Pressure Transmitter for Bio-Reactors

Digitally Compensated / Rangeable / Digital and Analog Output

Series 35 X HT
Series 35 X HTT

Piezoresistive pressure transmitter for applications in bio-reactors or autoclaves. The transmitter is compensated up to 150 °C and may be operated continuously or sterilised at this level, including the special circuit electronics.

The transmitters are supplied in absolute or gauge versions, with current or voltage output.

The sensing component is a micro-machined silicon pressure chip of high sensitivity. An independent temperature sensor is integrated on the surface of the silicon chip.

Series 35 X HT

Digital Output of Transmitter

These Series are based on the stable, piezoresisitive transducer and a micro-processor electronics 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 Palmtop, Laptop or PC. The READ30 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.

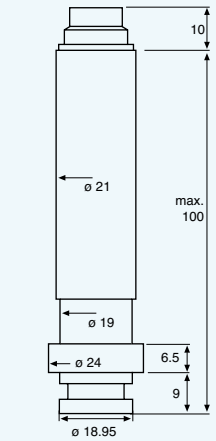
Series 35 X HTT

Transmitter with Analog Output

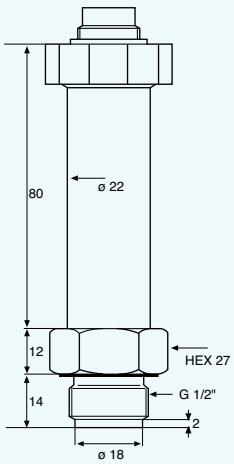
The micro-processor integrates a D/A converter of 16 bit for analog signal outputs of 4…20 mA or 0…10 V. The output rate is 100 Hz (adjustable). The accuracy is diminished by this converting process by 0,05 %FS. The digital output is available on all transmitters with analog output.

Programming

With the KELLER software READ30 and PROG30, a RS485 converter (i.e. K-102, K-104 or K-107 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.



Series 35 X HT
(Manometer Pressure Port)



Series 35 X HTT
(G 1/2")

PIN ASSIGNMENT

Output	Function	Binder 723	MIL C-26482
4…20 mA	OUT/GND	1	C
2 Wire	+Vcc	3	A
0…10 V	GND	1	C
3 Wire	OUT	2	B
	+Vcc	3	A
Digital	RS485A	4	D
	RS485B	5	F

CE

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Specifications

Standard Pressure Ranges (FS) and Overpressure in Bar						
Version Absolute / Gauge	-1	1	3	10	30	bar
Overpressure	2	2	5	20	60	bar

	(digital)	(analog)	(analog)
Output	**RS 485**	**4…20 mA** (2 Wire)	**0…10 V** (3 Wire)
Supply (U)	8…28 Vcc	8…28 Vcc	13…28 Vcc
Accuracy, Error Band[1] (20...120 °C)[2]	0,15 %FS	0,2 %FS	0,2 %FS

[1] Linearity + Hysteresis + Repeatability + Temp. Coeff. + Zero + Span Tolerance [2] other compensated temp. ranges on request

True Output Rate	100 Hz
Resolution	0,002 %FS
Long Term Stability typ.	Range ≤ 2 bar: 2 mbar Range > 2 bar: 0,2 %FS
Load Resistance (Ω)	<(U-7V) / 0,02A (2-wire) > 5'000 (3-wire)
Electrical Connection	– Binder-Plug 723 (5 pole) – MIL C-26482-Plug (6 pole)
Insulation	100 MΩ / 50 V
Storage- / Operating Temperature Range	-20…150 °C (electronics max. 120 °C)
Pressure Endurance	10 Million Pressure Cycles 0…100 %FS at 25 °C
Vibration Endurance	20 g (5...2000 Hz, max. amplitude ± 3 mm), according to IEC 68-2-6
Shock Endurance	20 g (11 ms)
Protection	IP 65 optional: IP 67 oder IP 68 (with cable)
CE-Conformity	EN 61000-6-1 to -6-4
Material in Contact with Media	Stainless Steel 316L (DIN 1.4435) / Viton®
Weight	≈ 280 g
Dead Volume Change	< 0,1 mm³

Remark:
– RS485 pins (for digital output and for programming) is available on all types.
– Options: – Switch output, programmable via interface
– Special calculations with pressure and temperature
– Different housing-material, oil filling, pressure thread or connector

All intermediate ranges for the analog output are realizable with no surcharge by spreading the standard ranges.

Option: Adjustment directly to intermediate ranges (below 20 pieces against surcharge).

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 levels of pressure and temperature. The corresponding measured values of S, together with the exact pressure and temperature values, allow the coefficients A_0...D_3 to be calculated. These are written into the EEPROM of the microprocessor.

When the pressure transmitter is in service, the microprocessor measures the signals (S) and (T), 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.

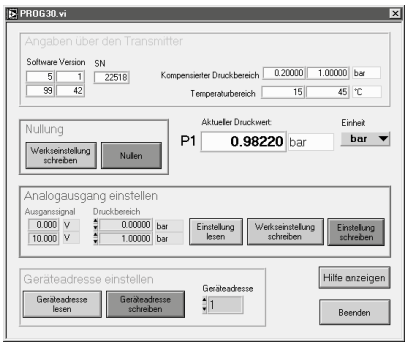
Accessories Series 30

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. K-102, K-104 or K-107). Two programs are offered:

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)
- Programming of the switch output
- Changing the output rate

READ30: Data collection with graphs
- Fast read-out and viewing of the pressure signals in a graph
- Documentation of dynamic measurements
- Up to 16 transmitters on one serial connection (Bus-operation)

Software PROG30



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 (optional)

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.

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