

LEX1

Digital precision manometer

Features

- High precision of up to 0,01 %FS
- Insulated piezoresistive pressure sensor encapsulated in an oil-filled metal housing
- RS485 bus interface for communication with up to 128 devices
- Battery-operated with up to 2000 hours of battery life
- Can be used with external power supply
- License-free KELLER software available to download
- Intrinsically safe, explosion-proof version LEX1-Ei available

Functions

- Wide range of units of pressure to choose from
- Zero point calibration via button
- Automatic shutdown
- Min / max display
- User-defined units of pressure can be configured
- Digital calibration (zero point, end point)

Typical applications

- Calibration
- Laboratory use
- Industrial applications

Accuracy

± 0,05 %FS

Total Error Band

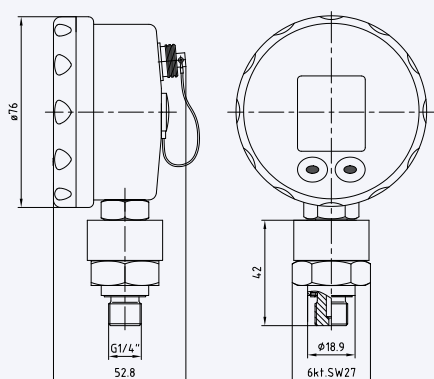
± 0,05 %FS

Pressure Ranges

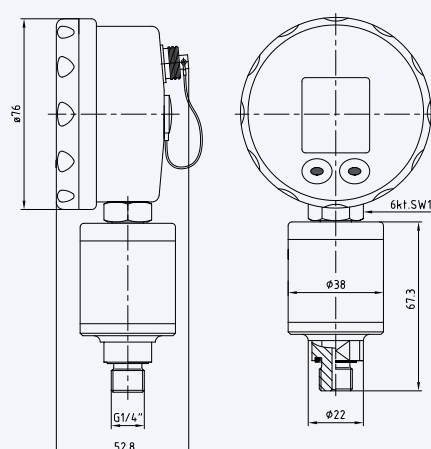
0...30 mbar to 0...1000 bar



LEX1 with piezoresistive measuring cell



LEX1 with capacitive measuring cell



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LEX1 – Specifications

Standard pressure ranges

LEX1 piezoresistive

Gauge pressure, PR	-1...1	-1...3	-1...6	-1...10	-1...16	-1...30								bar rel.
Absolute pressure, PAA	0...2	0...4	0...7	0...11	0...17	0...31	0...61	0...101	0...161					bar abs.
Absolute pressure, PA										0...300	0...400	0...700	0...1000	bar
Overload resistance	8	8	20	20	90	90	300	300	600	600	800	1100	1100	bar
Display resolution	0,1	0,1	1	1	1	1	1	10	10	10	20	50	100	mbar

LEX1 capacitive

Gauge pressure, PR	0...30	0...100	0...300	mbar
Differential pressure, PD				mbar diff.
Overload resistance	300	1000	1500	mbar
Negative overload resistance	30	100	300	mbar
Display resolution	0,01	0,01	0,1	mbar

For the PD version, a tube connection Ø 6 mm for the reference is available.

Key	PR	Gauge pressure	Zero at atmospheric pressure
	PAA	Absolute pressure	Zero at 0 mbar abs. (vacuum)
	PA	Absolute pressure	Zero at 1000 mbar abs.
	PD	Differential	

Performance

LEX1 piezoresistive

Accuracy @ RT (20...25 °C)	$\leq \pm 0,05 \%FS$	Nonlinearity (BFSL), pressure hysteresis, non-repeatability, zero point, amplification
Total error band (0...50 °C)	$\leq \pm 0,05 \%FS$	Max. deviation within the specified pressure and temperature range
Long-term stability	$\leq 0,1 \%FS$	> 1 bar, per year under reference conditions, yearly recalibration recommended
	$\leq 1,0 \text{ mbar}$	$\leq 1 \text{ bar}$, per year under reference conditions, yearly recalibration recommended
Degree of dependency on location	$\leq \pm 1,5 \text{ mbar}$	Calibrated in vertical installation position with pressure connection facing downwards
Accuracy of temperature measurement	$\pm 1 \text{ °C typ.}$	
Pressure range reserve	$\pm 10 \%$	
Vacuum endurance	$\leq 0,2 \text{ bar abs.}$	Of operation $\leq 0,2 \text{ bar abs.}$ upon request

LEX1 capacitive

Accuracy @ RT (20...25 °C)	$\leq \pm 0,1 \%FS$	Nonlinearity (BFSL), pressure hysteresis, non-repeatability, zero point, amplification
Total error band (0...50 °C)	$\leq \pm 0,2 \%FS$	Max. deviation within the specified pressure and temperature range
Long-term stability	$\leq 0,1 \%FS$	Per year under reference conditions, yearly recalibration recommended
Long-term stability 30 mbar range	$\leq 0,1 \text{ mbar}$	Per year under reference conditions, yearly recalibration recommended
Degree of dependency on location	none	
Line pressure dependency (PD versions)	$\leq \pm 0,005 \%FS / \text{bar}$	
Accuracy of temperature measurement	$\pm 1 \text{ °C typ.}$	
Pressure range reserve	$\pm 10 \%$	
Line pressure	$\leq 2 \text{ bar}$	

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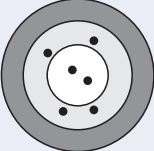
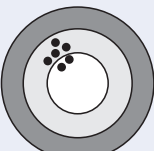
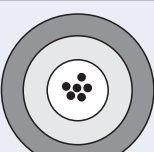
LEX1 – Specifications

Performance

Optional for LEX1 piezoresistive

Precision @ RT (20...25 °C)	$\leq \pm 0,01$ %FS	Nonlinearity (BFSL), pressure hysteresis, non-repeatability, with KELLER test report ex works
	$\leq \pm 0,025$ %FS	
Accuracy @ RT	$\leq \pm 0,01$ %FS	With DakkS (German accreditation body) certificate issued by external calibration laboratory

For PA / PAA ≥ 10 bar, except for flush versions.

	<p>Accuracy $\pm 0,05$ %FS, with KELLER test report ex works (standard)</p> <p>Keller uses pressure sources to calibrate its products that are at least four times more accurate than the product to be tested. This enables us to produce products in our factory with an absolute accuracy of up to $\pm 0,05$ %FS.</p>
	<p>Precision $\pm 0,01$ %FS / $0,025$ %FS, with KELLER test report ex works</p> <p>Additional measurement work and selection of a specific pressure transducer means that optimum repeatability is guaranteed for selected pressure transmitters and digital manometers. Owing to the residual measurement uncertainty of the pressure sources used at its factory, KELLER cannot provide any verification of measurement accuracy at scales below $\pm 0,05$ %FS for these ultra-precise devices. KELLER therefore uses the term "precision" to denote the ability of a pressure transmitter or manometer to repeat measured values within a tolerance of $0,01$ %FS based on the pressure sources used at the factory.</p>
	<p>Accuracy $\pm 0,01$ %FS with DakkS (German accreditation body) certificate, issued by an external accredited calibration laboratory</p> <p>By calibrating the zero point and performing amplification via the digital interface, an accredited calibration laboratory (ilac.org) can adapt ultra-precise KELLER products to their more accurate pressure sources and record the results. External calibration to an accuracy of up to $\pm 0,01$ %FS is performed in accordance with the guidelines set out by the German Calibration Service (DKD) and is conducted under reference conditions without any consideration of long-term effects.</p>

Temperature Ranges

Compensated temperature range	0...50 °C
Media temperature	0...50 °C
Ambient temperature	0...50 °C
Storage temperature	-20...70 °C

Electrical Data

Battery	3 V, type CR2430	LEX1-Ei only permitted for use in hazardous atmospheres when used with the Renata CR2430
Battery life	approx. 2000 hours	When used continuously
External power supply	8...28 VDC	LEX1-Ei devices must not be supplied with power from an external source and the RS485 interface must not be used in the Ex zone. See operating instructions for further information
Overvoltage protection and reverse polarity of external power supply	± 32 VDC	
RS485 voltage insulation	-7...12 VDC	
GND case insulation	> 10 M Ω @ 50 VDC	
External interface	RS485 half-duplex	
Interface measuring rate	30 measurements per second	
Electrical connection	Fischer D 103 A054-130	
CE conformity as per 2014/30/EU (EMC)	EN 61000-6-1 to -6-4 EN 61326-1 / EN 61326-2-3	

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LEX1 – Specifications

Display

Dimensions/appearance	Width x height: 27,8 x 30,0 mm (see Dimensions and options)
Number of digits on LC display	2 rows with 5 digits each
Display mode	Pressure + min / max
Measuring rate	2 measurements per second
Configurable units of pressure	[bar], [mbar], [hPa], [kPa], [MPa], [PSI], [mH ₂ O], [cmH ₂ O], [inH ₂ O], [ftH ₂ O], [mmHg], [inHg], [kp/cm ²]
Additional units of pressure	5 user-defined units can be configured

Mechanical Data

Materials in contact with media

Component	LEX1 piezoresistive	LEX1 capacitive
Pressure connection	Stainless steel AISI 316L	Stainless steel AISI 316L
Pressure transducer separating diaphragm	Stainless steel AISI 316L	Aluminium oxide 96 %, gold-plated
Pressure transducer seal (internal)	FKM (Viton® type A)	Nitrile
Pressure connection seal (external)	FKM (Viton® type A)	FKM (Viton® type A)

Other materials

Component	LEX1 piezoresistive	LEX1 capacitive
Display housing	Faradex AS-1003	Faradex AS-1003
Oil filling pressure transducer	Silicone oil	None

Further details

Component	LEX1 piezoresistive	LEX1 capacitive
Pressure connection	G1/4, see Dimensions and Options	
Diameter x height x depth	76 mm 118 mm x 55 mm	76 mm x 148 mm x 55 mm
Weight	approx. 300 g	approx. 335 g
Protection	IP65	

Explosion Protection LEX1-Ei

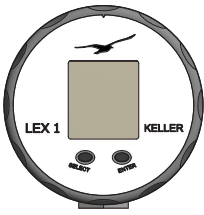

Intrinsically safe version in accordance with 2014/34/EU and IECEx	PTB 05 ATEX 2012 X IECEx PTB 13.0028 X Zone 1: Ex II 2 G Ex ia IIC T6 Gb	Permitted max. ambient temperature range -20...65 °C
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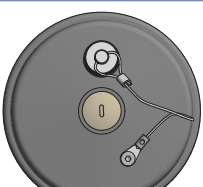

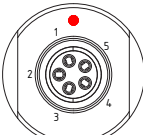
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LEX1 – Dimensions and Options

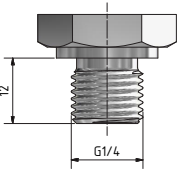
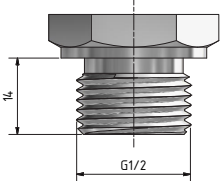
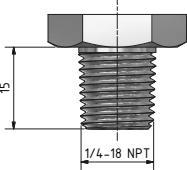
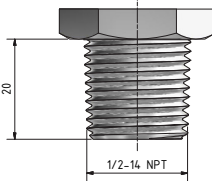
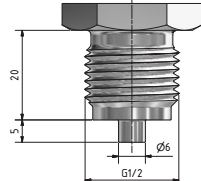
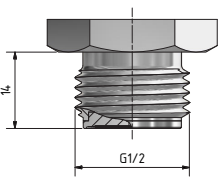
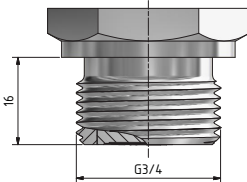
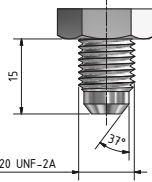
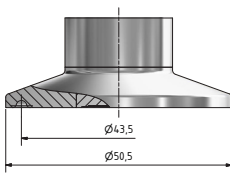
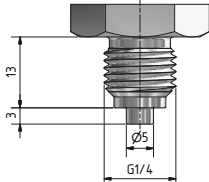
Display

Placement	Display information
	 <p>Width x height: 27,8 x 30,0 mm</p> <p>Digit height: 8,4 pt. large 6,3 pt. small</p>

External Connection

Placement	Connection		Pin assignment	
	Fischer connector D 103 A054-130		Red	Reference point
	 	1	GND	
		2	n.c.	
		3	+Vcc	
		4	RS485 A	
		5	RS485 B	

Available Pressure Connections

G1/4 (standard)	G1/2	1/4 NPT	1/2 NPT	G1/2 EN 837
				
G1/2 flush	G3/4 flush	7/16-20 UNF	Clamp DIN 32676 flush	G1/4 EN 837
				

Other pressure connections available upon request.

Other Customer-specific Options

- Other pressure and temperature ranges
- Parts that come into contact with media made from Hastelloy, Inconel or titanium
- Customer-specific front covers
- Integration of application-specific calculations
- Customer-specific firmware
- Detached pressure transducer
- Axial pressure connection
- Other sealing materials
- Other oil fillings pressure transducer

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LEX1 – Software and Accessories

Interface

The LEX1 manometer has a digital interface (RS485 half-duplex) which supports the KELLER bus protocol. The pressure measurement rate via the interface is up to 30 x per second. 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-114 A converter with the corresponding USB connector.

«ManoConfig» Software

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

Range of functions

- Display of online measured values
- Configuring the wait period before automatic shutdown
- Selecting standard pressure units
- Activating/deactivating pressure units
- User-defined pressure units can be programmed
- Restoring to factory settings
- Calibrating the manometer

«CCS30» Software




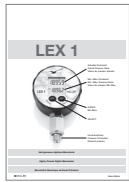
Recording measured values

- Live visualisation
- Adjustable measuring and storage interval
- Export function


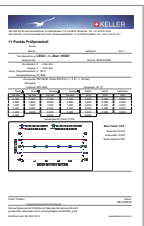



Configuration

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

Scope of Delivery

Plastic case	CR2430 battery	KELLER 5-point report	Operating instructions D/E/F
			

Accessories

Rubber cover	KELLER 11-point report	Calibration certificate	Interface converters	
				
For additional protection in harsh environments	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	K-114 A <ul style="list-style-type: none"> • With Fischer plug (5-pin) • Various adapter cables available 	K-114 BT A <ul style="list-style-type: none"> • with Bluetooth interface and integrated rechargeable battery • Wireless connection via Serial Port Profile (SPP) • 15 V measuring device supply from the converter's internal battery

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