PROGRAMMABLE LEVEL TRANSMITTER

SERIES 36 X S

DIGITALLY COMPENSATED / RANGEABLE / DIGITAL AND ANALOG OUTPUT

This pressure transmitter is designed for level measurement in narrow downhole applications where highest accuracy is required.

Product Benefits:

- Only **16 mm** diameter
- Mathematically compensated
- Programmable, assisting inventory reduction
- Filtering function 2 ms...30 sec
- Lightning Protection
- Bus-system capabilty (up to 128 transmitters)

36 X S level transmitter is available in two different versions:

• **PAA-36 X S** Absolute, Zero at Vacuum

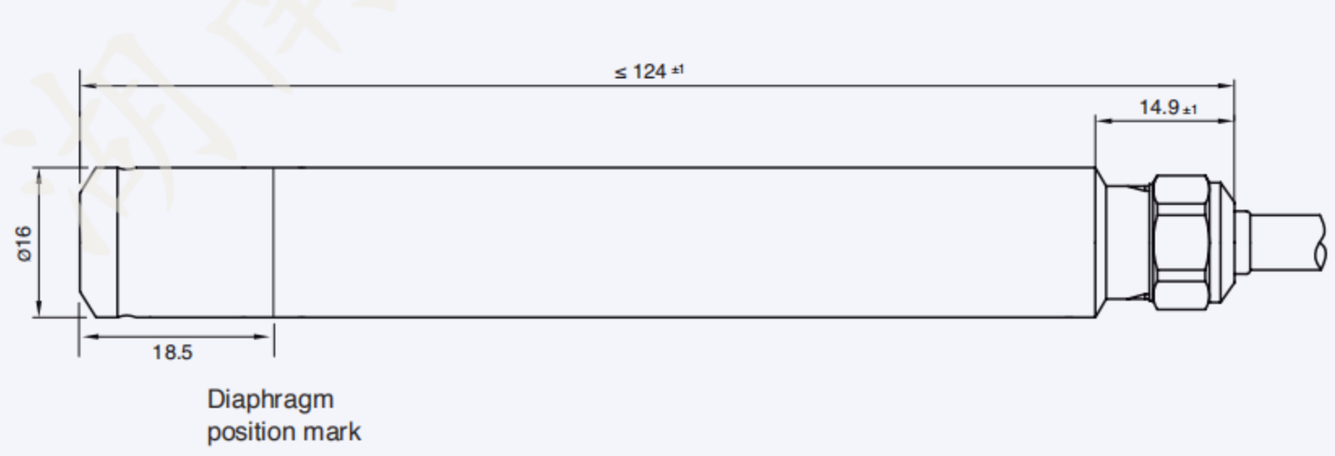
This probe is applied when the atmospheric pressure is measured by a separate barometer and when the water level is calculated as the difference between the absolute value and the ambient pressure. Venting of the electrical cable to atmosphere does not have to be considered for these installations.

• **PR-36 X S** Gauge, Zero at atmospheric Pressure

This probe is fitted with a durable cable with an integral vent tube to the atmosphere. To prevent the formation of internal condensation caused by installations in cold water on warm, humid days, it is important to ensure only dry air enters the transmitter enclosure via the vent tube. If the vent tube is not terminated in a warm, dry enclosure, KELLER recommends and can supply a purpose built cartridge filled with a silica gel which is fitted at the end of the reference tube.

Programming

With the KELLER software CCS30, a RS485 converter (i.e. K-114 from KELLER) and a PC (Laptop), the pressure can be displayed, the units changed, and new gain or zero set. The analog output can be set to any range within the compensated range.



ELECTRICAL CONNECTIONS

Output	Function	Cable
2-wire 4...20 mA	OUT/GND	white
	+Vcc	black
Digital	RS485A	blue
	RS485B	yellow
Transmitter Housing		Shield

RoHS CE

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KELLER

Specifications

Standard Pressure Range FS					
PR-36 X S	1	3	10	30	bar
PAA-36 X S	0,8…2,3	0,8…4	0,8…11	0,8…31	bar
Water column approx.	10	30	100	300	mH2O
Overpressure	3	5	20	40	bar

PAA: Absolute. Zero at vacuum PR: Gauge. Zero at atmospheric pressure

Note: The ranges 100, 200 or 500 mbar are realized with the 1 bar range. Accuracy for these ranges is ±2 mbar (0...50°C)

All intermediate ranges for the analog output are realizable with no surcharge by spreading the standard ranges. The Errorband rises propor-ti-onally.

Output	4...20 mA / RS485
Supply (U)	10...32 V
Accuracy [1] @ RT	0,025 %FS typ.
Total Error Band [2] (0...50 °C)	0,2 %FS
Resolution	0,002 %FS
Output Rate	400 Hz
Long Term Stability typ.	Range ≤ 1 bar: 2 mbar Range > 1 bar: 0,2 %FS

[1] Linearity (best straight line), hysteresis and repeatability
[2] Accuracy and temperature error within the compensated temperature range

Load Resistance	< (U - 10 V) / 25 mA (2-wire)
Electrical Connection (Cable)	PR: polyethylene (PE) Ø 5.8 mm (vented) PAA: polyolefin (PE-based) Ø 5.8 mm
Insulation	> 10 MΩ / 500 V
Storage-/Operating Temperature	-20…80 °C (icing not permitted)
Vibration Endurance, IEC 60068-2-6	20 g (10...2000 Hz)
Shock Endurance, IEC 60068-2-27	50 g (11 ms)
Protection	IP68
CE-Conformity (EMC)	EN 61000-6-1 to 6-4 / EN 61326-1 / EN 61326-2-3
Lightning Protection	Supply and RS485 200A @ 8/20 µs GND/CASE 2'000A @ 8/20 µs
Material in Contact with Media	Stainless Steel AISI 316L / Viton® / PE
Weight (without cable)	≈ 200 g

Note:

- Disturbance of the 4...20 mA signal occurs during communication through RS485.
- PAA 0,8…2,3 bar: for installation heights greater than 2000 m above sea level, special measuring ranges are required

Options:
- Special calculations with pressure and temperature
- Different housing-material, oil filling or pressure thread

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:

$$P(S,T) = A(T)\cdot S^0 + B(T)\cdot S^1 + C(T)\cdot S^2 + D(T)\cdot S^3$$

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

$$A(T) = A_0\cdot T^0 + A_1\cdot T^1 + A_2\cdot T^2 + A_3\cdot T^3$$
$$B(T) = B_0\cdot T^0 + B_1\cdot T^1 + B_2\cdot T^2 + B_3\cdot T^3$$
$$C(T) = C_0\cdot T^0 + C_1\cdot T^1 + C_2\cdot T^2 + C_3\cdot T^3$$
$$D(T) = D_0\cdot T^0 + D_1\cdot T^1 + D_2\cdot T^2 + D_3\cdot T^3$$

The transmitter is factory-tested at various le-vels of pressure and temperature. The corre-spon-ding measured values of S, together with the exact pressure and temperature values, allow the coefficients A0...D3 to be calculated. These are written into the EEPROM of the micro-processor.

Interface

The X-line products have a digital interface (RS485 halfduplex), which supports the MODBUS RTU and KELLER Bus protocols. Details of the communication protocols can be found at www.keller-druck.com. To integrate the communication protocol into your own software, documentation, a Dynamic Link Library (DLL) and various program examples are available.

Accessories

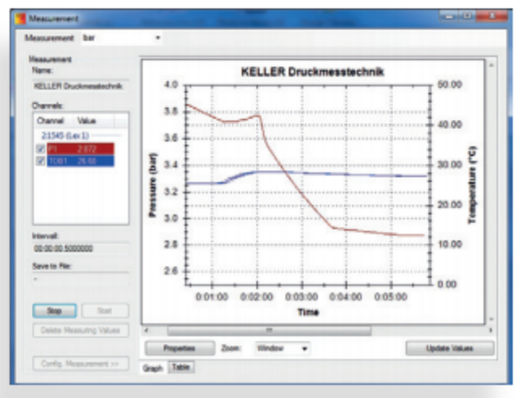
The connection to a computer is established via an RS485-USB interface converter To ensure smooth operation, we recommend the K-114 with the corresponding mating connector, robust driver module, fast RX/TX switching and connectable bias and terminating resistors.

Software

The licence-free software CCS30 is used to carry out configurations and record measured values.

Measurement collection
- Graphical live display
- Adjustable measurement and storage interval
- Export function
- Parallel recording in Bus operation

Configuration
- Call up of information (pressure and temperature range, software version, serial number etc.)
- Readjustment of zero point and amplification
- Rescaling of analog output (unit, pressure range)
- Adjustment of low-pass filter
- Selection of instrument address and baud rate



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