Made in Germany

www.lenord.com

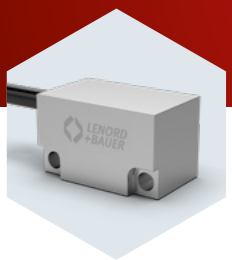


Solution Catalog

MiniCODER

for highly dynamic applications

- Railroad rolling stock
- Packaging machines
- **Machine tools**
- **General mechanical engineering**
- Renewable energies
- E-mobility
- Maritime applications







LENORD +BAUER

Finding solutions.
Founding trust.

Motion sensors and integrated drive technology

MiniCODER – Maxi advantages

Precise speed and position detection

Control the drives of your highly dynamic machinery efficiently and independently from the chosen control system. Our high-resolution and compact bearingless encoders detect speed and position and supply valuable information for monitoring your electric motors. Their full potential is exploited in installation situations with little space.

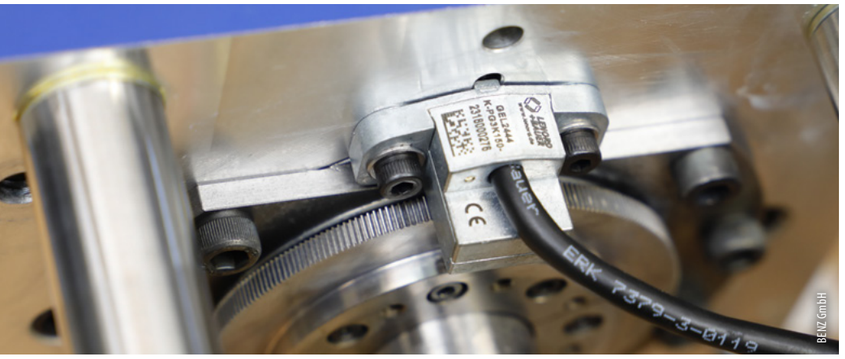
Simply integrate our products in your system architecture – MiniCODERs are quickly assembled and ready for immediate use. Our SensorDEVICE M mobile service unit supports you with a variety of interactive functions during installation and servicing. These are visualized in the browser as a web app using our intuitive user interface SensorDEVICE UI with easy access via smartphone, tablet or PC.



Advantages at a glance

- Fail-safe: Robust measuring system
- Flexible: The right solution for every installation situation
- Highly dynamic: Speed-resistant up to 100,000 r.p.m.
- Easy: Service and commissioning with the SensorDEVICE M
- Precise: High position accuracy
- Condition Monitoring: Integrated operating state data acquisition

Market leader – the incremental MiniCODER



High measuring accuracy and compact design have made our MiniCODERs the most frequently used bearingless encoders in high-speed spindles of machine tools around the world. More than 500,000 pieces are installed, among other things, in high-speed cutting machinery.

The ideal solution for all applications

We offer you system solutions from our portfolio that are optimally matched to your application. If required, we can individualize the MiniCODER or the target wheel for you. From small to large series, we are your partner. Challenge us!

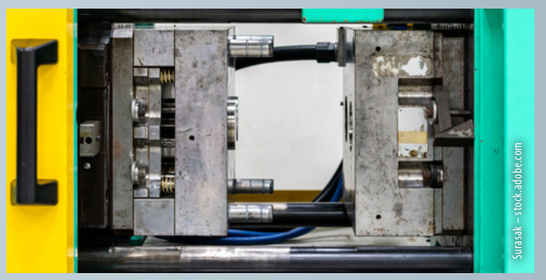
Machine tools

Our encoder kits meet a wide range of requirements. That is why our customers use MiniCODERs in turning and milling spindles, turrets, tool changers, and rotary and swivel tables for speed and position detection.



Die casting machines

For over 25 years, our MiniCODERs have proven themselves in die casting machines. For example, they detect contactless linear movements in order to monitor the pressing process. Our robust encoder kits are the ideal solution in such cases, as they are resistant to dust, moisture, strong temperature fluctuations, shock loads and vibrations.



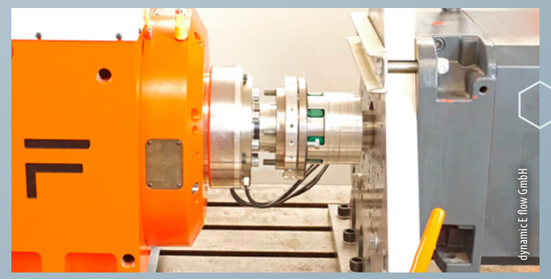
Electric motors

With the MiniCODER, the speed of the rotor can be measured without contact and thus without wear. It is also insensitive to stray magnetic fields. Due to its compact design, the MiniCODER can be integrated into almost all motor applications.



Test benches

Our measuring system scores particularly well in confined installation situations, such as those often found in test bench engines. The MiniCODER can demonstrate its full strength at speeds of up to 100,000 r.p.m. and with high demands on positioning accuracy.



Modular MiniCODER system

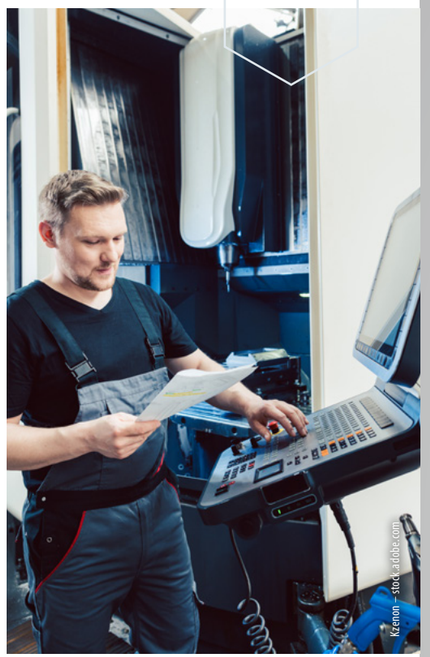
Pre-assembled and ready-to-use

The global trade in machine tools presents suppliers to the mechanical engineering industry with new challenges. That is because manufacturers and repair shops are increasingly demanding ready-to-use, plug-and-play components in a high number of variants.

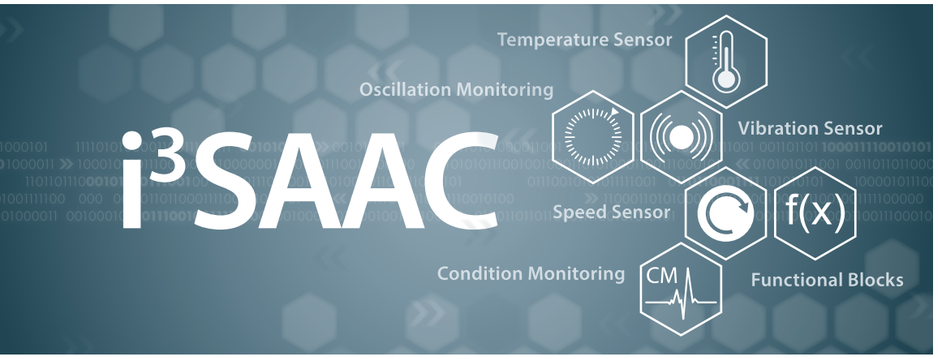
With the MiniCODER, the differences lie in the design, signal output, tooth wheel modules, functionality and types of connection for individual markets. We have attached particular importance to modularity and the implementation of common standards and created a modular system for you. On request, we offer you individually developed MiniCODER variants or completely customized according to your requirements as well as precise target wheels. These are tailor-made for your application in close cooperation with our CAD experts.

Choose features from a range of properties and assemble your own bearing-free encoder kit. You will receive a measuring system perfectly adapted to your needs in the shortest possible lead time.

You can parametrize the speed and position sensor after installing it in your machine, enabling you to adapt the complete system optimally to your application.



Intelligent linking of human, machine and workpiece



We have already implemented the Industrie 4.0 market requirements in our MiniCODER family. Based on integrated microprocessors, the new MiniCODER generation sets new standards in communication and data preparation. That means our systems supply not only speed and position but also valuable, condition-oriented information.

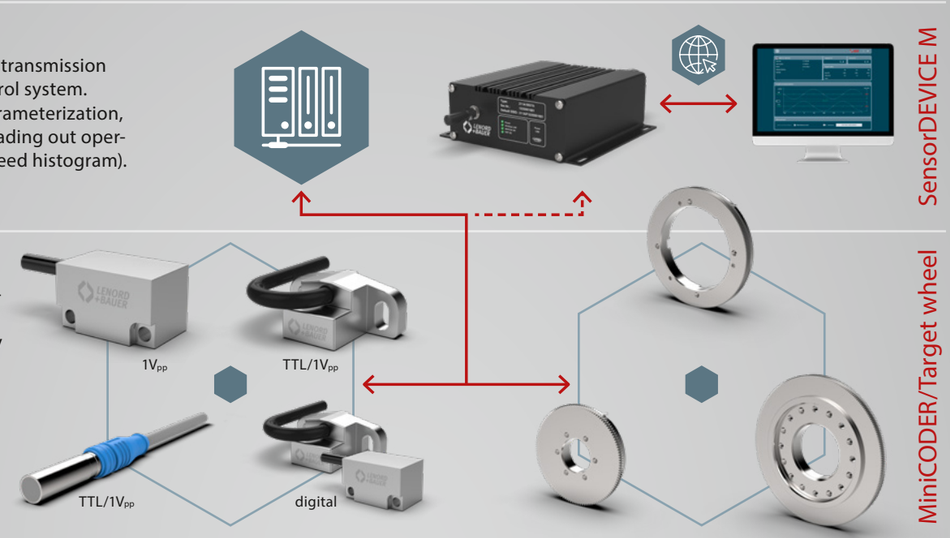
MiniCODER

System level

Analog or digital signal transmission to the higher level control system. Service interface for parameterization, optimization and for reading out operating state data (e.g. speed histogram).

Sensor level

The contactless measuring system comprises a MiniCODER and a highly accurate target wheel.



Precision-System

System level

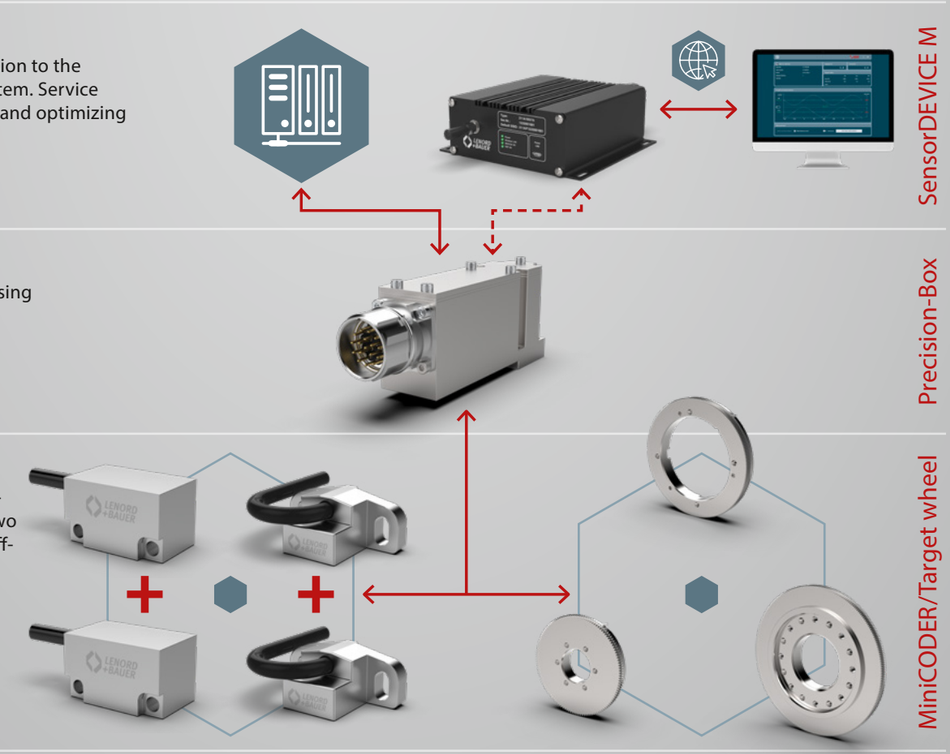
Analog signal transmission to the higher level control system. Service interface for setting up and optimizing the overall system.

Optimization level

Precision-Box for increasing position accuracy.

Sensor level

The contactless measuring system comprises two identical MiniCODERs offset by 180° and a highly accurate target wheel.



All trademarks and brands mentioned in this catalog are the property of their respective owners. They are not marked as such in this document.
Some products in this catalog are shown with optional extras, which are not included in the scope of supply. See technical information.

Our reliable MiniCODERs

Manufactured in Germany. Used globally.

Our durable MiniCODERs have stood the test under extreme operating conditions, such as those found in machine tools, for decades. The magnetic measuring systems consist of a ferromagnetic target wheel and a MiniCODER as scanning unit. Without dedicated bearings, they are completely wear-free and maintenance-free even if oils, lubricants, coolants or dirt contaminate the installation space.

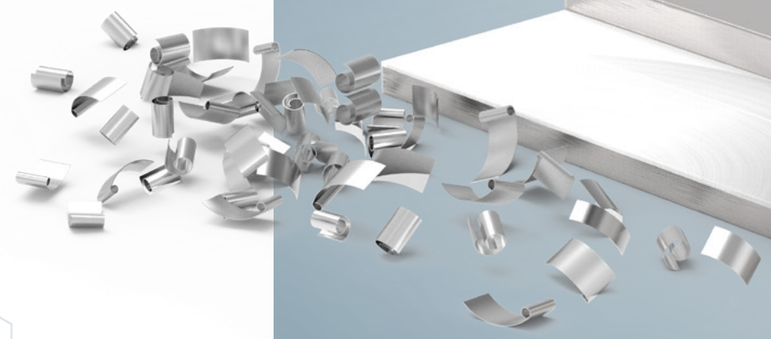
The electronic components of our products are protected from humidity, shock, impact and vibration by special manufacturing methods. The optimized circuit and screening technique, and fully encapsulated electronics ensure reliable operation. Even temperature fluctuations will not harm the MiniCODERs. You benefit from a highly reliable system with low life cycle costs.



Highest reliability even under the most extreme conditions

- Contactless sensing principle
- Particularly well protected against electrostatic discharge (ESD)
- Degree of protection IP 68
- Very high electromagnetic compatibility (EMC)
- Oil resistance
- Wide temperature range

You can rely on our MiniCODERs!



Benefit from our…

… versatile…

MiniCODERs are used in many applications where high speeds are required and limited installation space is available. They are also successfully used for high-precision positioning applications.

MiniCODER
pages 10–19

… smart and…

In addition to speed, MiniCODERs can also record and store operating state data, such for example temperature and running time in different speed ranges. This offers you extended analysis options in the event of a warranty or service claim. Our digital MiniCODERs monitor parameterizable limit values during operation and report warning and error messages to the higher level control system in real time.

Target wheel
pages 20–23

Precision-System
pages 24–27

SensorDEVICE M
pages 28–35

… interactive solutions.

For example, you can increase signal quality simply by adjusting the sensor signals of the integrated encoder. Visualize the measurement data of the MiniCODER with our mobile SensorDEVICE M service unit and the SensorDEVICE UI user interface.

Product qualification

100 % tested and in use worldwide

A significant proportion of our products are installed in durable capital assets, such for example machine tools. These must function trouble-free on a permanent basis. Our reliable sensor solutions make a significant contribution to this. They are characterized by excellent product quality and high reliability. These points are embedded in our strategic corporate goals, which we pursue holistically in all corporate areas.

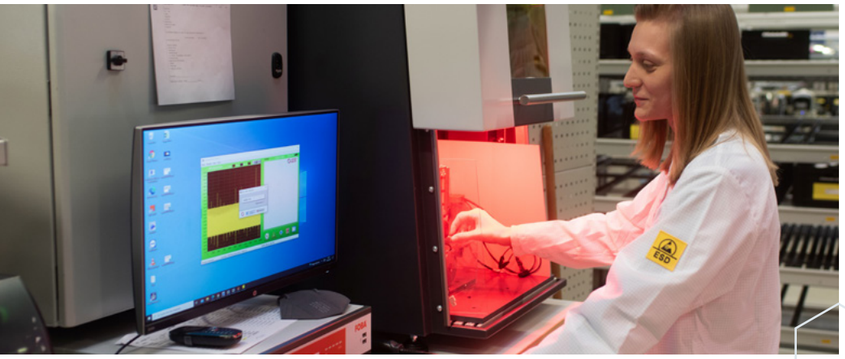
Quality management for us already begins in the product development stage and is a constant in all business areas. Every year, we put our measures to the test in external and internal audits. We are thus certified according to DIN EN ISO 9001, DIN EN ISO 14001 as well DIN EN ISO 22163 (IRIS).

This is your guarantee for durable products. Furthermore, we offer our customers the opportunity to audit us as a supplier at any time.

Our goal is to provide you with a reliable measurement solution for your application. We are keen to meet the challenge!



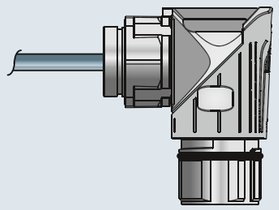
Quality pays off...



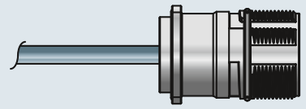
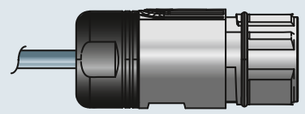
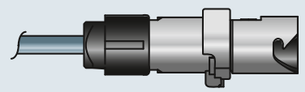
Our MiniCODERs are delivered 100 % final tested and pre-balanced. Thanks to our high quality standards, we save our customers time-consuming service calls. We can provide test records or calibration certificates on request.

Connection variants

Easy to install, safe in operation

Design	Plug-in view	Note:
Model J: 12-pin male connector 		Cable lengths [2]: 0.30/0.50/1.50/2.50/6.00 m
Model K: Flying lead [1] 		Cable lengths [2]: 0.30/0.50/1.50/2.50/6.00 m
Model M: 17-pin panel-mounting socket, angled with male contacts 		EMC screening, strain relief and sealing, IP 67 (plugged)

Plug-and-play sensors save time during assembly. Hundreds of products equipped with cables and connectors leave our factory every day.

Design	Plug-in view	Note:
Model N: 17-pin panel-mounting socket with male contacts 		EMC screening, strain relief and sealing, IP 67 (plugged)
Model P: 10-pin female connector 		Cable length [2] accurate to the centimeter
Model U: 12-pin coupling with male contacts 		Cable lengths [2]: 0.30/0.50/1.20/1.50/2.00/ 2.50/6.00 m
Model Z: 10-pin male connector 		Cable lengths [2]: 1.20/2.00/2.50 m

Use complete systems and reduce the number of operations during installation.

(1) The delivery takes place with connected test connector from Lenord+Bauer.
(2) Not available with temperature sensor cable.

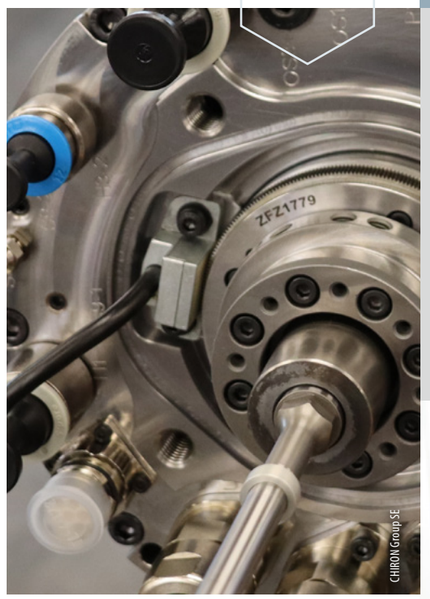
MiniCODER

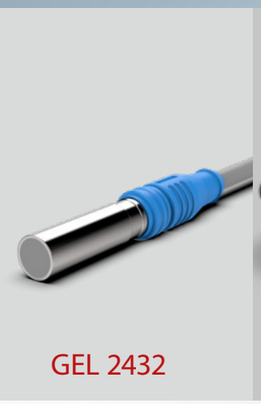
Precise, reliable and efficient

MiniCODERs detect rotational or linear movements in machines, gears, motors and high-speed spindles by scanning a ferromagnetic measuring scale.

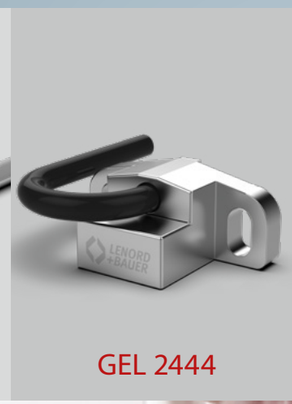
Reliable operation at high speeds in continuous and reversing operation is based on a magnetic sensing principle. MiniCODERs have a magnetic field that is changed by the rotational or linear movement of the measuring scale. The sensors detect the magnetic field change and the integrated electronics convert this into the desired output signals to detect the direction of rotation, speed and position.

Without dedicated bearings, MiniCODERs function contactless and are entirely maintenance-free. This makes them significantly more robust against shocks and vibrations than bearing-mounted rotary encoders. Manufactured with advanced microsystem technology, MiniCODERs ensure precise and reliable measurements in demanding industrial environments.





GEL 2432



GEL 2444



GEL 2449



GEL 244xM



MiniCODER selection guide

MiniCODER	Output signal			Measuring scale		Target wheel				Measuring rod			Reference mark (1)			
	1 V_{pp} (sin/cos)	TTL/RS485	Mitsubishi (MHSSI)	Target wheel	Measuring rod	Module 0.3	Module 0.4	Module 0.5	Module 1.0	Pitch 1.0	Pitch 1.6	Pitch 2.0	without	Groove	Lug	Tooth
GEL 2432	✓	✓	–	✓	✓	–	–	✓	✓	✓	✓	✓	–	–	–	–
GEL 2444	✓	✓	–	✓	–	✓	–	✓	–	–	–	–	✓	✓	✓	✓
GEL 2449	✓	–	–	✓	–	–	✓	–	✓	–	–	–	–	–	–	✓
GEL 244xM	–	–	✓	✓	–	✓	✓	✓	✓	–	–	–	–	–	–	✓

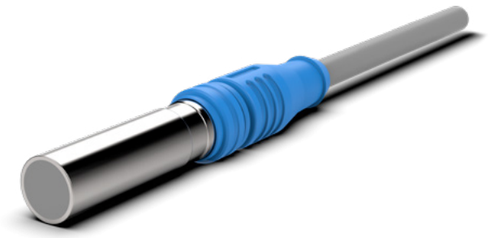
(1) For new designs, we recommend using a target wheel with reference mark variant “Tooth”.

GEL 2432

Rotational speed and position sensor

Description

Only one through bore is required for mounting the GEL 2432. The MiniCODER scans the measuring scale (target wheel or measuring rod) with magnetoresistive sensors without contact and sends signals to detect the direction of rotation, speed and position.



Properties

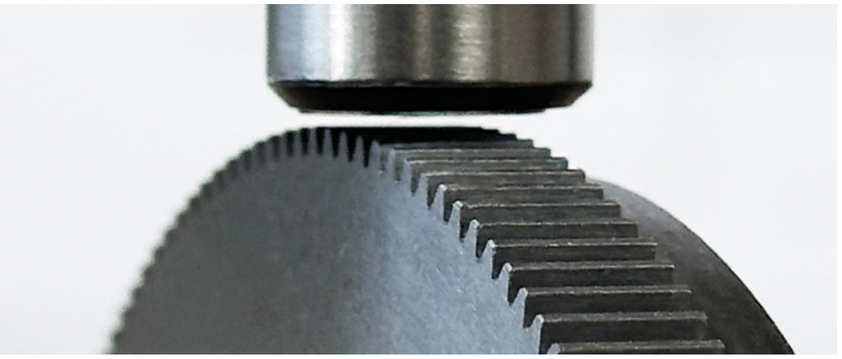
- Output signal: 1 V_{pp} Differential signal (sin/cos) or TTL/RS422
- Selection of interpolation factors to increase the number of pulses per revolution possible (TTL/RS422)



Advantages

- Maintenance and wear-free
- Low temperature drift and high signal quality
- Full encapsulation of electronics
- Resistant to typical oils, lubricants and coolants
- High design flexibility due to customized manufacture of target wheels

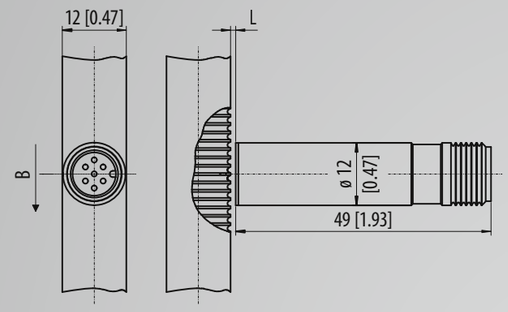
Maintenance and wear-free



Our bearing-free built-in encoder kits use the magnetic measuring principle and measure rotary movements without contact. As a result, they score points as they are wear-free.

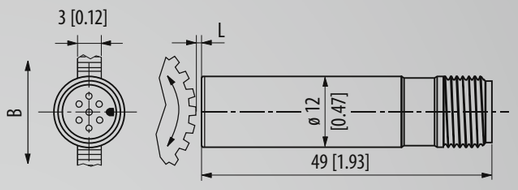
Product information

Assembly with measuring rod

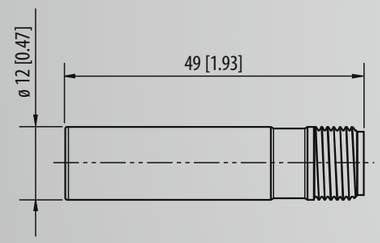


Pitch	Air gap L preset measure	Distance tolerance (1)
1.0 mm	0.15 mm	± 0.05 mm
1.6 mm	0.25 mm	± 0.05 mm
2.0 mm	0.30 mm	± 0.05 mm

Assembly with target wheel



Module	Air gap L preset measure	Distance tolerance (1)
0.5 mm	0.25 mm	± 0.05 mm
1.0 mm	0.50 mm	± 0.10 mm



B Moving direction
L Air gap (see tables)

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Technical data	
Measuring scale	Target wheel or measuring rod made of ferromagnetic steel
Module/pitch	0.5/1.0 (target wheel), 1.0/1.6/2.0 (measuring rod)
Reference mark	without
Output frequency	1 V_{pp} (sin/cos): 0 to 200 kHz, TTL/RS485: 0 to 500 kHz
Permissible air gap	see assembly sketch above
Supply voltage U_B	5 V DC ± 5 %, reverse polarity protected
Working temperature range	-20 °C to +85 °C/-4 °F to 185 °F
Operating temperature range	-20 °C to +85 °C/-4 °F to 185 °F
Storage temperature range	-30 °C to +100 °C/-22 °F to 212 °F
Housing material	Sensor tube: Stainless steel 1.4305, cap: PPS, oil-resistant
Degree of protection	IP 67 (with mounted connector)
Maximum permissible cable length	100 m (2)

(1) Distance tolerance applies to sin/cos signal with internal control and to square-wave signal with interpolation factor 1. With higher interpolation factors, the distance tolerance decreases. (2) Observe voltage drop on the supply cable.

GEL 2444

Configurable rotational speed and position sensor

Description

GEL 2444 can be integrated into many applications due to its compact design. This design is the standard in Europe and offers many variants for the cable outlet. The MiniCODER scans the target wheel with magnetoresistive sensors without contact and sends signals to detect the direction of rotation, speed and position.

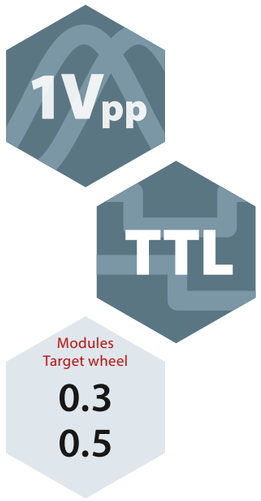


Properties

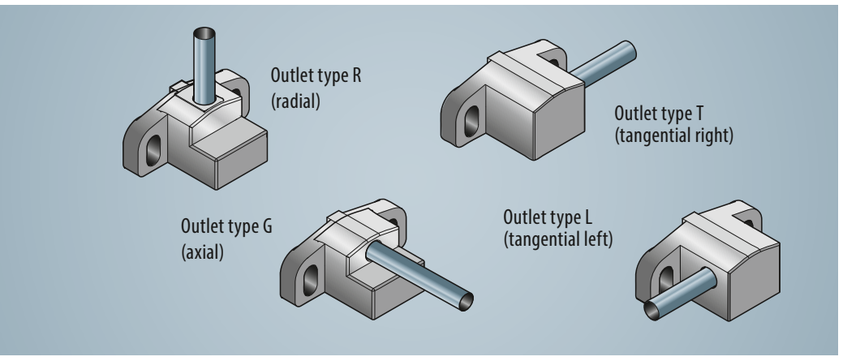
- Output signal: 1 V_{pp} Differential signal (sin/cos) or TTL/RS422
- Selection of interpolation factors to increase the number of pulses per revolution possible (TTL/RS422)
- Rectangular differential reference signal (optional)
- Recording of temperature and rotational speed histogram and automatic calibration possible
- Safety integrated (1)

Advantages

- Maintenance and wear-free
- Low temperature drift and high signal quality
- Highest interference immunity due to completely screened metal housing
- Resistant to typical oils, lubricants and coolants
- Fast and easy commissioning in the assembled state without opening the spindle with the SensorDEVICE M mobile service unit
- High design flexibility due to customized manufacture of target wheels



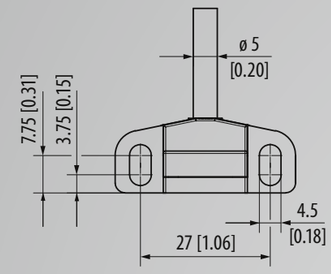
Overview cable outlets MiniCODER GEL 2444

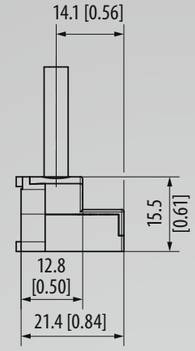


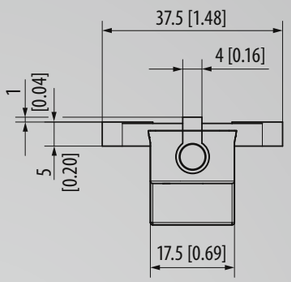
Our MiniCODERs can be flexibly integrated into your machines. Select the cable outlet that best suits your installation situation.

(1) MiniCODERs with output signal 1 V_{pp} are tested by the IFA in conjunction with Siemens Sinumerik control systems in accordance with Safety Integrated.

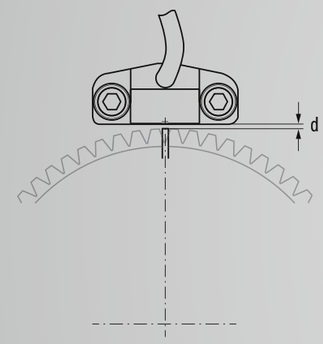
Product information

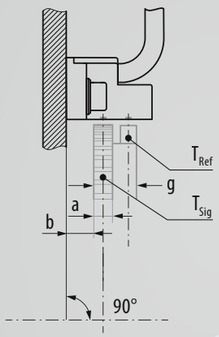






Installation dimensions





a Width of signal track: ≥ 4.0 mm [0.16]
b Distance from mounting surface to target wheel: depending on the target wheel geometry (for example, width of signal track)
d Air gap: depending on the module
g Target wheel width
T_{Ref} Reference track
T_{Sig} Signal track

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Technical data	
Measuring scale	Target wheel made of ferromagnetic steel
Module (2)	0.3/0.5
Reference mark	Without, groove, lug, tooth (3)
Output frequency	0 to 200 kHz
Permissible air gap	0.15 mm ± 0.02 mm (module 0.3), 0.2 mm ± 0.03 mm (module 0.5)
Supply voltage U_B	5 V DC ± 5 %, polarity reversal protected, overvoltage protected
Working temperature range	-30 °C ... +85 °C / -22 °F ... 185 °F
Operating temperature range	-40 °C to +120 °C/-40 °F to 248 °F
Storage temperature range	-40 °C to +120 °C/-40 °F to 248 °F
Housing material	Zinc die casting
Degree of protection	IP 68
Maximum permissible cable length	100 m (4)

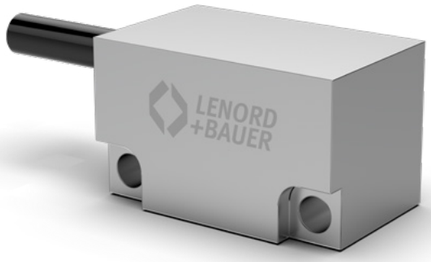
(2) Other modules upon request. (3) For new designs, we recommend using a target wheel with reference mark variant "Tooth".
(4) Observe voltage drop on the supply line.

GEL 2449

Configurable rotational speed and position sensor

Description

GEL 2449 can be integrated into many applications due to its compact design. This design is often used in the Asian market. The MiniCODER scans the target wheel with magnetoresistive sensors without contact and sends signals to detect the direction of rotation, speed and position.



Properties

- Output signal: 1 V_{pp} Differential signal (sin/cos)
- Rectangular differential reference signal (optional)
- Recording of temperature and rotational speed histogram and automatic calibration possible
- Safety integrated [1]

Advantages

- Maintenance and wear-free
- Low temperature drift and high signal quality
- Highest interference immunity due to completely screened metal housing
- Resistant to typical oils, lubricants and coolants
- Fast and easy commissioning in the assembled state without opening the spindle with the SensorDEVICE M mobile service unit
- High design flexibility due to customized manufacture of target wheels

1Vpp

Modules
Target wheel
0.4
1.0

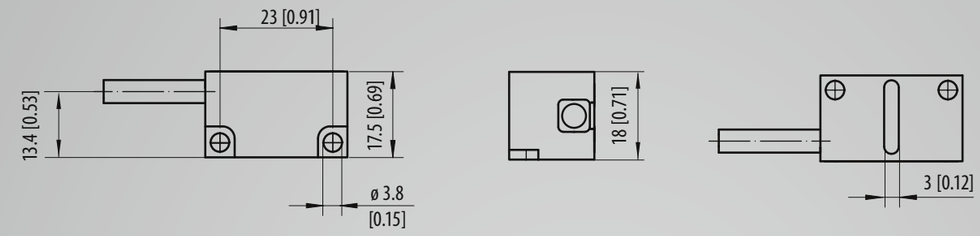
Fits like a glove



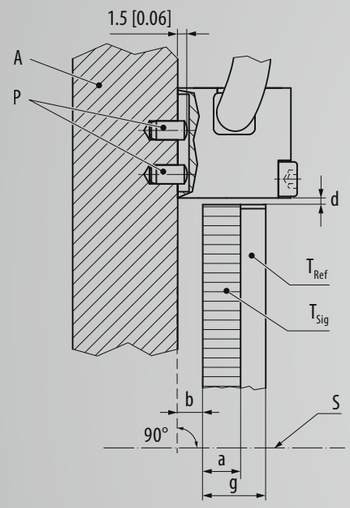
The MiniCODER GEL 2449 is characterized by its installation compatibility. This means you can easily integrate it into existing systems, without having to make complex design changes.

(1) MiniCODERs with output signal 1 V_{pp} are tested by the IFA in conjunction with Siemens Sinumerik control systems in accordance with Safety Integrated.

Product information



Installation dimensions



a Width of the signal track
b Distance of mounting surface to target wheel: depending on geometry of target wheel (for example width of signal track)
d Air gap: depending on target wheel module
g Width of the target wheel
A Mounting fixture
P Positioning pins M3
d Air gap: depending on the module
S Center line shaft/target wheel
T_{Ref} Reference track
T_{Sig} Signal track

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Technical data

Measuring scale	Target wheel made of ferromagnetic steel
Module [2]	0.4/1.0
Reference mark	Tooth
Output frequency	0 to 200 kHz
Permissible air gap	0.2 mm ± 0.01 mm (module 0.4), 0.4 mm ± 0.02 mm (module 1.0)
Supply voltage U_B	5 V DC ± 5 %, polarity reversal protected, overvoltage protected
Working temperature range	0 °C to +70 °C/-32 °F to 158 °F
Operating temperature range	-30 °C to +120 °C/-22 °F to 212 °F
Storage temperature range	-30 °C to +120 °C/-22 °F to 212 °F
Housing material	Zinc die casting
Degree of protection	IP 68
Maximum permissible cable length	100 m [3]

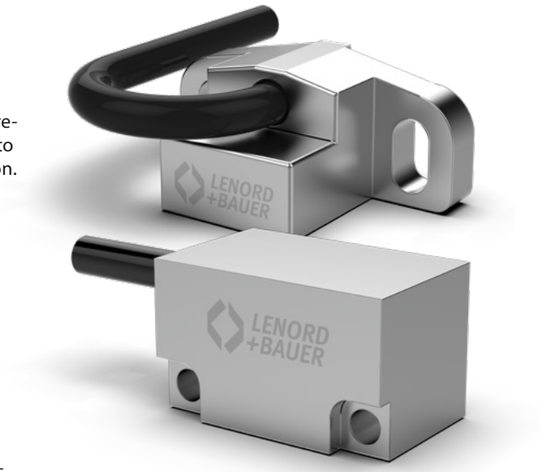
(2) Other modules upon request. (3) Observe voltage drop on the supply cable.

GEL 244xM

Bearing-free encoder with serial interface for Mitsubishi CNC series

Description

The measuring system comprises a MiniCODER and a target wheel for attachment to shafts. The MiniCODER scans the target wheel with magnetoresistive sensors without contact and sends signals to detect the direction of rotation, speed and position.



Properties

- Digital interface: MHSSI (Mitsubishi High Speed Serial Interface)
- Maximum permissible rotational speed: Up to 100,000 r.p.m.
- Resolution: Up to 26 bits
- Operating temperature range -30 °C to +105 °C
- Degree of protection IP 68
- Position determination by reference mark detection

Advantages

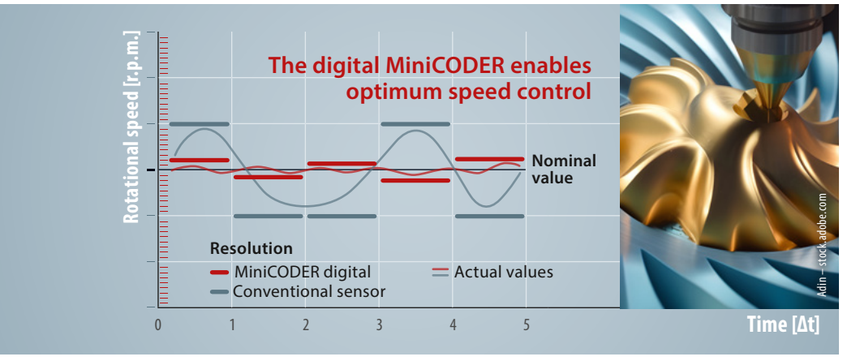
- Direct connection to Mitsubishi M800/M80/E80/C80 CNC systems
- Maintenance and wear-free
- Low temperature drift and high signal quality
- Highest interference immunity due to completely screened metal housing
- Fast and easy commissioning in the assembled state without opening the spindle with the SensorDEVICE M mobile service unit
- High design flexibility due to customized manufacture of target wheels

MHSSI

MITSUBISHI ELECTRIC
e-F@ctory Alliance

Modules Target wheel
0.3/0.4
0.5/1.0

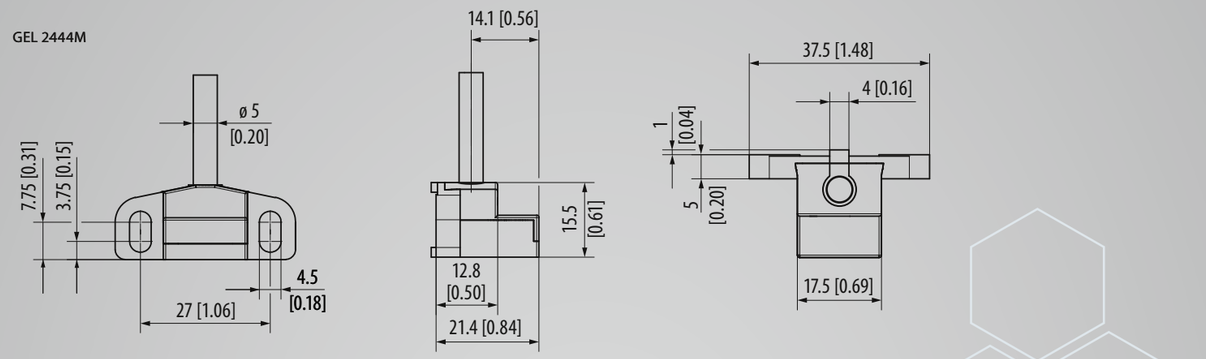
Up to 26 bits for perfect surfaces



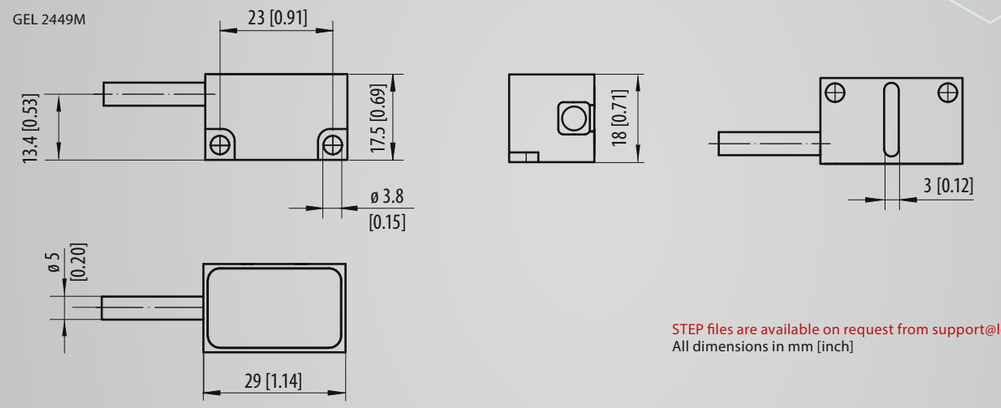
The 26 bit resolution is available up to a maximum speed of 100,000 r.p.m. Improved surface quality can be achieved by increasing control accuracy. The integrated signal conversion also allows precise positioning in the scope of a few arcseconds.

Product information

GEL 2444M



GEL 2449M



STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Possible applications Mitsubishi CNC series M800/M80/E80/C80

Spindle drive		Servo drive	
Model ■ MDS-E-SP series ■ MDS-EH-SP series ■ MDS-EJ-SP series ■ MDS-EM-SP series ■ MDS-EMH-SP series	Firmware number: BND-1501W202 Firmware version: B2 or higher	Model ■ MDS-E-Vx series ■ MDS-EH-Vx series ■ MDS-EJ-Vx series ■ MDS-EJH-Vx series ■ MDS-EM-Vx series ■ MDS-EMH-Vx series	Firmware number: BND-1501W201 Firmware version: B2 or higher

Alarm and warning table

Alarm number (MiniCODER connected with CN2)	2B	2C	2D	2E	48	49	4A	4B
Alarm number (MiniCODER connected with CN3)	1B	1C	1D	1E	27	28	29	2A
GEL 244xM... (ID: 9F)	Signal error	Amplitude warning	EEPROM error	Undervoltage	Hardware error	Warning: Overspeed	Meter error	Temperature warning

Target wheel

Measuring scale for scanning with MiniCODER

Description

Target wheels are suitable for contactless, magnetic scanning with magnetoresistive sensor elements for rotational speed and position detection. They can optionally be designed with a reference mark (tooth, lug or groove) to generate a reference signal.

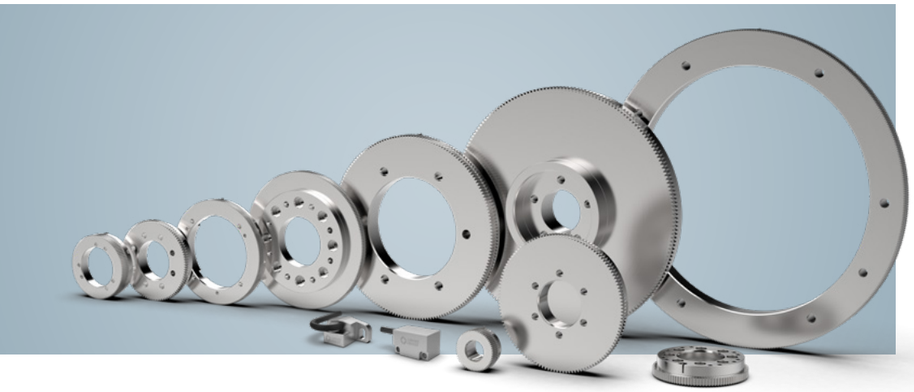
Properties

- Number of teeth: typically 64 to 1024
- Module: 0.3 to 1.0
- Standard material: 16MnCr5, others upon request
- Individual inside diameters
- Optionally with feather keyway for torsion protection

Advantages

- High level of mounting flexibility (shrink-fit, clamping, screw-on)
- Multifunctional design makes it possible to use the target wheel as a bearing cover
- High design flexibility due to customized manufacture

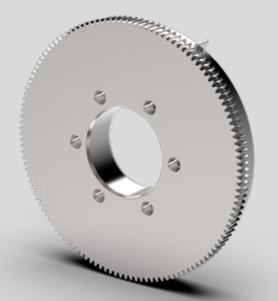
Customer-specific solutions from dedicated production



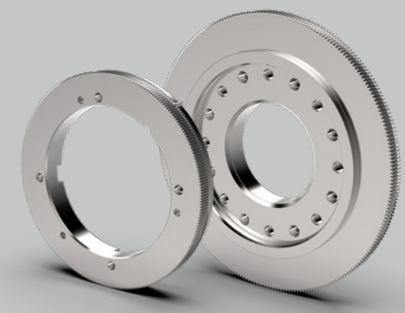
To ensure greater flexibility with regard to machine design, we offer standard target wheels as well as customized models with individual inner diameters and tooth numbers, bores, threads or feather keyways. Thanks to our high vertical integration and our in-house CAD department, you will receive your individual target wheel promptly. To date, over 1,800 different target wheel variants have proven themselves on the market.

Standard

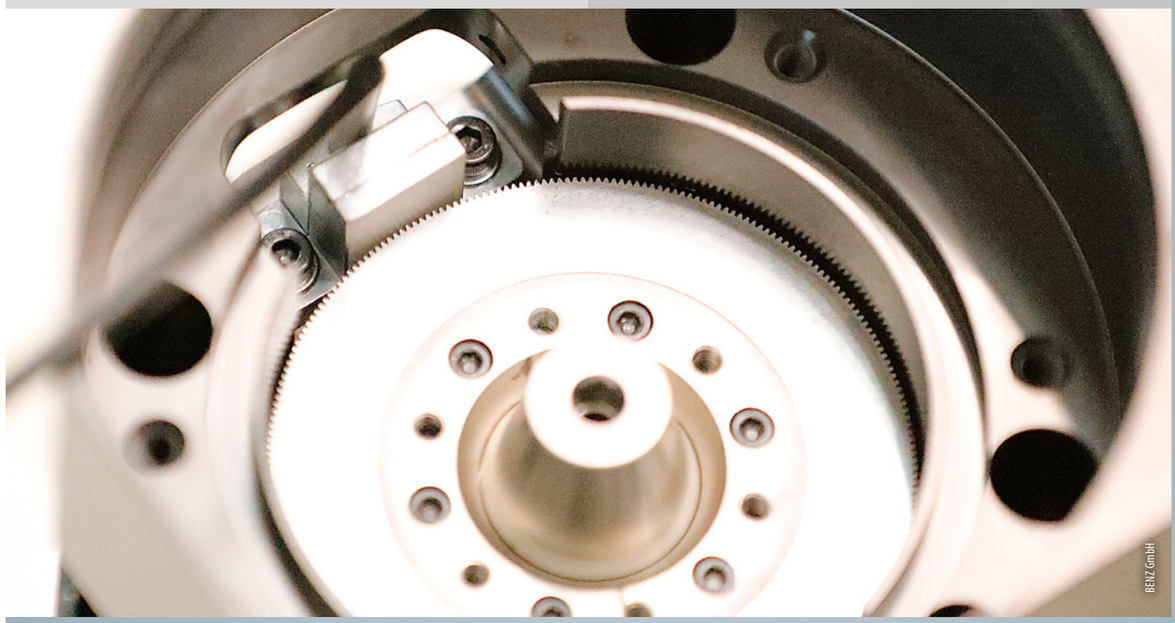
Customized



ZA-/ZAZ/ZAN



ZFF/ZFM/ZFZ



Encoders and target wheels from a single source – an optimal solution!

ZAN/Z and ZFF/M/N/Z

Standard or customized target wheels

Standard target wheels

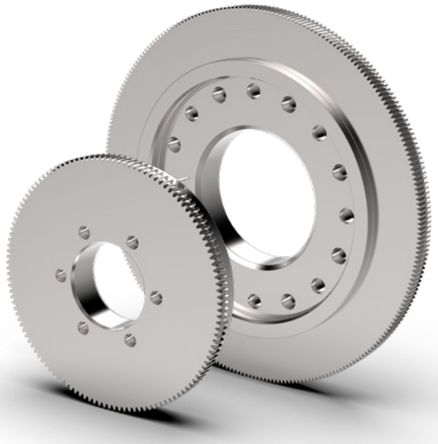
High-precision standard target wheels (ZA) made of ferromagnetic steel are available ex-factory at short notice.

Customized target wheels

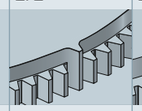
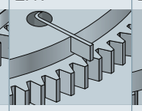
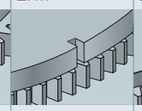
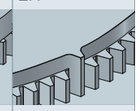
Lenord+Bauer supplies customer-specific target wheels (ZF) upon request. These are manufactured in accordance with drawings and are fitted with bores, threads and grooves, for example. Please attach a design drawing of the target wheel (if possible in PDF format) to your inquiry and forward it to: info@lenord.de.

Reference marks

Selection of the reference mark is determined by the size and rotational speed of the target wheel used, as both affect the forces acting on the reference mark. The following reference marks can be selected: lug (N), tooth (Z) or groove (M). For new designs, we recommend using a target wheel with tooth (Z) reference marks.



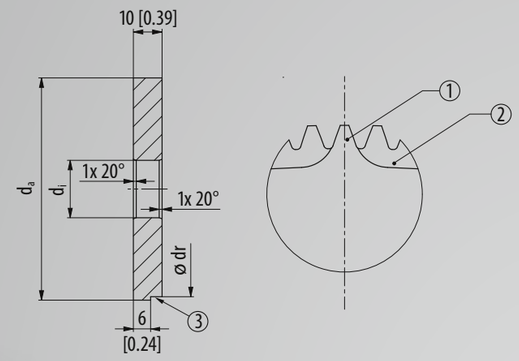
The correct target wheel for every application

Examples	2444K-x	2444KZx	2444KNx	2444KMx	2449KZX
Reference mark (RM)	without	Tooth	Lug	Groove	Tooth
Standard	Za-	ZAZ	ZAN	–	–
Customized	ZF-	ZFZ	ZFN	ZFM	ZFF
Figure					
Width [mm]	10	10	10	10	8.6
RM position	–	congruent with one tooth	exactly between two teeth	exactly between two teeth	congruent with one tooth
Module (upon request)		0.3/0.4/0.5/1.0	0.3/0.5	0.3/0.5	0.4/1.0
Manufacture	in one piece		in one piece, lug glued and cast	made of two parts	in one piece

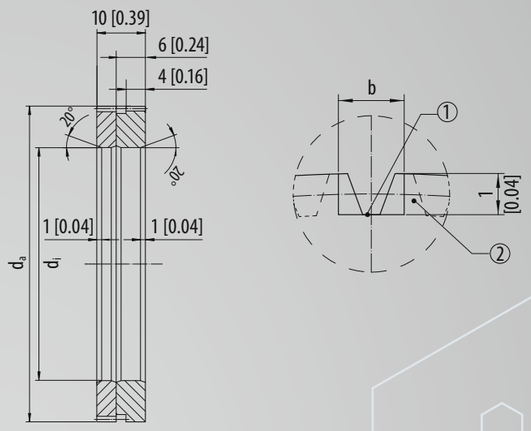
MiniCODERs combined with matching ferromagnetic target wheels result in a “plug-and-play” solution that is optimally adapted to your installation situation.

Product information

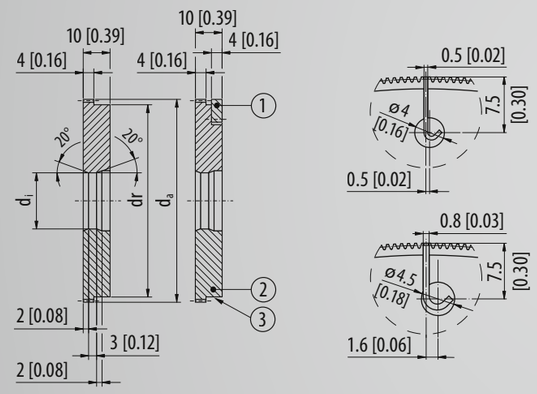
Standard target wheel with reference mark tooth – ZAZ



Example Customized target wheel with reference mark lug – ZFM



Standard target wheel with reference mark lug – ZAN



1 Reference mark
2 Target wheel
3 Collar does not run to toothing
b 1.2 to 1.6 (depending on the module)
d_a Outside diameter (depending on module and number of teeth)
d_i Inside diameter

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Typical rotational speed range depending on inside diameter and reference mark

Number of teeth z	Module m	Inside diameter d_i [mm]	Outside diameter d_a [mm]	Reference mark, signal	Maximum rotational speed n_{max} [r.p.m.]
128	0.3	10	39	Z	113,000
128	0.3	20	39	Z	86,000
200	0.3	40	60.6	Z	47,000
256	0.3	12	77.4	Z	62,000
256	0.3	50	77.4	Z	39,000
360	0.3	70	108.6	Z	28,000
512	0.3	100	154.2	Z	20,000
512	0.3	120	154.2	Z	17,000
80	0.5	10	41	Z	110,000
128	0.5	30	65	Z	54,000
200	0.5	12	101	Z	52,000
256	0.5	50	129	Z	30,000
256	0.5	80	129	Z	23,000
360	0.5	120	181	Z	16,000
512	0.5	100	257	Z	16,000
512	0.5	150	257	Z	14,000

Precision-System

Rotational speed measurement and high-precision positioning application

Description

The Precision system combines rotational speed measurement and high-precision positioning applications. The eccentricity error of the incremental measuring system can be dynamically minimized by installation of two standard MiniCODERs offset 180° and the signal processing in the Precision Box. This leads to an increase in system accuracy.

System equipment

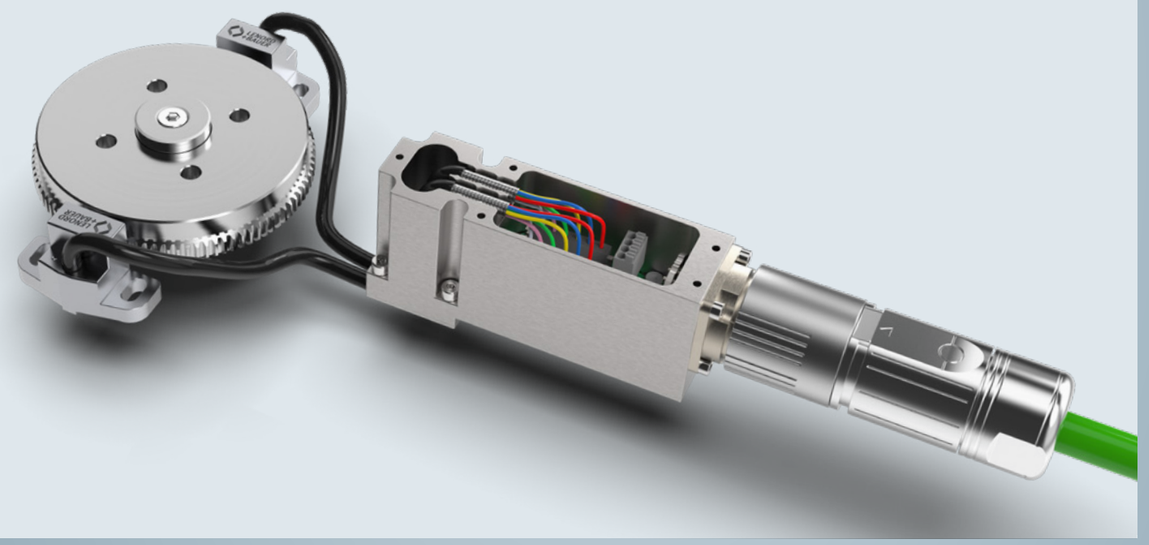
- 2x MiniCODER GEL 2444 or GEL 2449 with output signal 1 V_{pp} (sin/cos) and optional extras P
- 1x target wheel with even number of teeth (standard or customized)
- 1 Precision-Box GEL SDA10

Advantages

- High positioning accuracy up to 4 arcseconds
- Use of two proven standard - MiniCODERs
- Dynamic minimization of the eccentricity error even at high speeds
- Fast and easy commissioning in the assembled state with the SensorDEVICE M mobile service unit
- High design flexibility due to customized manufacture of target wheels

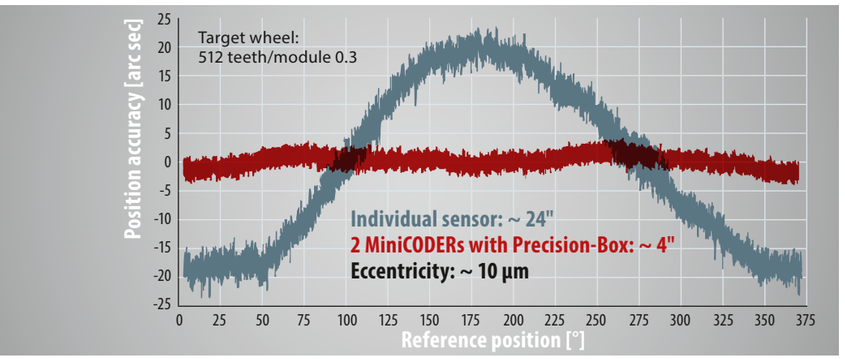


GEL SDA10



Smart combination: Two proven standard MiniCODERs combined with Precision-Box GEL SDA10 to provide a precise positioning solution.

Increased position accuracy from 24 to 4 arcseconds



Achieve positioning accuracies in the range of a few arcseconds in your application! The Precision-Box processes analog signals from two MiniCODERs mounted opposite each other. The eccentricity error is minimized dynamically even at high speeds far in excess of 50,000 r.p.m.

GEL SDA10

Precision-Box as additional electronics of the Precision-System

Description

As part of the Precision system, the Precision-Box ensures dynamic minimization of the eccentricity error of the incremental measuring system. The Box can be mounted directly on the spindle where it can replace the often used M23 connector due to its mounting compatibility. The Box detects the 1 V_{pp} signals from the two MiniCODERs installed 180° offset, processes them and passes them on to the control system (CNC).

Optionally available signals (e.g. temperature sensors) can be connected directly to the Box. The signals are output unchanged on the M23 connector. A suitable female connector is included in the scope of supply.



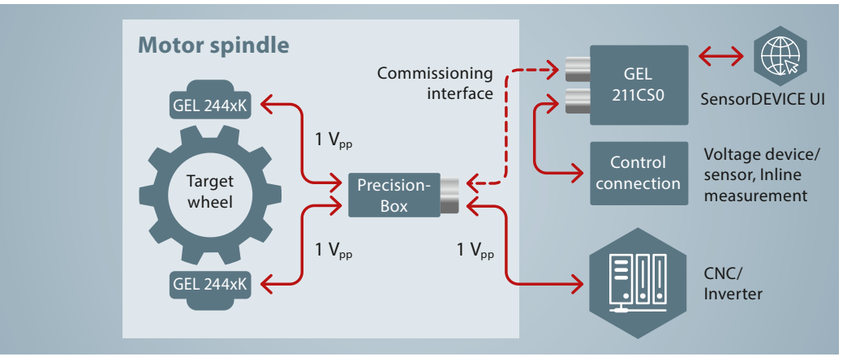
Properties

- Output signal: 1 V_{pp} Differential signal (sin/cos)
- Minimizing the eccentricity error

Advantages

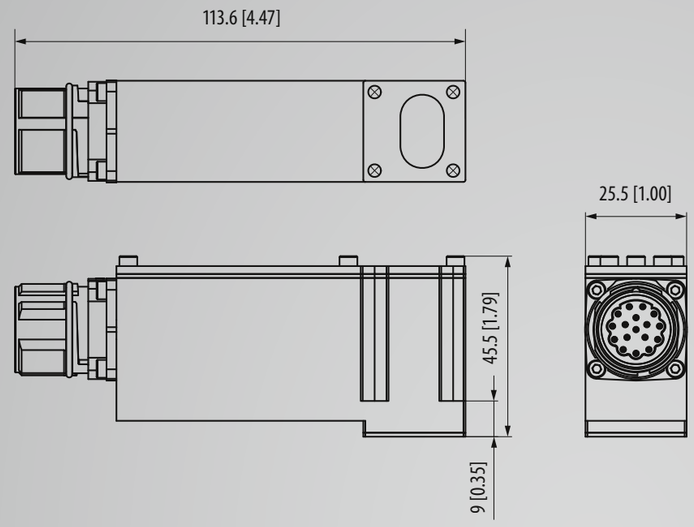
- Simple installation
- Mounting compatibility of the Precision-Box to existing M23 connectors
- Looping through up to four temperature signals or other signals

Easy commissioning using SensorDEVICE M

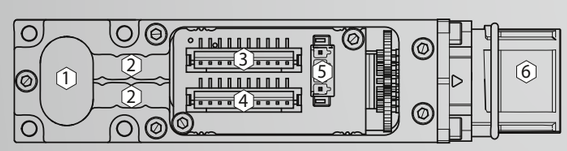


In order to achieve a positional accuracy in the range of a few arcseconds, the Precision system can be parameterized and the signal quality optimized with the SensorDEVICE M mobile service unit after installation. The SensorDEVICE UI user interface provides the user with an intuitive commissioning wizard that guides the user step-by-step through the setup of the Precision system. In this way, errors during commissioning can be avoided and the assembly time can be shortened.

Product information



Connections



1 Cable bushing
2 Cable routing and contact surface for cable screens
3 MiniCODER 1
4 MiniCODER 2
5 Temperature sensors or other signals
6 GEL 211CS0 / CNC

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Technical data	
Supply voltage U_B	5 V DC ± 5 %
Output level	1 V_{pp} Differential signal
Output frequency	0 kHz to 200 kHz
Degree of protection	IP 54
Housing material	Aluminum
Working temperature range	-20 °C to +85 °C/-4 °F to 185 °F
Operating/storage temperature range	-20 °C to +85 °C/-4 °F to 185 °F
Maximum relative air humidity	< 95 %
Condensation	not permitted

SensorDEVICE M

Mobile service units

Description

The SensorDEVICE M product family includes our compact and mobile service units for easy analysis, optimization and parameterization of the MiniCODER. In addition, operating state data stored in the MiniCODER (for example speed histogram) can be read out during servicing. The user interface is conveniently accessed via web browser without any software installation. The data is transmitted either via Ethernet or WLAN.

Properties

- Communication via Ethernet or WLAN
- Visualization of data in web browser

Advantages

- Plug and play: Connection to the MiniCODER via the external connector, no disassembly required
- Easy operation via SensorDEVICE UI on any end device such as smartphone, tablet or PC, no software installation necessary

Intuitive to use – Our web-based user interface SensorDEVICE UI



We focus on smooth usage without hurdles – that is why you can easily use our SensorDEVICE UI on all popular browsers without having to preinstall any product-specific software.

Service units



GEL 211CS0



GEL 211CST

User interface



SensorDEVICE UI



Gorodenkoff – stock.adobe.com

Our GEL 211CS0 and GEL 211CST service units offer you more flexibility in sensor testing and ensure fast error diagnosis.

GEL 211CS0

Mobile service unit with output signal 1 V_{pp}

Description

The GEL 211CS0 service unit is suitable for connecting MiniCODERs with output signal 1 V_{pp} (sin/cos). The MiniCODER can be analyzed, optimized and parameterized in its installed state via the SensorDEVICE UI user interface. In addition, the operating state data recorded in the MiniCODER at runtime can be read out.



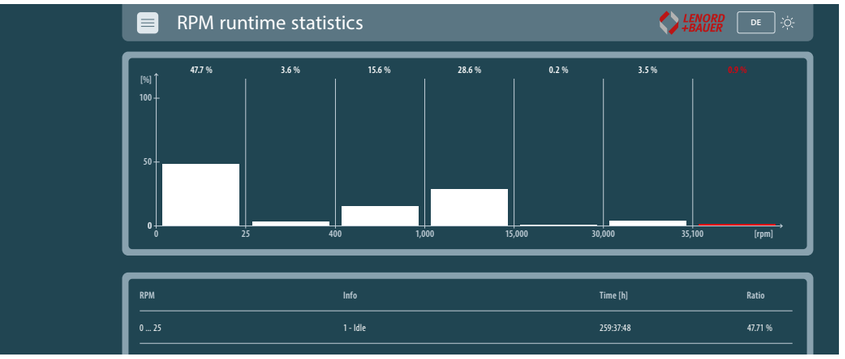
Functionality

- Setting and saving different tolerance presets
- Analysis and optimization of the 1 V_{pp} signals in the installed state
- Checking the quality and installation situation of the target wheel
- Readout of operating state data (speed histogram, min/max temperatures, etc.)
- Creation of analysis reports

Advantages

- Facilitates mounting and assembly
- Optimizes maintenance and service work
- Increases reliability

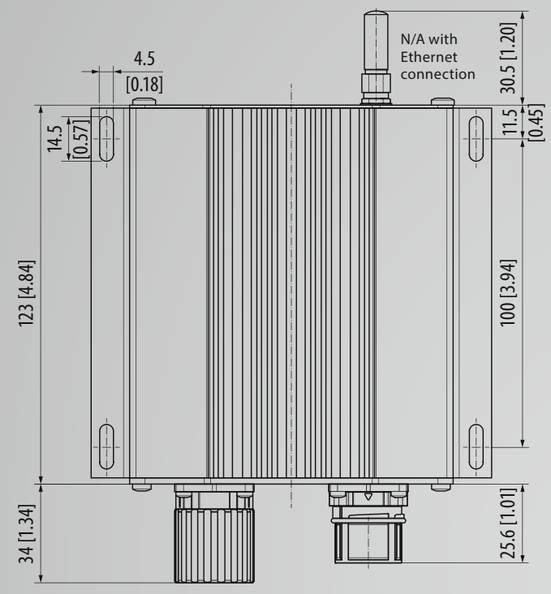
Save costs in the event of service and warranty claims

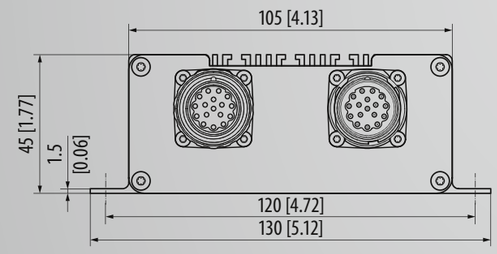


Our MiniCODERs offer the possibility of integrated operating state data acquisition. Operating conditions such as minimum and maximum temperatures and speed ranges are recorded during runtime. In the event of a service or warranty claim, for example, it can be used to check whether a motor has been operated above permissible speed.

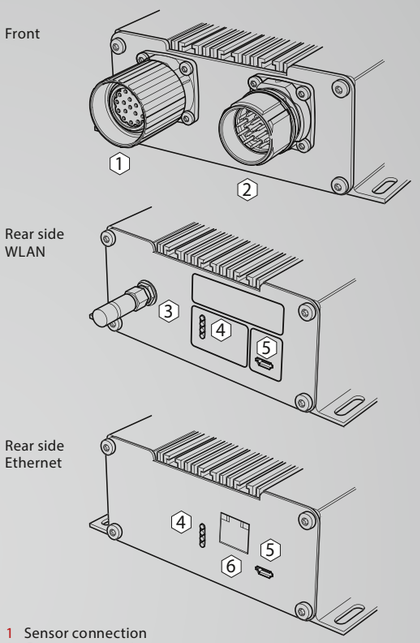
Product information

GEL 211 WLAN/Ethernet





Device overview



1 Sensor connection
2 Control connection
   - Supply voltage device
   - Supply voltage sensor
   - Connection control system for inline measurement
3 WLAN aerial
4 Indicators (Power/Comm/Signal/Status)
5 Micro USB connection (type B):
   - Integration in an existing radio network
   - Firmware update
   - Changes to settings (for example, WLAN password)
   - Data transmission
6 Ethernet connection (RJ45 female socket)
   - Integration in an existing cable network

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Technical data

Supply voltage U_B	5 V DC
Data transmission Ethernet	Ethernet – Report files: Ethernet or USB
Data transmission WLAN	WLAN – Report files: WLAN or USB
Degree of protection	IP 20
Housing material	Aluminum, anodized, black
Working temperature range	0 °C to +70 °C/32 °F to 158 °F
Storage temperature range	-20 °C to +85 °C/-4 °F to 185 °F
Maximum relative air humidity	80 %
Condensation	not permitted

GEL 211CST

Mobile service unit for MiniCODER with digital interface

Description

The GEL 211CST service and commissioning device is suitable for connecting MiniCODERs with digital interface. The MiniCODER can be analyzed, optimized and parameterized in its installed state via the SensorDEVICE UI user interface. In addition, current status information such as position, temperature and warning and error messages can be read out.



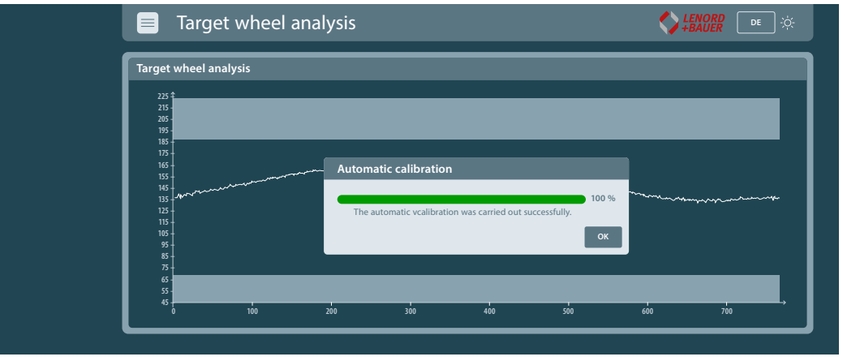
Functionality

- Configuration of sensor and control-dependent parameters (number of teeth, resolution, etc.)
- Reading out status information
  - » Position and angle
  - » Current temperature
  - » Warning and error messages
- Checking the quality and installation situation of the target wheel
- Increase in position accuracy due to automatic adjustment in the installed state

Advantages

- Facilitates mounting and assembly
- Optimizes maintenance and service work
- Increases reliability

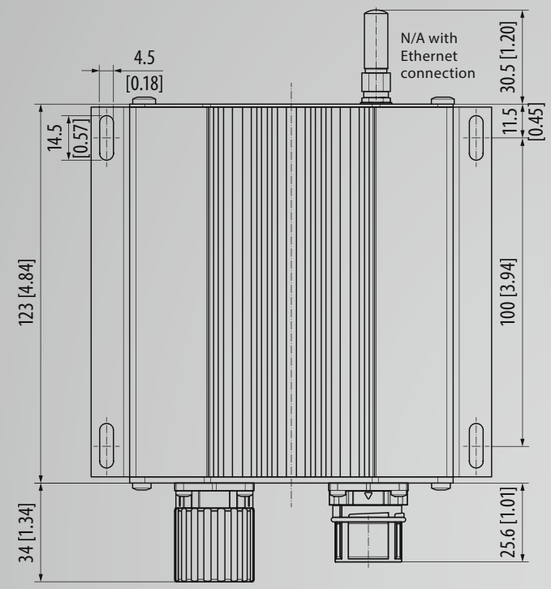
Higher position accuracy due to signal optimization in installed state

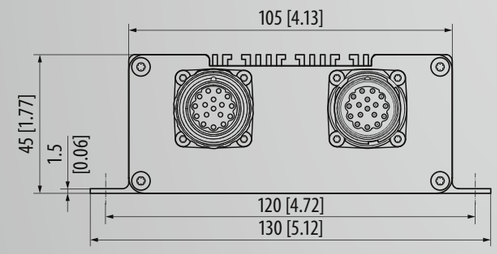


The mobile service unit SensorDEVICE M can be used to calibrate the MiniCODERs while they are installed. During the adjustment process, the signal quality of the sensor is improved, which allows higher position accuracy to be achieved.

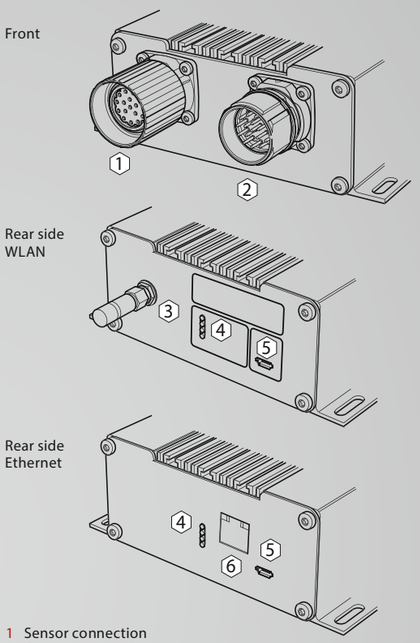
Product information

GEL 211 WLAN/Ethernet





Device overview



1 Sensor connection
2 Control connection
- Supply voltage device
- Supply voltage sensor
- Connection control system for inline measurement

3 WLAN aerial
4 Indicators (Power/Comm/Signal/Status)
5 Micro USB connection (type B):
- Integration in an existing radio network
- Firmware update
- Changes to settings (for example, WLAN password)
- Data transmission

6 Ethernet connection (RJ45 female socket)
- Integration in an existing cable network

STEP files are available on request from support@lenord.de
All dimensions in mm [inch]

Technical data

Supply voltage U_B	5 V DC
Data transmission Ethernet	Ethernet – Report files: Ethernet or USB
Data transmission WLAN	WLAN – Report files: WLAN or USB
Degree of protection	IP 20
Housing material	Aluminum, anodized, black
Working temperature range	0 °C to +70 °C/32 °F to 158 °F
Storage temperature range	-20 °C to +85 °C/-4 °F to 185 °F
Maximum relative air humidity	80 %
Condensation	not permitted

SensorDEVICE UI

INTERACTIVE USER INTERFACE

User interface for SensorDEVICE M

Modern web app

The SensorDEVICE UI (SDUI) is the graphical user interface of the SensorDEVICE M (SDM) product family. The SDUI runs as a web app in the browser and is loaded directly from the SDM – so no software installation is required. The future-proof software architecture enables optimized display on any end device such as smartphone, tablet or PC. The uniform design and the clear presentation of functions enable the user to operate the system intuitively.



Functions

The SDUI offers various analysis and optimization tools as well as user-friendly parameter management for different application cases. The visualization optimally supports the user when testing the connected sensors. The use of the Wizard function enables speedy commissioning which can be automated. In the event of a service or warranty claim, the operating state data stored in the MiniCODER and visualized in the SDUI can provide valuable information.

Window to MiniCODER

The connected sensor is automatically detected by the SDUI. The user interface adapts dynamically – so all relevant information and functions are clearly displayed.



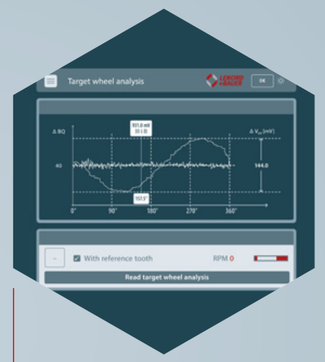
Dashboard

Clear display of the connected devices and the available functions



Signal analysis

Checking the signals and optimizing the signal quality



Target wheel analysis

Checking the target wheel for damage, concentricity and toothing quality

Operating state data

Readout of the temperature ranges stored in the MiniCODER, the operating hours meter and the speed histogram with seven freely configurable rotational speed ranges.





Reports

Summary of the measurement results and stored data of a MiniCODER. The report can be output as a customizable PDF file.

Expertise at your side

Our know-how gives you a technological advantage

We are an international specialist in the field of motion sensors and integrated drive technology. We develop, produce and distribute leading technology solutions that are used in the most demanding applications. Among other things, our products ensure that high-speed trains run safely, packaging machines are set up with minimum effort, tool spindles are precisely monitored and automotive electric drives are controlled in an energy-efficient manner. For 60 years, our customers have been benefiting from extensive technical consultancy competence and our knowledge of applications.

We are the competent partner for you when it comes to efficiently integrating sensors and actuators, intelligently transforming signals into value-added functions and making them accessible interactively. With us, data streams become usable information at the point of origin. Integration into your system environment thus becomes possible intuitively.

Rely on our experience, which guarantees you low lifecycle costs, high availability and digital future reliability.

Lenord+Bauer – Finding solutions. Founding trust.



High quality standards

To ensure excellent product quality and high failsafe performance, we naturally have a consistent process landscape and are certified as per DIN EN ISO 9001, DIN EN ISO 14001 and DIN EN ISO 22163 (IRIS). This process landscape is monitored and confirmed annually by an external body. In addition, you can of course audit us as a supplier.

Active in future markets worldwide

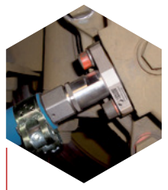
1965
Lenord, Bauer & Co. GmbH is set up in a basement in Oberhausen

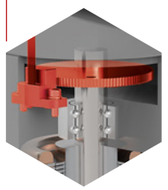




1973
The company headquarters is built in Oberhausen

1993
Sensors for high precision and speed in machine tool applications

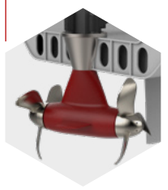




1996
Robust and wear-free sensor solutions for rail traffic

1999
Pole wheel position and speed encoders prove themselves under extreme operating conditions in ship propulsion systems





2008
Drive technology for packaging machines: The first generation of positioning drives is launched on the market

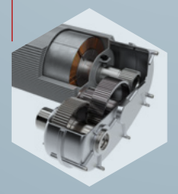
2011
Internationalization: New subsidiary is established in Shanghai





2012
New production plant in Gladbeck is inaugurated

2019
Sensor for electromobility: Efficient drive control for synchronous and asynchronous motors





2021
Lenord+Bauer Italy and USA are launched

2022
VarioCODER: technologically innovative inductive rotor position encoder





2025
Establishment of Lenord+Bauer India

2022: MMP RWTH Aachen University / 2025: WESTOCK – stock.adobe.com

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