

## PIEZORESISTIVE OEM PRESSURE TRANSMITTERS

## SERIES 4 LC...9 LC

-40...150 °C, WITH EMBEDDED SIGNAL CONDITIONING

The Series 4 LC to 9 LC is characterized by having fully integrated compensation and signal standardization over the entire temperature range from -40 °C to 150 °C.

### Technology

KELLER grew up in the 1970s with OEM pressure transducers. Now the company has not only outstanding know-how in design, connection and housing technology at its disposal. After many years of experience in digital signal processing, KELLER has integrated signal processing and compensation at chip level in a joint, hermetically sealed housing in a top class OEM transmitter in the Series 4 LC to 9 LC.

Chip-in-Oil technology means that the term „embedded system“ has two meanings at KELLER. First, the entire transmitter electronics in the transducer housing are hermetically embedded in oil and second, these highly-integrated OEM transmitters represent an ideal pressure transmitter module for integration in higher-order systems due to the selected analogue and digital output signals.

### Interfaces

The ratiometric, analogue output signal makes connecting to an external analogue/digital converter extremely simple: the fact that both systems are in principle referenced to each other means that there is no need to set up an expensive, absolute measuring system.

The CIO pressure transmitters are designed for 5 V applications, and also provide constant protection against overvoltage and polarity reversal on all lines up to ±33 VDC. Faraday encapsulation makes them extremely EMC resistant.

### 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
- 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.



4 LC



7 LC



8 LC



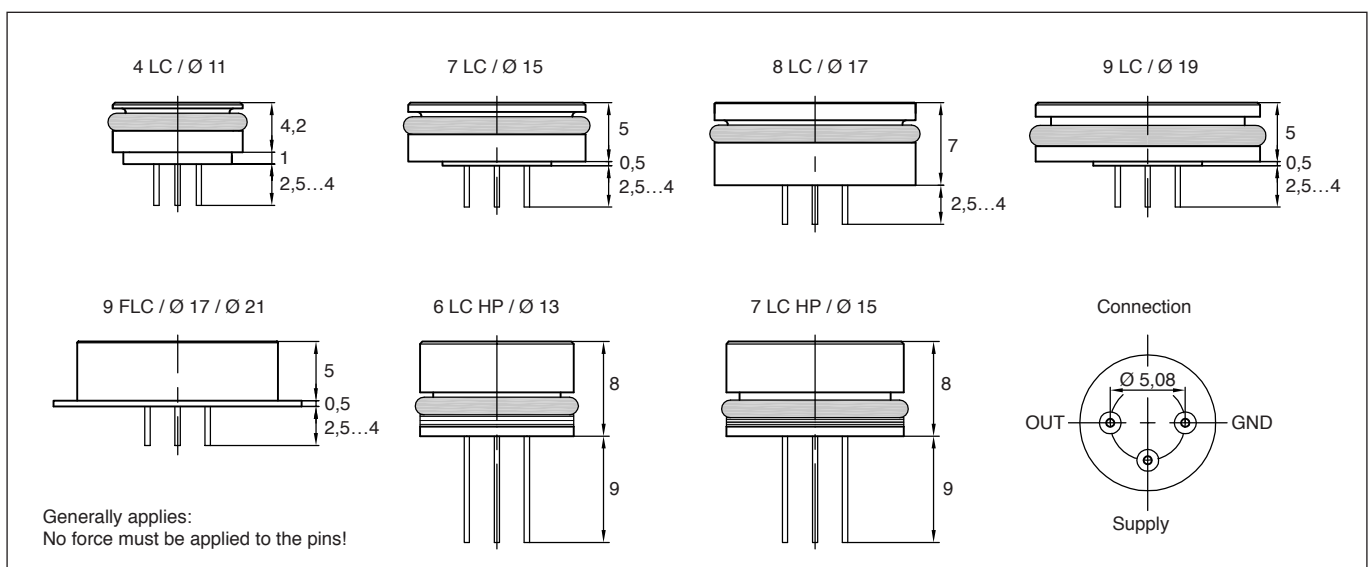
9 LC



9 FLC



6 LC HP / 7 LC HP  
(High Pressure)



Subject to alterations

02/2011

KELLER AG für Druckmesstechnik  
KELLER Ges. für Druckmesstechnik mbH

St. Gallerstrasse 119  
Schwarzwaldstrasse 17

CH-8404 Winterthur  
D-79798 Jestetten

Tel. +41 (0)52 - 235 25 25  
Tel. +49 (0)7745 - 9214 - 0

Fax +41 (0)52 - 235 25 00  
Fax +49 (0)7745 - 9214 - 60



# 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)
Stability	max. +/- 0,3 %FS

Type/ Version	Dimensions [mm]	Pressure Range	Storage Temperature	Operating Temperature	TEB <sup>(1)</sup> [%FS]
4 LC	ø 11 x 4,2	3...200 bar abs. <sup>(2)</sup>	-10...+80 °C	0...50 °C	± 1,0 %FS
7 LC	ø 15 x 5	2...200 bar abs. 2...30 bar rel. <sup>(3)</sup>	-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 operating 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

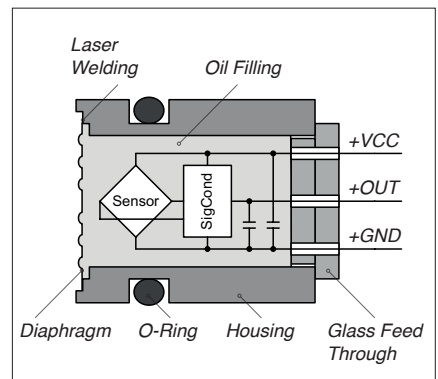
Material in Contact with Media	Stainless Steel AISI 316L (DIN 1.4404 / 1.4435) / optionally Hastelloy C-276 Exception: 6 LC HP / 7 LC HP optionally and @ > 600 bar and > 100 °C: Inconel 718 O-Rings: Viton® 70° Sh @ 6 LC HP / 7 LC HP: Viton® 90° Sh Support Ring @ 6 LC HP / 7 LC HP: PTFE
Pressure Endurance	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 sinus 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 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
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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 21 C

The CIO pressure transmitters can also be installed in almost any housing with a pressure connection and a plug or cable (example: Series 21 C).

The I2C version is available as an alternative for further processing of the pressure

information in digital form. The 2-wire interface with open drain ports does not require much hardware, and even makes it possible to connect several OEM transmitters to the same two bus lines, which then requires slave addressing.

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Fax +49 (0)7745 - 9214 - 80