INSTRUKART Keller Leo Record Manometer

Digital Manometer Instruction Manual

Model: Keller Leo Record Manometer

Brand: INSTRUKART

1. Introduction

The INSTRUKART Keller LEO Record Manometer is an autonomous, battery-powered digital manometer designed for precise pressure measurement and recording. It features a digital display and utilizes a robust piezoresistive pressure cell. This instrument is specifically engineered as an intrinsically safe version, making it suitable for use in hazardous area installations. It offers high measuring accuracy, resolution, and robustness, along with secure data storage in a non-volatile memory.

Image 1.1: Front view of the Keller LEO Record Manometer. This image displays the device's digital screen showing a pressure reading, along with "SELECT" and "ENTER" buttons at the bottom. The device is round with a pressure connection at the bottom.

Image 1.2: Angled view of the Keller LEO Record Manometer. This perspective shows the device from a slight angle, emphasizing its compact form factor and the robust pressure connection.

2. Safety Information

This device is designed for hazardous area installations and is intrinsically safe. Adherence to all safety guidelines is paramount to prevent injury or damage to the instrument. Always ensure the device is used within its specified operating conditions and pressure ranges. Do not attempt to open or repair the device in a hazardous environment. Refer to the device's certifications (e.g., ATEX, IECEx) for specific safety parameters and installation requirements in classified areas.

- Always verify the intrinsic safety rating is appropriate for the specific hazardous area classification.
- Ensure proper grounding and electrical connections as per local regulations and installation standards.
- Do not exceed the specified overpressure limits.
- Handle the device with care to avoid physical damage, which could compromise its intrinsic safety.
- Only use approved accessories and replacement parts.

3. Product Features

- **High Accuracy:** Offers high measuring accuracy, resolution, and robustness for reliable readings.
- **Data Security:** Features high data security due to the use of a non-volatile memory, ensuring recorded data is retained even without power.
- **Recording Function:** Capable of recording pressure and temperature values. Data can be analyzed using the included Software Logger 5.
- **Data Storage:** Allows for storage of installation data and comments directly within the instrument.
- **Wide Pressure Ranges:** Available in various pressure ranges, from -14.5 to 43.5 psi up to 0 to 14503 psi, with corresponding resolutions.
- **Robust Construction:** Media-contacting parts are made of Stainless Steel (AISI 316L) for durability and compatibility with various media.
- **Long Battery Life:** Powered by a 3.6 V Lithium battery, providing approximately 2 years of battery life.
- **Interface:** Equipped with an RS485 interface for communication and data transfer.
- **Protection Class:** Rated IP65, offering protection against dust and low-pressure water jets.

4. Components and Supply Scope

The standard supply scope for the Keller LEO Record Manometer includes the following items:

- 1 unit of Keller LEO Record Manometer
- Protective rubber covering
- Instruction Manual (this document)

Optional accessories, such as specific interface cables (e.g., K103-A/USB) or carrying bags, may be available separately.

5. Setup and Installation

5.1. Battery Installation

The LEO Record Manometer is powered by a 3.6 V Lithium battery. To install or replace the battery, carefully open the battery compartment located on the rear of the device. Insert the battery, ensuring correct polarity. Close the compartment securely to maintain the IP65 protection rating.

5.2. Pressure Connection

The device features a G1/4" pressure connection. Before connecting to a pressure source, ensure the connection point is clean and free of debris. Use appropriate sealing materials (e.g., PTFE tape) if necessary, and tighten the connection firmly but without excessive force to prevent damage. Verify that the pressure medium is compatible with the device's stainless steel (AISI 316L) wetted parts.

5.3. Initial Power-On

After battery installation and pressure connection, the device should power on automatically or by pressing one of the control buttons. The digital display will show the current pressure reading. Allow a few moments for the device to stabilize.

6. Operation

The LEO Record Manometer is operated using two buttons: **SELECT** and **ENTER**. The left key (**SELECT**) is used to turn the instrument on, to select functions, and to scroll through options. The right key (**ENTER**) executes the selected function or unit.

6.1. Key Functions

- **ZERO:** The ZERO function allows you to set any value as a new zero reference. This is useful for relative pressure measurements.
- **UNITS:** All standard measurement units are calibrated in the instrument. The pressure can be displayed in various units, such as bar, mbar/hPa, kPa, MPa, psi, kp/cm², mH_2O. Use the **SELECT** button to cycle through available units and **ENTER** to confirm your selection.
- **RECORD:** The record function can be started or ended with the operating keys. The configuration of the record takes place via the interface/software.

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DIGITAL MANOMETER
WITH RECORD FUNCTION

LEO RECORD
LEO RECORD Ei

LEO Record is an autonomous battery powered instrument with digital display designed to record pressure and temperature over long periods. LEO Record Ei is approved per IECEx for use in hazardous areas. Both the piezoresistive LEO Record as well as the capacitive LEO Record (ideal for low pressure ranges) offer the following advantages:

- High measuring accuracy, resolution and robustness
- High data security due to the use of a non-volatile memory
- Display of the actual pressure and the record status
- Recording of the pressure and temperature
- Software Logger 5 (included in delivery) for instrument configuration and analysis of measured data
- Combination of event-controlled recording and interval recording prevents unnecessary data being recorded (i.e. only measuring the pressure changes...)
- Installation data (and comments) of the measuring station can be stored in the instrument
- Pressure connection with G1/4" thread (other threads on demand)

The pressure is measured and displayed once per second (shortest interval). The top display indicates the actual pressure, the bottom display shows the record status.
All LEO Record versions have two operating keys. The left key is to turn the instrument on, to select the functions and the pressure units. The right key executes the selected function or unit.

The instruments have the following functions:

ZERO The ZERO-function allows to set any value as a new Zero reference.

UNITS All standard instruments are calibrated in bar. The pressure can be indicated in the following units: bar, mbar/hPa, kPa, MPa, PSI, kp/cm², (m)H_2O

RECORD The record can be started or ended with the operating keys.
The configuration of the record takes place via interface/software.

Optional accessories: - Protective rubber covering
- Carrying bag

CE

LEO Record

LEO Record Ei with capacitive sensor

SPECIFICATIONS LEO Record (Ei)

Pressure Ranges[1], resolution, overpressure:	Ranges	Resolution	Overpressure
	-1…3 bar	1 mbar	10 bar
	-1…30 bar	10 mbar	60 bar
	0…300 bar	100 mbar	400 bar
	0…700 bar	100 mbar	700 bar
	0…1000 bar	100 mbar	1000 bar
Total Error Band (0…50 °C)	0,1 %FS (Accuracy, incl. temperature error)		
Long Term Stability typ.	0,1 %FS		

SPECIFICATIONS LEO Record (Ei) capacitive

	Standard FS Pressure Ranges[1]			
PR (relative) / PD[2] (differential)	30	100	300	mbar
Overpressure	300	1000	1500	mbar
Negative Overpressure	30	100	300	mbar
Total Error Band (10…40 °C)	±0,2 %FS			
Long Term Stability typ.	±0,1 mbar			

[1] Other pressure ranges as well as instruments with relative pressure measuring cells on request
[2] For the PD-version, a tube connection Ø 6 mm for the reference is available

LEO Record Ei

Intrinsically Safe Version, 94/9/CE and IECEx

Classification: II 2 G Ex ia IIC T4 Gb
Certifications File:
PTB 05 ATEX 2012 X and IECEx PTB 13.0028X

The intrinsic safe version of LEO Record incorporates an additional protection board.

Functions, ranges and accuracy are identical to the standard LEO Record version.

The factory setting of the zero for the ranges ≤ 61 bar absolute is at vacuum (0 bar absolute). For relative pressure measurements, activate "ZERO SET" at ambient pressure. Instruments > 61 bar absolute or instruments with a relative pressure sensor (label marked with: Range: rel) are calibrated with the zero at atmospheric pressure.

Image 6.1: Excerpt from the official manual detailing the ZERO, UNITS, and RECORD functions, along with a specifications table for the LEO Record (EI) model.

7. SPECIFICATIONS

The following table provides detailed technical specifications for the Keller LEO Record Manometer:

Parameter	Value
Pressure Ranges (Example)	-14.5 to 43.5 psi (Resolution: 0.0145 psi); -14.5 to 435.1 psi (Resolution: 0 to 145 psi); 0 to 4351 psi (Resolution: 1.45 psi); 0 to 14503 psi (Resolution: 1.45 psi)
Overpressure (Example)	145.0 psi (for 43.5 psi range); 870.2 psi (for 435.1 psi range); 5801 psi (for 4351 psi range); 14503 psi (for 14503 psi range)
Storage Temperature	-10 to 60 °C (14 to 140 °F)
Operating Temperature	0 to 50 °C (32 to 122 °F)
Memory	57,000 measuring values (at ≤15 s interval); 28,000 measuring values (at >15 s interval)
Power Supply	3.6 V Lithium battery
Battery Life	Approx. 2 years (at 1 recording every 10 seconds)
Pressure Connection	G1/4"
Interface	RS485 (rear-sided mating plug "Fischer" compatible with PC-converter cable K103-A (RS232) and K104-A(USB))
Media Contact Material	Stainless steel (AISI 316L)
Protection Class	IP65
Dimensions (approx.)	Diameter x Height x Depth: 76 x 120 x 55 mm (LEO Record)
Total Error Band (10 to 40 °C)	± 0.2 %FS
Long Term Stability (Type)	± 0.1 mbar
Intrinsic Safety Version	94/9/CE and IECEx (suitable for hazardous area installations)

8. Maintenance

Proper maintenance ensures the longevity and accuracy of your LEO Record Manometer. Always disconnect the device from any pressure source before performing maintenance.

8.1. Cleaning

Clean the exterior of the device with a soft, damp cloth. Do not use abrasive cleaners or solvents, as these may damage the casing or display. Ensure no liquid enters the pressure connection or battery compartment.

8.2. Battery Replacement

Replace the 3.6 V Lithium battery when the low battery indicator appears on the display or when the device fails to power on. Refer to Section 5.1 for battery installation instructions. Dispose of old batteries according to local environmental regulations.

8.3. Storage

When not in use for extended periods, store the manometer in a clean, dry environment within the specified storage temperature range (-10 to 60 °C). It is recommended to store the device with the protective rubber covering to prevent physical damage.

9. Troubleshooting

This section provides guidance for common issues you might encounter with your LEO Record Manometer. For problems not listed here, or if issues persist, please contact INSTRUKART customer support.

Problem	Possible Cause	Solution
Device does not power on.	Depleted battery or incorrect battery installation.	Replace the battery (refer to Section 8.2). Ensure correct polarity.
Inaccurate pressure readings.	Device not zeroed, incorrect unit selected, or sensor contamination.	Perform a ZERO function (refer to Section 6.1). Verify the correct unit is selected. Check pressure connection for leaks or blockages.
Display shows "Error" or unusual characters.	Internal malfunction or sensor issue.	Power off the device and restart. If the error persists, contact customer support.
Cannot transfer data to PC.	Incorrect cable, driver issues, or software not running.	Ensure you are using the correct RS485 interface cable (e.g., K103-A/USB). Install necessary drivers. Verify Logger 5 software is running and configured correctly.

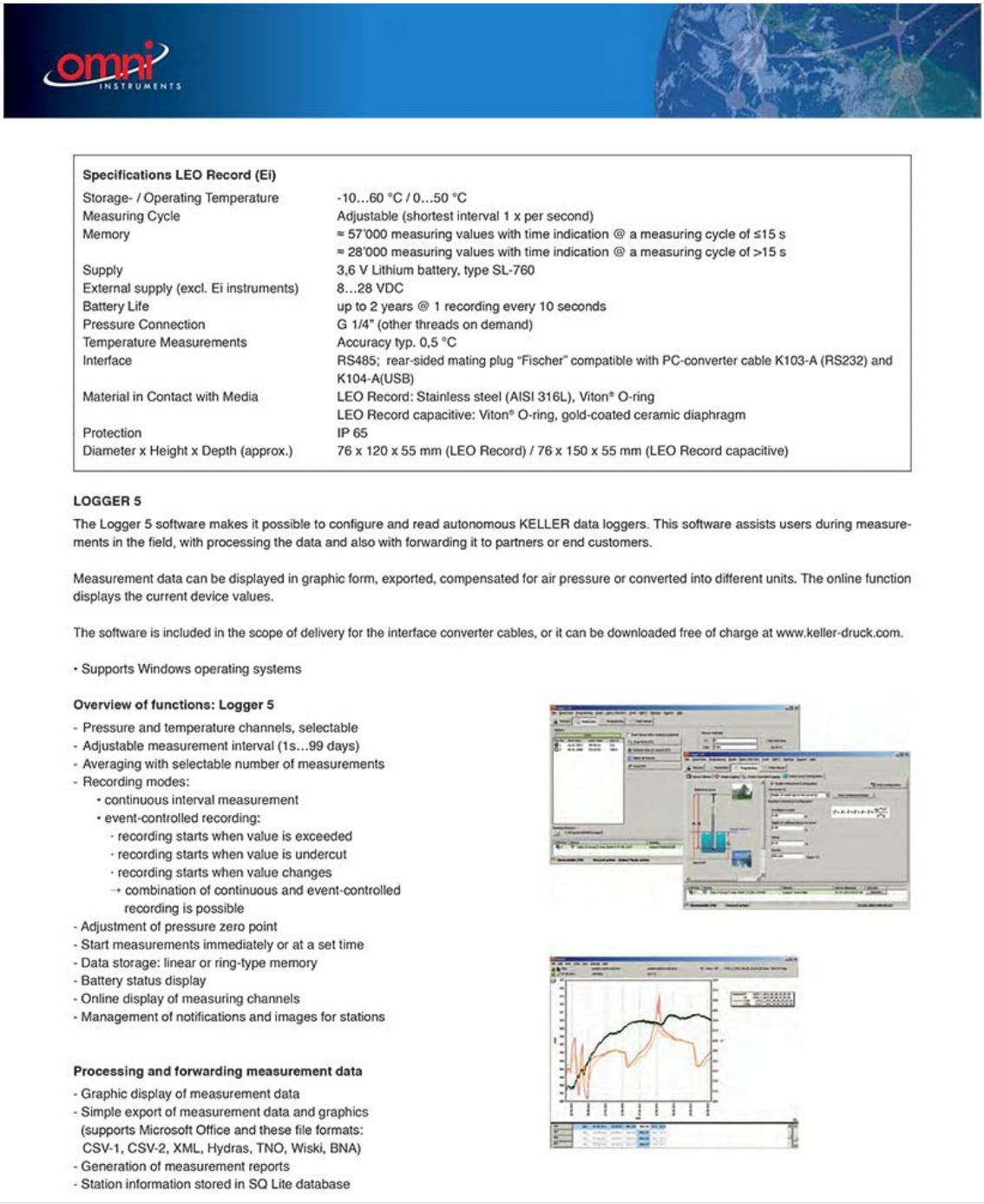
10. Software: Logger 5

The LEO Record Manometer is designed to work seamlessly with the Logger 5 software, which is included in the delivery. This software allows you to configure the device, read recorded data, and perform comprehensive analysis.

10.1. Key Functions of Logger 5

- **Data Acquisition:** Configure and read autonomous KELLER data loggers.
- **Measurement Display:** Measurement data can be displayed in graphic form, exported, or compensated for air pressure. The online function displays current device values.
- **Recording Modes:** Supports various recording modes including continuous, event-controlled, and combination of continuous and event-controlled recording.
- **Data Management:** Simple export of measurement data and graphics to programs like Microsoft Office. Supports various file formats (CSV, TXT, XML, DXF, WMF, BMP, JPG, GIF).
- **Station Information:** Installation data and comments of the measuring station can be stored in the instrument and managed within the software.

The Logger 5 software is compatible with Windows operating systems. The software and necessary interface converter cables are included, and the software can also be downloaded from the manufacturer's website (www.keller-druck.com).



Specifications LEO Record (Ei)

Storage- / Operating Temperature	-10…60 °C / 0…50 °C
Measuring Cycle	Adjustable (shortest interval 1 x per second)
Memory	≈ 57'000 measuring values with time indication @ a measuring cycle of ≤15 s ≈ 28'000 measuring values with time indication @ a measuring cycle of >15 s
Supply	3,6 V Lithium battery, type SL-760
External supply (excl. Ei instruments)	8…28 VDC
Battery Life	up to 2 years @ 1 recording every 10 seconds
Pressure Connection	G 1/4" (other threads on demand)
Temperature Measurements	Accuracy typ. 0,5 °C
Interface	RS485; rear-sided mating plug "Fischer" compatible with PC-converter cable K103-A (RS232) and K104-A(USB)
Material in Contact with Media	LEO Record: Stainless steel (AISI 316L), Viton® O-ring LEO Record capacitive: Viton® O-ring, gold-coated ceramic diaphragm
Protection	IP 65
Diameter x Height x Depth (approx.)	76 x 120 x 55 mm (LEO Record) / 76 x 150 x 55 mm (LEO Record capacitive)

LOGGER 5

The Logger 5 software makes it possible to configure and read autonomous KELLER data loggers. This software assists users during measurements in the field, with processing the data and also with forwarding it to partners or end customers.

Measurement data can be displayed in graphic form, exported, compensated for air pressure or converted into different units. The online function displays the current device values.

The software is included in the scope of delivery for the interface converter cables, or it can be downloaded free of charge at www.keller-druck.com.

• Supports Windows operating systems

Overview of functions: Logger 5

- Pressure and temperature channels, selectable
- Adjustable measurement interval (1s…99 days)
- Averaging with selectable number of measurements
- Recording modes:
  - • continuous interval measurement
  - • event-controlled recording:
    - · recording starts when value is exceeded
    - · recording starts when value is undercut
    - · recording starts when value changes
    - → combination of continuous and event-controlled recording is possible
- Adjustment of pressure zero point
- Start measurements immediately or at a set time
- Data storage: linear or ring-type memory
- Battery status display
- Online display of measuring channels
- Management of notifications and images for stations

Processing and forwarding measurement data

- Graphic display of measurement data
- Simple export of measurement data and graphics (supports Microsoft Office and these file formats: CSV-1, CSV-2, XML, Hydras, TNO, Wiski, BNA)
- Generation of measurement reports
- Station information stored in SQ Lite database

Image 10.1: Excerpt from the official manual providing an overview of the Logger 5 software's functions and capabilities, including screenshots of its interface.

11. Warranty and Support

For warranty information, please refer to the specific warranty terms provided with your purchase or visit the INSTRUKART official website. The warranty typically covers defects in materials and workmanship under normal use. For technical support, troubleshooting assistance, or service requests, please contact INSTRUKART customer service. Have your product model and serial number ready when contacting support to expedite the process.
INSTRUKART Customer Support:

Please refer to your purchase documentation or the INSTRUKART website for current contact details.