

## LEO3

Digital gauge with scaleable 4...20 mA output

### Features

- High accuracy
- Insulated and encapsulated piezoresistive pressure sensor
- Licence-free KELLER software available to download
- Analog output signal via RS485 interface and scaleable using buttons (turn-down)
- RS485 bus interface for communication with up to 128 devices

### Functions

- Wide range of pressure units to choose from
- Zero point calibration via buttons
- Min/max display
- Additional display for the analog 4...20 mA output
- User-defined units of pressure can be configured

### Typical applications

- Pump applications
- Fluid technology
- Pressure testing
- Industrial applications

#### Accuracy

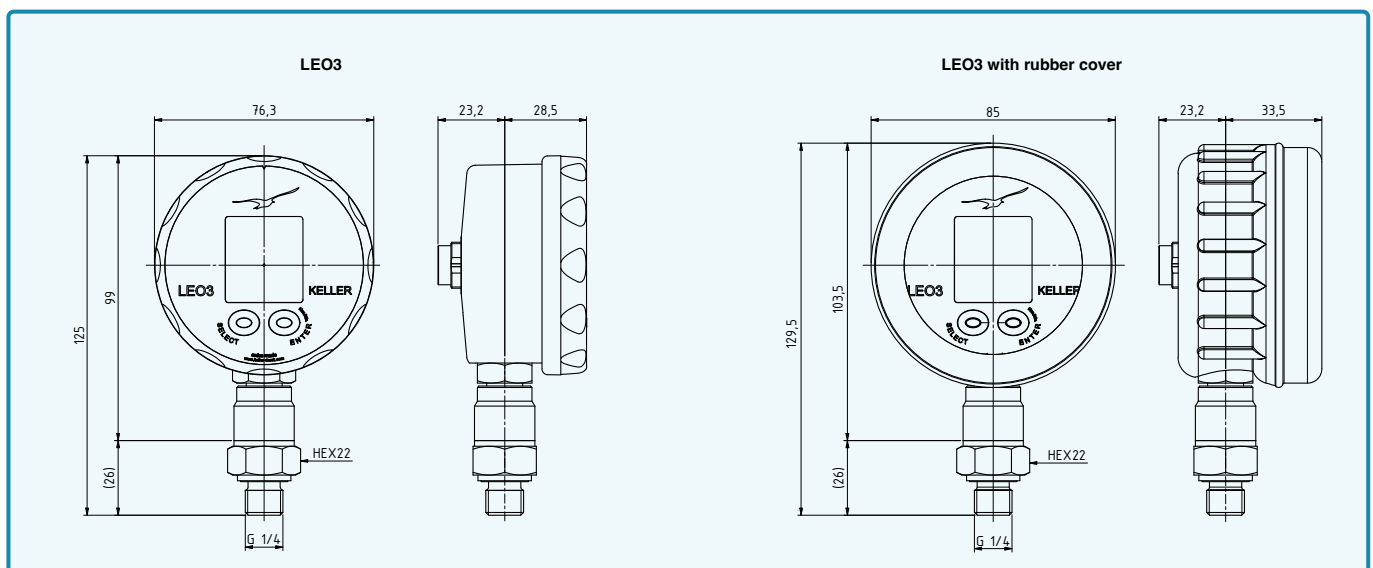
± 0,1 %FS

#### Total error band

± 0,2 %FS

#### Pressure ranges

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



## LEO3 – Specifications

### Standard pressure ranges

Relative pressure PR	Absolute pressure PAA	Absolute pressure PA	Proof pressure	Display resolution
-1...3	0...4		12	0,001
-1...10	0...11		30	0,002
-1...30	0...31		90	0,01
	0...101		300	0,02
		0...300	600	0,1
		0...700	1200	0,2
		0...1000	1200	0,2
bar rel.	bar abs.	bar	bar	bar
Reference pressure at atmospheric pressure	Reference pressure at 0 bar abs. (vacuum)	Reference pressure at 1 bar abs.	Based on reference pressure	

### Performance

#### Pressure

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	Max. deviation within the compensated pressure and temperature range.
Compensated temperature range	0...50 °C	
Long-term stability	$\pm 0,2$ %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	$\pm 10$ %	Valid measured values outside the pressure range, no overflow/underflow.

### Electrical information

Connectivity	2-wire + digital	
Analog interface	4...20 mA	
Digital interface	RS485	
Voltage supply	8...32 VDC	
Power consumption	3,5...22,5 mA	
RS485 voltage insulation	$\pm 18$ VDC	
Note	Disturbance of the 4...20 mA signal occurs during communication via the digital interface.	

Start-up time (power supply ON)	< 300 ms
Overvoltage protection and reverse polarity protection	$\pm 32$ VDC
GND case insulation	> 10 M $\Omega$ @ 300 VDC

#### Analog interface

Load resistance	< (U – 8 V) / 25 mA	2-wire
Limiting frequency	$\geq 30$ Hz	2-wire

## LEO3 – Specifications

### Digital interface

Type	RS485	Half-duplex
Communication protocols	KELLER bus protocol	Proprietary
	<i>MODBUS RTU is not supported</i>	
Identification	Class.Group: 7.09	Standard settings: bus address 1, baud rate 9600 bit/s.  Other default settings available on request. Can be reconfigured via software by the customer later.
Unit of pressure	bar	
Unit of temperature	°C	
Data type	Float32 and Int32	
Baud rates	9600 bit/s.	
Interface measuring rate	100/s	
Cable length	up to 1,2 km	

### Electrical connection

Plug	Round plug 423 - 723 - 425	M16 x 0,75	DIN EN 61076-2-106, 5-pin
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### Electromagnetic compatibility

CE conformity as per 2014/30/EU (EMC)	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
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### 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 4 1/2 digits each
Display mode	Pressure + min/max or 4...20 mA signal
Display interval	2/s
Configurable pressure units	bar, mbar, hPa, kPa, Mpa, PSI, kp/cm2
Additional pressure units	5 user-defined units can be configured via software

### Mechanical data

#### Materials in contact with media

Pressure connection	Stainless steel AISI 316L	≤ 400 bar
	Stainless steel AISI 318LN, 1.4462	> 400 bar
Pressure transducer diaphragm	Stainless steel AISI 316L	
Pressure transducer seal (internal)	none	
Pressure connection seal (external)	FKM (75 Shore, -20...200 °C)	For media temperatures < -20 °C, FVMQ (70 Shore, -60...175 °C) is used  Optional: EPDM (-40...125 °C)

#### Other materials

Display housing	Faradex NS003
Front glass	LEXAN® 163R
Pressure transducer oil filling	Silicone oil

#### Further details

Pressure connection	G1/4 male	See Dimensions and options
	1/4-18NPT male	
Diameter x height x depth	76 x 125 x 52 mm	Without rubber cover
	85 x 130 x 57 mm	With rubber cover
Weight	approx. 210 g	Without rubber cover

## LEO3 – Specifications

### Environmental conditions

Media temperature range	-40...85 °C	Icing not permitted
Ambient temperature range	-10...60 °C	
Storage temperature range	-20...70 °C	
Protection	IP65	
Load cycles @ RT (20...25 °C)	> 10 m. pressure cycles	0...100 %FS
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.	

# LEO3 – Dimensions and options

## LC display

Front cover	Content	Dimensions
		Width x height: 27,8 mm x 30,0 mm  Digit size: top: 8,0 mm x 3,6 mm bottom: 7,0 mm x 3,2 mm

## Electrical connection

Placement	Connection	Pin assignment
	Round plug 423 - 723 - 425, M16 x 0,75, 5-pin	1 OUT/GND
		2 n.c.
		3 +Vs
		4 RS485A
		5 RS485B

## Available pressure connections

For pressure ranges ≤ 400 bar

G1/4 (standard)	1/4-18NPT
DIN EN ISO 1179-2	ASME/ANSI B 1.20.1

For pressure ranges > 400 bar

G1/4 (standard)	1/4-18NPT
DIN EN ISO 1179-2	ASME/ANSI B 1.20.1

Other pressure connections available on request.

## Other customer-specific options

- Other compensated pressure ranges
- Other compensated temperature ranges
- Parts made of other materials that come into contact with media
- Customer-specific front covers
- Customer-specific firmware (e.g. application-specific calculations or leak measurement)
- Other pressure units can be configured ex works

## LEO3 – Software, scope of delivery and accessories

### Interface

The LEO3 gauge has a digital interface (RS485 half-duplex) which supports the KELLER bus protocol. Details of the communication protocols can be found at [www.keller-druck.com](http://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-114 with the corresponding USB connector.

### «ManoConfig» software

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

#### Range of functions

- Display of online measured values
- Configuring the wait period before automatic shutdown
- Activating/deactivating pressure units
- Entering user-defined pressure units
- Calibrating the pressure

### «CCS30» software

The CCS30 software has no licence costs and is used to perform configurations and record measured values.

#### Measurement recording

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






#### Configuration

- Call up of information (pressure and temperature range, firmware version, serial number etc.)
- Readjustment of zero point and amplification
- Rescaling of analog output (unit, pressure range)
- Selection of instrument address and baud rate

### Scope of delivery

Plastic case	Operating instructions D/E/F
	

### Accessories

Rubber cover	Interface converter	Calibration certificate with 5 measuring points	Calibration certificate with 11 measuring points	External calibration certificate
				
For additional protection in harsh environments.	K-114-B Round plug 423 - 723 - 425, M16 x 0,75	Deviation at room temperature.	Measurement deviation at room temperature with hysteresis.	Issued by an external calibration laboratory accredited by DakkS or SAS.