

UNIVERSAL INTELLIGENT 2-WIRE IN-HEAD TRANSMITTERS



IPAQ-H is a universal and intelligent, Isolated 2-wire In-head transmitter for temperature and other measurement applications.

IPAQ-HX is the Intrinsically Safe version for use in Ex-applications.

The combination of *competitive pricing, functionality and simple configuration* has made IPAQ-H and IPAQ-HX leading in-head transmitters for industrial temperature measurements.

The Windows based and user friendly software, IPRO 4, is used for transmitter configuration, documentation, monitoring and calibration purposes.

Performance and design

Excellent stability

- Long-term stability 0.1%/year.

Enhanced total system accuracy

- Sensor error correction (for known sensor errors).
- System error correction (against known temperatures).

NAMUR-compliant

- Output limitations and fail currents according to NAMUR recommendations.

Input-Output isolation 1500 VAC

- Eliminates measuring errors due to ground loops.

High load capacity

- Only 6.5 V voltage drop over the transmitter (IPAQ-H) allows for high loads.

Designed for harsh conditions

- Operation temperature:
-40 to +85 °C, -40 to +185 °F.
- Excellent EMC performance.
- Durable, shockproof design.

Simple mounting and connection

- For DIN B head or larger.
- Large center hole (dia. 7 mm / 0.28 inch).

5 year limited warranty

Functions

Input for RTDs, T/Cs, mV and resistance

- Reduced inventory costs.
- Simplified plant engineering.

True on-line communication

- Full access to all features while in operation.

Sensor diagnostics

- SmartSense detects low sensor isolation (essential for correct measurements).
- Selectable sensor break action.

Simplified loop check-up

- The transmitter works as an accurate current generator.

On-screen indications and line recording

- Valuable tools for temporary measurements.



ORDERING INFORMATION

Item	Part Number
Transmitter (Isolated)	IPAQ-H
Transmitter (Isolated/FM)	IPAQ-HX
Software & Cable	IPRO SOFTWARE KIT
Factory Configuration	70CAL00001
Surface Mounting Box	70ADA00008
Rail Mounting Box	70ADA00009
Rail Mounting Kit	70ADA00013



IPAQ-H / IPAQ-HX Main Features

Accuracy and stability

IPAQ-H / IPAQ-HX are designed for applications with standard industrial demands on accuracy. To reach these demands, the following factors are essential:

- **Linearity and calibration errors** – The use of quality components and precision calibration equipment reduce these errors, e.g. $\pm 0.1\%$ of span for RTD inputs.
- **High long-term stability** – Internal “self calibration”, by means of continuous adjustment of important parameters after comparison with accurate built-in references, contributes to a stability of $\pm 0.1\%$ /year.

Customized linearization and Engineering units

The *Customized linearization* can be used to create a linearization curve for RTD, T/C, resistance and mV inputs. By combining *Customized linearization* with the use of *Engineering units*, the transmitters can be programmed to give a linear output corresponding to a specific measuring range expressed in the primary process value.

IPRO 4 – The user friendly software for all transmitters of the IPAQ family

IPRO 4, which is used with **all** IPAQ-transmitters, is the tool to utilize all the versatile functions of the IPAQ-H / IPAQ-HX such as:

- **Measurement configuration** – Sensor type, range, sensor or system error correction, linearization, engineering units, output settings, filter activation, etc.
- **Monitoring of sensor status** – Sensor break and sensor isolation (SmartSense).
- **On-screen real time presentation** of measured values and output signal in the form of numericals, meters, bar graphs and line recorder.
- **Transmitter calibration** – Field calibration in one or two points and basic calibration.
- **Documentation** – Configuration files can be saved for future use and configuration protocols can easily be printed.

The communication with the transmitter can be performed **on line**, i.e. with transmitter in operation. An isolated and Ex-approved communication cable is included in the

software kit, IPRO-X.

IPRO 4 is compatible with Windows 3.1, Windows 3.11, Windows 95 and Windows NT Workstation 4.0. The program is menu-driven and easy to learn. On-line help is an effective tool for the user.

Sensor or System error correction

IPAQ-H / IPAQ-HX offer two ways of improving the measurement with temperature sensors:

- **Sensor error correction** – Known sensor errors compared to the standard curve, e.g. for a calibrated sensor, are entered, and the transmitter automatically corrects for the sensor errors.
- **System error correction** – This method is used to correct the system error (sensor + transmitter error) by exposing the sensor to one (one-point correction) or two (two-point correction) accurately measured temperatures (true temperatures). The true temperature(s) are entered, and the transmitter automatically corrects for the system errors.

SmartSense – Sensor isolation monitoring

SmartSense continuously monitors the isolation resistance of thermocouples and 3-wire connected RTDs as well as the cabling between sensor and transmitter. The transmitter will react by forcing the output to a user defined level if the isolation is too low. SmartSense requires an extra lead inside the thermocouple or RTD. *For detailed information, contact TTEC.*

Sensor break monitoring

IPAQ-H / IPAQ-HX monitor sensor break and force the output signal to a user defined level, when *any* sensor lead is broken or disconnected. The sensor break monitoring can be switched off. The monitoring is furnished with a *pulsed excitation current*. This eliminates the voltage drop in the lead wires (giving a measuring error), caused by a standard DC excitation current.

Controlled output for instrument calibration

IPAQ-H / IPAQ-HX can be set to automatically provide a recurring output current regardless of the input signal. The total time for the controlled output is adjustable up to 30 minutes.



IPAQ-H / IPAQ-HX Specifications

Input		
RTD's and Resistance		
Pt100 (IEC751, $\alpha = 0.00385$)	3-, 4-wire connection	-200 to +1000 °C / -328 to +1832 °F
Pt1000 (IEC751, $\alpha = 0.00385$)	3-, 4-wire connection	-200 to +200 °C / -328 to +392 °F
PtX $10 \leq X \leq 1000$ (IEC751, $\alpha = 0.00385$)	3-, 4-wire connection	Upper range depending on X-value
Ni100 (DIN 43760)	3-, 4-wire connection	-60 to +250 °C / -76 to +482 °F
Ni1000 (DIN 43760)	3-, 4-wire connection	-60 to +150 °C / -76 to +302 °F
D100 (Pt 100 acc.to JIS1604, $\alpha = 0.003916$)	3-, 4-wire connection	-200 to +1000 °C / -328 to +1832 °F
Potentiometer/resistance	3-, 4-wire connection	0 to 2000 Ω
Sensor current		~ 0.4 mA
Maximum sensor wire resistance		25 Ω /wire
Thermocouples and Voltage		
T/C	Type: AE, B, E, J, K, L, N, R, S, T, U	Ranges according to users manual
Voltage input		-10 to +500 mV
Input impedance		>10 M Ω
Maximum sensor wire resistance		500 Ω (total loop)
Monitoring		
Sensor break monitoring	User definable output	3.5 to 21.6 mA
SmartSense, sensor isolation monitoring	User definable output	3.5 to 21.6 mA
Adjustments		
Zero adjustment	All inputs	Any value within range limits
Minimum spans	Pt100, Pt1000, Ni100, Ni1000	10 °C / 18 °F
	Potentiometer	10 Ω
	T/C, mV	2 mV
Output		
Straight, reversed or any intermediate value		4-20/20-4 mA
Resolution		5 μ A
Minimum output signal	Measurement/Failure	3.8 mA / 3.5 mA
Maximum output signal	Measurement/Failure	20.5 mA / 21.6 mA
Permissible load	IPAQ-H	795 Ω @ 24 VDC, 22 mA
	IPAQ-HX	725 Ω @ 24 VDC, 22 mA
Accuracy		
Linearity	RTD Potentiometer, mV	$\pm 0.1\%$ ¹⁾
	T/C	$\pm 0.2\%$ ¹⁾
Calibration	RTD	Max. of ± 0.2 °C / ± 0.4 °F or $\pm 0.1\%$ ¹⁾
	Potentiometer	Max. of ± 0.1 Ω or $\pm 0.1\%$ ¹⁾
	mV, T/C	Max. of ± 20 μ V or $\pm 0.1\%$ ¹⁾
Cold Junction Compensation (CJC)	T/C	± 0.5 °C / ± 0.9 °F
Temperature influence ⁴⁾	All inputs	Max. of ± 0.25 °C/25 °C or $\pm 0.25\%$ /25 °C ^{1) 3)}
		Max. of ± 0.5 °F/50 °F or $\pm 0.28\%$ /50 °F ^{1) 3)}
Temperature influence CJC ⁴⁾	T/C	± 0.5 °C/25 °C / ± 1.0 °F/50 °F
Instrument calibration output	4-20 mA	± 8 μ A
Sensor wire resistance influence	RTD, Potentiometer, 3-wire	Negligible ²⁾
	RTD, Potentiometer, 4-wire	Negligible
	mV, T/C	Negligible
Load influence		Negligible
Power supply influence		Negligible
RFI influence, 0.15 to 1000 MHz, 10 V or V/m		$\pm 0.1\%$ ¹⁾ (typical)
Long-term stability		$\pm 0.1\%$ ¹⁾ /year

¹⁾ Of input span

²⁾ With equal wire resistance for RTD

³⁾ If zero-deflection > 100% of input span: add 0.125% of input span/25 °C or 0.14% of input span/50 °F per 100% zero-deflection

⁴⁾ Reference temperature 23 °C / 73 °F

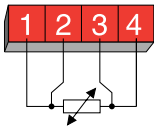


IPAQ-H / IPAQ-HX & MESO H / HX Wiring Diagram

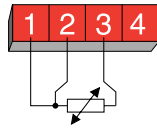
INPUTS (IPAQ-H / HX & MESO-H / HX)

RTD

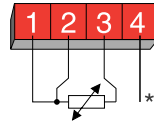
Pt100, Pt1000, Ni100, Ni1000, PtX, D100
 4-wire connection



3-wire connection

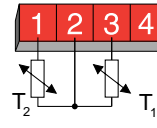


Pt100, D100
 3-wire connection



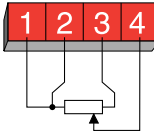
* SmartSense lead

Pt100
 Diff temperature $T_1 > T_2$

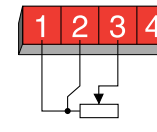


Potentiometer

4-wire connection

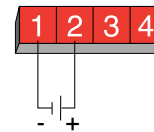


3-wire connection



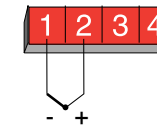
Voltage

millivolt



Thermocouple

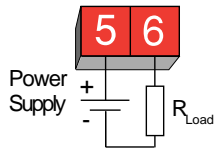
AE,B,E,J,K,L,N,R,S,T,U
 or customer specific



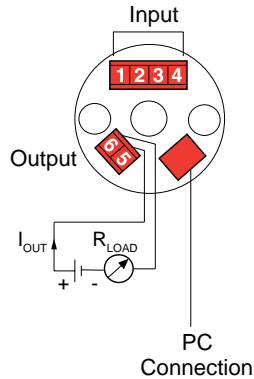
* SmartSense lead

OUTPUT IPAQ-H / HX

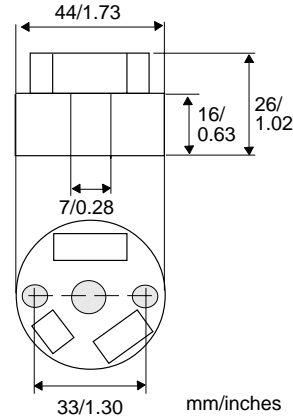
4-20 mA Output



Connections

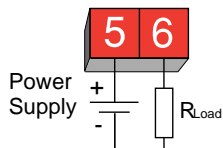


Dimensions

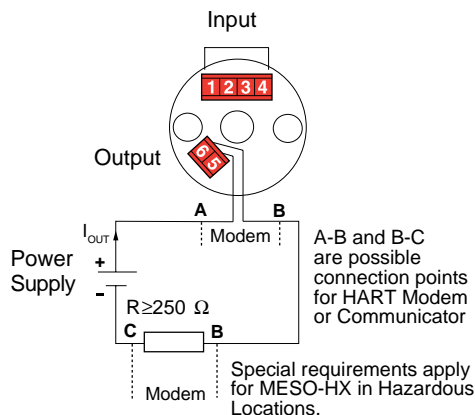


OUTPUT MESO-H / HX

4-20 mA Output



Connections



Dimensions

