Piezoresistive OEM Pressure Transmitters
WITH I2C INTERFACE AND EMBEDDED SIGNAL CONDITIONING

With the D-line, Keller introduces a unique combination consisting of an exceedingly robust industrial pressure transducer and the popular I2C microcontroller interface. Pressure transmitters with this interface are commonly available only in consumer market housings made of plastic or ceramic, where merely the parameters for compensation are stored in an integrated memory. The D-line OEM transmitters however have an unprecedented embedded digital signal processing (DSP) core for the compensation and normalization of the output values.

Technology
The Series 4 LD...9 LD is based on KELLER’s famous Chip-In-Oil (CIO) technology. The “L” stands for the laser welded stainless steel housing and could equally be representative for low-power (typ. 0.1 µA in idle/sleep mode) and low-voltage (Supply: 1.8...3.6 VDC). The housing is hermetically-sealed, oil-filled and builds a Faraday cage with feed-through capacitors around the entire electronics. The digital interface of the electronics with dual information of pressure and temperature is indicated by the “D”.

Interface
The easiest way to couple an OEM pressure transmitter to a microcontroller based system is a digital I/O-compatible interface; no amplification, no analog to digital conversion, no calibration, no temperature coefficients. In short: no problems.

I2C (Inter-Integrated Circuit) is designed for a direct connection between devices on a printed circuit board. It is a BUS-system because it allows the connection of multiple transmitters (slaves) to the same communication lines, but it is not a fieldbus with the classic long distance inter-connectability. So the D-Line combines an industrial pressure interface for harsh environment with an electrical interface for OEM applications.

The values are in 16 Bit unsigned integer format and the scaling is given by constants or by the memory content of the transmitter (two floating point values IEEE 754 for the pressure scaling).

Performance features
• Ultra low power consumption, optimised for battery powered applications
• Hermetically protected sensor electronics – extremely resistant to environmental influences
• Ultra-compact, robust housing made from stainless steel (optional 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
• Easy to integrate into microcontroller based systems
• Internal two-chip solution with pressure sensor and signal processing separation provides a high degree of flexibility
Specifications

<table>
<thead>
<tr>
<th>Pressure Ranges rel. PR</th>
<th>0...1</th>
<th>0,5...0,5</th>
<th>-1...3</th>
<th>-1...10</th>
<th>-1...30</th>
</tr>
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<table>
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<tr>
<th>Pressure Ranges abs. PA</th>
<th>0...3</th>
<th>0...10</th>
<th>0...30</th>
<th>0...100</th>
<th>0...200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0...400</td>
<td>0...600</td>
<td>0...1000</td>
<td>bar</td>
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<th>PAA</th>
<th>0...1</th>
<th>0,5...1,5</th>
<th>0...3</th>
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Accuracy max. ± 0,15 %FS (Linearity best straight line®RT, hysteresis, repeatability)

Overpressure 4 x pressure range (max. 350 bar resp. 1200 bar for 6 LD HP, 7 LD HP)

Long Term Stability typ. ± 0,1 %FS, max. ± 0,2 %FS (limited to max. ± 3 mbar)

Communication Protocol

D-Line OEM-transmitter samples only on request.
The idle state is the sleep mode to save power.

Sequence for data acquisition:

1. Request measurement
   2 bytes from master

2. Await the end of conversion (three ways)
   - Simple delay of 8 ms
   - Polling of the “Busy?” flag [5] in the status byte (only one byte reading needed)
   - Event triggering by the additional “EOC” handshake pin (goes to VDD)

3. Read out measurement results
   1 byte from master, 3...5 bytes from slave

4. Interpretation of new data
   - Polling of the ADDR [1]
   - Polling of the SUP [1]
   - Polling of the HIGH [1]
   - Simple delay of 8 ms

The complete communication protocol is available on the KELLER homepage.

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