

Incremental encoder **MiniCoder GEL 243** with sine-wave and square-wave output

SENSORLINE

LENORD+BAUER

Technical information

version 10.06



General information

- contactless measurement of rotational motion of target wheels with modules 1.0
- contactless measurement of linear motion of measuring rods with a pitch of 1.0/1.6 or 2.0 mm
- can be used under very harsh conditions
- very high protection class IP 67
- high EMC and resistance

Fields of application

- sensing piston movement in die-casting machines
- contactless measurement of speed and position at machines and motors

Measuring principle

- integrated magnetoresistors for the contactless scanning of a target wheel
- measuring frequency 0 ... approx. 200 kHz

Output signals

- output as sine-wave or square-wave
- reverse battery protection of supply voltage
- short-circuit-proof outputs
- waveforms:
 - two square-wave signals dephased by 90° and their inverse signal
 - sine-wave signal

Design

- temperature-resistant metal housing
- completely sealed
- cable outlet

Technical data

| | | |
|---|---|--|
| Supply voltage U_B | 5 V DC \pm 5%, reverse battery protected | |
| Measuring frequency | 0 ... max. 200 kHz | |
| Measuring scale | target wheel or measuring rod | |
| Width of gear wheel | min. 4.0 mm | |
| Power consumption without load | 0.6 W | |
| Material of measuring scale | ferromagnetic steel | |
| Max. admissible cable length (take into account the voltage drop via the supply voltage) | ca. 100 m The cable length depends on the frequency and the cable capacity. | |
| Bearing temperature range | -20 ... +85° C | |
| Operating and storage temperature range | -20 ... +85°C | |
| Protection class connection side | IP 65 | |
| Protection class measuring side | IP 67 | |
| EMC | EN 61000-6-1 to 4 | |
| Insulation strength | 500 V | |
| Vibration protection (IEC 68-2-6) | 200 m/s ² | |
| Shock protection (IEC 68-T2-27) | 2000 m/s ² | |
| Weight | 20 g | |
| Typ | 243 T | 243 L |
| Output | RS 422-A TTL | 1 V _{SS} |
| Output signal | two square-wave signals dephased by 90° and their inverse signal, short-circuit-proof | two sine-wave signals dephased by 90°, short-circuit-proof |
| Fields of application | measurement of distance, angle and speed with precision target wheels or lengths measured with measuring rods | lengths measured with measuring rods |
| Pin layout (Pol 4 nicht belegen) | <p>$U_B = +5 \text{ V} \pm 10 \%$</p> | <p>$U_B = +5 \text{ V} \pm 5 \%$</p> |
| Module (target wheel) permissible air gap | $m = 1.0$ 0.30 mm \pm 0.10 mm | - |
| Pitch (measuring rod) permissible air gap | $p = 1.0 \text{ mm}$ 0.10 mm \pm 0.02 mm | $p = 1.6 \text{ mm}$ 0.15 mm \pm 0.03 mm |
| Pitch (measuring rod) permissible air gap | $p = 2.0 \text{ mm}$ 0.15 mm \pm 0.03 mm | - |
| Offset (static) | - | < 60 mV |
| Amplitude tolerance | - | -20 ... + 10 % |
| Amplitude ratio U_A/U_B | - | 0.9 ... 1.1 |



Assembly information EMC information

Assembly information

The MiniCoder must be **symmetrically** adjusted and centered to the target wheel.

Dissymmetry causes measuring errors.

- Avoid any mechanical contact between the measuring scale and the 0.1 mm protective layer of the scanning system. **Scratches** on the protective layer may cause the **total failure** of the MiniCoder.
- Do not damage the surface of the toothing. Do not allow any mechanical components to run on the surface of the toothing.
- If you make your own target wheels, please observe the following:
 - Provide an involute toothing as per DIN 867.
 - You can only use target wheels with module 1.0.
 - Bear in mind that mechanical inaccuracies of tooth period, tooth shape and true running affect the accuracy of the system.
 - If the target wheel has a (slight) eccentricity, the MiniCoder must be adjusted in such a way that the air gap tolerance is observed in case of the smallest distance between the MiniCoder and the target wheel.

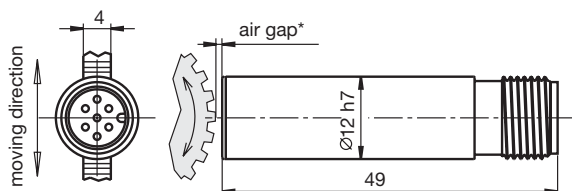
EMC information

To avoid influencing the certified electromagnetic compatibility (EMC) the following assembly information must be observed.

- The screening at the cable end must have **large-surface** contact.
- Keep all unscreened lines **as short as possible**.
- Provide for earth connections being **as short as possible** and having **a large cross-section** (e. g. low-inductance metal-alloy tape, flat-band conductor).
- Should there be any **potential difference** between the earth connection of the machine and the electronics, appropriate measures must be taken to ensure that no **compensating currents** can flow (e. g. lay potential equalization line with large cross-section (see below) or cable with separated duplex screening - the screens should be connected at one side only).
- Signal and control conduits must be laid away from the power conduits.
- The power supply must comply with installation class 0 or 1 according to point B.3 of the EN 61000-4-5 from 1995.

Assembly drawing GEL 243

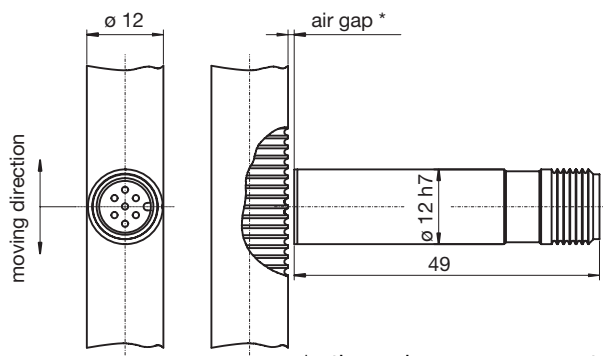
| module [mm] | pitch [mm] | air gap * preset measure | distance- tolerance* |
|----------------|---------------|--------------------------------|-------------------------|
| 1.0 | - | 0.30 mm | ± 0.10 mm |



* other values upon request

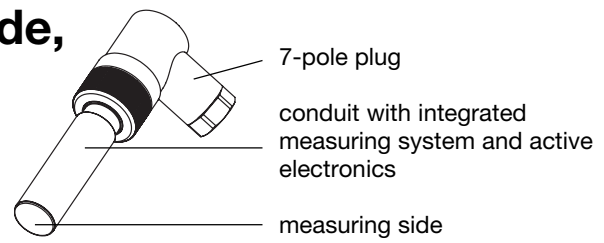
Assembly drawing GEL 243

| module [mm] | pitch [mm] | air gap * preset measure | distance tolerance * |
|----------------|---------------|--------------------------------|-------------------------|
| - | 1.0 | 0.10 mm | ± 0.02 mm |
| - | 1.6 | 0.15 mm | ± 0.03 mm |
| - | 2.0 | 0.15 mm | ± 0.03 mm |

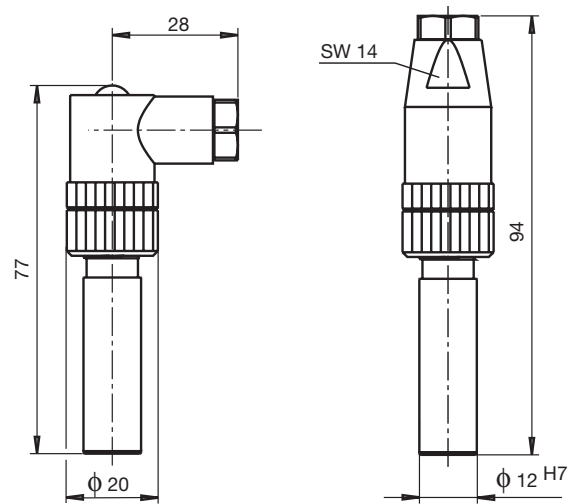


* other values upon request

Dimensioned drawing, Typ code, Interpolations electronics



Dimensioned drawing GEL 243



Available types

for scanning target wheels

GEL 243 T - 1 A 1
GEL 243 T - 1 B 1

for scanning measuring rods

GEL 243 L 1 A A
GEL 243 L 1 B A

GEL 243 T - 1 A B
GEL 243 T - 1 B B

GEL 243 T - 1 A C
GEL 243 T - 1 B C

Type code

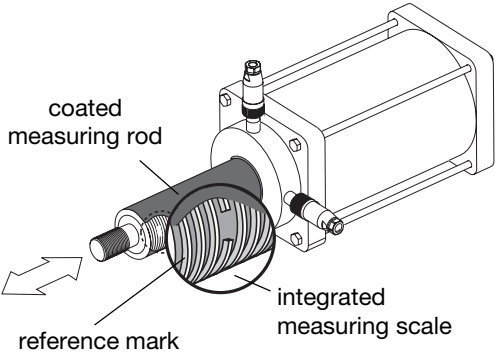
| | | | | | |
|-----|----------------|-------------------------------|------------------|---|------------------|
| | Signal pattern | | | | |
| | L | signal pattern L, sine-wave | | | |
| | T | signal pattern T, square-wave | | | |
| | | | | | Connector outlet |
| | | | A | connector outlet staight | |
| | | | B | connector outlet 90° offset | |
| | | | | Module | |
| | | | | - in case of reference signal (module and pitch are not feasible) | |
| | | | 1 | modul m = 1.0 | |
| | | | A | pitch p = 1.6 mm | |
| | | B | pitch p = 2.0 mm | | |
| | | C | pitch p = 1.0 mm | | |
| 243 | | - | 1 | | |

Interpolations electronics GEL 212/213 GEL 214



External interpolation electronic to convert sinusoidal signals to square waves.
If you would like further details of these products please ask for our separate technical information sheets, or you can download them in PDF format from our website: www.lenord.de.

Measuring scale, Measuring rod, Target wheel



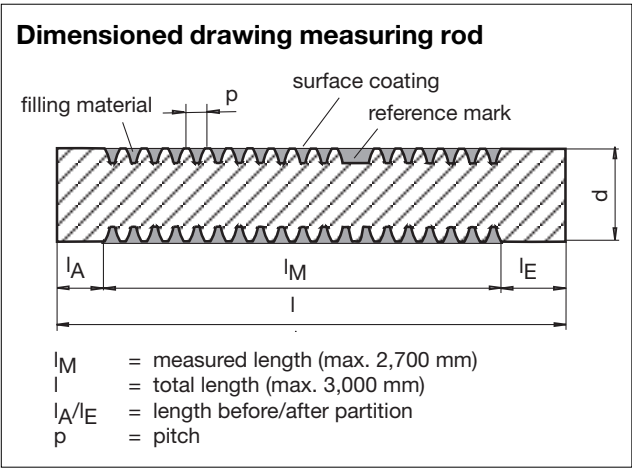
Measuring rods

For measuring linear movements and reference marks and for monitoring areas or end-of-travel positions MiniCoders, type GEL 243, may be used in connection with an measuring scale (e.g. attached to piston rods). The measuring scale is a dividing structure which can be applied to any ferromagnetic machine element. Measuring scale with various pitches or additional reference marks – provided that they are locked – make it easy to perform different measurements simultaneously (see picture).

Thanks to this extremely flexible technology piston rods or machine elements may be directly used as measuring scale. Where piston rods are concerned, the applied pitch structure is filled by employing a special production process and is then coated with a wear resistant hard chromium layer. Depending on the specific application other coating materials may be used. Thanks to this special process even toothed racks may be used for detecting position.

We can supply piston rods and other initiators – depending on the specific application you have in mind – with the following pitch: 1 mm, 1.6 mm and 2 mm. For this purpose, we require precise drawings and information on the operating conditions . You may, however, also produce the measuring scale yourself in accordance with technical specifications supplied by Lenord + Bauer.

Standard measuring rods of various sizes, which have a 2.0 mm hard chromium surface, are available ex stock at short notice. Their diameter is produced in compliance with the ISO tolerance h6. The surface hardness is approx. 950 ± 50 HV, the surface quality is approx. Ra = 0.2 µm.



Type code

| | | | | |
|----|---|---|---------------|--|
| MS | - | A | Pitch p in mm | |
| | | | p = 1.6 | |
| | | | 0000 | Length in mm (max. 2,700 mm) e. g. 0500 |
| | | | 000 | Diameter in mm (h6) 012 / 016 / 020 / 025 |
| MS | - | A | | |

Target wheel



As target wheels you can use ordinary commercial spur-toothed wheels with module = 1. Just ask us if you need addresses of suppliers.
We will also be happy to prepare a quote for special-purpose solutions.