HIGHLY PRECISE (0.01%) PRESSURE TRANSMITTERS
MATHEMATICALLY COMPENSATED / PROGRAMMABLE

Digital Output of Transmitter
This high precision of 0.01 %FS is available as an option (the standard Series 33 X has an accuracy of 0.05 %FS). These Series are based on the stable, floating piezoresistive transducer and the newly developed XEMICS micro-processor with integrated 16 bit A/D converter. Temperature dependencies and non-linearities of the sensor are mathematically compensated. With the READ30 software and the KELLER cable K-107, the calculated pressure can be displayed on a Laptop or PC. The READ 30 software also allows the recording of pressure signals and the graphic display on the PC. Up to 128 transmitters can be hooked together to a Bus-system.

Transmitter with Analog Output
Integrated in the XEMICS processor is a D/A converter of 16 bit for analog signal outputs of 4...20 mA or 0...10 V. The output rate is 400 Hz. The accuracy is diminished by this converting process by 0.05 %FS. The digital output is available on all transmitters with analog output.

Programming
With the KELLER software READ30 and PROG 30, a RS485 converter (i.e. K102 or K107 from KELLER) and a PC, the pressure can be displayed, the units changed, a new gain or zero set. The analog output can be set to any range within the compensated range.

Accuracy and Precision
“Accuracy” is an absolute term, “Precision” a relative term. Dead weight testers are primary standards for pressure, where the pressure is defined by the primary values of mass, length and time. Highest class primary standards in national laboratories indicate the uncertainty of their pressure references with 70 to 90 ppm or close to 0.01%.

Commercial dead weight testers as used in our facilities to calibrate the transmitters indicate an uncertainty or accuracy of 0.025%. Below these levels, KELLER use the expression “Precision” as the ability of a pressure transmitter to be at each pressure point within 0.01 %FS relative to these commercial standards.

The transmitter’s full-scale output can be set up to match any standard of your choice by correcting the gain with the PROG30 software.

**PIN ASSIGNMENT**

<table>
<thead>
<tr>
<th>Function</th>
<th>Output</th>
<th>MIL C-26482</th>
<th>Binder 723</th>
<th>DIN 43650</th>
</tr>
</thead>
<tbody>
<tr>
<td>4...20 mA OUT/GND</td>
<td>2 Wire</td>
<td>C</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2 Wire</td>
<td></td>
<td>A</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>0...10 V GND</td>
<td>3 Wire</td>
<td>C</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>+Vcc</td>
<td></td>
<td>B</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>+Vcc</td>
<td></td>
<td>A</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Digital</td>
<td></td>
<td>D</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**Serie 33 X**

(G1/4"")

**Serie PD-33 X**

with DIN 43650 Connector

**Serie 35 X**

(G1/2"")

Subject to alterations 08/2009
### Specifications

<table>
<thead>
<tr>
<th>Standard Pressure Ranges (FS) and Overpressure in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PR 33 X / PD 33 X / PR 35 X</strong></td>
</tr>
<tr>
<td><strong>PA(A) 33 X / PA(A) 35 X</strong></td>
</tr>
</tbody>
</table>

**Overpressure**
- 2
- 5
- 20
- 60
- 200
- 400
- 1000
- 2000
- 10000

**Overpr. referential pressure side PD**
- 2
- 5
- 7
- 20

**PD, static line pressure**
- standard / high Pressure
- 200 bar / 600 bar

<table>
<thead>
<tr>
<th>Output</th>
<th>Supply (U)</th>
<th>Accuracy, Error Band</th>
<th>Optional: Precision</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS 485</td>
<td>8...28 V / 3,5...12 V</td>
<td>0,05 %FS</td>
<td>(10...40 °C)</td>
</tr>
<tr>
<td>4...20 mA</td>
<td>8...28 V</td>
<td>0,1 %FS</td>
<td>(10 %FS</td>
</tr>
<tr>
<td>0...10 V</td>
<td>13...28 V</td>
<td>0,1 %FS</td>
<td>(10...80 °C)</td>
</tr>
<tr>
<td>0...2,5 V / 0...5 V</td>
<td>6...28 V / 8...28 V</td>
<td>0,1 %FS</td>
<td>(10...80 °C)</td>
</tr>
<tr>
<td>0,1...2,5 V</td>
<td>3,5...12 V</td>
<td>0,1 %FS</td>
<td>(10...80 °C)</td>
</tr>
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<td>0,1...2,5 V</td>
<td>0,1 %FS</td>
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</tbody>
</table>

**Remarks:**
- Dead Volume Change < 0,1 mm
- **Series PD-33 X**
- **Material in Contact with Media:** Stainless Steel AISI 316L / Viton
- **Protection:** IP 65 / optional: IP 67 or IP 68 (with cable)
- **Shock Endurance:** 20 g (11 ms) / EN 60068-2-6
- **Temperature Range:** -40…120 °C
- **Vibration Endurance:** 20 g (5…2000 Hz, max. amplitude ± 3 mm), according to IEC 68-2-6
- **Weight:** Series 33 X = 140 g; Series 35 X = 160 g; Series PD-33 X = 500 g
- **Dead Volume Change:** < 0,1 mm

### Accessories Series 30

Each Series 30 transmitter also integrates a digital interface (RS485 halfduplex) which you can make use of: Connect the transmitter to a PC or Laptop via a converter RS232-RS485 (i.e. K102 or K107) or USB-RS485 (K104 or K104B). Two programs are offered for free:

**PROG30:** Instrument Settings
- Call up of information (pressure- and temperature range, version of software etc.)
- Indication of actual pressure value
- Selection of the units
- Setting of a new zero and gain for the transmitter
- Reprogramming of the analog output (i.e. different unit, other pressure range)
- Setting of the instrument address (for Bus-operation)
- Low-Pass Filter adjusting possibility

You can also tie up the transmitters into your own software. You have then a documentation, a DLL and numerous examples at your disposal.

### Changing the plug connector

Laboratory applications require the same transmitter to be used at different measurement points with different electrical connection arrangements. To accommodate such applications, KELLER can supply different connectors matching with the internal standard plug. This makes it easy to exchange the electrical connector of the transmitter.

### Polynomial Compensation

This uses a mathematical model to derive the precise pressure value (P) from the signals measured by the pressure sensor (S) and the temperature sensor (T). The microprocessor in the transmitter calculates P using the following polynomial:

\[
P(S,T) = A(T)S + B(T)S^2 + C(T)S^3 + D(T)S^4
\]

With the following coefficients \(A(T)\)…\(D(T)\) depending on the temperature:

- \(A(T) = A_0 + A_1T + A_2T^2 + A_3T^3\)
- \(B(T) = B_0 + B_1T + B_2T^2 + B_3T^3\)
- \(C(T) = C_0 + C_1T + C_2T^2 + C_3T^3\)
- \(D(T) = D_0 + D_1T + D_2T^2 + D_3T^3\)

The transmitter is factory-tested at various levels of pressure and temperature. The corresponding measured values of \(S\) and \(T\) are written into the EEPROM of the microprocessor. When the pressure transmitter is in service, the microprocessor measures the signals \(S\) and \(T\), and calculates the coefficients according to the temperature and produces the exact pressure value by solving the \(P(S,T)\) equation. Calculations and conversions are performed at least 400 times per second.

### Subject to alterations

08/2009
Website

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Email

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QR Code

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