Pressure Transmitter for Bio-Reactors

Digitally Compensated / Rangeable / Digital and Analog Output

Series 35XHT
Series 35XHTT

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 pressure measuring cell.

Digital Output of Transmitter

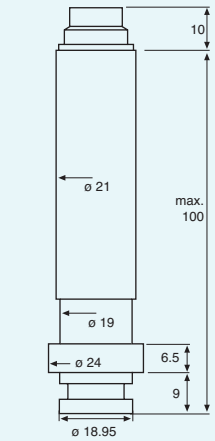
These Series are based on the stable, piezoresisitive pressure transducer and a micro-processor electronics. Temperature dependencies and non-linearities of the sensor are mathematically compensated. With the CCS30 software and the converter K-114 from KELLER Pressue, the calculated pressure can be displayed on a computer. The CCS30 software also allows the recording and graphic display of pressure signals. Up to 128 transmitters can be hooked together to a Bus-system.

Transmitter with Analog Output

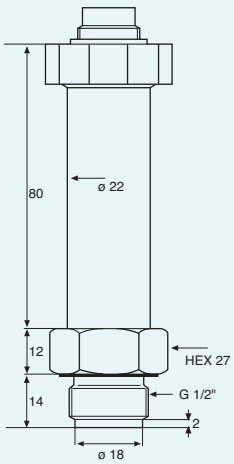
The micro-processor integrates a D/A converter for analog signal outputs of 4…20 mA or 0…10 V. The output rate is 100 Hz (adjustable). The accuracy is diminished by this converting process by 0,05 %FS. The digital output is available on all transmitters with analog output.

Programming

The transmitters are calibrated to the base range. The CCS30 software permits programming of the analog output signal in each section of the range within the base range.



Series 35XHT
(Manometer Pressure Port)



Series 35XHTT
(G 1/2")

PIN ASSIGNMENT

Output	Function	Round Plug M16 x 0.75	Souriau Serie 8525
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

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info@keller-pressure.com

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…32 VDC	8…32 VDC	13…32 VDC
Accuracy, Error Band[1] (20...120 °C)[2]	0,15 %FS	0,2 %FS	0,2 %FS

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	Round Plug M16 x 0.75 (5 pole) Souriau Series 8525 (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 or IP 68 (with cable)	
CE-Conformity	EN IEC 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 mm^3	

Remark
- 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).
- Linearity + Hysteresis + Repeatability + Temp. Coeff. + Zero + Span Tolerance [1]
- RS485 pins (for digital output and for programming) is available on all types.

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:

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

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

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

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.

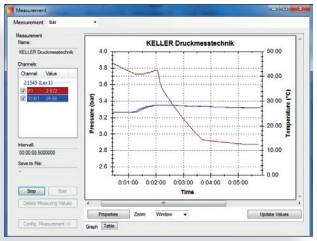
Calculations and conversions are performed at least 400 times per second.

Customised configurations on request [2]

- Switch output, programmable via interface
- Special calculations with pressure and temperature
- Different housing-material, oil filling, pressure thread or connector

Interface

The X-line products have a digital interface (RS485 halfduplex), which supports the MODBUS RTU and Bus protocols from KELLER Pressure. Details of the communication protocols can be found at www.keller-pressure.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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