

## MATHEMATICALLY COMPENSATED / PROGRAMMABLE

Séries: HPX | HPXFL

Series HPX: 1/4" thread

Series HPXFL: G1/2", flush diaphragm

## Digital Output of Transmitter:

This high precision of 0,01 %FS is available as an option (the standard Series HPX 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 INT-30 software and the VELKI cable INT-107, the calculated pressure can be displayed on a Palmtop, Laptop or PC. The INT 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 VELKIsoftware INT30 and INTPR 30, a RS485 converter (i.e. INT102 or INT107 from VELKI) 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:

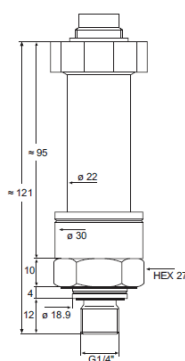
"Accuracy" is an absolute term, "Precision" a relative term. Dead weight testers are primary standards for pressure, where the pressure is defined by the primary values of mass, length and time. Highest class primary standards in national laboratories indicate the uncertainty of their pressure references 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, INOTECH 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.

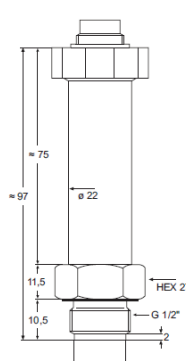
The transmitter's full-scale output can be set up to match any standard of your choice by correcting the gain with the INT30 software.



Series HPX 1/4" Thread



Serie HPX (G1/4")



Serie HPXFL (G1/2")

## PIN ASSIGNMENT

Output	Function	MIL C-26482	Binder 723	DIN 43650
4...20mA	OUT / GND	C	1	1
2 Wire	+Vcc	A	3	3
0...10V	GND	C	1	1
3 Wire	OUT	B	2	2
	+Vcc	A	3	3
Digital	RS485A	D	4	
	RS485B	F	5	



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## Specifications:

## STANDARD PRESSURE RANGES (FS) AND OVERPRESSURE IN BAR

PR HPX / PR HPXFL 1 3 10 30	1	3	10	30		
PAA HPX / PAA HPXFL	0,8...1,2	3	10	30 100	300	1000

Overpressure	2	5	20	60 200	400	1000
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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).

	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 (10...40 °C)	0,05 %FS	0,15 %FS	0,1 %FS
Accuracy, Error Band (-10...80 °C)	0,1 %FS	0,2 %FS	0,15 %FS
Optional: Precision* (10...40 °C)	0,01 %FS	-	-

\* Only for Series HPX and for ranges = 10 bar.

True Output Rate	400 Hz
Resolution	0,002 %FS
Long Term Stability typ.	Gauges: 1 mbar or 0,05 %FS Absolute: 0,5 mbar or 0,025 %FS (10...40 °C)
Load Resistance (Ω)	<(U-7V) / 0,02A (2-wire) > 5'000 (3-wire)
Electrical Connection	- MIL C-26482-Plug (6 pole) - Binder-Plug 723 (5 pole) - DIN 43650 Plug (4 pole)
Insulation	100 MΩ / 50 V
Storage-/Operating Temperature Range	-40...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	IP65 optional: IP 67 or IP68 (with cable)
CE-Conformity	EN 50081-2, EN 50082-2
Material in Contact with Media	Stainless Steel 316L (DIN 1.4435) / Viton
Weight	Series HPX ~ 140 g; Series HPXFL ~ 160 g
Dead Volume Change	< 0,1 mm³

## 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:

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

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 A0...D3 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.

## Remarks:

- RS 485 pins (for digital output and for programming) is available on all types.
- Options: - Switch output, programmable via interface - Calculations such as density, differential pressure, flow, absolute value, etc.
- Different housing-material, oil filling, pressure thread or connector

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### ACCESSORIES SERIES HPX

Each Series HPX 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. INT102 or INT107). Two programs are offered:

#### INTPR30:

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

#### INT30:

Data collection with graphs

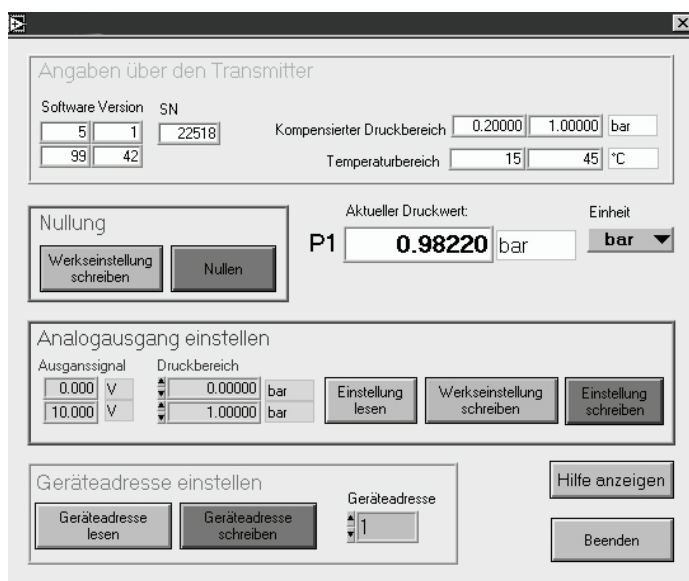
- Fast read-out and viewing of the pressure signals in a graph
- Documentation of dynamic measurements
- Up to 16 transmitters on one serial connection (Bus-operation)

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, VELKI can supply different connectors matching with the internal standard plug. This makes it easy to exchange the electrical connector of the transmitter.

#### Software INTPR30:



The screenshot shows the INTPR30 software interface with the following sections:

- Angaben über den Transmitter:**
  - Software Version: 5.1
  - SN: 22518
  - Kompensierter Druckbereich: 0.20000 to 1.00000 bar
  - Temperaturbereich: 15 to 45 °C
- Nullung:**
  - Buttons: Werkseinstellung schreiben, Nullen
  - Aktueller Druckwert: P1 0.98220 bar
  - Einheit: bar
- Analogausgang einstellen:**
  - Ausgangssignal: 0.000 V, 10.000 V
  - Druckbereich: 0.00000 bar, 1.00000 bar
  - Buttons: Einstellung lesen, Werkseinstellung schreiben, Einstellung schreiben
- Geräteadresse einstellen:**
  - Buttons: Geräteadresse lesen, Geräteadresse schreiben
  - Geräteadresse: 1
  - Buttons: Hilfe anzeigen, Beenden