

LR-Cal LPC 300

- Up to 10 interchangeable reference pressure sensors, this means up to 10 different pressure ranges with just one device.
- Pressure ranges from 0...250 mbar (0...4 psi) to 0...6000 bar (0...87000 psi). Unique number of pressure ranges available. Pressure, vacuum, compound and absolute pressure ranges.
- Accuracy (up to 1000 bar): $\pm 0.025\%$ FS.
- Including certificate of calibration for pressure, current and voltage. Optional: DAkkS (DKD) certificate
- Measurement of current (0/4...20 mA) and voltage (0...10 V).
- Sourcing voltage (to power unit under test, 24 VDC).
- Mode MEASURE: fast and very accurate pressure measurement
- Mode CALIBRATE: pre-define calibration procedures and work with them in the field. Afterwards download calibration data to PC with optional PC-software for creating certificates, etc.
- Mode SWITCH-TEST: shows switching points and calculates hysteresis.
- Complete calibration kits **LR-Cal LPP-KIT** available, incl. portable pressure test pumps, adapters, etc.. See **LR-Cal LPP-KIT**.



LR-Cal **LPC 300** for calibration service companies, service industry, maintenance facilities, measurement and control laboratories, quality assurance. Portable in the field or on bench in laboratory/workshop.

For a solution that always matches your application, there are many different pressure reference sensors **LR-Cal** **LPC-S** to choose from, with accuracies up to 0.025% and measuring ranges up to 8000 bar (116000 psi), which can be interchanged quickly and without tools. If the reference pressure sensor on the instrument is changed, then the digital indicator will recognise the new measuring range and so this saves the operator from having to configure it via menu. In addition to being fixed to the instrument, the reference pressure sensor can, optionally, be used externally via an approx. 1.2 m (4 ft.) long connecting cable.

In the setup menu, there are 3 operating modes to choose from. A menu assistant supports the user during each operation and records, for example, the calibration data from several calibrations or automatically calculates the switch hysteresis. To power the test item and to read test measurement signals, there are electrical inputs and outputs which are protected from adverse conditions in the field by optional protection caps.

For the evaluation and documentation of the calibration data stored in the **LR-Cal** **LPC 300** the software **LR-Cal** **LPC-Cal** is available. Using this software, the data is automatically transferred into a printable calibration certificate. For data transfer, an USB and RS232 interface are available at the **LR-Cal** **LPC 300**.

For mobile maintenance and service applications, various service case kits **LR-Cal** **LPP-KIT** are available. These include service cases with or without pressure generation, charger, test-cable set, adapters, etc.

A mains charger 115...230 VAC with EU-/UK-/US-adapters and a test-cable set are included in standard delivery.



Image:
Electrical ports at the **LR-Cal** **LPC 300**

Image (left):
LR-Cal **LPC 300** with 4 reference sensors **LR-Cal** **LPC-S** in optional transit case.

Reference pressure sensors LR-Cal LPC-S for LR-Cal LPC 300

Min. 1 sensor, max. 10 sensors with one **LR-Cal** **LPC 300** instrument. Direct connected or externally via optional extension cable 1.2 m (Order-Code: [LPC-KABEL](#))

Pressure range	[bar]	0...0.25	0...0.4	0...0.6	0...1	0...1.6	0...2.5	0...4	0...6	0...10	0...16
Overpressure limit	[bar]	1.6	2	4	5	10	10	14	35	35	80
Burst pressure	[bar]	2.4	2.4	4.8	6	12	12	20.5	40	42	96
Accuracy of measuring chain: $\pm 0.025\%$ FS (calibrated at 23°C (74°F) and in vertical mounting position, pressure connection facing downwards)											
Pressure range	[bar]	0...25	0...40	0...60	0...100	0...160	0...250	0...400	0...600	0...700	0...1000
Overpressure limit	[bar]	80	80	120	200	320	500	800	1200	1200	1500
Burst pressure	[bar]	96	96	550	800	1000	1200	1700	2400	2400	3000
Accuracy of measuring chain: $\pm 0.025\%$ FS (calibrated at 23°C (74°F) and in vertical mounting position, pressure connection facing downwards)											
Pressure range	[bar]	-0.4...0	-0.6...0	-1...0	-0.25...+0.25	-0.4...+0.4	-0.6...+0.6	-1...+1.5	-1...+3	-1...+5	-1...+9
Overpressure limit	[bar]	2	4	5	2	4	5	10	14	35	35
Burst pressure	[bar]	2.4	4.8	6	2.4	4.8	6	12	20,5	40	42
Accuracy of measuring chain: $\pm 0.025\%$ FS (calibrated at 23°C (74°F) and in vertical mounting position, pressure connection facing downwards)											
Pressure range	[bar]	-1...+10	-1...+15	-1...+20	-1...+24	-1...+39	All pressure ranges from 0...0.4 bar to 0...25 bar are also available as absolute pressure ranges.				
Overpressure limit	[bar]	35	80	80	80	80					
Burst pressure	[bar]	42	96	96	96	96					
Accuracy of measuring chain: $\pm 0.1\%$ FS; 0...7000 bar and 0...8000 bar $\pm 0.15\%$ FS (calibrated at 23°C (74°F) and in vertical mounting position, pressure connection facing downwards)											

Techncal data LR-Cal LPC 300**Anzeige**

Display Large TFT colour screen for the display of reference and test signals and additional information

Display resolution up to 6 digits, adjustable

Pressure units mbar, bar, psi, Pa, hPa, Mpa, mmHg, cmHg, inHg, mmH2O, cmH2O, mH2O, inH2O, kg/cm²
and a customer-specific unit (freely selectable dependant on measuring range)

Funktions

Operating modes MEASURING, CALIBRATION and SWITCH-TEST

Measurement rate 2 values per second

Functions MEASURING, CALIBRATION, SWITCH-TEST
Min-/Max memory, Tare, Min-/Max alarm (audible/visual), filter (running average), zero-point adjustment, PowerSave function

Menu languages German, English, Spanish, French, Italian (settable), or Russian

CALIBRATE function

Memory capacity up to 16 test items

Test points / test item up to 32 comparison points per test item

SWITCH-TEST function

Switch points Determination of the switch points and automatic calculation of the hysteresis

Measuring input: Voltage

Measuring ranges 0...1 VDC, 0...2 VDC, 0...5 VDC, 0...10 VDC

Resolution up to 6 digits, adjustable

Accuracy 0.5 mV

Measuring input: Current

Measuring ranges 0...20 mA, 4...20 mA

Resolution up to 6 digits, adjustable

Accuracy 1.6 μ A

Output

Voltage supply 24 VDC (load: max. 50 mA; min. 20 mA), can be activated via menu

Power supply

Supply Internal Lithium-Ion rechargeable battery (charging time < 6 h)

Battery life approx. 20 hours of operation

Permissible ambient conditions

Operating temperature 0...50°C (32...122°F)

Storage temperature -20...+70°C (-4...+158°F)

Relative humidity 0...85% r.h. (non-condensing)

Communication

Interfaces USB and RS232

Case

Material Impact-resistant ABS plastic, membrane keypad, transparent screen

Ingress protection IP 54 (with protection caps closed)

Dimensions 156 mm x 208 mm x 78 mm (incl. direct mounted reference sensor)

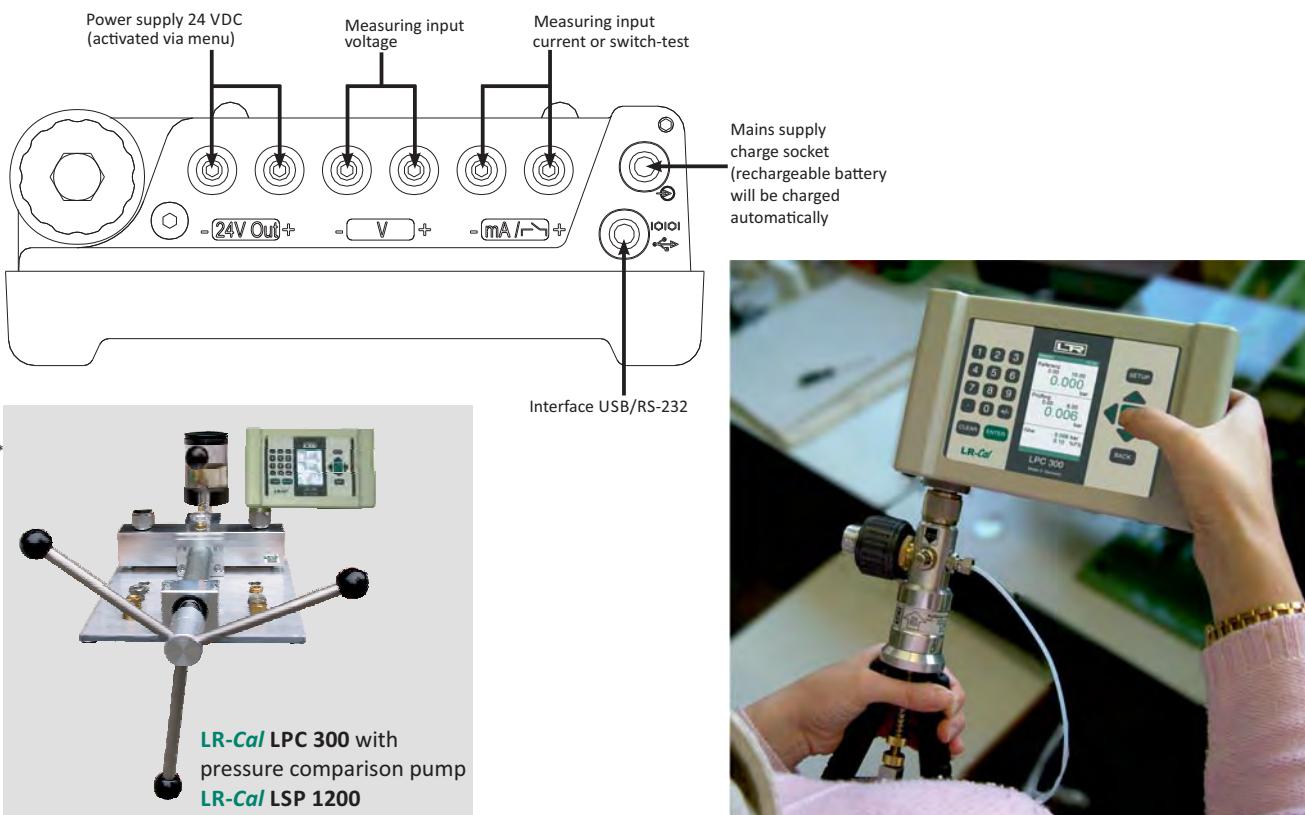
Weight approx. 850 g (1.87 lbs) (without reference sensor)

Technical data LR-Cal LPC-S sensor for LR-Cal LPC 300

Pressure connection	≤ 1000 bar: 1/2" BSP male (optional several threaded adapters available) ≥ 1600 bar: M16 x 1.5 female with sealing cone 60°
Material	
Wetted parts	Stainless steel (ranges ≥ 40 bar... ≤ 1000 bar: Elgiloy® in addition)
Internal transmission fluid	Only for measuring ranges up to 25 bar (360 psi): synthetic oil For optional oxygen variants: Halocarbon oil (max. +60°C / +140°F)
Sensor specifications	
Accuracy per year	$\leq 0.025\%$ FS (only with related LR-Cal LPC 300) Ranges ≥ 1600 bar: $\pm 0.1\%$ FS, ≥ 7000 bar: $\pm 0.15\%$ FS
Compensated range	0...50°C (32...122°F)
Permissible ambient conditions	
Medium temperature	-20...+80°C / -4...+176°F (optional oxygen variants: max. +60°C / +140°F)
Operating temperature	-20...+80°C / -4...+176°F
Storage temperature	-40...+85°C / -40...+185°F
Relative humidity	0...95% r.h. (non-condensing)
Case	
Material	Stainless steel
Connection to LR-Cal LPC 300	Plug and Play, direct (optional: externally via extension cable 1.2 m / 4 ft.)
Ingress protection	IP65 (with cable connected)
Dimensions	Height 126 mm x largest diameter 40 mm
Weight	approx. 230 g (0.5 lbs.)
Output signal	Digital communication to LR-Cal LPC 300

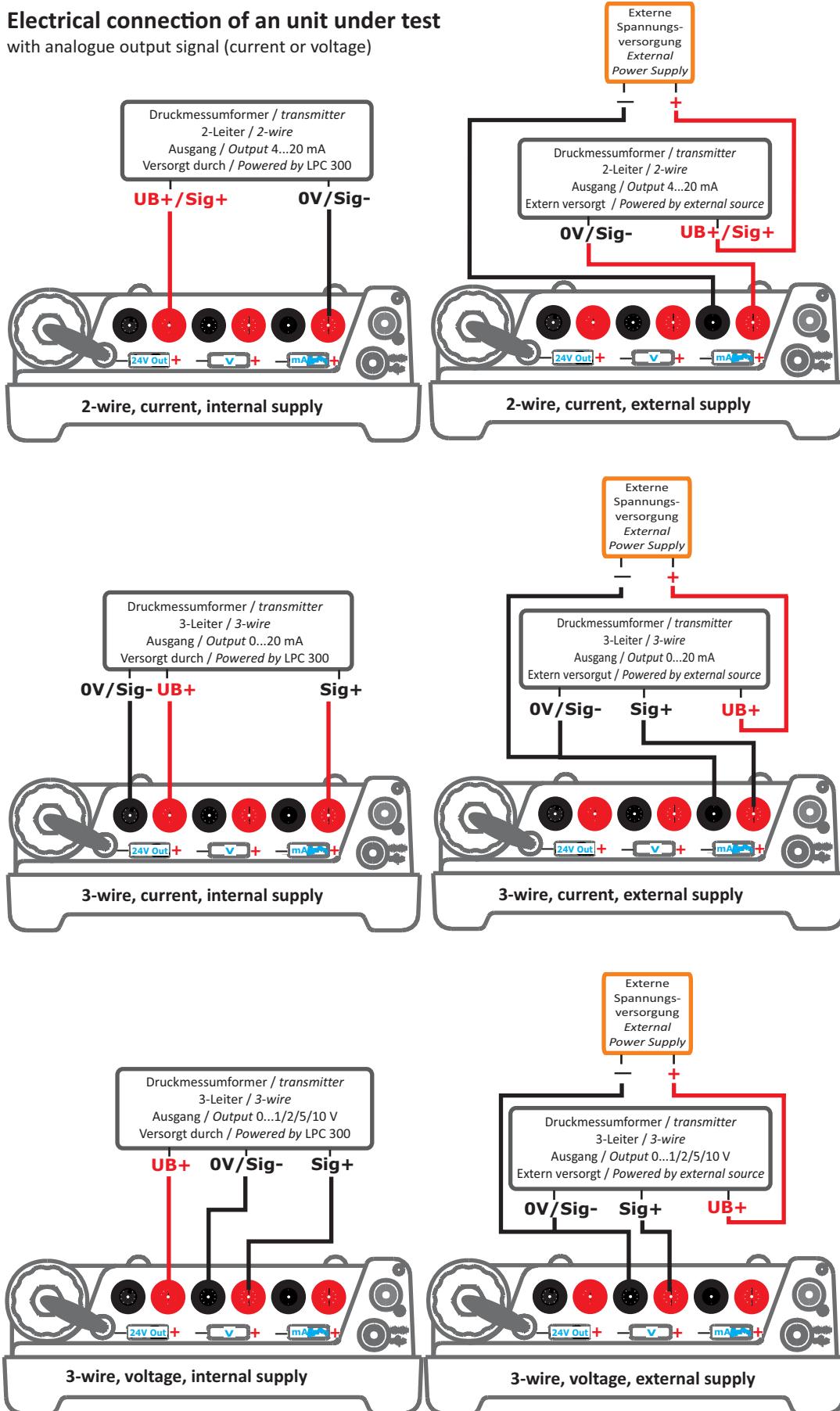
Conformities, approvals and certifications

- EMC directive 2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (LR-Cal LPC 300: portable measuring equipment and LR-Cal LPC-S: industrial application)
- Pressure equipment directive 97/23/EC, module A, PS > 200 bar, pressure accessory
- Traceable factory certificates of calibration for pressure, current and voltage
Optional: DAkkS (DKD) certification for pressure

Electrical connections at the instrument LR-Cal LPC 300

Electrical connection of an unit under test

with analogue output signal (current or voltage)

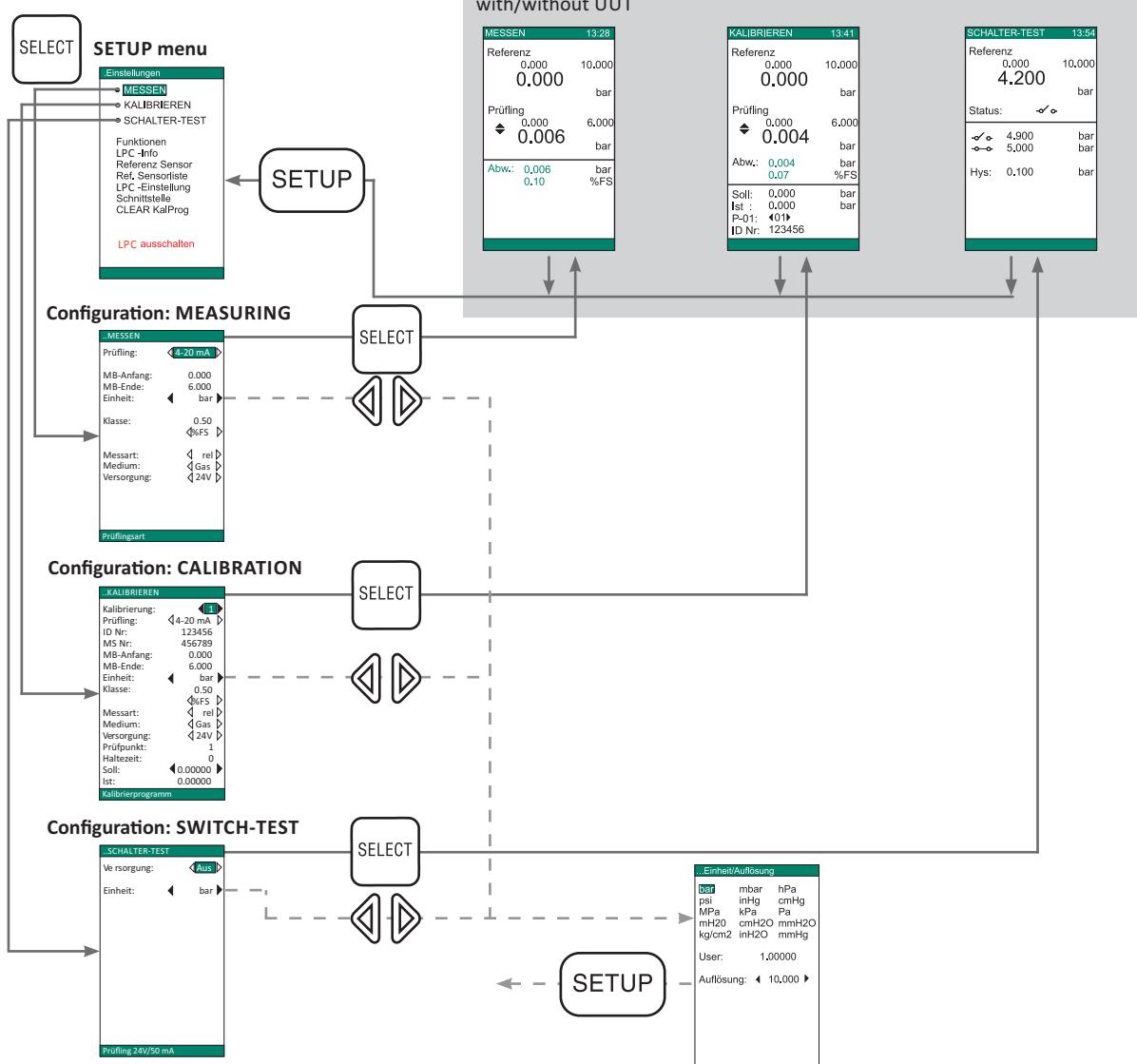


User interface

- 1 - Setup menu
- 2 - Selection and entry confirmation
- 3 - One step back
- 4 - Clear entry
- 5 - Entry acknowledgement
- 6 - Numeric keypad

Switch ON:
via pressing any button/key.

Switch OFF:
via menu item in main menu

**Operating modes****Menu structure**

LPC 300

Documenting process and pressure calibrator
with up to 10 measuring ranges, $\pm 0.025\% \text{ FS}$

LR-Cal

LR

Reference pressure sensor **LR-Cal** LPC-S mounted directly at the **LR-Cal** LPC 300 instrument:



Reference pressure sensor **LR-Cal** LPC-S externally with optional extension cable connected to **LR-Cal** LPC 300



Mode: MEASURE

MESSEN	13:28
Referenz	0.000
	0.000
Prüfling	0.000
◆	0.006
Abw.	0.006
	bar
	0.10
%FS	

Mode: CALIBRATE

KALIBRIEREN	13:41
Referenz	0.000
	0.000
Prüfling	0.000
◆	0.004
Abw.	0.004
	bar
	0.07
%FS	
Soll:	0.000
Ist :	0.000
P-01:	401
ID Nr.:	123456

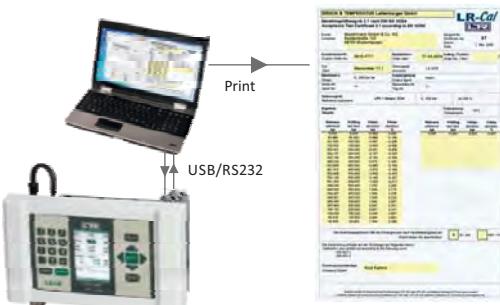
Mode: SWITCH-TEST

SCHALTER-TEST	13:54
Referenz	0.000
	10.000
bar	
Status:	✓ ◊
◆	4.900
◊	5.000
bar	
Hys:	0.100
bar	

The menu guides the user through the steps to configure and carry out calibrations and measurements. Different height levels between reference and unit under test can be specified and automatically corrected.

Comfortable checking and testing of pressure switches.
Indication of switch points and automatically calculation of the hysteresis.

Optional PC software **LR-Cal** LPC-Cal



- Calibration of pressure transmitter, pressure gauges on site, without PC or laptop.
- A calibration assistant guides through the calibration, considering the DKD/DAkkS guidelines (e.g. dwell times, pre-charges, etc.) The data is stored including date & time in the instrument's memory. Calibration procedures can be pre-defined with the calibrator.
- With the **LR-Cal** LPC-Cal software the stored calibration data can be downloaded to PC/laptop and printed out as certificate.

Komplette Test-, Service- und Kalibrierkoffer

Transit and service case including pressure test pump(s), set(s) of threaded adapters and software. See datasheet **LR-Cal** LPP-KIT resp. brochure „Portable Pressure Calibration“.



Electronic Pressure Calibrator **LR-Cal LPC 200, changeable pressure sensors**

- Very simple operation, easily-read display (backlighting selectable)
- Changeable reference sensors (plug & play)
this means, up to 10 pressure ranges with one instrument
- Ranges from 0...5.8 psi (400 mbar) up to 0...87000 psi (6000 bar)
(also vacuum-, compound- and absolute pressure ranges)
- Accuracy up to 1000 bar: $\pm 0.025\%$ f.s.; up to 6000 bar: $\pm 0.1\%$ f.s.
- Logging function, pressure rate, min-/max value, Bargraph, Tare
- Issue calibration certificates with optional PC-Windows® -software **LPC-Cal**
- Pressure calibration kit's, complete with calibration hand pumps as portable pressure source
- Chargeable Lithium-Ion battery, incl. Charger, USB-interface
- Switchable pressure unit PSI, bar, mbar, kPa, mmHg, inHg



Together with a suitable calibration pressure source like the calibration hand pumps **LR-Cal** LPP 40 (pneumatic) or **LR-Cal** LPP 700 / LPP 1000 (hydraulic), the **LR-Cal** LPC 200 offers a precision pressure calibration system, suitable also for use on site, portable. The **LR-Cal** LPC 200 also opens up other helpfull applications, e.g. recording of pressure curves (logging function), leak testing (pressure rate function). These useful functions can be easily activated or deactivated by pressing the respective keys.

A factory calibration certificate for each reference sensor certifies the total uncertainty of the measuring chain. Alternatively, on request, a DAkkS calibration certificate can be supplied.



Using the optional **LPC-Cal** software, the logged data, stored in the **LR-Cal** LPC 200, can be transferred to a PC via a USB connection, where it can be stored in an Excel® file for documentation and further evaluation. In addition, **LPC-Cal** offers the possibility of PC-supported calibration of pressure measuring instruments using the **LR-Cal** LPC 200.

Technical Data (Indicator **LR-Cal LPC 200 together with reference sensor **LPC-2**):**

Standard Pressure Ranges (PSI)	5.8	23.2	87	232	580	1450	3626	8700	14500
Standard Pressure Ranges (bar)	0.4	1.6	6	16	40	100	250	600	1000
Overpressure safety (bar)	2	10	35	80	80	200	500	1200	1500
Burst pressure (bar)	2.4	12	42	96	400	800	1200	2400	3000
Accuracy (Total uncertainty of measurement chain)	0.025% FS, calibrated at 23°C and in vertical mounting position with pressure conn. facing down.								
High Pressure Ranges (PSI)	23200	36200	58000	72500	87000				
High Pressure Ranges (bar)	1600	2500	4000	5000	6000				
Overpressure safety (bar)	2000	3000	4400	6000	7000				
Burst pressure (bar)	4000	5000	7000	10000	11000				
Accuracy (Total uncertainty of measurement chain)	0.1% FS (calibrated at 23°C and in vertical mounting position with pressure conn. facing down.)								
Type of pressure	see above (standard and high pressure ranges) but also vacuum-, compound- and absolute pressure ranges								
Units of pressure	bar, mbar, kPa, mmHg, inHg, PSI (depending on range, switchable)								
Active temperature compensation	+10...+40°C								
Permissible ambient temperature	0...+50°C								
Calibration	Traceable factory certificate of calibration (optional: DAkkS certificate of calibration)								

Technical Data Indicator LR-Cal LPC 200:

Display	large graphic display, with backlighting on/off selectable
Display resolution	up to 6 digits, selectable
Measuring rate (pressure)	5 values per second
Functions	min-, max-memory, tare, pressure rate, filter, zeropoint-adjustment
Data logger	up to 1000 values, cycle time adjustable 1...3600 seconds
Interface	USB
Power supply	internal Lithium-Ion rechargeable battery (charging time <6 h) alternative: mains supply via charger
Battery operation	approx. 25 hours
Permissible air humidity	0...85% r.h. at 50°C, non-condensing
Permissible storage temperature	-20...+60°C
Housing material	Polyamide 12, membrane keyboard, transparent panels
Ingress protection	IP 65
Weight (without sensor)	approx. 480 g
Dimensions (without Sensor)	width x height x depth: 75/106 x 50/82 x 194 mm
CE-conformity	interference emission and immunity to EN 61326 declaration of conformity on request

Technical Data Reference Sensors LPC-2:

Pressure connection	up to 1000 bar: 1/2" BSP male (other on request) >1000 bar: high pressure port M16 x 11,5 female, with sealing cone
Wetted parts (material)	stainless steel
Permissible medium temperature	-30...+105°C
Permissible storage temperature	-40...+85°C
Housing material	stainless steel
Electrical connection	round plug, 8-pole, suitable for LR-Cal LPC 200
Weight	approx. 220 g
Dimensions	diameter x height: 40 x 102,5 mm
CE-conformity	89/336/EWG interference emission and immunity to EN 61326 97/23/EG pressure equipment directive (module H)

Scope of Supply:

- Indicator **LR-Cal** LPC 200
- 1 reference sensor **LPC-2** (optional up to 9 more reference sensors = pressure ranges possible)
- Factory certificate of calibration 3.1 as per EN 10204
- Battery charger 115...230 VAC, incl. several adaptors
- Operating manual

Options / Accessories:

- DAkkS certificate of calibration
- Thread adaptors for pressure connection
- MINIMESS [®] quick-connectors and hoses
- **LPC200-MAH** magnetic hook
- **LPC200-SCH** supporting loop
- USB interface cable and PC-Windows-Software **LPC-Cal**
- Calibration handpump **LR-Cal** LPP 40, **LR-Cal** LPP 700, **LR-Cal** LPP 1000 and case (complete pressure calibration kit's **LR-Cal** LPP-KIT)



Electronic Pressure & Temperature Calibrator **LR-Cal** LPC 200-T

- Pressure: interchangeable sensors **LPC-2**,
up to 1000 bar ±0.025% FS,
up to 6000 bar ±0.1% FS
- Temperature: Pt 100, Accuracy ±0.05°C

For calibration service companies and service industry,
measurement and control laboratories, quality assurance.

- Digital indicator with temperature sensor and
interchangeable pressure sensors **LPC-2** (plug & play).
- Pressure ranges from 0...400 mbar to 0...6,000 bar
as well as absolute and compound pressure ranges.
- Simultaneously measurement of pressure & temperature
- Min- and Max values, pressure rate and data logging
- PC-Software **LPC-Cal** included in standard delivery
(Read-out of logged data, creation of calibration
certificates)



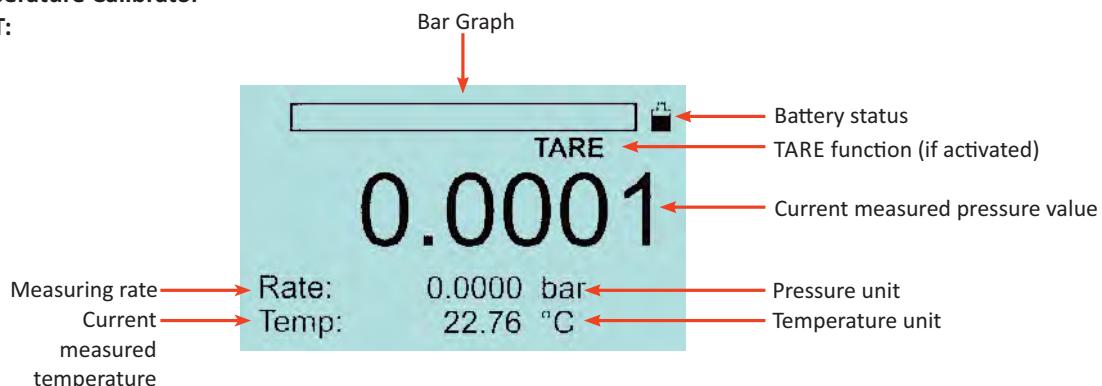
Together with a suitable calibration pressure source like the pressure test pumps **LR-Cal LPP 40**, **LR-Cal LPP 60**, **LR-Cal LPP 700** or **LR-Cal LPP 1000**, or pressure comparison pumps like **LR-Cal LPP 60-T** or **LR-Cal LSP** the pressure and temperature calibrator **LR-Cal LPC 200-T** offers a precision pressure calibration system with accurate temperature measurement. The **LR-Cal LPC 200-T** also opens up other helpfull applications, e.g. recording of pressure and temperature curves (logging function), leak testing (pressure rate function with recording of a influence of temperature) and Peak value measurement (MIN/MAX value function).

With the supplied PC-software **LPC-Cal**, the logged data can be transferred to a PC via USB connection. In addition, the software offers the possibility of PC-supported calibration of pressure measuring instruments using the **LR-Cal LPC 200-T**.

For mobile use, several Kits including portable pressure test pump(s), hose and threaded adapters, supplied in transit case with custom foams, are available.

For each reference sensor **LPC-2** and the temperature sensor a traceable certificate of calibration is supplied. Optional DKD-/DAkkS-certification is available.

**The Display of the
Pressure & Temperature Calibrator
LR-Cal LPC 200-T:**



Technical Data		Pressure and Temperature Calibrator LR-Cal LPC 200-T (complete measuring chain)								
Pressure measurement		1 reference pressure sensor LPC-2 (changeable without tools) ¹⁾								
Measuring range	bar	0.4 *)	1.6 *)	6 *)	16 *)	40	100	250	600	1000
Overpressure safety	bar	2	10	35	80	80	200	500	1200	1500
Burst pressure	bar	2.4	12	42	96	400	800	1200	2400	3000
Accuracy of the measuring chain		0.025 % FS ²⁾								
Measuring range	bar	1600	2500	4000	5000	6000				
Overpressure safety	bar	2300	3500	5000	6000	7000				
Burst pressure	bar	4000	6000	8000	10000	11000				
Accuracy of the measuring chain		0.1 % FS ²⁾								
Type of pressure		gauge pressure; *) = also as absolute ranges; compound pressure ranges also available: -1...0 bar, -1...+0.6 bar, -1...+3 bar, -1...+5 bar, -1...+24 bar								
Pressure units		bar, mbar, kPa, psi, mmHg, inHg and kg/cm ² (depending on the measuring range, selectable)								
Active temperature compensation	°C	10 ... 40								
Temperature measurement		Sensor 295 x 3 mm, with handle								
■ Sensor type		Pt100, 4-wire								
■ Measuring range	°C	-10 ... +50								
■ Resolution	°C	0.01								
■ Accuracy	°C	0.05								
Permissible ambient temperature	°C	0 ... 50								
Calibration ²⁾		Factory calibration certificate (optional: DKD/DAkkS calibration certificate)								

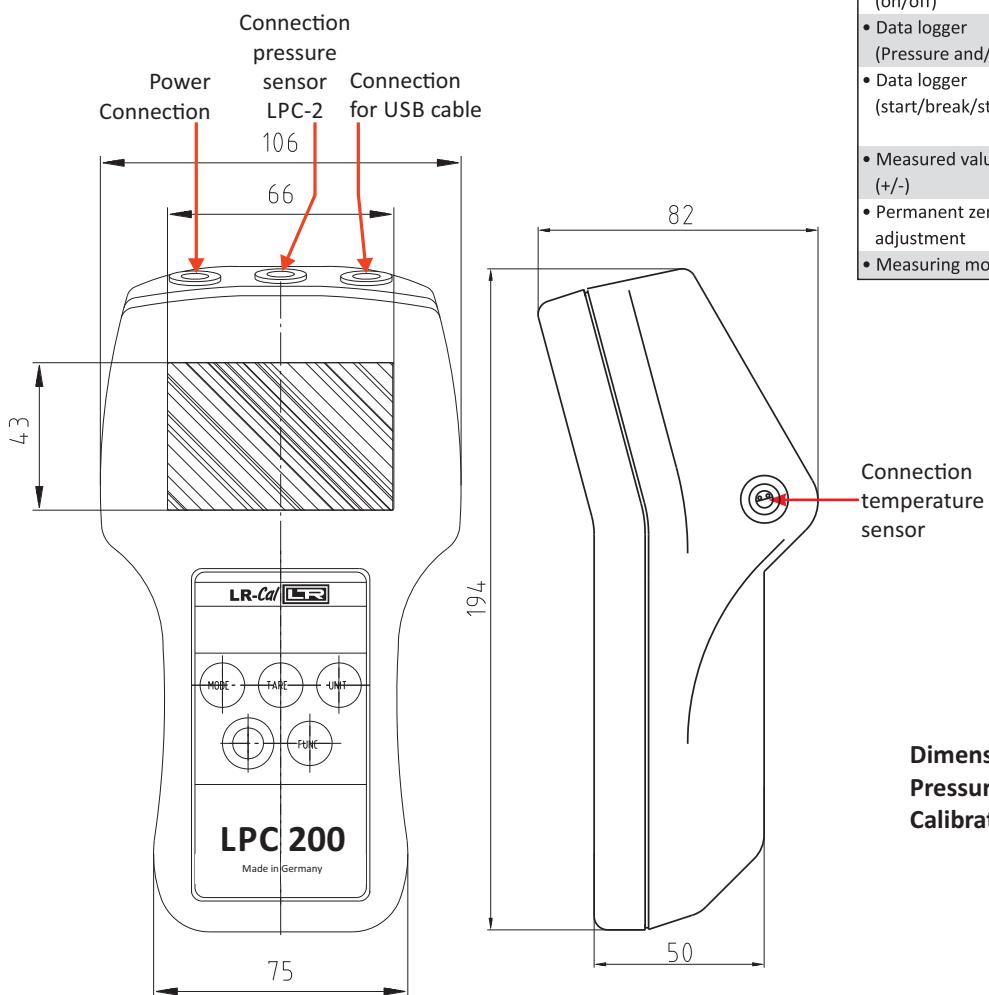
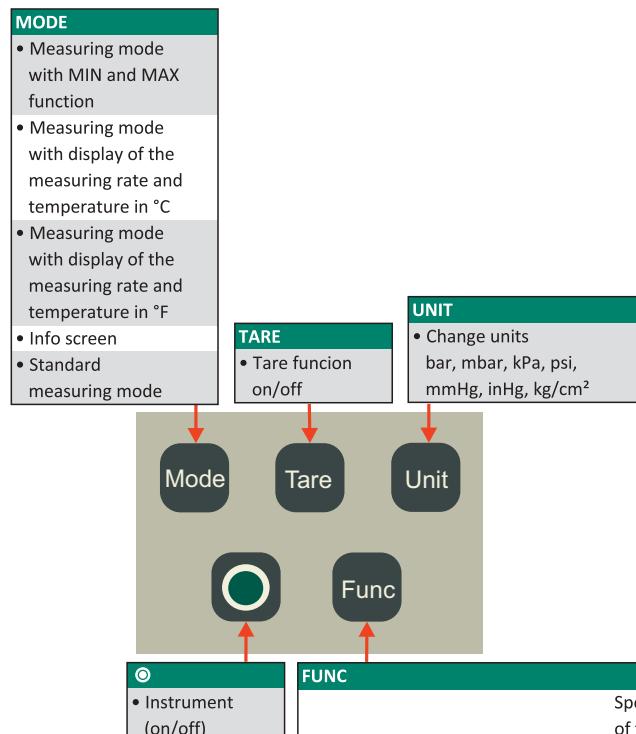
Specifications		Digital handheld indicator LR-Cal LPC 200-T								
Display		Large graphic display, with backlighting (On/Off selectable)								
Display resolution		up to 6 digits; selectable								
Measuring rate (pressure)		5 values/sec								
Functions		Min, Max memory, pressure rate, tare, offset-correction for gauge pressure ranges, data logger function								
Data logger		- Cyclic data logger: automatic recording of up to 1000 values (500 pressure values and 500 temperature values) - Cycle time: adjustable from 1 ... 3600 seconds								
Interface		USB								
Permissible										
■ Relative humidity	% r. H.	0 ... 85 (non-condensing; at 50 °C)								
■ Storage temperature	°C	-20 ... +60								
Power supply										
■ Current supply		Internal Lithium-Ion rechargeable battery (charging time: < 6 h)								
■ Battery operation	h	approx. 25								
Case		Polyamide 12, membrane keyboard, transparent panels								
Ingress protection		IP 65								
Weight	g	approx. 480								
CE conformity										
■ EMC directive		2004/108/EC, EN 61326 Emission (Group 1, Class B) and Immunity (portable measurement equipment)								

Specifications		Reference pressure sensor LPC-2								
Pressure connection		≤ 1000 bar: G ½ B; {various connection adapters on request} > 1000 bar: M16 x 1.5 female, with sealing cone								
Material		Stainless steel for wetted parts (for measuring ranges > 25 bar ... ≤ 1000 bar additional Elgiloy®)								
Internal transmission fluid		Synthetic oil (only for measuring ranges up to 25 bar)								
Permissible temperature ranges										
■ Medium	°C	-20 ... +80								
■ Storage	°C	-40 ... +85								
Case		Stainless steel								
Electrical connection		Circular connector, 8-pin								
Ingress protection		IP 65 (with cable connected)								
Weight	g	approx. 220								
CE conformity										
■ Pressure equipment directive		97/23/EC, PS > 200 bar; module A, pressure accessory								
■ EMC directive		2004/108/EC, EN 61326 Emission (Group 1, Class B) and Immunity (industrial locations)								

1) Up to 10 reference sensors LPC-2 (= pressure ranges) can be used with one instrument LR-Cal LPC 200-T.

2) Calibrated at 23 °C and in vertical mounting position with pressure connection facing downwards.

The keypad of the
Pressure & Temperature Calibrator
LR-Cal LPC 200-T:



Special functions of the upper keys:	
• Backlight (on/off)	MODE = on UNIT = off
• USB interface (on/off)	MODE = on UNIT = off
• Data logger (Pressure and/or temperature)	MODE = pressure UNIT = temperature
• Data logger (start/break/stop)	MODE = start TARE = break UNIT = stop
• Measured value resolution (+/-)	MODE = + UNIT = -
• Permanent zero adjustment	TARE = correction
• Measuring mode	

Scope of Standard Delivery:

- Digital indicator **LR-Cal** **LPC 200-T**
 - 1 Reference pressure sensor **LPC-2** (to be ordered separately)
 - 1 Reference temperature probe Pt 100 (4-wire, 195 x 6 mm)
 - Mains Power Charger 110...230 VAC (with EC/UK/US adapters)
 - PC Software **LPC-Cal**
 - USB interface cable
 - Factory certificates of calibration for pressure and temperature
 - Operating manual



Optional Accessories:

- Transit cases with custom foams
 - Pressure test pumps
 - Pressure comparison pumps
 - Threaded adapters
 - DKD-/DAkkS certificates
 - Magnetic hook LPC200-MAH
 - Support loop LPC200-SCH



PC-Software **LPC-Cal:**

This Windows Software is used for the calibration (inspection equipment monitoring) of mechanical and electronic pressure measuring devices. Features: simple step-by-step calibration, user-friendly interface, customer-specific input of the calibration steps, generation of 3.1 certificates in accordance with EN 10204, customer-specific test reports possible (EXCEL-based). Languages: German/English/Spanish/French. Also the logged data can be transferred to PC in tabular form in an EXCEL file.

Requirements: PC with Windows XP, 2000 or 7 and EXCEL version 2000, XP, 2003 or 2007.



**Digital Reference Pressure Indicator Type TLDMM
(electronic Pressure Calibrator)**

- **Accuracy: $\pm 0.05\%$ v.E., Ranges up to 2000 bar available**
- 1 year autonomy without recharging (battery operated)
- Pressure units "bar", "mbar", "psi", "MPa", "kPa" switchable
- PEAK function (positive and negative)
- Digital Filter (programmable)
- Pressure connection: 1/2" BSP male
- Clear easy to read LCD display with large numbers
- Including S.I.T. Calibration Certificate (similar to DKD cert.)



The **TLDMM** is a microprocessor based digital pressure gauge, made of particularly high long-term stable analogue section and an 16 bit A/D converter which ensure 65,000 internal divisions. These features, together with a 0.05% accuracy class, make it ideal as a laboratory instrument: in fact the **TLDMM** is proposed as a first line sample for Calibration Laboratories and is provided with a S.I.T. calibration certificate, traceable to international standard.

The pressure calibrator **TLDMM** has internal batteries with 1 year autonomy, also guaranteed by the Auto-PowerOff function, which activates if no measurements changes are detected in the previous 30 minutes.

The user can select different engineering units (bar, mbar, psi, MPa, KPa), resolution and digital filter, suitable for measurements to be performed. In order to increase the level of integration among components, a combined (traditional and SMT) technology has been used, that makes this reference gauge more resistant against mechanical stresses and vibrations and guarantees maximum reliability for the circuit. The display also shows an analogue indication bar for pressure, that is still on, even in the programming menu.

A carrying case and a S.I.T. calibration certificate (similar to DKD certification) are included in standard supply.

As an option, the **TLDMM** is available with a RS232 interface. A connection cable and a simple Software to read out the RS232 interface can be supplied on request. Furthermore, a build-in version for panel mounting and a version with mains power supply are available.



Image 1



Image 2



Image 3

The **TLDMM** can be used with portable or stationary calibration pressure sources like LSP spindle pumps and portable calibration pump **LPP 30** (pneumatic) and / or **LPP 700 - LPP 1000** (hydraulic).

Image 1: Hydraulic Calibration Handpump LPP 700

Image 2: calibration kit LPP-KIT-PD-20 with LPP 30

Image 3: pressure comparison pump LSP



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Technical Data:

Linearity and Hysteresis:	$\leq \pm 0.05\% \text{ FS}$
Readings per sec. (0 filter)	10 (100 ms)
Temperatures:	Reference: +23°C, Ambient 0...+50°C, Storage -10...+60°C
Temperature Effect (1°C):	on Zero $\leq \pm 0.002\%$; on Sensitivity $\leq \pm 0.002\%$
Programmable Functions:	Zero: 50%, digital Filter: 0...99% Display Resolution: 1, 2, 5 or 10 Digits Pressure Units: bar, mbar, MPa, kPa, psi Baudrate RS232 (Option): 19200, 9600, 4800 Peak-Function: Positive (+) and Negative (-)
Display:	LCD, height 16 mm
Power Supply:	4 Alkaline Batteries 1,5 V (size AA)
Mechanical Limit Values (referred to nominal pressure):	Service Pressure: 100% FS; High Dynamic Pressure: 75% FS Permissible Pressure: max. 150% FS; Breaking Pressure: >300% FS
Standard Process Coupling:	1/2 BSP male
Recommended Gasket:	USIT A 63-18
Tightening Torque:	28 Nm (Tightening Wrench: 27 mm)
Housing:	Material: Aluminium, Dimensions: appr. 132 x 80 x 48 mm
Protection:	IP 40
RS232-Interface (optional)	9-pole D-SUB (female)

Order Code:

T	L	D	M	M	-				-				
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Range:	max. Resolution
0-14.5 psi / 0-1 bar	0.0001 bar
0-36 psi / 0-2.5 bar	0.0005 bar
0-72.5 psi / 0-5 bar	0.0005 bar
0-145 psi / 0-10 bar	0.001 bar
0-290 psi / 0-20 bar	0.002 bar
0-725 psi / 0-50 bar	0.005 bar
0-1450 psi / 0-100 bar	0.01 bar
0-3626 psi / 0-250 bar	0.02 bar
0-5076 psi / 0-350 bar	0.05 bar
0-7252 psi / 0-500 bar	0.05 bar
0-10153 psi / 0-700 bar	0.05 bar
0-14503 psi / 0-1000 bar	0.1 bar
0-21756 psi / 0-1500 bar	0.2 bar
0-29007 psi / 0-2000 bar	0.5 bar
-30 inHg/+14.5 psi/-1/+1 bar	0.0001 bar
-30 inHg/+35 psi / -1/+2,5 bar	0.0005 bar
-30 inHG/+72.5 psi / -1/+5 bar	0.0005 bar
-30 in Hg/+290 psi / -1/+20 bar	0.02 bar

Recommended Accessory: Usage of TLDMM with **LPP 30**: volume reducer, order-code **VRS-G12**.

Option: build-in version for panel mounting 83 x 83 mm, back conn.: add **EBA** to the order-code of the instrument

Option: mains power supply 230 VAC (instead of batteries): add **SNT** to the order-code of the instrument



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Digital reference pressure gauge and data logger**Model: LR-Cal LDM 80****Accuracy $\pm 0.2\%$ FS, optional $\pm 0.1\%$ FS****Pressure ranges from 0...100 mbar to 0...2000 bar****USB interface, optional WIRELESS data transmission****Optional with Pressure Switch Test function****Incl. measurement of medium temperature****and allways visible analogue bargraph display****Chargeable battery, easy charging via USB**

Messung der Mediumtemperatur
Measurement of medium temperature



The digital reference pressure test gauge **LR-Cal LDM 80** is featured with an outstanding longterm stability. It is perfect for reference pressure measurements, for testing and calibration purposes. Together with the portable pressure test pumps **LR-Cal LPP 40**, as well as **LR-Cal LPP 700** or **LR-Cal LPP 1000** it can be used mobile, on site. For higher pressure values we recommend our pressure comparison pumps **LR-Cal LSP**.

The **LR-Cal LDM 80** is powered by a rechargeable li-ion battery and is fitted with an USB interface. In addition, the device is featured with a data logging function (max. 60,000 values) and it measures the temperature of the pressure medium. A transit case, an USB charger and a traceable factory certificate of calibration are included in standard delivery.

Optional, the **LR-Cal LDM 80** is available with electrical connection for pressure switch tests or with WIRELESS transmission of data to PC/Laptop (instead of via USB interface).

Technical Data:**Internal resolution:** 65,000 div.**Measurements per second** (if filter is set to 0): 10 (100 ms).**Pressure measurement/indication:** see table on page 2. Accuracy $\pm 0.2\%$ FS, optional $\pm 0.1\%$ FS (Code **LDM80-KL01**).**Filter:** programmable digital filter for stabilisation of displayed values also at fluctuating pressures.**Temperature measurement/indication:** Resolution 0.1°C; Accuracy $\pm 1\%$ (range -10...+70°C, ambient temp. 0...50°C).**Reference temperature:** +23°C.**Working temperature range:** -10...+70°C.**Storage temperature range:** -10...+80°C.**Temperature influence:** $\leq \pm 0.002\% / 1^\circ\text{C}$.**Display:** LCD 13 mm; with programmable backlight (1...60 seconds, or off).**Programmable resolution:** 1, 2, 5, 10.**Interface:** USB 2.0 (virtual COM port on PC/Laptop, programmable baud rate 19200, 9600 or 4800)

Optional: WIRELESS, RF frequency 433 MHz, RF transmission 200 m in free air, max. 10 transmissions per second.

ZEROing: Via key press, up to 50% of FS.**Maximal-/Minimal values:** PEAK function, active at positive and negative pressures, 10 measurements per second**Pressure units:** selectable; bar, mbar, psi, MPa, kPa, kg/cm², mHg, mmHg, mmH₂O, mH₂O.**Temperature units:** selectable; °C, °F.**Data logger:** max. storing frequency: 1 value per second, capacity max. 60,000 measured values

(= 60,000 pressure values or 30,000 pressure values plus 30,000 temperature values)

Supply: rechargeable inside li-ion-battery 3.7 V size 14500, autonomy approx. 3 months (if backlight of display is switched off and without optional WIRELESS data transmission, charging time approx. 8 hours (via PC/Laptop or supplied USB charger)).**Pressure port:** 1/2" BSP male, recommended gasket: USIT A 63-18. (Ranges >1000 bar: sealing cone **TLDMM-DK**).**Pressure limits:** Static pressure up to 100% FS, max. permissible pressure up to 150% FS, breaking pressure >300% FS, at highly dynamic pressure max. 75% FS.**Pressure port mounting:** Tightening wrench 27 mm, tightening torque 28 Nm.**Protection degree:** IP 40**Materials:** Indicator housing: black coated aluminium, pressure sensor and port: stainless steel.

LDM 80 Pressure Calibrator and Data logger

Accuracy $\pm 0.2\%$ FS, optional $\pm 0.1\%$ FS

LR-Cal **LR**

Order-Codes and Pressure Ranges

Order-Code	Pressure Range	Display	Resolution
LDM80-8010	0...100 mbar	100.0 mbar	0.1 mbar
LDM80-8025	0...250 mbar	250.0 mbar	0.1 mbar
LDM80-8050	0...500 mbar	500.0 mbar	0.1 mbar
LDM80-0001	0...1 bar	1.000 bar	0.001 bar
LDM80-0002	0...2,5 bar	2.500 bar	0.001 bar
LDM80-0005	0...5 bar	5.000 bar	0.001 bar
LDM80-0010	0...10 bar	10.00 bar	0.01 bar
LDM80-0020	0...20 bar	20.00 bar	0.01 bar
LDM80-0050	0...50 bar	50.00 bar	0.01 bar
LDM80-0100	0...100 bar	100.0 bar	0.1 bar
LDM80-0250	0...250 bar	250.0 bar	0.1 bar
LDM80-0350	0...350 bar	350.0 bar	0.1 bar
LDM80-0500	0...500 bar	500.0 bar	0.1 bar
LDM80-0700	0...700 bar	700.0 bar	0.1 bar
LDM80-1000	0...1000 bar	1000 bar	1 bar
LDM80-1500	0...1500 bar	1500 bar	1 bar
LDM80-2000	0...2000 bar	2000 bar	1 bar
LDM80-1010	-1...+1 bar	1.000 bar	0.001 bar
LDM80-1025	-1...+2.5 bar	2.500 bar	0.001 bar
LDM80-1050	-1...+5 bar	5.000 bar	0.001 bar
LDM80-1020	-1...+20 bar	20.00 bar	0.01 bar
LDM80-8050-ABS	0...0.5 bar absolute	0.5000 bar	0.0001 bar
LDM80-0001-ABS	0...1 bar absolute	1.000 bar	0.001 bar
LDM80-0002-ABS	0...2.5 bar absolute	2.500 bar	0.001 bar
LDM80-0005-ABS	0...5 bar absolute	5.000 bar	0.001 bar
LDM80-0010-ABS	0...10 bar absolute	10.00 bar	0.01 bar
LDM80-DK	Sealing cone 60° for the pressure port, recommended for pressure ranges > 1000 bar.		

Option LDM80-ST

Pressure switch test, electr. male conn. 2-pin power jack 5x5 x 2.1 mm, at the bottom side of the housing.



Option LDM80-WF

WIRELESS data transmission (instead of via USB interface). 100 m in free air, frequency 433 MHz, max. 10 transmissions per second.

Option LDM80-KL01

Accuracy $\pm 0.1\%$ v.E. instead of 0.2% incl. factory certificate of calibration

Option PC-WIRELESS

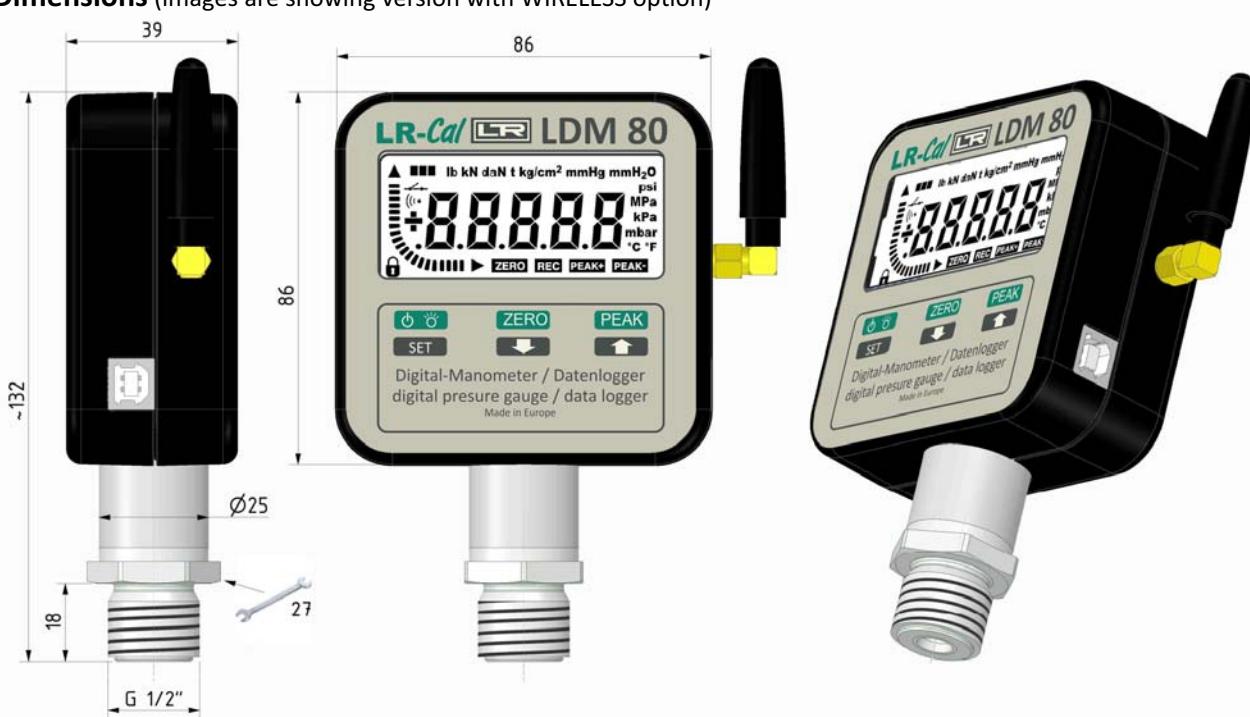
WIRELESS receiver to be connected to PC or Laptop (USB). Up to 5 **LR-Cal** LDM 80 at one PC/Laptop.



PC/Laptop driver for USB (virtual COM port) are available for free download on our internet site www.lrcal.net on the related product page.

Scope of delivery: **LR-Cal** LDM 80 + USB battery charger + USB cable + case + calibration certificate + operating manual

Dimensions (images are showing version with WIRELESS option)



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Digital Test Pressure Gauge LR-Cal LDM 70-E25: Accuracy ±0,125% FS**Digital Test Pressure Gauge LR-Cal LDM 70-K50: Accuracy ±0.25% FS**

(Accuracy as per BFSL = Best Fit Straight Line)

- Battery powered, rugged, rotatable housing (DS 70 mm)
- 4.5-digit LC display (digit height 11 mm)
- 6-digit additional display to show the selected pressure unit (height 7.5 mm)
- Pressure unit switchable (psi-bar/mbar-mWS-inHg-cmHg/mmHg-kPa/MPa)
- Easy configuration via three push buttons
- Ingress protection IP 65
- Ranges from 0/1.45 psi to 0/8,700 psi (0/100 mbar to 0/600 bar)
- MIN and MAX value storage

The display is continuously rotatable so that a clear readability is guaranteed even in unusual installation positions. The **LR-Cal LDM 70** can be operated menu-driven via three push-buttons. Besides showing information about the nominal pressure range as well as minimal and maximal pressure of the process, several pressure units (PSI, bar, mbar, mWC, inHg, cmHg, mmHg, kPa, MPa) and the position of the decimal point can be set. The instruments zero and span can be calibrated, the **LR-Cal LDM 70** can be set to factory default values via menu.



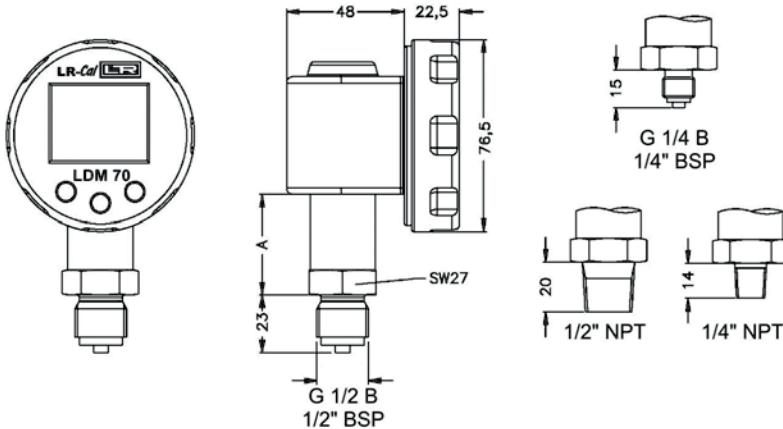
Technica data:	Type LDM 70-E25	Type LDM 70-K50
Pressure Ranges: (see tab. on back page)	all standard ranges, gauge pressure, absolute pressure, vacuum and compound ranges	all standard ranges 0/1.6 to 0/600 bar
Nominal case diameter:	DS 70 mm / 27.6 inches	
Accuracy (BFSL)	±0.125% f.s. (ranges ≤ 5.8 psi / 400 mbar: ±0.25% f.s.)	±0.25% f.s.
Measuring rate:	5 per second	
Thermal error (zero-point and span within temperature compensated range)	Tolerance band: Ranges ≤ 0.1 bar: ≤± 2.0% f.s.; average TC: ±0.3% f.s. / 10 K Ranges ≤ 0.25 bar: ≤± 1.5% f.s.; average TC: ±0.2% f.s. / 10 K Ranges ≤ 0.4 bar: ≤1.0% f.s.; average TC: ±0.14% f.s. / 10 K Ranges ≤ 1.0 bar: ≤0.1% f.s.; average TC: ±0.1% f.s. / 10 K Ranges >1.0 bar: ≤± 0.75% f.s.; average TC: ±0.07% f.s. / 10 K	≤± 0.2% f.s. / 10 K
Temp. compensated range:	Ranges ≤ 0.4 bar: 0...50°C; ranges >0.4 bar: 0...70°C	-25...+85°C
Permissible temperatures:	Medium: -4/+185°F=-20/85°C; Ambient: -4/+158°F=-20/70°C; Storage: -22/+176°F=-30/80°C	
Material display housing:	PA 6.6 polycarbonate	
Material pressure port:	stainless steel 1.4571 / 1.4435	
Material diaphragm:	stainless steel 1.4435	ceramic Al ₂ O ₃ 96%
Material seals:	wetted seals: FKM (optional: EPDM, NBR, others on request)	
Display:	LCD 1.57" x 1.18"= 40 x 30 mm; 4 1/2 digit 7-segment-main display, digit height 11 mm, Indication range ±19999; 6-digit 14-segment additional display, digit height 7.5 mm	
Electromagnetic compatibility:	emission and immunity according to EN 61326	
Mechanical stability:	vibration: 5 g RMS (20...2000 Hz); shock: 100 g / 11 msec.	
Supply:	3.6 V lithium batteries, 2 pcs. (type 1/2 AA)	
Data memory:	EEPROM (non-volatile)	
Ingress protection:	IP 65	
Installation position:	any (the LDM 70 is calibrated in vertical position with pressure port down. If this position is changed on installation, there can be slight deviations in the zero-point for LDM-70-E25 ranges <1 bar)	
Other data:	weight 300 g; AD-converter solution: 10 Bit; mech. operational life: > 100 x 10 ⁶ pressure cycles; battery life: app.. 5 years in standby mode;	
Pressure port:	1/2" BSP male, 1/4" BSP male, 1/2" NPT male, 1/4" NPT male	



The Digital Test Pressure Gauges **LR-Cal LDM 70** are available as complete pressure calibration kits (case, with calibration testpump **LR-Cal LPP 40**, **LR-Cal LPP 60** or **LR-Cal LPP 700**).

For a stationary use, as calibration pressure source we recommend our pressure comparators (spindle pumps) series **LR-Cal LSP**.

Dimensions:



dimension "A" for
type **LDM70-E25**: 35 mm

dimension "A" for
type **LDM70-K50**: 41.5 mm

Order-Codes and Pressure Ranges:

L	D	M	7	0	-			-			-		
Accuracy ±0.125% f.s.	E	2	5										
Accuracy ±0.25% f.s.	K	5	0										
*) Range 0...1.45 psi / 0...100 mbar	8	1	0	0	-	0							
*) Range 0...2.32 psi / 0...160 mbar	8	1	6	0	-	0							
*) Range 0...3,63 psi / 0...250 mbar	8	2	5	0	-	0							
*) Range 0...5.80 psi / 0...400 mbar	8	4	0	0	-	0							
**) Range 0...8.70 psi / 0...0,6 bar	0	0	0	0	-	6							
**) Range 0...14.5 psi / 0...1 bar	0	0	0	1	-	0							
Range 0...23.2 psi / 0...1,6 bar	0	0	0	1	-	6							
Range 0...36.3 psi / 0...2,5 bar	0	0	0	2	-	5							
Range 0...58.0 psi / 0...4 bar	0	0	0	4	-	0							
Range 0...87.0 psi / 0...6 bar	0	0	0	6	-	0							
Range 0...145.0 psi / 0...10 bar	0	0	1	0	-	0							
Range 0...232.1 psi / 0...16 bar	0	0	1	6	-	0							
Range 0...362.6 psi / 0...25 bar	0	0	2	5	-	0							
Range 0...580.2 psi / 0...40 bar	0	0	4	0	-	0							
Range 0...870.2 psi / 0...60 bar	0	0	6	0	-	0							
Range 0...1450 psi / 0...100 bar	0	1	0	0	-	0							
Range 0...2321 psi / 0...160 bar	0	1	6	0	-	0							
Range 0...3626 psi / 0...250 bar	0	2	5	0	-	0							
Range 0...5802 psi / 0...400 bar	0	4	0	0	-	0							
Range 0...8702 psi / 0...600 bar	0	6	0	0	-	0							
**) Range -30 / 0 in Hg / -1/0 bar	0	0	0	0	-	0							
**) Range -30 inHg / +8.7 psi / -1/+0.6 bar	9	0	0	0	-	6							
Range -30 inHg/+22 psi / -1/+1,5 bar	0	0	0	1	-	5							
Range -30 inHg/+43.5 psi / -1/+3 bar	0	0	0	3	-	0							
Range -30 inHg/+72.5 psi / -1/+5 bar	0	0	0	5	-	0							
Range -30 inHg / +130.5 psi / -1/+9 bar	0	0	0	9	-	0							
Range -30 inHg/+217.6 psi / -1/+15 bar	0	0	1	5	-	0							
Range -30 inHg/+348 psi / -1/+24 bar	0	0	2	4	-	0							
Range -30 inHg/+565.6 psi / -1/+39 bar	0	0	3	9	-	0							

Pressure Port thread 1/2" BSP male (standard)

Pressure Port thread 1/4" BSP male

Pressure Port thread 1/2" NPT male

Pressure Port thread 1/4" NPT male

G 1 2

G 1 4

N 1 2

N 1 4

Order-Code for

extra charge for

Absolute version:

LDM70-MP-ABS

*)

= only with accuracy ±0.25% (BFSL) as type LDM-70-K50 available

**) = only with accuracy ±0.125% (BFSL) as type LDM-70-E25 available

Digital Reference Pressure Indicator DFP

Scalable conversion to Force (to, kg, daN, KN)

Perfect for checking pressure gauges at hydraulic presses.

- Accuracy: $\pm 0.1\%$ v.E., Pressure ranges up to 2000 bar
- 1 year autonomy without recharging (battery operated)
- Pressure unit "bar", conversion to Force
- PEAK function (positive and negative)
- Digital Filter (programmable)
- Pressure connection: 1/2" BSP male
- Clear easy to read LCD display with large numbers

The **DFP** is a microprocessor based digital pressure gauge, made of particularly high long-term stable analogue section and a 16 bit A/D converter which ensure 65,000 internal divisions. These features, together with a 0.1% accuracy class, make it ideal as a reference instrument: in fact the **DFP** is proposed as a first line sample for Quality Insurance Laboratories.



The Digital Reference Pressure Gauge **DFP** has internal batteries with 1 year autonomy, also guaranteed by the Auto-PowerOff function, which activates if no measurement changes are detected in the previous 30 minutes (adjustable).

The user can define his own engineering unit for force. The **DFP** is supplied calibrated in "bar" pressure unit as a normal pressure gauge. It is up to the installer to set the full scale value in the force unit used (kg or ton) by using the following formula:

$$F[N] = P \cdot D^2 \cdot \Pi / 40$$

P = Pressure in **bar**

D = Diameter of cylinder in **mm**

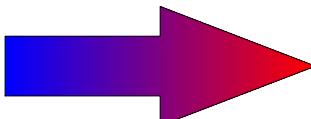
$$F[kg] = F[N] / 9,80665$$

F = force

N = Newton

kg = Kilogramm

Pressure



Force

In order to increase the level of integration among components, a combined (traditional and SMT) technology has been used, that makes this reference gauge more resistant against mechanical stresses and vibrations and guarantees maximum reliability for the circuit.

As an option, the **DFP** is available with a RS232 interface. A connection cable and a simple software to read out the RS232 interface can be supplied on request.

Furthermore, a build-in version for panel mounting 83 x 83 mm with back connection, and a version for mains power supply (230 VAC) is available as option.



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The Digital Reference Pressure Gauge **DFP** can be used with the portable calibration hand pumps **LPP 30** (pneumatic), **LPP 700** or **LPP 700** (hydraulic), as well as with the pressure comparison pumps **LSP**.

Left image: LSP; Right image: LPP 30

Technical Data:

Linearity and Hysteresis:	$\leq \pm 0.1\% \text{ v.E.}$
Reading per sec. (0 filter)	10 (100 ms)
Temperatures:	Reference: +23°C, Ambient 0...+50°C, Storage -10...+60°C
Temperature Effect (1°C):	on Zero $\leq \pm 0.002\%$; on Sensitivity $\leq \pm 0.002\%$
Programmable Functions:	Zero: 50%, digital Filter: 0...99% Display Resolution: 1, 2, 5 or 10 Digits Pressure Unit: bar, Force Units: kg, t, daN, KN (scalable) Baud Rate RS232-Interface (Option): 19200, 9600, 4800 Peak-Function: Positive (+) and Negative (-)
Display:	LCD, height 16 mm
Power Supply:	4 Alkaline Batteries 1,5 V (size AA)
Mechanical Limit Values (referred to nominal pressure):	Service Pressure: 100% FS; High Dynamic Pressure: 75% FS Permissible Pressure: max. 150% FS; Breaking Pressure: >300% FS
Standard Process Coupling:	1/2" BSP male
Recommended Gasket:	USIT A 63-18
Tightening Torque:	28 Nm (Tightening Wrench: 27 mm)
Housing:	Material: Aluminum, Dimensions: appr. 132 x 80 x 48 mm
Protection:	IP 40
RS232-Interface (optional)	9-pole D-SUB (female)

Order-Code:

D F P -

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Range:	0 0 1 0	R S 2 3 2
0-10 bar.....	0 0 1 0	R S 2 3 2
0-20 bar.....	0 0 2 0	(free / empty)
0-50 bar.....	0 0 5 0without
0-100 bar.....	0 1 0 0	RS232
0-250 bar.....	0 2 5 0	
0-350 bar.....	0 3 5 0	
0-500 bar.....	0 5 0 0	
0-700 bar.....	0 7 0 0	
0-1000 bar.....	1 0 0 0	
0-1500 bar.....	1 5 0 0	
0-2000 bar.....	2 0 0 0	

max. Resolution:

0.001 bar
0.002 bar
0.005 bar
0.01 bar
0.02 bar
0.05 bar
0.05 bar
0.05 bar
0.1 bar
0.2 bar
0.5 bar

Recommended Accessory: Usage of DFP with **LPP 30**: volume reducer, order-code **VRS-G12**.

Option: build-in version for panel mounting 83 x 83 mm, back conn.: add **EBA** to the order-code of the instrument

Option: mains power supply 230 VAC (instead of batteries): add **SNT** to the order-code of the instrument



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