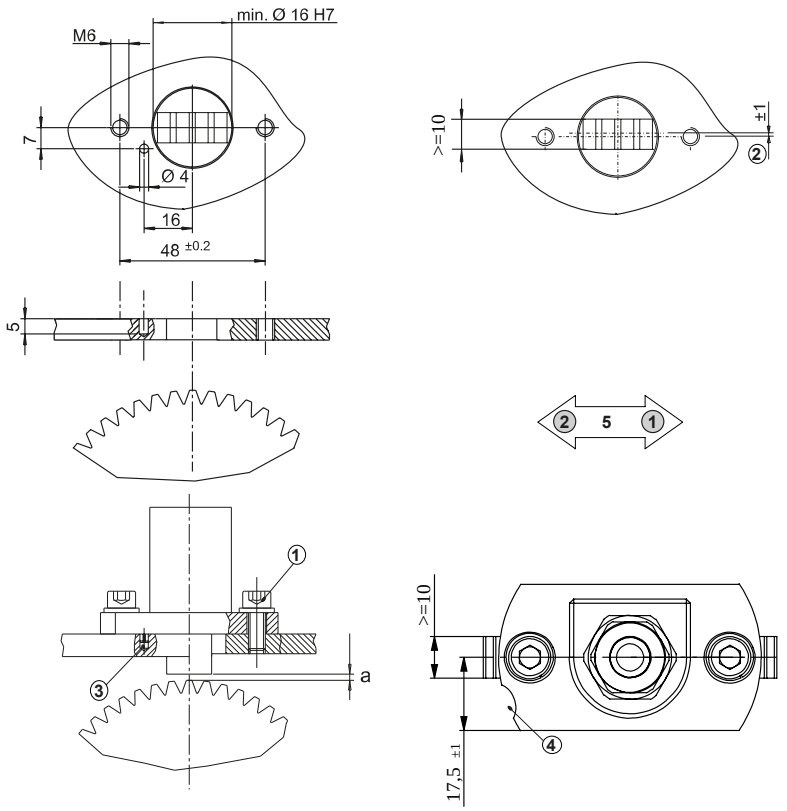
Shield design	
Selection of shield support	**Shield mounting on the encoder housing**
Option **SD**—directly attached (see Type Code)	Directly connected to the sensor housing
Option **SC** – capacitively attached (see Type Code)	Capacitively connected to the sensor housing
Despite its high immunity to interference, the sensor must be integrated into a shielding concept to ensure EMC compliance.	

If the electromagnetic environment requires special shielding concepts, Lenord+Bauer provides support with extensive knowledge and experience in integrating the sensor into the application’s shielding concept.

Follow the EMC guidelines in the accompanying documentation.

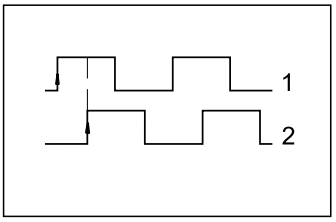
Installation Drawing

All dimensions in mm, general tolerance DIN ISO 2768 mK

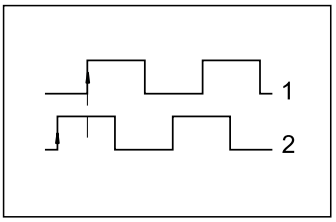


d Air gap: see air gap table
1 M6 mounting screw
2 Axial offset
3 Index pin
4 Orientation surface
5 Direction of rotation

Direction-of-rotation signal 1



Signal for direction of rotation 2



Other mounting orientations (such as rotated by 45°) are available upon request.

The orientation surface (4) or the index pin (3) are used to determine the direction of rotation.
- If the Target wheel rotates from the index pin or the orientation surface toward the center of the sensor, this is **rotation direction 1**.
- If the Target wheel rotates from the center of the sensor toward the index pin or the orientation surface, this is **rotation direction 2**.

Air Gap Table

Module	Permissible air gap	Nominal air gap	Max. Permissible Runout
1.00	0.2 … 0.8 mm	0.5 mm	± 0.3 mm
1.25			
1.50	0.2 … 1.3 mm	0.7 mm	
1.75			
2.00	0.2 … 1.5 mm	0.7 mm	
2.25			
2.50			
2.75			
3.00			
3.25			
3.50			

Type Code GEL 2473

2473	**Product Type**								
	Application								
	RA	Rail Vehicle Industry							
	MA	Maritime Applications							
	IA	Industrial Applications							
		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 a 90° phase offset and their inverse signals						
		D-	2-channel square-wave signals with a 90° phase offset, electrically isolated						
		H-	2-channel square-wave signals with a 90° phase offset and their inverted signals, electrically isolated						
			Shield contact						
			SD	directly attached					
			SC	capacitively attached					
				Module		**Module**			
				M01	m = 1.00, steel, involute	**M12**	m = 1.00, steel, rectangular		
				M02	m = 1.25, steel, involute	**M13**	m = 1.25, steel, rectangular		
				M03	m = 1.50, steel, involute	**M14**	m = 1.50, steel, rectangular		
				M04	m = 1.75, steel, involute	**M15**	m = 1.75, steel, rectangular		
				M05	m = 2.00, steel, involute	**M16**	m = 2.00, steel, rectangular		
				M06	m = 2.25, steel, involute	**M17**	m = 2.25, steel, rectangular		
				M07	m = 2.50, steel, involute	**M18**	m = 2.50, steel, rectangular		
				M08	m = 2.75, steel, involute	**M19**	m = 2.75, steel, rectangular		
				M09	m = 3.00, steel, involute	**M20**	m = 3.00, steel, rectangular		
				M10	m = 3.25, steel, involute	**M21**	m = 3.25, steel, rectangular		
				M11	m = 3.50, steel, involute	**M22**	m = 3.50, steel, rectangular		
				M45	m = 6.1, steel, special-tooth sprocket				
					Cable outlet				
					S	Straight cable outlet			
					L	Side cable outlet			
						angle			
						0	without angle		
						1	With angle, 0 degrees	**5**	with angle, 180 degrees
						2	with angle, 45 degrees	**6**	with angle, 225 degrees
						3	with angle, 90 degrees	**7**	with angle, 270 degrees
						4	with angle, 135 degrees	**8**	with angle, 315 degrees
							Cable protection		
							P00	None	
							P02	Corrugated tube NW12	
							P03	Hydraulic hose DN12	
							P06	Anaconda HFXV0 5/16"	
								Cable length L	
								L1	1000 mm
								LX	X=2: 2000 mm, X=3: 3000 mm ... X=7: 7000 mm
								L8	8,000 mm
▼	▼	▼	▼	▼	▼	▼	▼	▼	
2473	__	__	__	___	_	_	___	__	**◄ Product code**

Accessories

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

A Y-number is assigned for customer-specific designs. Custom designs are manufactured according to drawings or application descriptions and may differ from the standard technical specifications.

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