

LEO-Record

Digital gauge with memory function

Features

- High accuracy
- Insulated and encapsulated piezoresistive pressure sensor
- Pressure and temperature recording
- Non-volatile memory ensures a high degree of data security
- Very low power consumption, long battery life
- Optional: Intrinsically safe version LEO-Record-Ei available for use in explosive environments

Functions

- Wide range of pressure units to choose from
- 5 user-defined pressure units configurable via software
- Zero point calibration via buttons
- Record function can be stopped and started manually
- Various configurable recording functions

Typical applications

- Long-term monitoring and logging
- Water supply line monitoring
- Leakage monitoring
- Pressure monitoring in oil fields
- Gas line pressure checking

Accuracy

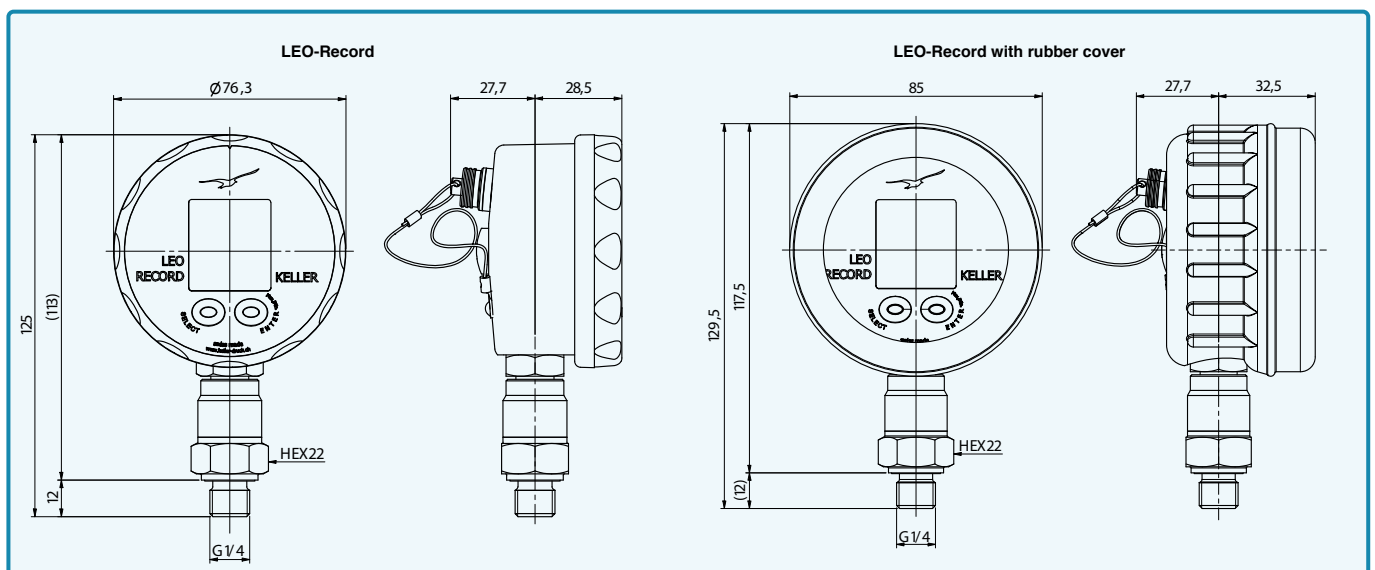
± 0,05 %FS

Total error band

± 0,1 %FS

Pressure ranges

-1...3 bar to 0...1000 bar



LEO-Record – Specifications

LEO-Record piezoresistive standard pressure ranges

| Relative pressure PR | Absolute pressure PAA | Absolute pressure PA | Proof pressure | Display resolution |
|--|---|----------------------------------|--------------------------------|--------------------|
| -1...3 | 0...4 | | 10 | 0,001 |
| -1...10 | 0...11 | | 30 | 0,001 |
| -1...30 | 0...31 | | 90 | 0,01 |
| | 0...61 | | 180 | 0,01 |
| | 0...101 | | 300 | 0,01 |
| | | 0...300 | 600 | 0,1 |
| | | 0...700 | 1200 | 0,1 |
| | | 0...1000 | 1200 | 0,1 |
| bar rel. | bar abs. | bar abs. | bar | bar |
| Reference pressure at atmospheric pressure | Reference pressure at 0 bar abs. (vacuum) | Reference pressure at 1 bar abs. | Relating to Reference pressure | |

LEO-Record capacitive standard pressure ranges

| Relative pressure PR | Differential pressure PD | Proof pressure | Negative Proof pressure | Display resolution |
|--|-----------------------------|-----------------------------|----------------------------|--------------------|
| 0...0,03 | | 0,3 | 0,03 | 0,01 |
| 0...0,1 | | 1 | 0,1 | 0,01 |
| 0...0,3 | | 1,5 | 0,3 | 0,1 |
| bar rel. | bar diff. | bar | bar | mbar |
| Reference pressure at atmospheric pressure | | Based on reference pressure | | |

The PD version features a 6 mm diameter capillary connection for reference.

Performance

LEO-Record piezoresistive

| | | |
|----------------------------------|---------------------|---|
| Accuracy @ RT (20...25 °C) | $\leq \pm 0,05$ %FS | Non-linearity (best fit straight line, BFS), pressure hysteresis, non-repeatability, zero point deviation and amplification deviation |
| Total error band (0...50 °C) | $\leq \pm 0,1$ %FS | Maximum deviation within the specified pressure and temperature range. |
| Compensated temperature range | 0...50 °C | |
| Long term stability | $\leq \pm 0,1$ %FS | Per year under reference conditions, annual recalibration recommended. |
| Position dependency | $\leq \pm 1,5$ mbar | Calibrated in vertical installation position with pressure connection facing downwards. |
| Pressure range reserve | ± 10 % | Valid measured values outside the pressure range, no overflow/underflow. |
| Temperature measurement accuracy | ± 1 °C typ. | |

LEO-Record – Specifications

LEO-Record capacitive

| | | |
|---------------------------------------|----------------------------|--|
| Accuracy @ RT (20...25 °C) | $\leq \pm 0,1$ %FS | Non-linearity (best fit straight line, BFSL), pressure hysteresis, non-repeatability, zero point deviation and amplification deviation |
| Total error band (0...50 °C) | $\leq \pm 0,2$ %FS | Maximum deviation within the specified pressure and temperature range. |
| Compensated temperature range | 0...50 °C | |
| Long term stability | $\leq \pm 0,1$ %FS | Per year under reference conditions, annual recalibration recommended. |
| Long term stability 30 mbar range | $\leq \pm 0,1$ mbar | |
| Position dependency | $\leq \pm 0,2$ %FS | Calibrated in vertical installation position with pressure connection facing downwards. |
| Temperature measurement accuracy | ± 1 °C typ. | |
| Pressure range reserve | ± 10 % | Valid measured values outside the pressure range, no overflow/underflow. |
| Line pressure dependency (PD version) | $\leq \pm 0,005$ %FS / bar | |
| Line pressure | ≤ 2 bar | |

Electrical data

| | | |
|--|------------------------------------|---|
| Battery | 3.6 V lithium battery, type SL-760 | For hazardous application areas, only 3.6 V SL-760 batteries from Tadiran are permitted (LEO-Record-Ei). |
| Battery life | Approx. 2 years | When used continuously with a storage interval of every 10 seconds. |
| External voltage supply | 8...28 VDC | LEO-Record-Ei devices cannot be used with an external power supply, and the RS485 interface must not be used in explosive areas. See operating instructions for further information. |
| Overvoltage and reverse polarity protection of external power supply | ± 32 V DC | |
| RS485 voltage insulation | -7...12 V DC | |
| GND - CASE insulation | > 10 M Ω @ 50 VDC | |
| External interface | RS485 half-duplex | |
| Interface measuring rate | 2/s | |
| Electrical connection | Female socket D 103 A054-130 | |

Electromagnetic compatibility

| | |
|---------------------------------------|---|
| CE conformity as per 2014/30/EU (EMV) | EN IEC 61326-1 / EN IEC 61326-2-3 / EN IEC 61000-6-1 / EN IEC 61000-6-2 / EN IEC 61000-6-3 / EN IEC 61000-6-4 |
|---------------------------------------|---|

Data logger

| | | |
|------------------|---------------------------------------|--|
| Cyclical logger | Recording of pressure and temperature | Various recording functions can be configured. |
| Data storage | 57,000 measured values with timestamp | Measurement interval ≤ 15 s |
| | 28,000 measured values with timestamp | Measurement interval > 15 s |
| Storage interval | Shortest 1/s | Configurable |

LEO-Record – Specifications

LC display

| | |
|--------------------------------|--|
| Dimensions/appearance | Width x height: 27,8 mm x 30 mm (see Dimensions and options) |
| Number of digits on LC display | 2 rows with 5 digits each |
| Display mode | Pressure and record status |
| Display interval | 2/s |
| Configurable pressure units | bar, mbar, hPa, kPa, MPa, PSI, mH ₂ O, cmH ₂ O, inH ₂ O, ftH ₂ O, mmHg, inHg, kp/cm ² |
| Additional pressure units | 5 user-defined units can be configured via software |

Mechanical data

Materials in contact with media

| Component | LEO-Record piezoresistive | LEO-Record capacitive |
|-------------------------------------|--|----------------------------------|
| Pressure connection | Stainless steel AISI 316L ≤ 400 bar | Stainless steel AISI 316L |
| | Stainless steel AISI 318LN, 1.4462 > 400 bar | |
| Pressure transducer diaphragm | Stainless steel AISI 316L | Aluminium oxide 96%, gold plated |
| Pressure transducer seal (internal) | None | Nitrile |
| Pressure connection seal (external) | FKM (75 Shore, -20...200 °C) | FKM (75 Shore, -20...200 °C) |

Other materials

| Component | LEO-Record piezoresistive | LEO-Record capacitive |
|---------------------------------|---------------------------|-----------------------|
| Display housing | Faradex AS-1003 | Faradex AS-1003 |
| Front glass | LEXAN® 163R | LEXAN® 163R |
| Pressure transducer oil filling | Silicone oil | None |

Other data

| Component | LEO-Record piezoresistive | LEO-Record capacitive | |
|---------------------------|---------------------------|------------------------|----------------------------|
| Pressure connection | G 1/4 male | G 1/4 male | See Dimensions and options |
| | 1/4-18NPT male | 1/4-18NPT male | |
| Diameter x height x depth | 76 mm x 125 mm x 54 mm | 76 mm x 150 mm x 55 mm | Without rubber cover |
| | 85 mm x 130 mm x 58 mm | 85 mm x 130 mm x 58 mm | With rubber cover |
| Weight (approx.) | 250 g | 350 g | Without rubber cover |

Environmental conditions

| | | |
|---------------------------|--|---------------------|
| Medium temperature range | -40...85 °C | Icing not permitted |
| Ambient temperature range | -10...60 °C | |
| Storage temperature range | -20...70 °C | |
| Protection | IP65 | |
| Note | Readability of the LC display is guaranteed between 0 °C and 50 °C. Outside of this temperature range, the readability of the display may be limited. | |

LEO-Record-Ei explosion protection

| | | |
|---|---|--|
| Intrinsically safe version LEO-Record-Ei in accordance with 2014/34/EU (ATEX) and IECEx | Ex II 2G Ex ia IIC T4 Gb PTB 05 ATEX 2012 X IECEx PTB 13.0028 X | The intrinsically safe version may only be operated using the 3.6 V battery, SL-760 from Tadiran. Max. permitted ambient temperature range -20...60 °C. |
| Note | The conditions for safe use can be found in the operating instructions. | |

LEO-Record – Dimensions and options

LC display

| Front cover | Content | Dimensions |
|-------------|---------|--|
| | | Width x height: 27,8 mm x 30,0 mm Digit size: top: 8,4 mm x 3,8 mm bottom: 6,3 mm x 2,9 mm |

External connection

| Placement | Connection | Pin assignment | |
|-----------|---|----------------|-----------------|
| | Female socket D 103 A054-130 | Red | Reference point |
| | | 1 | GND |
| | | 2 | n.c. |
| | | 3 | +Vs |
| | | 4 | RS485A |
| 5 | RS485B | | |

Available pressure connections

For pressure range ≤ 200 bar

| G1/4 | 1/4-18NPT |
|-------------------|-------------------|
| | |
| DIN EN ISO 1179-2 | ASME/ANSI B 120.1 |

For pressure ranges > 200 bar

| G1/4 | 1/4-18NPT |
|-------------------|-------------------|
| | |
| DIN EN ISO 1179-2 | ASME/ANSI B 120.1 |

Other pressure connections available on request.

LEO-Record – Dimensions and options

Other customer-specific options

- Other compensated pressure ranges
- Other compensated temperature ranges
- Parts that come into contact with media made from Hastelloy, Inconel 718 or titanium
- Customer-specific front covers
- Customer-specific firmware with application-specific calculations (e.g. leakage measurement)
- Other sealing materials for pressure transducers
- Other oil filling types for pressure transducers

LEO-Record – Software, scope of delivery and accessories

Interface

The LEO-Record gauge has a digital interface (RS485 half-duplex). Details of the communication protocols can be found at www.keller-druck.com. Documentation, a Dynamic Link Library (DLL) and various programming examples are available to integrate the communication protocol into your own software.

Interface converters

The connection to a computer is established via an RS485-USB interface converter. Suitable converters are available as accessories. To ensure smooth operation, we recommend the K-114A converter with the corresponding USB connector.

KOLIBRI Desktop

With the «KOLIBRI Desktop» Windows software, data recorded using KELLER pressure gauges with a recording function can be read and visualised. This data can be exported in CSV, JSON, image, Excel or Word format, as an image, or in other formats for further processing or documentation. Thanks to the intuitive software interface, the digital gauge is easy to configure and the various recording functions provide an optimum level of adaptability to suit the measuring task at hand. In order to convert measurement results directly after reading them, information about the measuring site, for instance parameters relating to water level calculation, can be saved directly in the measuring device.

KOLIBRI Desktop has a free license and is compatible with all products in the KOLIBRI suite.

Configuration options

- Configurable pressure and temperature channels
- Configurable storage interval (1s ... 99 days)
- Averaging from a configurable number of measurements
- Recording types
 - Constant interval measurement
 - Event-controlled recordings
 - Recording starts when value exceeded
 - Recording starts when measurement drops below a value
 - Recording starts when value changes
 - Combination of constant and event-controlled recording possible
- Calibration of the zero pressure point
- Start measurement immediately or at a specific time
- Water level calculation
- Data storage Linear or ring storage

Mano-Config

The ManoConfig program is compatible with various types of KELLER gauges and allows end customers to configure the devices.

Range of functions

- Configuring the wait period before automatic shut-down
- Activating/deactivating pressure units
- User-defined pressure units can be programmed
- Calibrating the pressure

CCS30

Measurement recording

- Graphical live visualisation of the measured values in a configurable time interval
- Adjustable measuring and storage interval
- Export function for the measured values recorded (csv, ...)

Configuration

- Call up of information (pressure and temperature range, firmware version, serial number etc.)





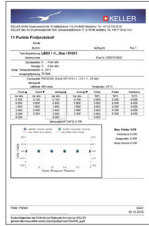



LEO-Record – Scope of delivery and accessories

Scope of delivery

| | | |
|---|---|---|
| Plastic case | 3.6 V lithium battery, type SL-760 | Operating instructions D/E/F |
|  |  |  |

Accessories

| | | |
|---|---|--|
| Rubber cover | Carry case | Interface converter |
|  |  |  |
| For additional protection in harsh environments. | With belt loop. | K-114-A <ul style="list-style-type: none"> • With Fischer plug (5-pin) • Various adapter cables available |
| KELLER 5-point report | KELLER 11-point report | Calibration certificate |
|  |  |  |
| Measurement deviation at room temperature. | Measurement deviation at room temperature with hysteresis. | Issued by the external calibration laboratory of the German accreditation body DAkkS or the Swiss accreditation body SAS. |