

Professional Handheld Indicator **LR-Cal/ LHM** for pressure, force/weight and torque

- With internal pressure or force sensor or without internal sensor.
- External sensors for pressure and torque.
- Rigid aluminium housing, portable.
- Up to 4800 measurements per second, programmable.
- Data logger (130,000 measured values).
- USB interface.
- PEAK function, positive and negative.
- „First PEAK“ detection, programmable.
- Programmable filter and average function.
- Chargeable Li-Ion battery, incl. USB charger.
- 15 pressure units, 9 force/weight units, 8 torque units.
- Up to 7 external sensors, also mixed, automatic sensor recognition.
- Possibility of linearisation and calibration of the sensor(s).
- Optional WIRELESS data transmission.



The multipurpose high accurate handheld indicator **LR-Cal/ LHM** is not only suitable for very precise measurement of pressure, force and torque in the field, but also specially as reference instrument for calibration, verification and adjustment of pressure, force or torque reading instruments. The analog-digital converter's resolution of 50,0000 digits works with all **LR-Cal** reference sensors with 2mV/V signal. Via menu it is possible to set zero-point and span as well as linearisation with 5 points.

The measurement rate of up to 4,800 measurements per second make this handheld instrument ideal for detection of max. or min. values (PEAKs).



LR-Cal/ LHM
Very precise
and accurate
measurement of
pressure, force
and torque.



LR-Cal/ LHM with internal pressure sensor,
from 100 mbar, accuracy up to 0.05% FS
in transit case, with pressure test pump
LR-Cal/ LPP 08 as kit for calibration, verification
and adjustments, for small
pressure values, with very high accuracy.

Specification:

Supply	Built-in chargeable Li-Ion battery, 3.7 V, 750 mAh, Type 14500
Operating time with fully charged battery:	approx. 24 h (if backlight is switched off and no data logging)
Graphic display:	LCD 128 x 64 dots with 3 level of back lightning 180° rotatable on key press
Selectable pressure units:	bar, mbar, psi, Mpa, kPa, Pa, mH2O, inH2O, kg/cm ² , mmHg, cmHg, inHg, atm, mHg, mmH2O
Selectable force/weight units:	kg, g, t, N, daN, kN, MN, lb, klb
Selectable torque units:	Nm, Nmm, kgm, kNm, in/lbf, ft/lbf, gcm, kgmm
Selectable displacement units:	mm, inch
Internal resolution:	24 bit
Readings per second (programmable):	5, 10, 20, 50, 100, 300, 600, 1200, 2400 oder 4800
Max. transmission rate (USB):	50 ms (in continuous mode)
Digital filter (moving average):	1, 2, 4, 8, 16 or 32 points
Programmable resolution:	1, 2, 5, 10, 20, 50 or 100
ZERO function:	100% FS
PEAK function:	Positive and Negative
Data logger:	130,000 values, programmable (1 s to 24 h) oder key press
Reference temperature:	+23°C
Working temperature:	+10...+50°C
Storage temperature:	-10...+60°C
Protection degree:	IP 40
Case material:	Aluminium
Dimensions:	176 x 79 x 32 mm
Max. number of external sensors:	Up to 7 sensors, automatic recognition
Interface:	USB 2.0, or WIRELESS with option " LHM-WF "

Optional internal pressure sensor	gauge, absolute or differential pressure, opt. with vacuum
Gauge and differential pressure ranges:	100 mbar, 500 mbar, 1 bar, 2,5 bar or 5 bar
Absolute pressure ranges:	500 mbar, 1 bar, 2,5 bar oder 5 bar
Accuracy:	±0.10% or optional ≤0.05% with option " LHM-KL005 "
Temperature influence (at zero and at FS):	each ≤±0.01%
Pressure port: (at differential pressure: 2 ports)	M8 female, suitable for quick fit hose connector " LPP-08-PN-STECK " (for hose 4 x 2 mm, not in standard supply)

Resolution (internal pressure sensors):

bar		mbar		psi		MPa		kPa		Pa		mH2O	
FS	Res.	FS	Res.	FS	Res.	FS	Res.	FS	Res.	FS	Res.	FS	Res.
0.1000	0.0001	100.00	0.01	1.4500	0.0001	0.0100	0.0001	10.000	0.001	10000	1	1.0000	0.0001
0.5000	0.0001	500.00	0.10	7.2000	0.0010	0.0500	0.0001	50.000	0.005	50000	5	5.0000	0.0005
1.0000	0.0001	1000.0	0.1	14.500	0.0001	0.1000	0.0001	100.00	0.01	100000	10	10.000	0.001
2.5000	0.0005	2500.0	0.5	36.200	0.005	0.2500	0.0001	250.00	0.05	250000	50	25.500	0.005
5.0000	0.0005	5000.0	0.5	72.500	0.005	0.5000	0.0001	500.00	0.05	500000	50	51.000	0.05

inH2O		Kg/cm2		mmHg		cmHg		inHg		Atm	
FS	Res.	FS	Res.	FS	Res.	FS	Res.	FS	Res.	FS	Res.
40.000	0.005	0.1000	0.0001	75.00	0.01	7.500	0.001	3.0000	0.0002	0.1000	0.0001
200.00	0.02	0.5000	0.0001	375.00	0.05	37.500	0.005	14.500	0.002	0.5000	0.0001
400.00	0.05	1.0000	0.0001	750.0	0.1	75.00	0.01	30.000	0.002	1.0000	0.0001
1000.00	0.10	2.5500	0.0005	1900.0	0.2	190.00	0.02	75.00	0.01	2.5000	0.0002
2000.0	0.2	5.0000	0.0005	3750.0	0.5	375.00	0.05	145.00	0.02	5.0000	0.0005

Instruments with internal pressure sensors are fitted with 1 or 2 (differential pressure versions) pressure ports at the top of the instrument: M8 female. For pressure hose connection we recommend our part number **LPP-08-PN-STECK**: Push&Pull quick fit hose connector for pneumatic hoses 4 x 2 mm.



Optional internal force sensor (measurement of compression and tension)

Force ranges:	10N, 25N, 50N, 100N, 250N, 500N, 1kN, 3kN or 5 kN
Accuracy:	≤±0.05%
Temperature influence (at zero and at FS):	each ≤±0.01%
Process connection:	M6 male thread (Tool-kit „LHM-N-KIT“ recommended)

Resolution (internal pressure sensors):

N		daN		kN		kg		g		lb	
FS	Aufl./Res.	FS	Aufl./Res.	FS	Aufl./Res.	FS	Aufl./Res.	FS	Aufl./Res.	FS	Aufl./Res.
10.000	0.005	1.0000	0.0005	0.0100	0.0005	1.0000	0.0005	1000.0	0.5	2.2000	0.001
25.000	0.005	2.5000	0.0005	0.0250	0.0005	2.5000	0.0005	2500.0	0.5	5.5000	0.001
50.000	0.005	5.0000	0.0005	0.0500	0.0005	5.0000	0.0005	5000.0	0.5	11.000	0.001
100.00	0.05	10.000	0.005	0.1000	0.005	10.000	0.005	10000	5	22.000	0.01
250.00	0.05	25.000	0.005	0.2500	0.005	25.000	0.005	25000	5	55.000	0.01
500.00	0.05	50.000	0.005	0.5000	0.005	50.000	0.005	50000	5	110.00	0.01
1000.0	0.5	100.00	0.05	1.0000	0.0005	100.00	0.05	/	/	220.00	0.1
3000.0	0.5	300.00	0.05	3.0000	0.0005	300.00	0.05	/	/	660.00	0.1
5000.0	0.5	500.00	0.05	5.0000	0.0005	500.00	0.05	/	/	1100.0	0.1

Input for external sensors

Input signal:	±2 mV/V
Internal resolution:	±50,000
Accuracy:	≤ 0.01%
Supply:	5 VDC ±4%
Electrical connection:	4-wire
Temperature influence (at zero and at FS):	each ≤±0.01%

Optional external pressure sensor TP16

Pressure ranges:	10 bar, 20 bar, 50 bar, 100 bar, 250 bar, 350 bar, 500 bar, 700 bar, 1000 bar, 1500 bar, 2000 bar
Accuracy:	±0.1% or optional ±0.05% with option "LHM-P-KL005"
Working range:	up to 100% FS (at dynamical pressures up to 75% FS)
Overpressure:	150% FS
Burst pressure:	>300% FS
Measurement frequency:	from 20 to 100 kHz
Temperature influence (at zero and at FS):	each ≤±0,015%
Pressure port:	1/2" BSP male
Recommended gasket up to 700 bar:	USIT-ring A 63-18
Recommended sealing ≥1000 bar:	Double sealing cone 60°, Code TLDMM-DK (not in standard delivery)
Material:	Stainless steel
Connection to LR-Cal/ LHM:	approx. 4 m connection cable, automatic recognition



Optional external torque sensor TRS (measurement clockwise and counter-clockwise):

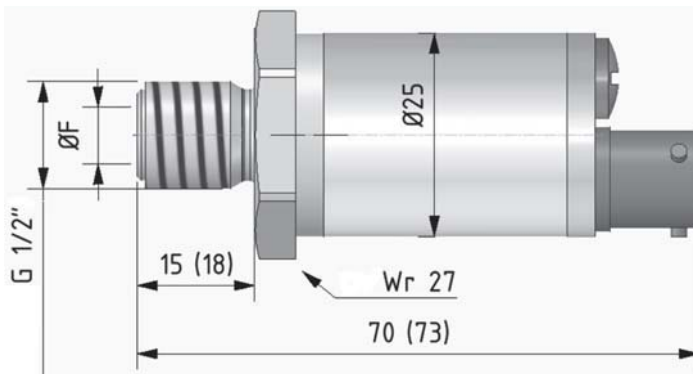
Torque ranges:	0,5 Nm, 2,5 Nm, 5 Nm, 10 Nm, 25 Nm, 50 Nm, 100 Nm, 250 Nm, 500 Nm or 1000 Nm
Accuracy:	±0.2% or optional ±0.1% with option "LHM-TRS-KL01"
Working range:	up to 100% FS (at dynamic torques up to 70% FS)
Max. load:	150% FS
Burst load:	>300% FS
Reference temperature:	+23°C
Working temperature:	-10...+70°C
Storage temperature:	-20...+80°C
Connection port:	0,5 - 2,5 - 5 - 10 Nm: □ 1/4" 25 - 50 Nm: □ 3/8" 100 - 250 Nm: □ 1/2" 500 - 1000 Nm: □ 3/4"
Material:	Stainless steel
Connection to LR-Cal/ LHM:	approx. 4 m connection cable, automatic recognition



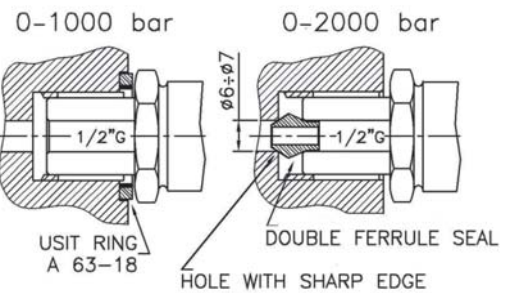
Dimensions [mm] (the images on the left hand side are showing the version with WIRELESS option)



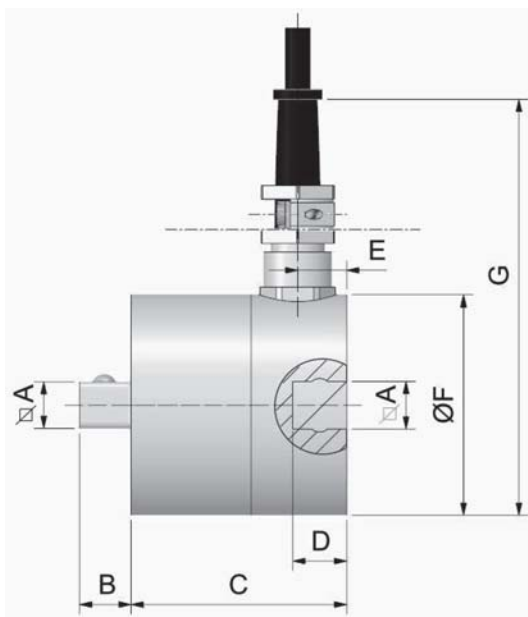
Dimensions [mm] External pressure sensor LHM-TP16:



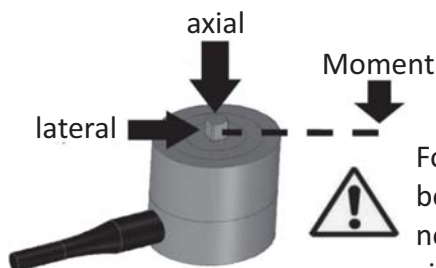
Installation / Sealing LHM-TP16:



Dimensions [mm] Externer torque sensor LHM-TRS:



Artikel-Nr. Order-Code	Bereich Load	□ A	B	C	D	E	F	G
LHM-TRS-8005	0,5 Nm	1/4"	7,5	44	8	10	45	85
LHM-TRS-0002	2,5 Nm	1/4"	7,5	44	8	10	45	85
LHM-TRS-0005	5 Nm	1/4"	7,5	44	8	10	45	85
LHM-TRS-0010	10 Nm	1/4"	7,5	44	8	10	45	85
LHM-TRS-0025	25 Nm	3/8"	10,5	44	11	10	45	85
LHM-TRS-0050	50 Nm	3/8"	10,5	44	11	10	45	85
LHM-TRS-0100	100 Nm	1/2"	15,0	44	16	10	45	85
LHM-TRS-0250	250 Nm	1/2"	15,0	44	16	10	45	85
LHM-TRS-0500	500 Nm	3/4"	22,5	53,5	24	17,5	51	91
LHM-TRS-1000	1000 Nm	3/4"	22,5	53,5	24	17,5	51	91



For correct measurement both axial and transverse forces and bending moment should be absent. In case of presence, they must not be greater than the values below, to be reduced in simultaneous presence of more solicitations:

Artikel-Nr. Order-Code	Bereich Range	Max. axiale Belastung Max. axial permissible load	Max. seitliche Belastung Max. lateral permissible load	Max. Abwinklung Bending limit moment
LHM-TRS-8005	0,5	0,38 kN	15 N	1 Nm
LHM-TRS-0002	2,5	0,38 kN	15 N	1 Nm
LHM-TRS-0005	5	0,5 kN	15 N	1,5 Nm
LHM-TRS-0010	10	0,9 kN	30 N	3,5 Nm
LHM-TRS-0025	25	2,2 kN	30 N	4,5 Nm
LHM-TRS-0050	50	3,5 kN	80 N	15 Nm
LHM-TRS-0100	100	6 kN	150 N	20 Nm
LHM-TRS-0250	250	9,5 kN	180 N	42 Nm
LHM-TRS-0500	500	18 kN	250 N	65 Nm
LHM-TRS-1000	1000	28 kN	400 N	170 Nm

Overview Order-Codes for measurement of pressure and force:

LR-Cal LHM with internal pressure sensor:

LHM-0100-GP 0...100 mbar gauge
LHM-0500-GP 0...500 mbar gauge
LHM-1000-GP 0...1 bar gauge
LHM-2500-GP 0...2,5 bar gauge
LHM-5000-GP 0...5 bar gauge

LHM-0100-VA -100...+100 mbar
LHM-0500-VA -500...+500 mbar
LHM-1000-VA -1...+1 bar
LHM-2500-VA -1...+2,5 bar
LHM-5000-VA -1...+5 bar

LHM-0500-AP 0...500 mbar absolute
LHM-1000-AP 0...1 bar absolute
LHM-2500-AP 0...2,5 bar absolute
LHM-5000-AP 0...5 bar absolute

LHM-0100-DP 0...100 mbar differential press.
LHM-0500-DP 0...500 mbar differential press.
LHM-1000-DP 0...1 bar differential press.
LHM-2500-DP 0...2,5 bar differential press.
LHM-5000-DP 0...5 bar differential press.



External pressure sensors LHM-TP16:

LHM-P-0010 0...10 bar
LHM-P-0020 0...20 bar
LHM-P-0050 0...50 bar
LHM-P-0100 0...100 bar
LHM-P-0250 0...250 bar
LHM-P-0350 0...350 bar
LHM-P-0700 0...700 bar
LHM-P-1000 0...1000 bar
LHM-P-1500 0...1500 bar
LHM-P-2000 0...2000 bar



LR-Cal LHM with internal force sensor:

LHM-0010-N 0...10 N
LHM-0025-N 0...25 N
LHM-0050-N 0...50 N
LHM-0100-N 0...100 N
LHM-0250-N 0...250 N
LHM-0500-N 0...500 N
LHM-1000-N 0...1000 N
LHM-3000-N 0...3000 N
LHM-5000-N 0...5000 N



Accuracy of pressure measurement: $\pm 0.1\%$ FS, optional $\pm 0.05\%$ FS.

Accuracy of force measurement: $\pm 0.05\%$.

Included in scope of delivery:

- Handheld **LR-Cal** LHM without internal sensor, or
Handheld **LR-Cal** LHM with internal gauge pressure, absolute pressure or differential pressure sensor, or
Handheld **LR-Cal** LHM with internal force sensor
- Built-in chargeable Li-Ion battery 3.7 V (size 14500)
- USB charger 110...230 VAC, 5 V, 750 mA
- USB 2.0 cable
- Certificate(s) of calibration, as follows:
 - **LR-Cal** LHM without internal sensor: none
 - **LR-Cal** LHM with internal pressure sensor: Factory certificate of calibration
 - **LR-Cal** LHM with internal force sensor: ACCREDIA (DAkKS) certificate for tension
 - External pressure sensors LHM-TP16: Factory certificate of calibration
 - Externe torque sensors LHM-TRS: ACCREDIA (DAkKS) certificate for clockwise direction
- Transit case with suitable foams
- Operating manual (German/English)

Options for all instrument versions:

- **LHM-WF** WIRELESS option
- **LHM-GK** Rubber cup, yellow
- **LHM-Cal** Windows-Software (english) for PC/Laptop
- **PC-WIRELESS** WIRELESS Receiver 433 Mhz. for PC/Laptop with USB port

Options for instruments with internal pressure sensor:

- **LHM-KL005** Accuracy $\pm 0.05\%$ FS (standard: 0.1% FS)
- **LHM-AZERT** ACCREDIA (DAkKS) certificate (standard: factory certificate)
- **LPP-08-PN-STECK** Push&Pull quick fit hose connectors for pneumatic hose 4 x 2 mm
(for version with differential pressure sensor you need 2 pcs.)

Options for instruments with internal force sensor:

- **LHM-N-A-D** ACCREDIA (DAkKS) certificate for compression
- **LHM-N-KIT** Tool-Kit with parts for mesuring compression and tension

Options for external pressure sensor LHM-TP16:

- **LHM-P-KL005** Accuracy $\pm 0.05\%$ FS (standard: 0.1% FS)
- **LHM-P-AZERT** ACCREDIA (DAkKS) certificate (standard: factory certificate)
- **TLDMM-DK** Double sealing cone 60° for pressure port ranges 1500 and 2000 bar

Options for external torque sensor LHM-TRS:

- **LHM-TRS-KL01** Accuracy $\pm 0.1\%$ FS (standard: 0.2% FS)
- **LHM-TRS-AZERT-0500** ACCREDIA (DAkKS) certificate, counter-clockwise direction, ranges up to 500 Nm
- **LHM-TRS-AZERT-1000** ACCREDIA (DAkKS) certificate, counter-clockwise direction, ranges 1000 Nm and above



with
WIRELESS antenna



Im Lieferumfang enthaltener Koffer



Artikel-Nr. **LHM-N-KIT**



Artikel-Nr. **PC-WIRELESS**