Universal high-performance Profibus-PA transmitters

PROFIPAQ®-H

PROFIPAQ®-HX

PROFIPAQ-H is a universal temperature transmitter with additional voltage and resistance input. It is designed according to the latest PROFIBUS-PA standard for temperature transmitters, i.e. Profile A & B, version 3.
PROFIPAQ-HX is the Intrinsically Safe version for use in hazardous areas.

Thanks to the digital output, PROFIPAQ-H/-HX offer very accurate measurements as well as sensor and process information. With double inputs, new features such as two redundant Pt100 in 3-wire connection, are available.
Configuration from a PC with Inor software or over the Profibus network is possible.

PROFIBUS-PA
- Up to 125 transmitters in one Profibus network
- Profile A & B, version 3.0, 31.25 kbit/s
- Intrinsically Safe applications
- High noise immunity

Time and cost saving PC configuration
- With the Inor Windows software *ProfiSoft*
- Direct connection from PC to transmitter, without costly PROFIBUS tools
- Complete set-up, including transmitter address, before installation

PROFIBUS configuration
- From a PROFIBUS Master Device (Master Class 2) over the PROFIBUS network
- Integrated in the Siemens PDM system
- DTM (Device Type Manager) is available for other systems, e.g. Freelance and Symphony

Universal double inputs
- Accepts RTD, Thermocouple, mV and Ohm
- Double inputs for RTD (3-wire connection), T/C and mV
- Redundancy with double sensor elements
- Arithmetic functions: Difference, Average, Minimum and Maximum

High accuracy
- Typical accuracy for Pt100: ±0.1°C
- Very low temperature drift
- Accurate CJC
- Sensor error correction
- Smart Filter - effective noise reduction

Versatile
- 50 point linearization – any sensor can be matched

Sensor monitoring
- Sensor aging (with double sensor inputs)*
- Low sensor isolation - SmartSense*
- Sensor break and short-circuit

Compact, easy installation
- Large center hole facilitates wiring and mounting
- Compact design. Fits into DIN B or larger heads
- Rugged industrial terminals

Rugged design
- 1500 VAC input/output isolation
- Excellent EMC performance
- Completely moulded

5 year limited warranty

LIMITED 5 YEAR WARRANTY

INOR® PROCESS AB

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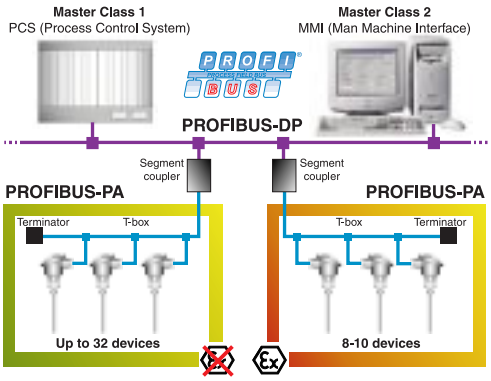
*In preparation

PROFIBUS



PROFIBUS is a fieldbus network for digital communication over a 2-wire architecture based on the international standard EN 50170. Two levels are used in a PROFIBUS network: the high level PROFIBUS-DP used for process control and the field level PROFIBUS-PA used for field instrumentation.

PROFIBUS-DP Short specification

- High speed - up to 12 000 kBit/s
- 2-wire cable
- RS 485 transmission technology

PROFIBUS-PA Short specification

- Medium speed - 31.25 kBit/s
- 2-wire cable
- IEC 1158-2 transmission technology
- Supports Intrinsically Safe installations
- The transmitter power is supplied over the bus cable

Main features of PROFIPAQ-H/-HX

Configuration

PROFIPAQ-H/-HX can be configured in two different ways:

- With the Inor Windows software *ProfiSoft* and a direct connection from PC to the separate communication port of the transmitter. This is a time and cost saving alternative to configuration over the PROFIBUS. The configuration is made without costly PROFIBUS tools (software, interface and segment coupler). The complete set-up, including transmitter address, can be carried out before the installation in the network.
  Besides normal configuration, ProfiSoft can be used for basic calibration of PROFIPAQ-H/-HX, saving of configurations files for future use and printing of configuration protocols.
  ProfiSoft is compatible with Windows 95, Windows 98 and Windows NT Workstation 4.0. The program is menu-driven and easy to learn. On-line help at the fingertip is an effective tool for all users.
- From a PROFIBUS Master Device (Master Class 2), for instance a PC or a PCS (Process Control System) with PROFIBUS interface and integrated configuration software, via a segment coupler.

The EDD (Electronic Device Description) for PROFIPAQ-H/-HX is integrated in the Siemens PDM system. A DTM (Device Type Manager) is available for other systems, e.g. Freelance and Symphony, using the FDT (Fieldbus Device Tool) concept.

Accuracy and stability

PROFIPAQ-H/-HX are designed for applications with the highest demands on accuracy and stability under severe operating conditions.
Low linearity and calibration errors - The combination of a high-efficient 50-point linearization and precision calibration equipment reduces these errors to a minimum (See Specifications).
Temperature and long-term stability - The reduction of analog circuits (digital output) and the use of quality components give excellent stability for temperature changes and over time (See Specifications).

Measurements with RTD's and other resistances

PROFIPAQ-H/-HX accept inputs from standardized Platinum and Nickel RTDs like Pt10…Pt1000 acc. to IEC 751 (α=0.00385) and JIS 1604 (α=0.003916) and Ni50…Ni1000 acc. to DIN 43760, as well as inputs from plain resistance sensors such as potentiometers (max. 4000 ohm). 2-, 3- or 4-wire connection can be chosen.

Measurements with thermocouples and plain voltage

PROFIPAQ-H/-HX accept inputs from 12 types of standardized thermocouples as well as plain mV input (max. 1000 mV).
For T/C input, the CJC (Cold Junction Compensation) is either fully automatic, by means of an internal accurate sensor, remote with Pt100 sensor or fixed by entering an external CJ temperature.

Double inputs for RTDs, thermocouples and voltage

Double inputs are available and can be used for arithmetic calculation such as difference, average and min./max. monitoring. Redundancy between two sensors can be activated.

Customized linearization and Engineering units

The accurate and versatile 50-point *Customized linearization* can be used to create any type of linearization curve for RTD, T/C, resistance and mV inputs. By combining *Customized linearization* with the use of *Engineering units*, the transmitter can be programmed to give an output in the process value, in spite of a non-linear relation between process value and sensor output.

Sensor error correction

An offset value can be entered to correct for RTD or thermocouple errors due to sensor aging or mounting.

Mounting

PROFIPAQ-H/-HX are designed to fit inside connection heads type DIN B or larger.
The large center hole, diameter 7 mm / 0.28 inch, allows for alternative mountings. Four sensor leads or a 1/4" insert tube will easily pass through the hole.

Sensor failure monitoring

PROFIPAQ-H/-HX monitor sensor break and short-circuit. When *any* sensor lead is broken or short-circuited, a status information will be transmitted over the PROFIBUS.
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.

Sensor aging monitoring*

If a RTD or thermocouple with double sensor elements is used, PROFIPAQ-H/-HX can often detect sensor aging by checking the reading from both elements. Too big a difference will indicate sensor aging, and information will be transmitted over the PROFIBUS.

SmartSense - Sensor isolation monitoring*

SmartSense continuously monitors the isolation resistance of thermocouples and RTDs as well as the cabling between sensor and transmitter. PROFIPAQ-H/-HX will react by transmitting information over the PROFIBUS if the isolation resistance is below a user defined level.
SmartSense requires an extra lead inside the thermocouple or RTD.

Smart Filter

The Smart Filter detects the difference between fast signal changes and electrical noise, thus allowing for a short update time combined with high noise immunity.

Adjustable damping

For smoothing down instabilities on the input, an additional damping, with a time constant of 0 to 60 seconds, can be activated.

**In preparation*

Specifications

Input RTD		2-, 3- and 4-wire connection
Pt10	(IEC751, α=0.00385)	-200 to +850°C
Pt50	(IEC751, α=0.00385)	-200 to +850°C
Pt100	(IEC751, α=0.00385)	-200 to +850°C
Pt200	(IEC751, α=0.00385)	-200 to +850°C
Pt500	(IEC751, α=0.00385)	-200 to +850°C
Pt1000	(IEC751, α=0.00385)	-200 to +850°C
Pt X (10≤X≤1000)	(IEC751, α=0.00385)	-200 to +850°C
Pt10	(JIS1604, α=0.003916)	-200 to +850°C
Pt50	(JIS1604, α=0.003916)	-200 to +850°C
Pt100	(JIS1604, α=0.003916)	-200 to +850°C
Ni50	(DIN 43760)	-60 to +250°C
Ni100	(DIN 43760)	-60 to +250°C
Ni120	(DIN 43760)	-60 to +250°C
Ni1000	(DIN 43760)	-60 to +250°C
Sensor current		~250 µA
Maximum sensor wire resistance		25 Ω / wire
Input Resistance		
Potentiometer / Resistance		2-, 3- and 4-wire connection
Low range		0 to 400 Ω
High range		0 to 4000 Ω
Customized linearization		Up to 50 points
Sensor current		~250 µA
Maximum sensor wire resistance		25 Ω / wire
Input Thermocouple		
T/C B	Pt30Rh-Pt6Rh (IEC 584-1)	400 to +1800°C
T/C C	W5-Re (ASTME 998)	0 to +2315°C
T/C D	W3-Re (ASTME 998)	0 to +2315°C
T/C E	NiCr-CuNi (IEC 584-1)	-200 to +1000°C
T/C J	Fe-CuNi (IEC 584-1)	-200 to +1000°C
T/C K	NiCr-Ni (IEC 584-1)	-200 to +1350°C
T/C L	Fe-CuNi (DIN 43710)	-200 to +900°C
T/C N	NiCrSi-NiSi (IEC 584-1)	-200 to +1300°C
T/C R	Pt13Rh-Pt (IEC 584-1)	-50 to +1750°C
T/C S	Pt10Rh-Pt (IEC 584-1)	-50 to +1750°C
T/C T	Cu-CuNi (IEC 584-1)	-200 to +400°C
T/C U	Cu-CuNi (DIN 43710)	-200 to +600°C
T/C Custom	50 point linearization	-10 to +100mV
Input impedance		>10 MΩ
Maximum sensor wire resistance		500 Ω (total sensor loop)
Cold Junction Compensation (CJC)		Internal, remote (Pt100) or fixed
Input Voltage		
Low range		-10 to +100mV
High range		-10 to +1000mV
Customized linearization		Up to 50 points
Input impedance		>10 MΩ
Maximum sensor wire resistance		500 Ω (total loop)
Double inputs for RTD, Thermocouple and Voltage		
Differential	Output value:	Ch1 - Ch2 or Ch2 - Ch1
Average	Output value:	0.5 * (Ch1 + Ch2)
Average with redundancy	Output value:	0.5 * (Ch1 + Ch2), Ch1 or Ch2 if the other one is broken
Minimum	Output value:	Min (Ch1, Ch2)
Maximum	Output value:	Max (Ch1, Ch2)
Output		
Serial output		Acc. to IEC 1158-2
Cyclic communication w. Master Class 1		Measured values, status information
Response time		~100 ms
Acyclic communication w. Master Class 2		Measured values, status information and transmitter configuration
General data		
Adjustable damping time		0 to 60 s
Update time		~200 ms
Isolation		1500 VAC, 1 min
Intrinsic safety (Approvals pending)	PROFIPAQ-HX	Cenelec: EEx ia IIC T4-T6
		ATEX: II 1 G
		FM: Class I-III, Div. 1, Gr. A-D, G
Power supply	From segment coupler	9 to 32 VDC, Non-I.S. applications
		9 to 17.5 VDC, I.S. applications
Connection head		DIN B or larger
Environment conditions		
Ambient temperature	Storage	-40 to +85°C
	Operating	-40 to +85°C
Humidity		0 to 100 %RH
Vibration		Acc. to IEC 68-2-31
Shock		Acc. to IEC-68-2-6
EMC	General standards	EN 50082-2, EN 61326
	NAMUR recommendation	NE21

Resolution and Accuracy		
Resolution	Resistance, 0 to 400 Ω	5 mΩ
	Resistance, 0 to 4000 Ω	50 mΩ
	Voltage, -10 to 100 mV	0.5 µV
	Voltage, -10 to 1000 mV	5 µV
	RTD and Thermocouple	Depends on sensor type
Accuracy	Resistance, 0 to 400 Ω	40 mΩ (@ 25°C incl. calibration and linearity errors)
	Resistance, 0 to 4000 Ω	400 mΩ
	Voltage, -10 to 100 mV	10 µV
	Voltage, -10 to 1000 mV	100 µV
	RTD and Thermocouple	See table below
Cold Junction Compensation (CJC)	Internal comp.	±0.25°C
	Remote comp. (Pt100)	Acc. to spec. for RTD
Temperature influence	RTD and Thermocouple	±0.005°C/°C
	Resistance and Voltage	±0.0005 %FSR/°C
Temperature influence CJC	Internal comp.	±0.02°C/°C
	Remote comp. (Pt100)	Negligible
Sensor wire influence	RTD and Resistance, 2-wire	Adjustable wire resistance compensation
	RTD and Resistance, 3-wire	Negligible, with equal wire resistance
	RTD and Resistance, 4-wire	Negligible
	Thermocouple and Voltage	Negligible
RFI influence	0.15 to 1000 MHz, 10 V/m	±0.5°C
Long-term stability		Better than ±0.5°C / year

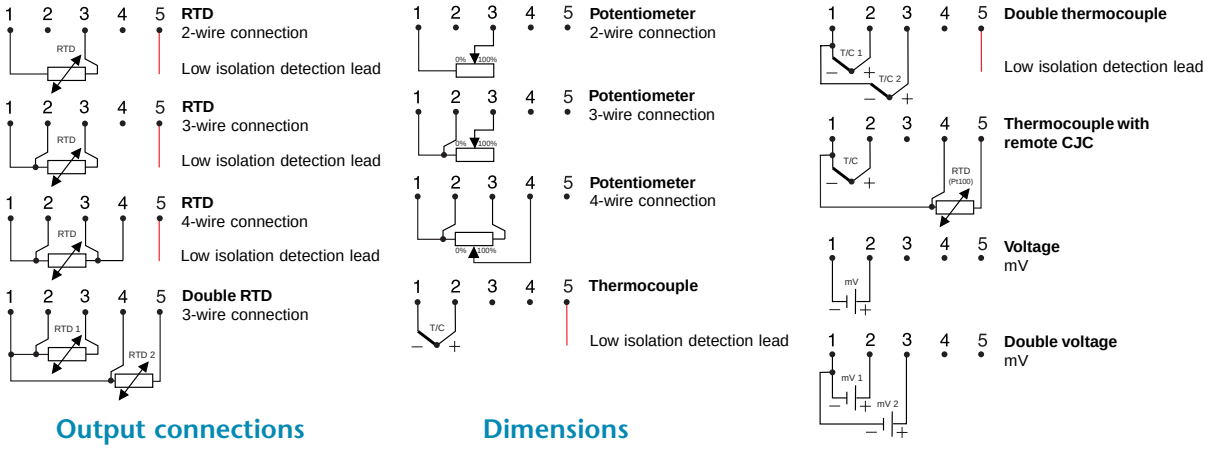
Accuracy Specifications for RTD and Thermocouple Input

Specified @ 25 °C. Including calibration and linearity errors. CJC error not included.

Input type	Total temperature range	Temperature range 1	Maximum[1] measuring error in range 1	Maximum[1] measuring error outside range 1	Typical[2] measuring error in range 1
RTD Pt10	-200 to +850°C	-200 to +850°C	1.5°C	-	0.8°C
RTD Pt50	-200 to +850°C	-200 to +850°C	0.3°C	-	0.2°C
RTD Pt100	-200 to +850°C	-200 to +700°C	0.15°C	0.2°C	0.1°C
RTD Pt200...Pt1000	-200 to +850°C	-200 to +850°C	0.3°C	-	0.2°C
RTD Ni50...Ni1000	-60 to +250°C	-60 to +250°C	0.2°C	-	0.1°C
T/C type B	400 to +1800°C	+780 to +1800°C	1.5°C	3.0°C	0.8°C
T/C type C	0 to +2315°C	0 to +2100°C	1.0°C	1.3°C	0.5°C
T/C type D	0 to +2315°C	0 to +2200°C	1.0°C	1.2°C	0.5°C
T/C type E	-200 to +1000°C	0 to +1000°C	0.2°C	0.5°C	0.1°C
T/C type J	-200 to +1000°C	-100 to +1000°C	0.3°C	0.5°C	0.2°C
T/C type K	-200 to +1350°C	-100 to +1350°C	0.4°C	0.8°C	0.2°C
T/C type L	-200 to +900°C	-100 to +900°C	0.3°C	0.5°C	0.2°C
T/C type N	-200 to +1300°C	+100 to +1300°C	0.4°C	1.0°C	0.2°C
T/C type R	-50 to +1750°C	+200 to +1750°C	1.3°C	3.0°C	0.7°C
T/C type S	-50 to +1750°C	+200 to +1750°C	1.3°C	3.0°C	0.7°C
T/C type T	-200 to +400°C	-100 to +400°C	0.4°C	0.7°C	0.2°C
T/C type U	-200 to +600°C	-100 to +600°C	0.4°C	0.6°C	0.2°C

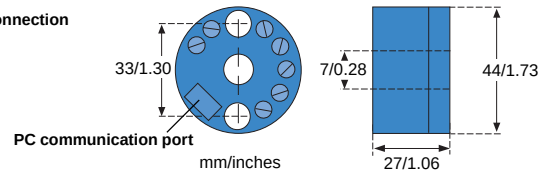
[1] *Conformance level 95% (2σ)*
[2] *Conformance level 68% (1σ)*

Input connections



Output connections

Dimensions



Ordering information

PROFIPAQ-H	70PPH00001
PROFIPAQ-HX (Cenelec, ATEX)	70PPHX0001
PROFIPAQ-HX (FM)	Appr. pending
PC configuration kit (Software/cable)	70CFG00006

LIMITED 5 YEAR WARRANTY

All information subject to change without notice

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