Operating Manual
Device manufacturer and publisher:

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1 About these operating instructions

1.1 General information

These Operating Instructions are part of the product and describe how to use it safely.

► Please read the Operating Instructions carefully before you begin assembly.
► Keep the Operating Instructions for the entire service life of the product.
► Make sure that the Operating Instructions are available to personnel at all times.
► Pass the Operating Instructions on to each subsequent owner or user of the product.
► Insert all additions received from the manufacturer.
► To avoid property damage or malfunctions, read and observe the specifications provided in these Operating Instructions.

1.2 Validity

These Operating Instructions apply to the standard design of the product. This includes all types that are not marked with a Y behind the product number in the type code (see section 2.2 → page 7).

A product marked with Y is a customised design with a special assembly and/or modified technical specifications. Depending on the customised modification, additional or other documents may be valid.

1.3 Target group

These operating instructions are intended for electrical specialists and mechanics who are authorised to mount and electrically connect devices and systems, to put them into operation, and to label them under the terms of safety-related standards, as well as machinery operators and manufacturers.

1.4 Liability and warranty

All information and instruction have been provided on the basis of our previous experience and the best of our knowledge.

We cannot accept any liability for damages occurring from failure to observe the information in these operating instructions.

1.5 Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>What's new?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-12</td>
<td>1.0</td>
<td>First edition</td>
</tr>
<tr>
<td>2010-02</td>
<td>2.0</td>
<td>New MG 25104 magnet assembly</td>
</tr>
<tr>
<td>2012-03</td>
<td>2.1</td>
<td>New MG 25105 magnet assembly</td>
</tr>
</tbody>
</table>
1.6 Symbols, markings and notes

The following symbols, markings and notes are used in this description to ensure quick recognition of certain information:

- **DANGER**: Notice of an immediate and eminent danger. Failure to respond may result in serious injury or death.
- **CAUTION**: Notice of a hazardous situation. Failure to respond can result in minor injury.
- **NOTICE**: Instructions to prevent damage to equipment.
- **i**: Important information for understanding or optimising work processes.
- **►**: Required work step.
- **→ page 6**: Page reference to another part of these operating instructions.
2 Identifying the odometer

2.1 ID plate

An ID plate with the following information is present on the odometer housing.

1 Device name according to type code (→ next section)
2 Serial number
3 Explosion protection class
4 Certificate number (→ Prototype test certificate)
5 Permissible ambient temperature range

2.2 Type code

<table>
<thead>
<tr>
<th>Version</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Short and straight</td>
</tr>
<tr>
<td>B</td>
<td>Long and angular</td>
</tr>
<tr>
<td>C</td>
<td>Long and straight</td>
</tr>
<tr>
<td>D</td>
<td>Short and angular</td>
</tr>
</tbody>
</table>

2510

(Shapes: → page 12)
2.3 Scope of supply

The following components form part of the scope of supply:

- Odometer GEL 2510
- Installation kit MB25101/25102, consisting of
  - 1 Set of flat seals
  - 4 Mounting screws
  - 4 Pairs of Nordlock retaining plates
  - 4 Caps for mounting screws
- These operating instructions

Optional (depending on particular order):

- 1 Magnet assembly
- 1 Reader with communication software
3 Safety information

⚠️ DANGER ⚠️

- Persons with a heart pacemaker: Keep a safe distance!
  The permanent magnet, which forms part of the measurement system, is very strong.
- Read out odometer data outside areas endangered by explosion and only when axle is not moving.

⚠️ NOTICE ⚠️

Because of the strong magnetic field,
- do not use or store cards with magnetic strips in the immediate vicinity,
- operate PCs or other electronic storage media only at a suitable distance from the magnet.

To ensure continuous, correct operation of the measurement system
- do not exceed the operating temperature range specified on the ID plate
- do not damage odometer housing during installation or operation to ensure proper explosion protection.

3.1 Designated Use

The GEL electronic odometer 2510 is an intrinsically safe, self-powered device for recording the mileage of rotating rail vehicle axles (mainly tank cars on the European rail network). It contains a sensor for measuring magnetic field changes.

The odometer may be operated in areas endangered by explosion (→ Technical Data). On the other hand, reading out the recorded data and programming the odometer with a reading device is permissible only outside areas endangered by explosion.

The odometer housing must be firmly installed on one of the rail vehicle's wheelset bearing covers and fitted to a part of the axle, as a transducer.

Always observe the instructions and data specified in the product documentation under all circumstances.

Any other use is considered unauthorised.

3.2 Instructions for operator

Personnel qualifications

- Please ensure that installation, operation, maintenance and removal are performed only by trained, specially instructed personnel or at least by a responsible, qualified employee.
Ensure that all applicable accident prevention and safety regulations available to the personnel.

Ensure that the personnel is familiar with all applicable accident prevention and safety regulations.

### 3.3 Modifications and conversions

Unauthorized modifications or conversions may damage the product.

**NOTICE** Do not make any modifications or conversions to the product, with the exception of activities described in this documentation.

### 3.4 Instructions on prevention of damage and malfunctions

The odometer is designed for extremely rugged use. Nevertheless, it can be damaged by excessive mechanical stress. Mechanical damage can quickly lead to failure of the measurement system or to loss of explosion protection.

**Handling the odometer**

- Do not strike or step on the housing.
- Never attempt to open the odometer.
- Assemble the odometer only as described in these operating instructions.
4 Description

Function
The magnet belonging to the measuring system is fitted on the axle of the particular wheelset.

The odometer is installed on the existing wheelset bearing cap, so that the active sensor cover can exactly detect the magnetic field.

If the car is moving, the magnet rotates along with the axle and thus runs past the odometer's sensor surface. At the same time, it induces AC pulses in the odometer, which are counted for recording the mileage. In addition, the alternating current supplies the power necessary for operating the odometer. The odometer status is saved in an internal memory.

A reader can be used to read out or write to the memory when the car is standing still. For this purpose, the reader induces power into the odometer using the RFID process. At the same time, the particular command is sent for reading or writing.

The odometer briefly stores the power and then uses it to transmit its memory contents inductively to the reader or to save the data it contains.

System design

1 Pressure plate on wheel bearing
2 Magnet assembly
3 Wheelset bearing cap
4 Odometer
5 RFID field
6 RFID transmitter/receiver (attachment)
7 Reader (handheld PC)
8 Data display and input field
9 Control panel (navigation buttons)
10 Spreadsheet with saved data (external application)

Versions
Four housing shapes are available for the most popular wheelset versions:
The following table provides an overview of the possible combinations of odometers (2510x), flat seals, wheelset bearing caps, shaft sealing parts and magnet assemblies (MG 2510x):

<table>
<thead>
<tr>
<th>Wheelset bearing cap</th>
<th>Shaft seal part</th>
<th>Pressure cap</th>
<th>Pressure plate</th>
<th>Slotted nut with retaining plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Fwg 000.02.004.005</td>
<td>2510A seal 0.5mm</td>
<td>2510C seal 0.5mm</td>
<td>2510A seal 0.5mm</td>
<td>MG 25101/4/5</td>
</tr>
<tr>
<td>LK 288</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3Fwg 000.1.02.04.001</td>
<td>2510A seal 0.5mm</td>
<td>2510C seal 0.5mm</td>
<td>2510A seal 0.5mm</td>
<td>MG 25101/4/5</td>
</tr>
<tr>
<td>LK 277/ LK 278</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3Fwg 839.02.004.005</td>
<td>2510A seal 1.5mm</td>
<td>2510C seal 1.5mm</td>
<td>2510A seal 1.5mm</td>
<td>MG 25101/4/5</td>
</tr>
<tr>
<td>LK 270</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3Fwg 825.02.004.05</td>
<td>2510A seal 1.5mm</td>
<td>2510C seal 1.5mm</td>
<td>2510A seal 1.5mm</td>
<td>MG 25101/4/5</td>
</tr>
<tr>
<td>LK 270</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3Fwg 8639.02.004.03.87</td>
<td>2510D seal 2mm</td>
<td>2510B seal 2mm</td>
<td>2510D seal 2mm</td>
<td>MG 25102/3</td>
</tr>
<tr>
<td>N 200</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UIC.3.00.02.237</td>
<td>2510D seal 0.5mm</td>
<td>2510B seal 0.5mm</td>
<td>2510D seal 0.5mm</td>
<td></td>
</tr>
<tr>
<td>N 180</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5 Installation

5.1 Magnet assembly (MG 2510x)

**NOTICE**

The magnet's high field strength results in strong forces of attraction for other metal objects. It is essential to bear this in mind when handling the magnet assembly.

Various magnet assemblies are used depending on the design of the axle:

**NOTICE** Regardless of the shape, the head of the mounting bolts should not protrude above the magnet:

![Diagram of magnet assembly](image)

1: Magnet assembly

### 5.1.1 Axle bearing with slotted nut and retaining plate: MG 25102/3

The magnet assembly has already been installed in the supplied retaining plate at the factory: There are two versions available, the use of which depends on the position of the threaded holes in the slotted nut in relation to the retaining plate's hole circle.

![Diagram of threaded holes](image)

MG 25102

1: Magnet  
2: Retaining plate Fwg 850.02.001.22

- Replace old retaining plate with new retaining plate with magnet.

### 5.1.2 Axle bearing with pressure cap or pressure plate: MG 25101/4/5

**Alternative 1: MG 25104, MG 25105**

In this case, one of the fixing screws for the pressure cap or pressure plate is replaced by a modified magnet screw assembly – MG25104 or MG 20105.
Standard: M20x60 (MG25104) or M20x65 (MG 20105) according to ISO 4017, strength category 10.9.

- Remove one existing fixing screw and insert the magnet screw assembly.
- Tighten the magnet screw assembly to the prescribed torque.

If a securing plate is used to secure the screws:
- Make sure that after installation, the necessary gap between the top of the magnet and the odometer is maintained.

**Alternative 2: MG 25101**

If a fixing screw is not to be replaced then the separate magnet assembly MG 25101 has to be installed in the pressure cap or pressure plate itself.

- Drill the necessary hole (see following installation illustrations).
- To ensure that the magnet assembly fits tightly, apply Loctite to the thread. Recommended: Loctite 268 (please observe manufacturer's directions)
- Tighten the magnet assembly to a maximum torque of 80 Nm.
- Fit the pressure cap/plate on the axle.

Installation drawings:

![Installation drawings](image)

5.2 **Odometer**

- Perform the necessary drilling and milling procedures on the wheelset bearing cap, according to the applicable information in the machining drawings.
- If the finished surfaces on the wheelset bearing cap are coated with protective paint, ensure that the threads are not filled and that the paint is not applied too thickly.
- Fit the wheelset bearing cap on the wheel.
- Check whether the magnet is in the correct position in relation to the odometer to be installed later: Visually check by looking through the odometer installation hole.
- Check whether the seal supplied has the correct thickness (see chart) → page 12).
- Clean (degrease) the odometer's bottom flange surface.
- Remove the protective paper from the flat seal supplied ([1] in the following drawings) and stick the seal onto the bottom flange of the odometer.
- Position the odometer in the wheelset bearing cap.
- Position the four pairs of Nordlock retaining plates on the bolts.
- Apply Loctite to seal the thread on the four Allen bolts supplied. Recommended: Loctite 268 (please observe manufacturer’s directions)
- Tighten the bolts to a torque of approx. 6 Nm.
- When it is certain that access to the bolts is no longer required, insert the plastic caps ([2] in figures below) so that they are flush with the top of the housing. **NOTICE** The caps will be destroyed when removed.
6 Start-up (programming)

After installation, the odometer data stored at the plant must be read out, processed and rewritten with a suitable reader – e.g., Recon™ Pocket PC, with RW2510 user software installed.

The user software runs on readers with Microsoft® Windows Mobile™ operating system, 5.0 or higher. Familiarity with Windows-based operating systems is required for the procedures described below. The user manual supplied with the reader provides suitable information – please observe particularly information on battery capacity, memory, data security and restoration! Use of the RW2510 application is described in a separate document (no. D-02B-2510RW).

► Switch the reader on.

► Check whether the system date and the time have been correctly set and update them if necessary.

   The correct date is of crucial importance for recording the data supplied by the odometer.

► Start the data exchange application software (RW2510, see associated operating instructions).

► Start the data transmission process: Switch from the main menu to configuration mode and then press the Read button.

   An audio signal indicates that the device is waiting for a transponder signal from the odometer.

► Hold the reader with the coil cover at a maximum distance of 3 cm from the odometer.

   An acoustic signal confirms the transmission process.

► After completing the read process, change the necessary parameters to adapt the odometer to the physical properties of the wheelset. These parameters are:

   ● Wheelset design
   ● Wheelset number
   ● Wheel diameter

   (For additional adjustable parameters, see RW2510 operating instructions.)

► To transmit the changed data to the odometer, press the Write button and hold the reader up to the odometer in the same manner as when reading.

This completes the odometer programming.
7 Maintenance

The odometer contains no serviceable parts.

The odometer's electrical circuit is completely sealed inside the metal housing, with plastic caps on the ends. This prevents the housing from being opened. Always replace mechanically or electrically defective odometers.

Dispose of defective odometers according to regional regulations for electrical and electronic devices.

<table>
<thead>
<tr>
<th>When?</th>
<th>What?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odometer defective</td>
<td>Replace odometer</td>
</tr>
<tr>
<td>Regularly</td>
<td>Check odometer for damage</td>
</tr>
<tr>
<td></td>
<td>Clean odometer</td>
</tr>
</tbody>
</table>
## 8 Technical data

### 8.1 Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>No external supply (power is produced by a magnet/coil system while the axle rotates; the power is induced into the reader by the handheld that reads out the odometer data)</td>
</tr>
<tr>
<td>Rated voltage (internal)</td>
<td>6 V DC in readout mode; 4-19 V DC in run mode</td>
</tr>
<tr>
<td>Operating and storage temperature</td>
<td>-40 °C - +85 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>0-98%, condensing</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 68</td>
</tr>
<tr>
<td>EMC</td>
<td>according to EN 50121-3-2, CE approved</td>
</tr>
<tr>
<td>Shock/vibration</td>
<td>according to IEC 61373, Cat. 3 (since the installation point on the axis is unsprung, the actual shock and vibration load may exceed the values specified in the standard)</td>
</tr>
<tr>
<td>Explosion protection</td>
<td>according to ATEX Directive 94/9/EC</td>
</tr>
<tr>
<td>Explosion-protection class</td>
<td>II 2G Ex ib IIB T4</td>
</tr>
<tr>
<td>Certificate number</td>
<td>BVS 06 ATEX E027</td>
</tr>
<tr>
<td>Type test</td>
<td>according to EN 50155</td>
</tr>
<tr>
<td>Air gap between magnet and odometer</td>
<td>3.5 mm ±3 mm</td>
</tr>
<tr>
<td>Material for odometer housing</td>
<td>aluminium AlSi12, anodised</td>
</tr>
<tr>
<td>Weight of odometer</td>
<td>approx. 250 g</td>
</tr>
<tr>
<td>Weight of magnet assembly</td>
<td>approx. 125 g (MG 25101)</td>
</tr>
<tr>
<td>Recording velocity</td>
<td>from 50 rpm</td>
</tr>
<tr>
<td>Temperature monitoring</td>
<td>threshold 70 °C and 85 °C</td>
</tr>
</tbody>
</table>
8.2 Dimensional drawings (dimensions in mm)

Odometer

Magnet assemblies

MG 25101

MG 25102, MG 25103

MG 25104, MG 25105
8.3 Prototype test certificate

EG-Baumusterprüfbescheinigung

- Richtlinie 94/9/EG -
Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen

(1) BVS 06 ATEX E 027

(4) Gerät: Umdrehungszähler Typ GEL 2510

(5) Hersteller: Lenord, Bauer & Co. GmbH

(6) Anschrift: 46145 Oberhausen

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.


Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 06.2011 EG niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit
EN 50014-1:1997 + A1 – A2 Allgemeine Bestimmungen
EN 50020:2002 Eigensicherheit "C"

(10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG. Für Herstellung und in Verkehr bringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

II 2G EEx ib IIB T4

EXAM BBG Prüf- und Zertifizierer GmbH
Bochum, den 02. März 2006

[Signatures]
9 Appendix: Machining drawings

The list below specifies the drilling and milling drawings for the wheelset bearing caps, which can be equipped with the odometer.

<table>
<thead>
<tr>
<th>Lenord+Bauer Drawing number</th>
<th>Bearing cap Drawing number</th>
<th>→ page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2510LD0001-D 3Fwg 000.02.004.005</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>2 2510LD0002-D 3Fwg 839.02.004.005</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>3 2510LD0003-D 3Fwg 000.1.02.04.001</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>4 2510LD0004-D Fw 8639.02.004.03.87</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>5 2510LD0005-D UIC.3.00.02.23</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>6 2510LD0006-D 3Fwg 825.02.004.05</td>
<td>27</td>
<td></td>
</tr>
</tbody>
</table>