

# Piezoresistive OEM Pressure Transmitters

## Series 4LC...9LC

**-40...150 °C, with embedded signal conditioning**

The Series 4LC...9LC family of miniature OEM pressure transmitters combines a piezoresistive pressure sensor with -40...150 °C-capable signal conditioning in one compact, easy-to-integrate package.

### Technology

The «LC» line of miniature pressure transmitters leverages KELLER's extensive background in high-stability piezoresistive pressure sensors and innovative digital signal processing. Now, both pressure sensor and signal processor are integrated into a miniature, hermetically-sealed housing no larger than was once required for the sensor only!

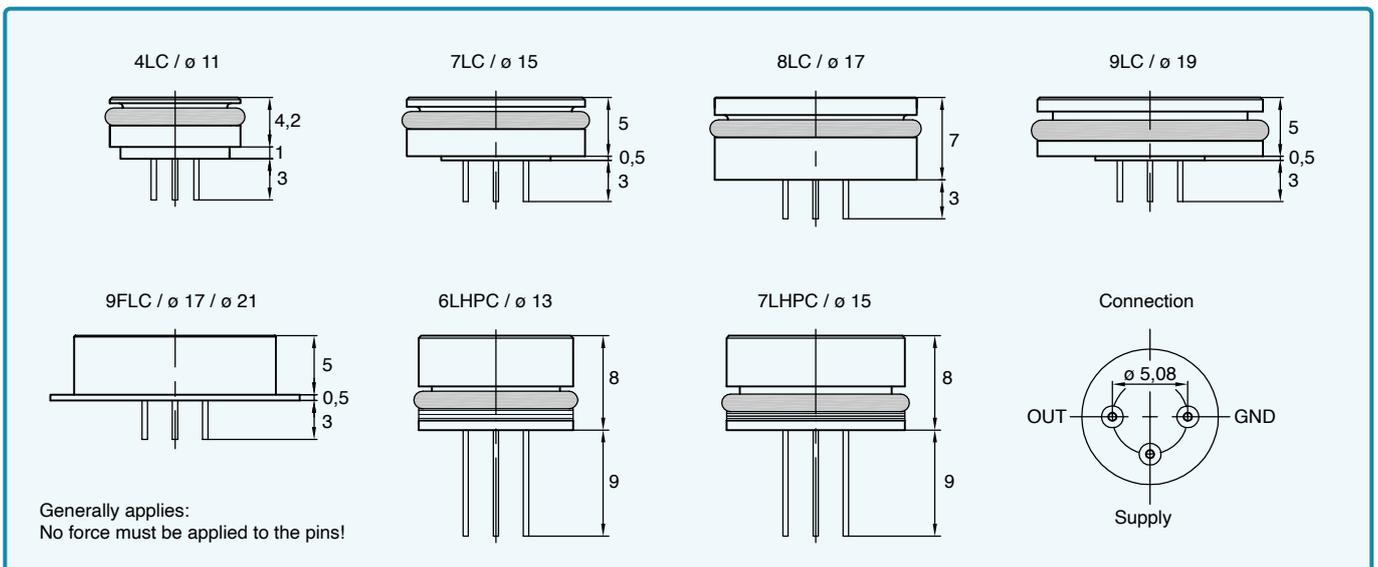
The name given to this new technology is Chip-In-Oil (CIO). CIO means not only that the entire pressure transmitter is embedded within a hermetically-sealed, oil-filled housing, but that this transmitter can then be seamlessly integrated into the OEM product, achieving cost savings and system performance not possible with other, conventional technologies.

### Interfaces

The ratiometric analog output simplifies the integrators task by providing a signal output wherein the output is ratiometric to the supply, thereby eliminating the need to incorporate an expensive, absolute reference. Providing an 0,5...4,5 VDC output from a 5 VDC supply, the LC-transmitter is inherently protected against overvoltage and reverse polarity up to ±33 VDC and provides noise immunity by a factor of 10X relative to the latest standards regarding emitted and conducted EMI.

### Performance features

- Hermetically protected sensor electronics - extremely resistant to environmental influences
- Operating temperature up to 150 °C
- Ultra-compact, robust housing made from stainless steel (optionally Hastelloy C-276)
- No external electronics for compensation or signal processing
- Extremely accurate, outstanding long-term stability, no hysteresis
- Pressure ranges of 1 bar to 1000 bar
- Extremely easy to integrate in overall systems
- Two-chip solution with pressure sensor and signal processing separation provides a high degree of flexibility.



## Specifications

Accuracy*	max. +/- 0,25 %FS * Linearity best straight line @ RT, hysteresis, repeatability
Overpressure	2,5 x pressure range, max. 300 bar resp. 1200 bar (6LHPC, 7LHPC)
Long Term Stability	max. +/- 0,3 %FS

Type/ Version	Dimensions [mm]	Pressure Range	Operating Temperature	Comp. Temp. Range	TEB <sup>(1)</sup> [%FS]
4LC	ø 11 x 4,2	3...200 bar abs. <sup>(2)</sup>	-10...+80 °C	0...50 °C	± 1,0 %FS
7LC	ø 15 x 5	2...200 bar abs.	-40...+125 °C	-10...80 °C	± 1,0 %FS
		2...30 bar rel. <sup>(3)</sup>		-40...+125 °C	± 2,0 %FS
8LC	ø 17 x 7	1...200 bar abs.	-40...+150 °C	-10...80 °C	± 0,8 %FS
9LC	ø 19 x 5	1...30 bar rel.		-40...+125 °C	± 1,5 %FS
9FLC	ø 17 x 5,5 Flange ø 21	1...50 bar abs.		-40...+150 °C	± 2,5 %FS
		1...30 bar rel.	(only > 3 bar)		
6LHPC	ø 13 x 8	200...1000 bar	-40...+150 °C	-10...80 °C	± 0,8 %FS
7LHPC	ø 15 x 8			-40...+150 °C	± 2,0 %FS

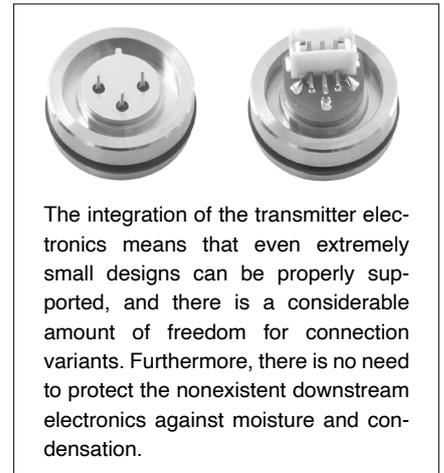
- (1) TEB (Total Error Band): Maximum deviation within specified pressure and compensated temperature range  
 (2) abs: Absolute Pressure Measurement (PAA: Absolute. Zero at vacuum PA: Sealed Gauge. Zero at 1,0 bar abs.)  
 (3) rel: Referential version (PR: Vented Gauge. Zero at atmospheric pressure)

Type	3-wire
Signal Output	0,1...0,9 V/V (0,5...4,5 V ratiometric)
Supply	5,0 VDC ± 0,5 V
Reverse Polarity and Overvoltage Protection	± 33 VDC (permanently on all leads)
Power Consumption	max. 8 mA
Load Resistance	> 5 kΩ
Sampling Rate / Bandwidth	2 kHz / 800 Hz
Rise Time T <sub>99</sub>	1 ms
Response Time (Supply ON)	< 5 ms (0...99 %)
Isolation	> 100 MΩ @ 500 VDC
EMC-Industry	EN 61000-6-2 / EN 61000-6-3 / EN 61326-2-3 / BCI 200mA @ 1...250MHz
DO-160F RF Susceptibility (radiated)	Cat. R: 150 V/m @ 400 MHz...8 GHz PM / 30 V/m @ 100 MHz...400 MHz CW & SW,
DO-160F RF Susceptibility (conducted)	Cat. R: 30 mA @ 10 kHz...40 MHz / 3 mA @ 40 MHz...400 MHz

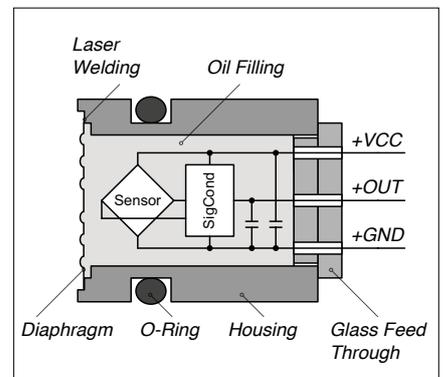
Material in Contact with Media	Stainless Steel AISI 316L (DIN 1.4404 / 1.4435) / optionally Hastelloy C-276 6LHPC: Steel, 7LHPC: Steel or optionally and @ > 600 bar and > 100 °C Inconel 718 O-Rings: Viton® 70 Shore A (-20...200 °C, exchangeable), @ 6LHPC / 7LHPC: Viton® 90 Shore A Support Ring @ 6LHPC / 7LHPC: PTFE
Pressure Endurance	0...100 %FS @ 25 °C: > 10 mio. pressure cycles with appropriate installation (see install. requirements)
Vibration Endurance	20 g, 5...2000 Hz, X/Y/Z-axis
Shock	75 g sine 11 ms
Oil Filling	Silicone oil, others on request

Electrical Connection	– Glass feed through pins D = 0,45 mm, L = 2,5...4 mm, Positioning: See scale drawing. Attention: It's important not to load forces to the pins! – Silicone wires 0,09 mm <sup>2</sup> @ the glass feed through pin – Plug JST 1,5 mm, 3-pole. Type: B3B-ZR-SM4-TF. Only for -20...85 °C and not for 4LC & 6LC As counterpart: IDC-socket with 1,27 mm flat band. Type: 03ZR-8M-P As counterpart: Crimp-socket with wires AWG 28. Type: ZHR-3, Crimp-contact: SZH-003-P0.5
-----------------------	---

Options Other pressure and temperature ranges, other accuracies.



The integration of the transmitter electronics means that even extremely small designs can be properly supported, and there is a considerable amount of freedom for connection variants. Furthermore, there is no need to protect the nonexistent downstream electronics against moisture and condensation.



Serie 21C

Applications requiring a mechanical package with certain pressure and electrical connections can be accommodated. Almost any combination of connections is possible with

our Series 21C product line. CIO is optionally available with the 2-wire I2C digital interface, enabling bus-capability in the system design.