Piezoresistive OEM Pressure Transmitters

Series 4 LC…9 LC

-40…150 °C, with embedded signal conditioning

The Series 4 LC…9 LC 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.

4 LC

7 LC

8 LC

9 LC

9 FLC

6 LC HP / 7 LC HP
(High Pressure)

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!

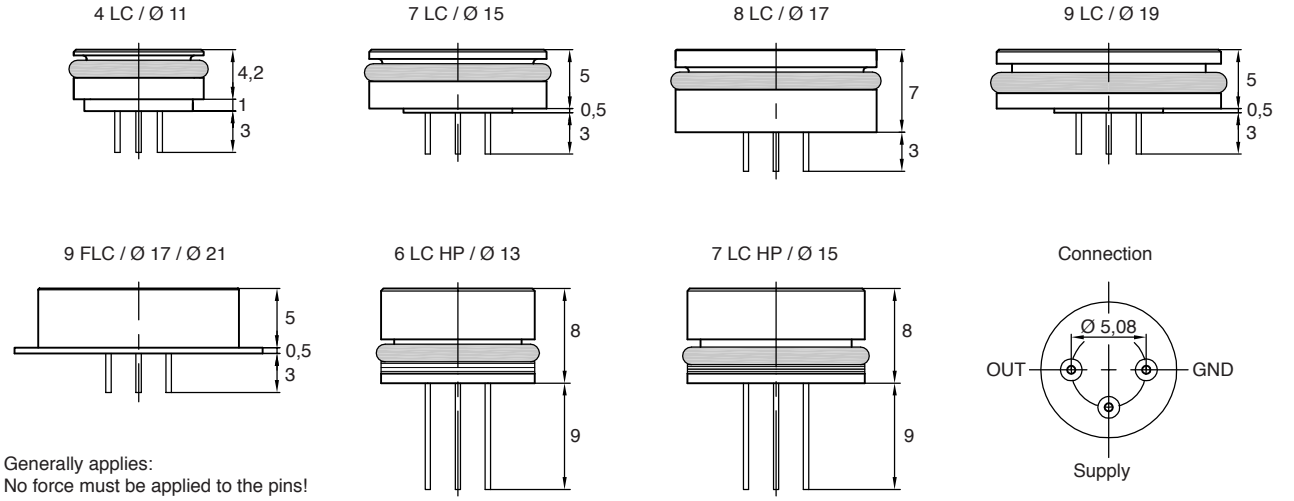
The name given to this new technology is Chip-In-Oil (CIO). CIO means not only that the entire pressure transmitter is embedded within a hermetically-sealed, oil-filled housing, but that this transmitter can then be seamlessly integrated into the OEM product, achieving cost savings and system performance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



Generally applies:
No force must be applied to the pins!

Subject to alterations

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KELLER

Specifications

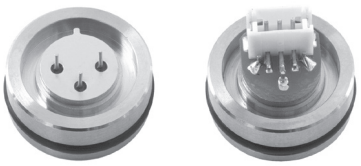
Accuracy* max. +/- 0,25 %FS
* Linearity best straight line @ RT, hysteresis, repeatability

Overpressure 2,5 x pressure range,
max. 300 bar resp. 1200 bar (6 LC HP, 7 LC HP)

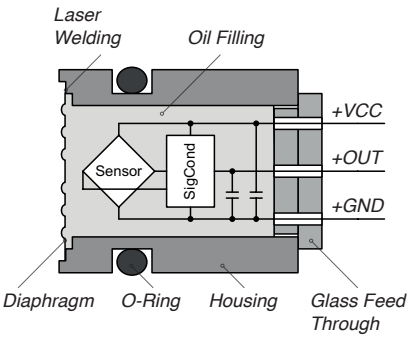
Long Term Stability max. +/- 0,3 %FS

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



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.



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_{99} 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
6 LC HP: Steel, 7 LC HP: Steel or optionally and @ > 600 bar and > 100 °C Inconel 718
O-Rings: Viton® 70 Shore A (-20…200 °C, exchangeable), @ 6 LC HP / 7 LC HP: Viton® 90 Shore A
Support Ring @ 6 LC HP / 7 LC HP: 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 mm² @ 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 4 LC & 6 LC
  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.

Serie 21 C

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.

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