Made in Germany

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Technical Information

GEL 2475CM

CombiCODER - Condition Monitoring

Highly Integrated Speed Sensor, VibrationSensor, Temperature Sensor

D-51T-2475CM | Status 2026-07-07

LENORD +BAUER

Finding solutions.
Founding trust.

Motion sensors and integrated drive technology

General Information

- 1-/2-channel Hall-effect Speed Sensor with integrated vibration and temperature measurement
- Reliable detection of high rotational speeds down to creeping movements (0 Hz…20 kHz)
- Vibration measurement in up to 3 axes with a 2.4 kHz bandwidth
- Temperature monitoring via Pt1000 in the range of -50 °C to +130 °C
- Ideally suited for condition monitoring and predictive maintenance



Features

- Rotational speed, vibration, and temperature measurement in a single housing
- Vibration measurement using state-of-the-art MEMS technology in 3 axes
- Galvanically isolated signals for reliable evaluation in various 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 7

Advantages

- Maximum compatibility
- Maintenance-free and wear-resistant
- Continuous condition monitoring of machines and components
- Maximizes the efficiency of maintenance planning
- Easy to install
- Easy integration
- Galvanically isolated measurement systems
- Compact and robust construction type
- 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

Applications

Railway Technology

- Rotational speed, vibration, and temperature analysis of traction motors and gearboxes
- Condition monitoring of bogies for early detection of bearing damage
- Collection of operational data for predictive maintenance

Maritime Applications

- Rotational speed, vibration, and temperature analysis of marine engines and generators
- Condition monitoring of engines, gearboxes, and turbochargers
- Early detection of mechanical anomalies to optimize maintenance

Commercial Vehicles

- Rotational speed, vibration, and temperature analysis of engines and transmissions
- Condition monitoring of axles and drivetrains
- Early detection of wear to reduce downtime

Industrial equipment

- Rotational speed, vibration, and temperature analysis of pumps, compressors, and fans
- Condition monitoring of rotating machinery for process reliability
- Detection of imbalances and bearing wear for maintenance planning

Power generation

- Rotational speed, vibration, and temperature analysis of turbines and generators
- Condition monitoring to prevent unplanned downtime
- Detection of thermal and mechanical anomalies to improve efficiency

Chemical and Process Industries

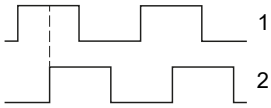
- Rotational speed, vibration, and temperature analysis of pumps, agitators, and compressors
- Condition monitoring to ensure stable process conditions
- Predictive maintenance to minimize production downtime

Technical Data

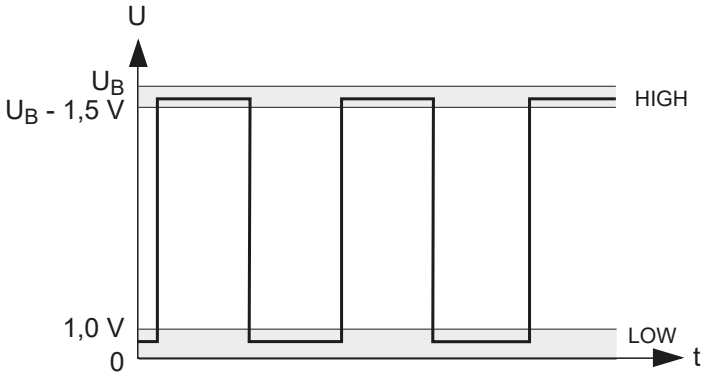
Signal Pattern	E-	V-	EM	VM
Electrical Data				
Supply voltage U_B (reverse-polarity protected)	10 ... 30 V DC		10 ... 20 V DC	
Current consumption I_B (no load)	≤ 30 mA		≤ 12 mA per channel	
Output signal (short-circuit-proof)	Square-wave signals			
Output signal level (High) (1)	≥ U_B - 1.5 V		≥ U_B - 1.8 V	
Output signal level (Low) (1)	≤ 1.0 V		≤ 1.5 V	
Output current per channel	≤ 20 mA		≤ 10 mA	
Frequency range	0 ... 20 kHz		0 ... 8 kHz	
Duty cycle	50% ± 20% (2)			
phase offset	–	typ. 90°	–	typ. 90°
Electrical Data for VIB Signal				
Supply voltage U_B (reverse-polarity protected)	10 ... 30 V DC			
Technical Data for MEMS Module	*„Technical Data for the MEMS Module“*			
Electrical Data for Pt1000 temperature sensor				
Measurement current	1 mA			
Measurement range	-50 °C to +130 °C			
Measurement tolerance	Accuracy Class B (3)			
Mechanical Data				
Sensor tube material	Stainless steel			
Flange material	Stainless steel			
Sensor weight (including 2 m cable)	500 g			
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 7*				

(1) Depending on output current and temperature
(2) Applies to operation at the rated air gap and with gear teeth in accordance with DIN 867
(3) Applies only to the sensor element

Output Signals and Connectors

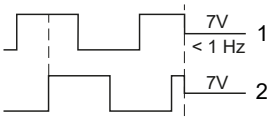
Signal Patterns for Voltage Output (E-, V-)			
Output Signals		**Supply Voltage**	**Pulse diagram**
E-	1 channel square-wave signal	10 ... 30 V DC	
V-	2-channel square-wave signals with a 90° phase offset	10 ... 30 V DC	

Output Signal Level – Voltage Output (E-, V-)

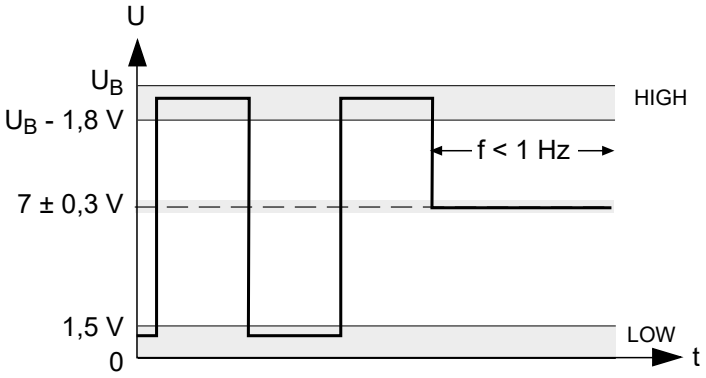


Pin assignment – voltage output (E-, V-)		
Cable 1 Signal	**E-**	**V-**
Rotational speed Channel 1	YE	YE
Rotational speed, Channel 2	-	WH
GND (0 V)	BU	BU
$+U_B$	RD	RD
PT+	BN	BN
PT-	BK	BK
Cable 2 Signal	**E-**	**V-**
VIB x-axis	YE	YE
VIB y-axis	WH	WH
VIB z-axis	BK	BK
VIB GND (0 V)	BU	BU
VIB $+U_B$	RD	RD
Cables / Shields	1 / 1	1 / 1
Cable shield directly attached to the sensor or optionally capacitively attached Wire color codes: **BK** black, **BN** brown, **BU** blue, **GY** gray, **PK** pink, **RD** red, **WH** white, **YE** yellow		

Output Signals and Connectors

Signal Patterns with Standstill Voltage (EM, VM)			
Output Signals		**Supply Voltage**	**Pulse diagram**
EM	1 channel square-wave signal and Standstill Voltage	10 ... 20 V DC	
VM	2-channel square-wave signals with 90° phase offset and Standstill Voltage	10 ... 20 V DC	

Output Signal Level – Voltage Output (EM, VM)



Pin assignment – voltage output (EM, VM)		
Cable 1 Signal	**EM**	**VM**
Rotational speed Channel 1	YE	YE
Rotational speed, Channel 2	-	WH
GND (0 V)	BU	BU
$+U_B$	RD	RD
PT+	BN	BN
PT-	BK	BK
Cable 2 Signal	**EM**	**VM**
VIB X-axis	YE	YE
VIB y-axis	WH	WH
VIB z-axis	BK	BK
VIB GND (0 V)	BU	BU
VIB $+U_B$	RD	RD
Cables / Shields	1 / 1	1 / 1
Cable shield directly attached to the sensor or optionally capacitively attached Wire color codes: **BK** black, **BN** brown, **BU** blue, **GY** gray, **PK** pink, **RD** red, **WH** white, **YE** yellow		

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

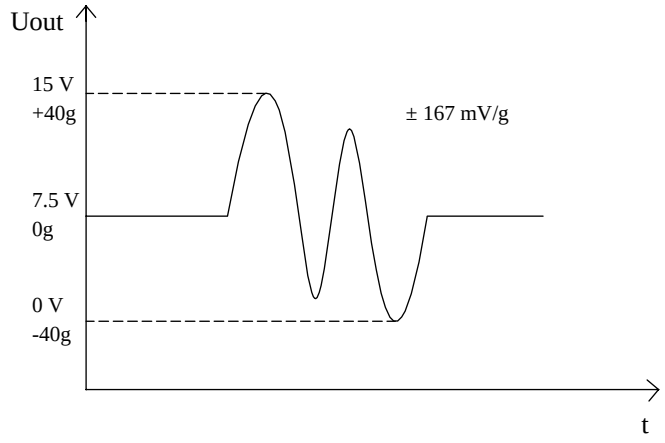
Vibration Sensor (MEMS Device)

Technical Data for the MEMS Module

MEMS module	
Acceleration Range	±40 g
Total bandwidth	2.4 kHz
Resonance frequency	5.5 kHz
Nonlinearity	1.3% FSR
Measurement sensitivity	167 mV/g

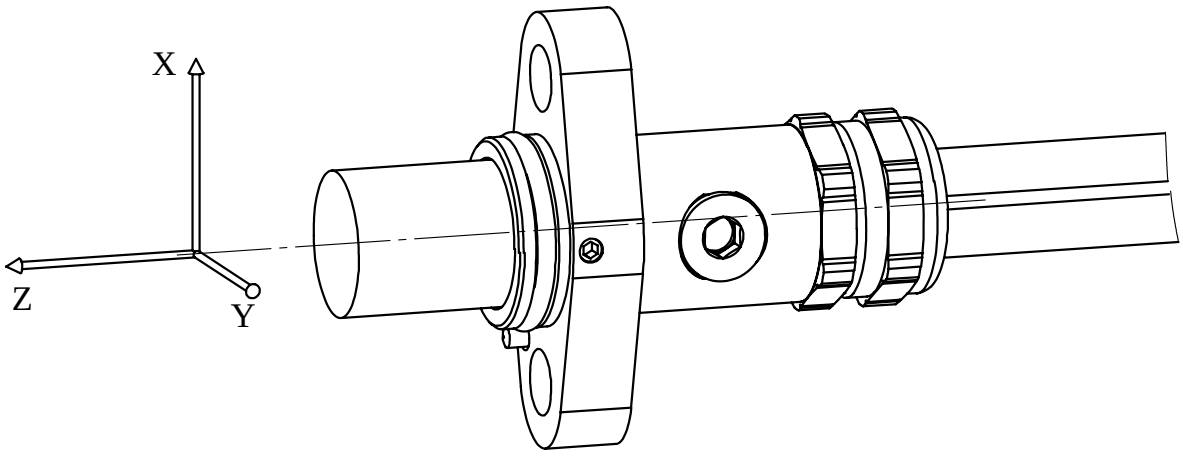
How the MEMS Module Works

A MEMS module is integrated into the sensor for vibration and acceleration measurement.
The MEMS modules consist of tiny, comb-shaped silicon fingers that interlock with one another. When there is a sudden change in impulse or motion, the combs are displaced relative to one another. This changes the distance between the fingers, which affects the electrical voltage. This change is measurable and is converted into an electrical signal that the sensor transmits.



Mounting Reference System

The directional axes of the measured vibrations depend on the sensor's mounting position and are defined as follows:



Mechanical Properties

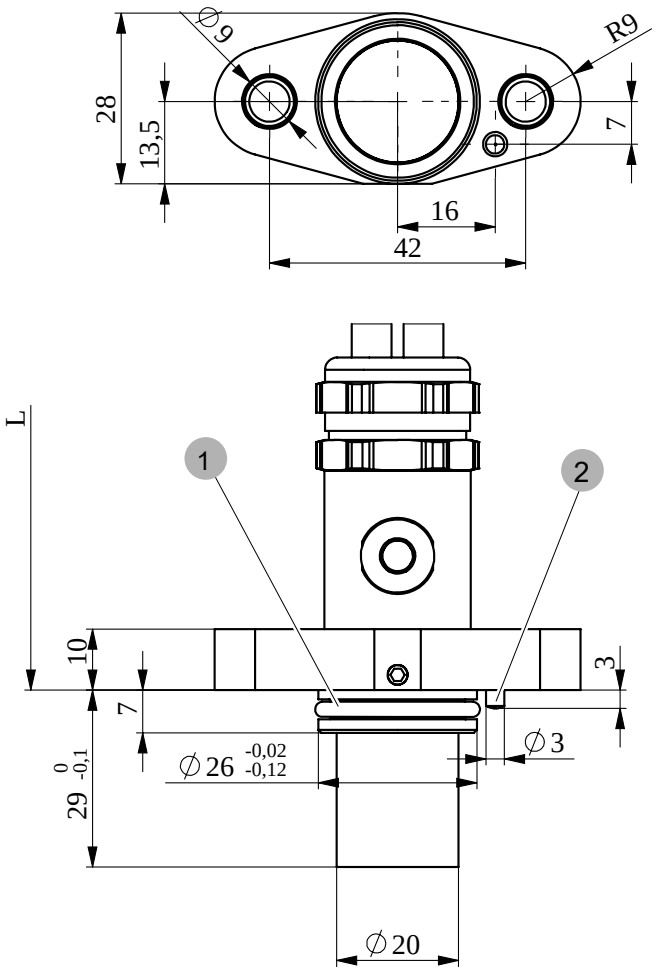
Target wheel	
Requirements for the target wheel	
Material	ferromagnetic steel
Tooth Profile	▪ Involute gearing per DIN 867 (see Type Code) ▪ Rectangular teeth, typically 1:1 (other ratios available upon request)
Width	≥ 15 mm (smaller widths available upon request)
Module m	The standard module size is 2.00. Other sizes are available upon request.
Air gap (nominal air gap)	0.2 ... 1.5 mm (0.7 mm)

Shielding concept	
Shield mounting options (see Type Code; additional options available upon request)	**Shield mounting on the encoder housing**
Option **S1**	Both cables directly attached
Option **S2**	Cable 1 (rotational speed) capacitively attached Cable 2 (VIB) directly attached
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 extensive knowledge and experience to assist with integrating the sensor into the application's shielding concept.

Follow the EMC instructions in the accompanying documents.

Cable outlet
Straight cable outlet Option **S** (see Type Code)
Additionally, the straight cable outlet can be connected via an angle: ***„Straight Cable Exit with Angle“***



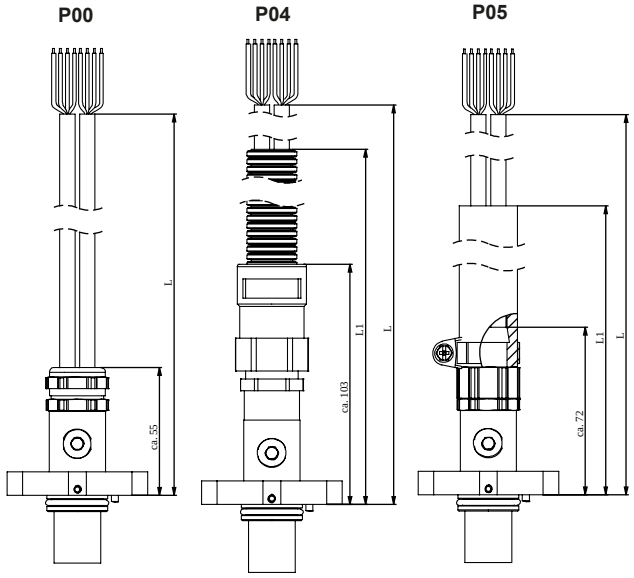
1	Sealing ring: O-ring 21 x 2.5 mm; NBR
2	Index pin
L	Cable length **L** is determined by the Type Code (Tolerance depends on the assembled cable length)

Cable Protection at the Cable Outlet	
The GEL 2475CM can be equipped with various types of cable protection at the cable outlet, as needed.	
Selection **P00**	No cable protection
Option **P04**	Corrugated tube NW17
Option **P05**	Hydraulic hose DN16

Technical Data for Cable Protection			
Option	**P00**	**P04**	**P05**
Type	2 Cables: 6 × 0.5 mm²	Corrugated tube NW17	Hydraulic hose DN16
Material	Halogen-free (specifications available upon request)	Polyamide, halogen-free	Rubber compound
Outer diameter	6.5 ± 0.3 mm	21.1 mm	24.9 mm
Minimum bending radius	20 mm (static) 33 mm (dynamic)	35 mm (static) 85 mm (dynamic)	90 mm

Straight cable outlet

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

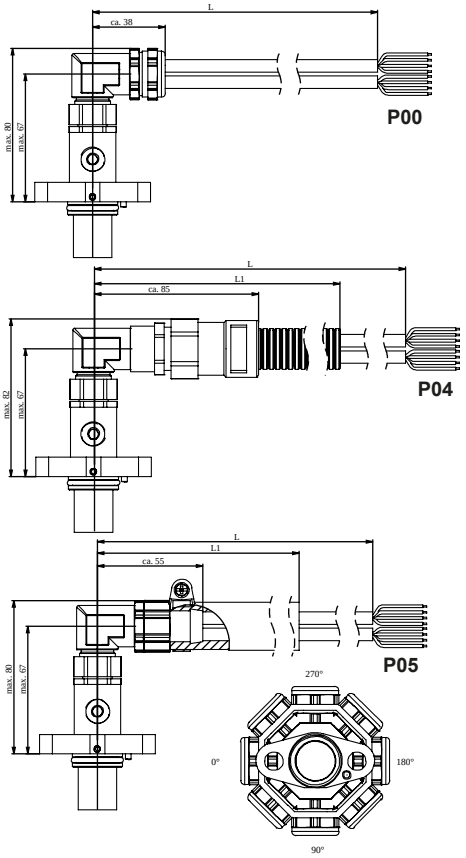


P00	Without cable protection
P04	Corrugated tube NW17
P05	Hydraulic hose DN16
L	Cable length **L** is determined by the Type Code (Tolerance depends on the assembled cable length)
L1	Protective hose length L1; depending on the cable connection and assembly, the protective hose length L1 corresponds to the cable length L minus 100 mm

Straight Cable Exit with Angle

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

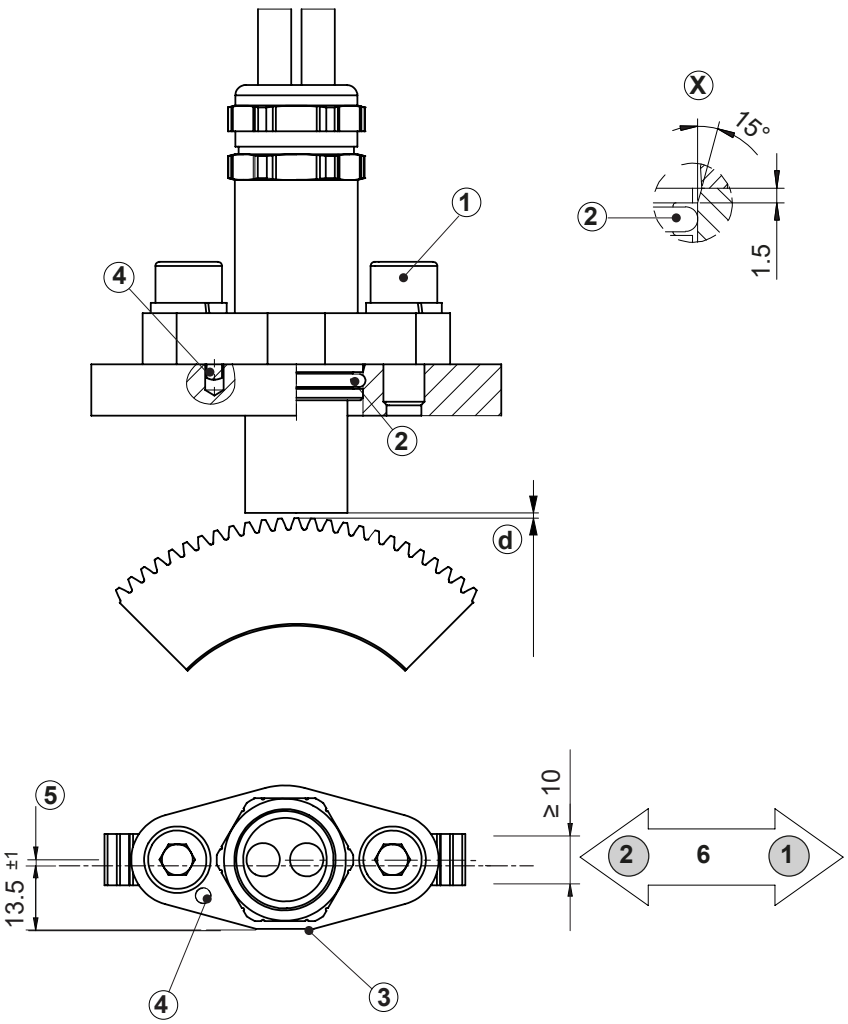
The selection can be made in 45° increments: 000°; 045°; 090°; 135°; 180°; 225°; 270°; 315° (tolerance ± 10°) (see Type Code).



P00	Without cable protection
P04	Corrugated tube NW17
P05	Hydraulic hose DN16
L	Cable length **L** is determined by the Type Code (tolerance depends on the assembled cable length)
L1	Protective hose length L1; depending on the cable connection and assembly, the protective hose length L1 corresponds to the cable length L minus 100 mm

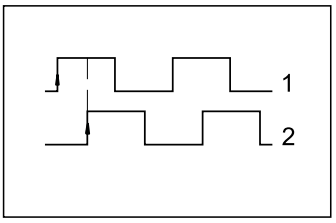
Installation Drawing

All dimensions in mm; general tolerance DIN ISO 2768 mK

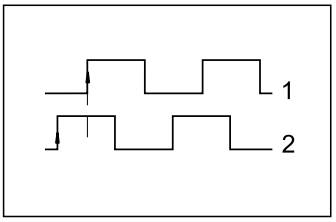


X Entry chamfer
d Air gap: 0.2 ... 1.5 mm
Nominal air gap: 0.7 mm maximum
Permissible runout: ± 0.3 mm
1 Mounting screw
(recommended: M8 x 20, DIN EN ISO 4762)
2 Sealing ring
3 Reference surface
4 Index pin
5 Axial offset
6 Direction of rotation of the Target wheel

Signal for direction of rotation 1



Signal for direction of rotation 2



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

When installing the unit, be sure to observe the reference system for vibration measurement!

„Vibration Sensor (MEMS Device)“, page 8

The reference surface (3) or the index pin (4) are used to determine the direction of rotation.

Index pin

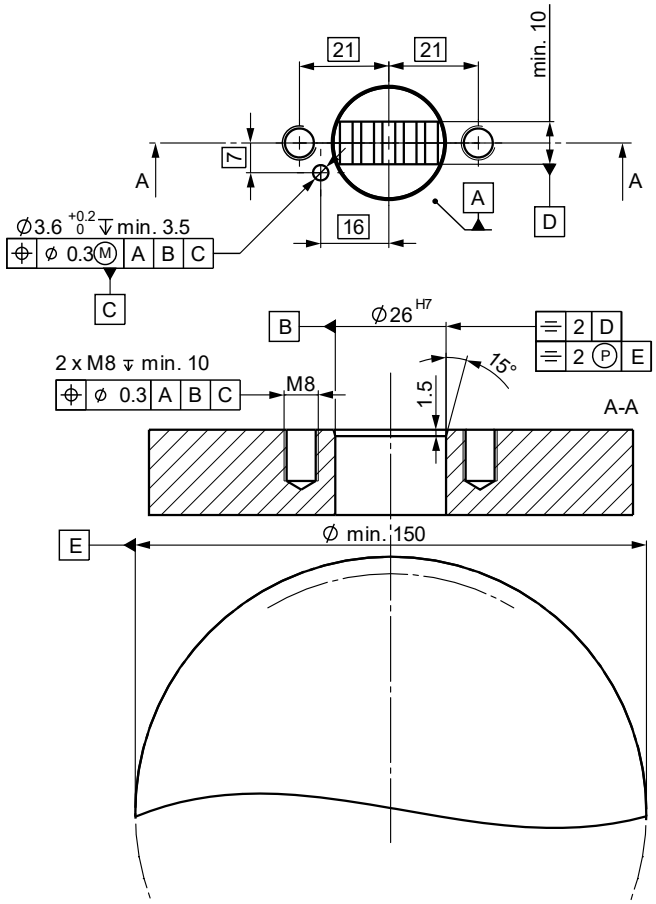
- If the Target wheel rotates from the index pin toward the center of the sensor, this is **rotation direction 1**.
- If the Target wheel rotates from the center of the sensor toward the index pin, this is **rotation direction 2**.

Reference surface

- If the Target wheel rotates clockwise when viewed from the reference surface, this is **rotation direction 1**.
- If the Target wheel rotates counterclockwise when viewed from the reference surface, this is **rotation direction 2**.

Drilling Pattern

All dimensions in mm; general tolerance DIN ISO 2768 mK



When installing, be sure to observe the reference system for vibration measurement!

„Vibration Sensor (MEMS Device)“

Type Code GEL 2475CM

2475CM	Product Type							
	Signal Pattern							
	E-	1-channel square-wave signals						
	V-	2-Channel Square-Wave Signals with 90° phase offset						
	EM	1-Channel Square-Wave Signal and Standstill Voltage						
	VM	2-channel square-wave signals with 90° phase offset and Standstill Voltage						
		Shield contact (1)						
		S1	Both cables directly attached					
		S2	Cable 1 (rotational speed) capacitively attached Cable 2 (VIB) directly attached					
			Module (2)					
			M05	m = 2.00, steel, involute				
			M16	m = 2.00, steel, rectangular				
				Cable outlet				
				S	Straight cable outlet			
					angle			
					0	without angle		
					1	With angle, 0 degrees		
					2	with angle, 45 degrees		
					3	with angle, 90 degrees		
					4	with angle, 135 degrees		
					5	with angle, 180 degrees		
					6	with angle, 225 degrees		
					7	with angle, 270 degrees		
					8	with angle, 315 degrees		
						Cable protection		
						P00	None	
						P04	Corrugated tube NW17	
						P05	Hydraulic hose DN16	
							Cable length L	
							L2	2000 mm
							L3	3000 mm
							L4	4000 mm
▼	▼	▼	▼	▼	▼	▼	▼	
2475CM	__	__	___	_	_	___	__	**◄ Product code**

(1) Additional screen sizes available upon request

(2) Other options available upon request

Accessories

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

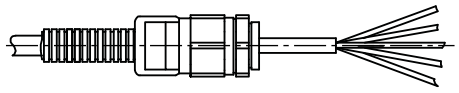
A Y-number is assigned for customer-specific designs. Custom designs are manufactured according to drawings or application descriptions and may differ from the standard technical specifications.

Examples of Preferred Types

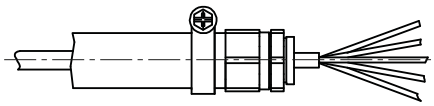
We can assemble the following for you upon request:

In addition to the extensive selection of cable exits and cable protection options (see Type Code), various configurations are also available for the cable end.

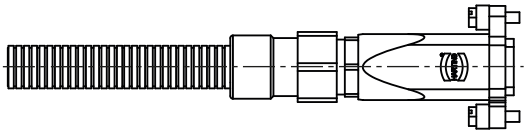
Examples of cable ends, preferred models



Corrugated tube and flying lead

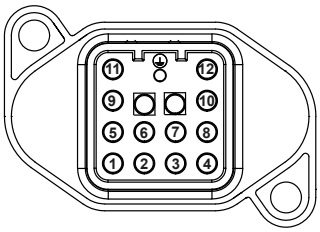


Rubber hose and flying lead



Corrugated tube with Harting HAN HPR connector

Pin assignment for Harting HAN HPR connector, preferred type



PIN	E-	V-	EM	VM
1	VIB X-axis	VIB x-axis	VIB X-axis	VIB X-axis
2	VIB $+U_B$	VIB $+U_B$	VIB $+U_B$	VIB $+U_B$
3	GND (0V)	GND (0V)	GND (0V)	GND (0V)
4	Rotational speed Channel 1	Rotational speed Channel 1	Rotational speed Channel 1	Rotational speed, Channel 1
5	VIB Z-axis	VIB Z-axis	VIB Z-axis	VIB z-axis
6	VIB y-axis	VIB y-axis	VIB y-axis	VIB y-axis
7	-	Rotational speed Channel 2	-	Rotational speed, Channel 2
8	$+U_B$	$+U_B$	$+U_B$	$+U_B$
9	VIB GND (0V)	VIB GND (0V)	VIB GND (0V)	VIB GND (0V)
10	PT+	PT+	PT+	PT+
11				
12	PT-	PT-	PT-	PT-

If you decide to have us assemble our Speed Sensors with cable protection and connectors, we recommend using the preferred types shown here. The necessary materials have been field-tested in large quantities and are always in stock. This allows us to achieve the fastest delivery times thanks to optimal material availability and the lowest retail prices due to large purchasing volumes. If you need assistance defining your desired product, please contact our sales team atsup-port@lenord.deor +49(0)208 9963-215.

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