User Instructions

PROF I^{P}AQ®-H|-HX|-L

86BPQ00001 2016-02 (ver. 1.4)

Table of Contents

1. Introduction

1.1 About this manual

   This manual is intended to assist in installing, operating, and maintaining ProfIPAQ temperature transmitters with PROFIBUS-PA, and it is divided into two parts;

Part 1: ProfIPAQ-H/-HX/-L Installation and Maintenance. Here you will find connection drawings, mechanical drawings, electrical data, guidelines for mounting into hazardous Ex location and accessories.
and
Part 2: Software and Programming. This describes ProfiSoft, the software to configure the ProfIPAQ transmitters via the PC serial port.
It also contains some generic PROFIBUS information. ProfIPAQ transmitters DD are integrated into Siemens Simatic PDM version 5.1 or higher. For use with an earlier version of Siemens Simatic PDM and other software problems using Siemens Simatic PDM, consult Siemens user's manual.

1.2 About ProfIPAQ

   ProfIPAQ is a line of temperature transmitters from INOR, designed according to the latest PROFIBUS-PA standard for temperature transmitters, i.e. Profile 3.0, class A & B. At present the following versions are available:
ProfIPAQ-H in-head for non-Ex and Non-Incendive gas (Zone 2) applications.
ProfIPAQ-HX in-head for Intrinsic safe Ex ia/ib gas applications (Zone 0 and 1),
ProfIPAQ-L DIN-rail mounted for non-Ex applications.

1.2.1 Features:

- PROFIBUS PA certified communication
- Easy setup via a separate INOR communication port as an alternative to PROFIBUS
- High accuracy measurement
- Linearizes for most temperature sensors.
- Custom linearization for other type of sensors with mV and ohm output.
- Accepts two input signals making it possible to do differential measurements, average measurement, redundancy and sensor ageing control.
- FDE (Fault Disconnect Equipment) ensures that the ProfIPAQ transmitter won't pull down a whole segment in a PROFIBUS net if the transmitter fails internally.
- DDL and GSD files available
- Sensor monitoring functions: sensor break, sensor short circuit, low sensor isolation
- A separate LCD-indicator can be connected to the communication port of the transmitter.

1.3 <u>About PROFIBUS</u>

PROFIBUS-PA is an all-digital, serial, two-way communication system that interconnects field equipment such as sensors, actuators, and controllers. Power supply and output digital signal uses the same two wires. The physical layer is described in EN 61158-2 and the protocol in EN 50170.

For more information concerning PROFIBUS, visit the PROFIBUS organization homepage at address www.profibus.com. There you find a lot of information about the PROFIBUS protocol, PROFIBUS tools, PROFIBUS news, GSD and DDL's, competence center, FAQ's and more and there is a lot of interesting PDF's for downloading.

Part 1

2 ProfIPAQ-H/-HX/-L Installation and Maintenance

2.1 General

Electrical temperature sensors such as RTDs and thermocouples produce low-level signals proportional to temperature. The ProfIPAQ temperature transmitter converts the analogue sensor signal to a digital signal that is relatively insensitive to lead length and electrical noise. This digital signal is then transmitted over the bus to the configuration device and the control system.

The ProfIPAQ transmitter is compatible with many RTD and thermocouple sensor types as well as potentiometer and voltage input. Figure 12 shows the correct input connections to the sensor terminals on the transmitter.

2.1.1 CAUTION

 If the sensor is installed in a high-voltage environment and a fault condition or installation error occurs, the sensor leads and transmitter terminals could carry lethal voltages. Use extreme caution when making contact with the leads and terminals.

2.1.2 Ex installation

 For a safe installation in hazardous area the transmitter must only be installed by qualified personnel that are familiar with the national and international laws, regulations, directives and standards (e.g. EN / IEC 60079-14, EN , EN / IEC 60079-17 and EN / IEC 60079-25) that apply to the installation conditions.

2.1.3 Default Settings

The ProfIPAQ transmitter has a standard configuration when it is delivered from factory. These settings can be changed by either the ProfiSoft software, via Simatic PDM system or via any other system using the ProfIPAQ DDL.

Default Settings:
Address:	126
Input signal:	Pt100, 4-wire
Output signal:	°C
Filter:	0 s
Sensor Monitoring:	Off

2.2 ProfiSoft Communication

 Communication to ProfIPAQ via ProfiSoft and INOR Communication cable **must NOT** be performed unless the area where the transmitter is located is known to be non-hazardous. When installed in hazardous area always use the PROFIBUS communication to change settings.

2.3 Short form Data (complete data in chapter Specifications)

Power supply   9 – 32 VDC
Isolation Input/Output   1500 VAC
Output   ProfIbus PA Profile v. 3.0 Class A&B
Operating temperature ProfIPAQ-H/-HX   -40 - +85 °C / -40 - +185 °F
ProfIPAQ-L   -20 - +70 °C / -4 - +158 °F

2.3.1 Ex Data (also see certificate and control drawings)

	ProfIPAQ-H	ProfIPAQ-HX
ATEX Approval	DEMKO 10 ATEX 150402X	DEMKO 05 ATEX 136988X
Gas	II 3G Ex nL IIC T4-T6	II 1G Ex ia IIC T4-T6

ProfIPAQ-H is intended to be connected to a standard power supply (Class 2) with maximum supply voltage to the transmitter of 30 VDC or a FNICO power supply / Segment coupler, mounted outside the hazardous area. The data for the transmitter is:

Bus-port (connector 6 and 7)		Sensor port (1- 5)		Comm.port	
U_i = Vmax :	30 VDC	U_o = Voc :	3,3 VDC	U_i = Vmax :	8,0 VDC
I_i = Imax :	no limit	I_o = Isc :	0,4 mA	I_i = Imax :	450 mA
P_i = Pmax :	no limit	P_o = Pt :	6,5 mW	P_i = Pmax :	0,8 W
C_i :	1 nF	C_o = Ca :	500 µF	C_i :	10 nF
L_i :	10 µH	L_o = La :	375 mH	L_i :	1 µH

For the ambient temperature:
T6:   -40°C < Ta < +60°C / -40°F < Ta < +140°F
T5:   -40°C < Ta < +75°C / -40°F < Ta < +167°F
T4:   -40°C < Ta < +85°C / -40°F < Ta < +185°F

ProfIPAQ-HX is intended to be connected to a certified intrinsic safe power supply / Segment coupler with FISCO data, mounted outside the hazardous area. The data for the transmitter is:

Bus-port (connector 6 and 7)		Sensor port (1- 5)		Comm.port	
U_i = Vmax :	17,5 VDC	U_o = Voc :	17,5 VDC	U_i = Vmax :	8,0 VDC
I_i = Imax :	380 mA	I_o = Isc :	56 mA	I_i = Imax :	450 mA
P_i = Pmax :	5,32 W	P_o = Pt :	244 mW	P_i = Pmax :	0,8 W
C_i :	1 nF	C_o = Ca :	166 nF	C_i :	10 nF
L_i :	10 µH	L_o = La :	6 mH	L_i :	1 µH

For the ambient temperature:
T6:   -40°C < Ta < +45°C / -40°F < Ta < +113°F
T5:   -40°C < Ta < +60°C / -40°F < Ta < +140°F
T4:   -40°C < Ta < +85°C / -40°F < Ta < +185°F

2.4 Identification of the transmitter: See labels on the transmitter

Part no

Serial no   (production date, Nyyww)

ProfIPAQ-H

70PPH00001
N0610.123456/VO 3XXXXX
PO Box 9125
SE-200 39 Malmö
SWEDEN
www.inor.com

INOR

ADR:

PROFIBUS
Cert.no: Z01083

ProfIPAQ-H   FNICO Field device   INOR

Uo = Voc: 3.3 VDC   Lo = La: 375 mH   Li: 10 µH
Io = Isc: 0.4 mA   Ui = Vmax: 30 V
Co = Ca: 500 µF   Ci: 1 nF

CE Ⓔx II 3G Ex nL IIC T4-T6
DEMKO 10 ATEX 150402X
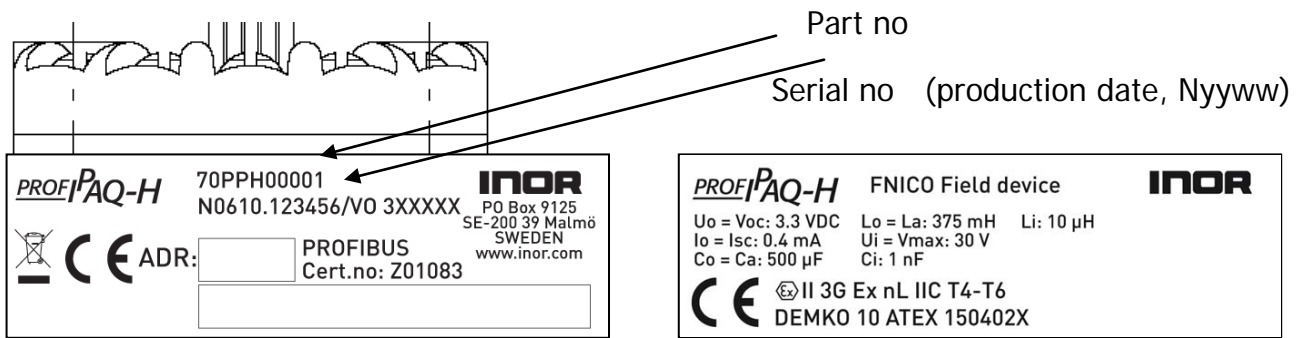
Figure 1 Label 1 and 2 on peripheral of the transmitter ProfIPAQ-H 70PPH00001

ProfIPAQ-HX

70PPHX0001
N0610.123456/VO 3XXXXX
PO Box 9125
SE-200 39 Malmö
SWEDEN
www.inor.com

INOR

ADR:

PROFIBUS
Cert.no: Z01083

ProfIPAQ-HX   FISCO Field device   INOR

Uo = Voc: 17.5 VDC   Lo = La: 6 mH   Pi = Pmax: 5.32 W
Io = Isc: 56 mA   Ui = Vmax: 17.5 V   Ci: 1 nF
Co = Ca: 166 nF   Ii = Imax: 380mA   Li: 10 µH

CE 0539 Ⓔx II 1G Ex ia IIC T4-T6
DEMKO 05 ATEX 136988X
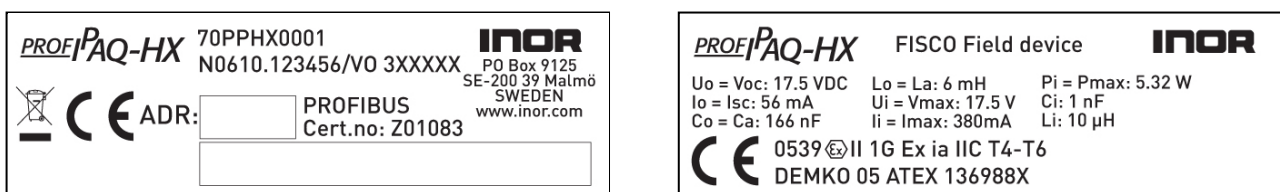
Figure 2 Label 1 and 2 on peripheral of the transmitter ProfIPAQ-HX 70PPHX0001

ProfIPAQ-L

INOR

PO Box 9125
SE-200 39 Malmö
SWEDEN
www.inor.com

CE

ADR.

PROFIBUS Cert.no: Z01083

Part no

70PPL00001
N0610.123456
VO 3XXXXX

Serial no   (production date, Nyyww)
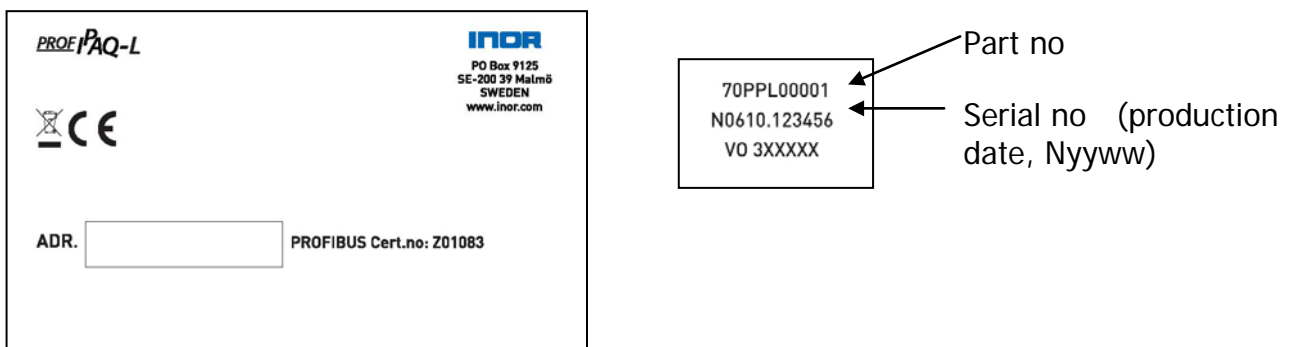
Figure 3 Label 1 and 2 on enclosure of the transmitter ProfIPAQ-L 70PPL00001

2.5 Installation in an encapsulation

2.5.1 Ambient temperature considerations

The ProfIPAQ-H / -HX transmitter is designed to operate within specifications for ambient temperatures between –40 and 85 °C (–40 and 185 °F), also see ambient temperatures depending on temperature class in section 2.3.1, Ex data. Heat from the process is transferred via the thermowell to the transmitter housing. If the expected process temperature is near or beyond specification limits, this may rise the temperature in the transmitter housing (encapsulation) above specified ambient temperature. Always verify that the temperature where the transmitter is mounted is not above the specified limit. One way to reduce heat transfer via the thermowell is to increase the length of the thermowell or to move the transmitter housing away from the heat source. The same safety measures can be used when the temperature is below the specified minimum temperature.

2.5.2 ProfIPAQ-H/-HX (Gas)

The transmitter may be mounted in a temperature sensor housing, in a box or on a DIN rail. It is recommended to use INOR mounting accessories, see 2.11, Accessories.

For non-Ex application, a housing with IP 54 is recommended. Most temperature housings fulfill this requirement.
For Ex n application (non-incendive, Zone 2, Category 3G) ProfIPAQ-H in a housing with at least IP 54 is needed. The enclosure must fulfill the requirements of EN 60079-0 and EN 60079-15 regarding impact and IP degree, which easiest is achieved by using certified enclosures, e.g. the housings approved together with ProfIPAQ-H/D / -HX/D.
For applications requiring installation into Zone 0 (Category 1G) or Zone 1 (Category 2G) ProfIPAQ-HX is used, installed in an appropriate housing with an ingress protection of at least IP20.
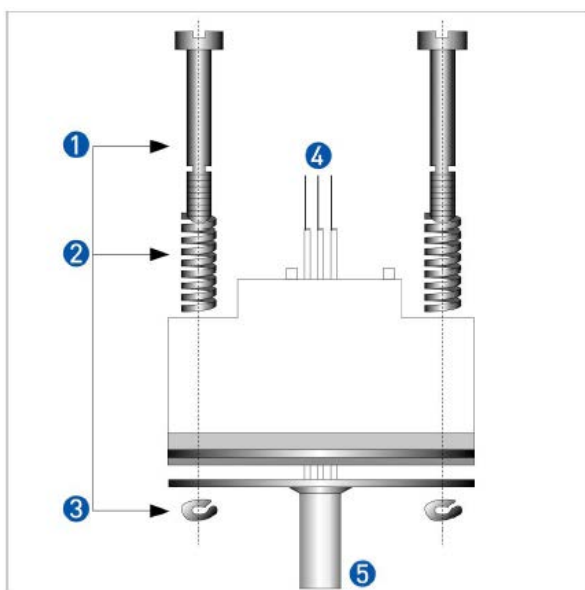
1 M4 Screw, special for ProfIPAQ-H/-HX
2 Spring
3 Locking washer
4 Sensor wires
5 Sensor protection tube

Figure 4 Mounting with Standard Mounting kit 70ADA00017

2.5.3 ProfIPAQ-L

The ProfIPAQ-L transmitter is intended for mounting on a 35 mm DIN Rail and **must not** be placed in Ex Hazardous area.
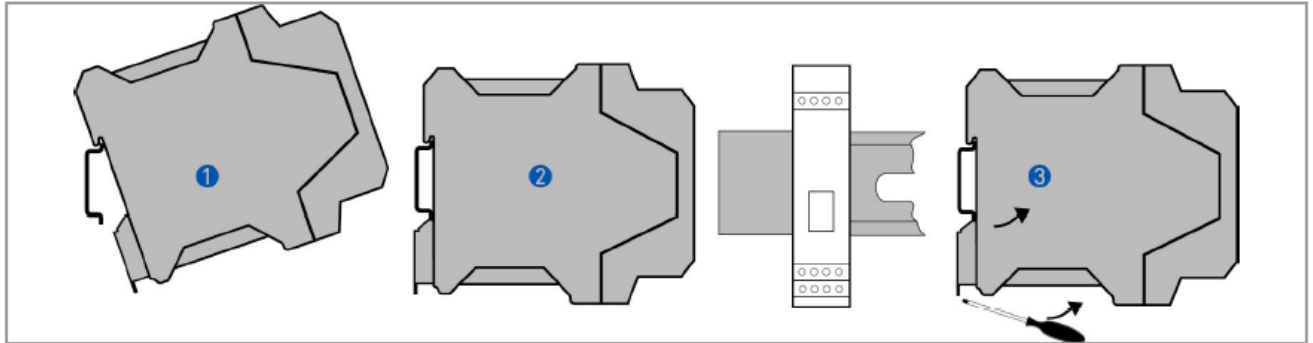
Figure 5 ProfIPAQ-L rail mounding and demounting

1 Place the transmitter on upper part of the rail
2 Press the transmitter down until it hangs on to the rail
3 To remove the transmitter, use a screw driver to loosen the hook from the lower rail part and bend gently the transmitter upwards

2.6 **Connections**

The input and output/power supply of the ProfIPAQ are connected according to connection chart, Figure 12. The output connection (Bus connection) is polarity independent. Also see Appendix B, Profibus cabling.

To ensure an adequate sensor connection, anchor the sensor lead wires beneath the flat washer on the terminal screw.

2.6.1 **Connection Diagram**
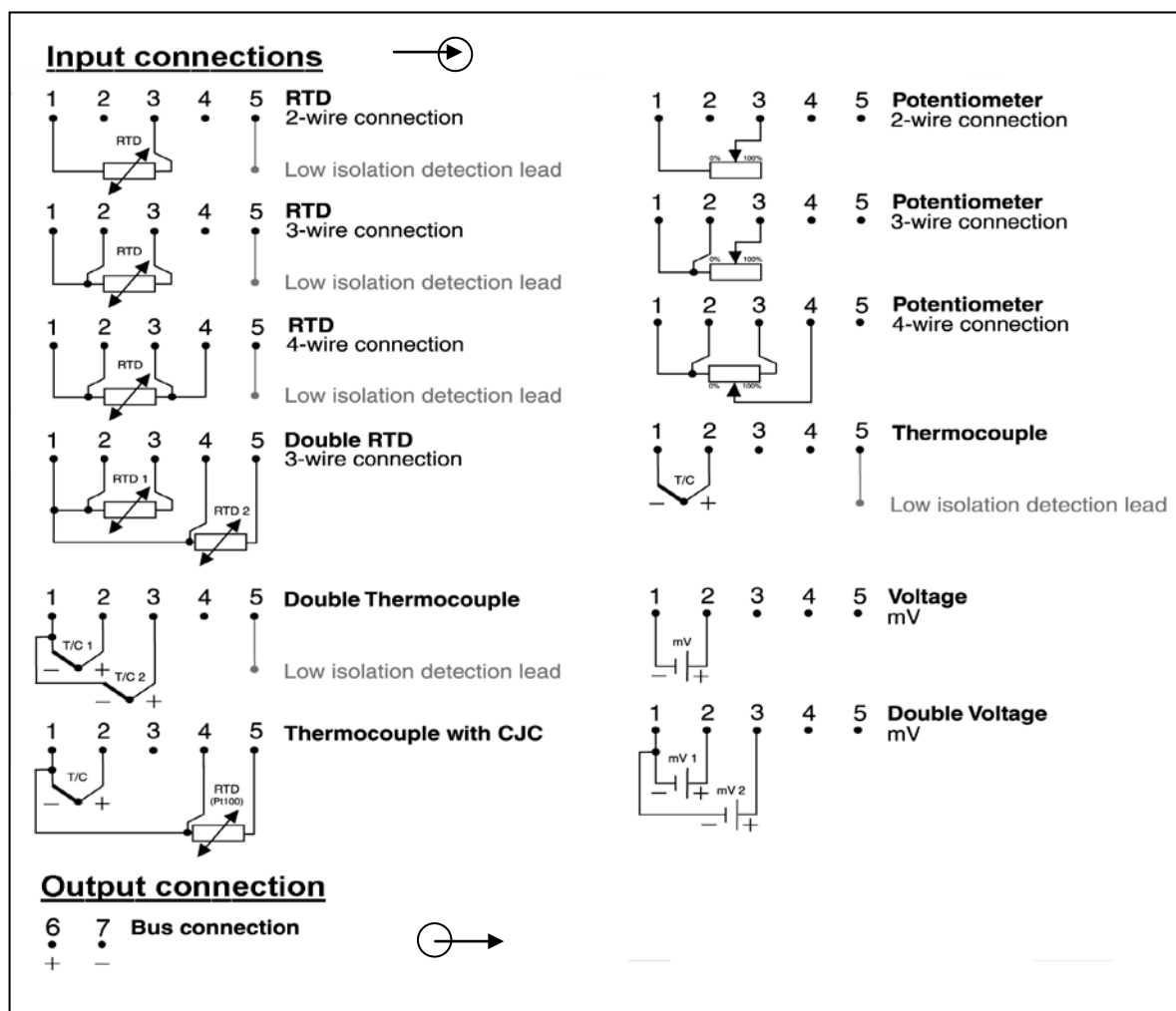
Figure 6 Connection chart

2.6.2 **LCD-W12**

A special LCD-indicator, INOR LCD-W12, can be connected to the communication port of the ProfIPAQ. It gets its power and digital data from the ProfIPAQ. The activation of the communication port as a display connection and number of decimals to be shown in the display are selected via the ProfiSoft software, see chapter 4. The display LCD-W12 is not approved for mounting into Ex Hazardous area.

2.6.3 **Ex Bus connection:**

The model ProfIPAQ-HX must be electrically connected via a certified intrinsic safe power supply unit or an intrinsic safe segment coupler, which is mounted outside the hazardous area, for use in Ex ia or Ex ib applications. For non-incendive Ex nL applications (ProfIPAQ-H) the transmitter must be connected to a standard power supply (Class 2 for USA). Provisions shall be made to protect the transmitter from transient disturbances of more than 42V on power supply lines.

2.6.4 Ex Cable requirements:

For an ambient temperature ≥ 70°C, heat resistant cables shall be used with a rating of at least 10K above the ambient temperature. For ambient temperatures below –10 °C use field wiring suitable for the minimum ambient temperature.

2.6.5 ProfIPAQ SmartSense (low sensor isolation detection)

SmartSense is a feature that continuously monitors the isolation resistance of thermocouples and RTDs as well as the cabling between sensor and transmitter. ProfIPAQ will react by transmitting information over the PROFIBUS if the isolation resistance is below a user-defined level. SmartSense requires an extra lead (Low isolation detection lead) inside the thermocouple or RTD, see connection chart. For information on how to activate this function, see 4.1.5 Output configuration in the Part 2 of the manual.

2.6.6 ProfIPAQ Sensor Aging

If an RTD or thermocouple with double sensor elements is used, ProfIPAQ can often detect sensor aging by checking the reading from both elements. Too big difference will indicate sensor aging, and information will be transmitted over the PROFIBUS. How to activate this function, see 4.1.5 Output configuration in Part 2 of the manual.

2.7 Specification

2.7.1 Input RTD   2-, 3- and 4-wire connection

Pt10	(IEC60751, a=0.00385)	-200 to +850°C
Pt50	(IEC60751, a=0.00385)	-200 to +850°C
Pt100	(IEC60751, a=0.00385)	-200 to +850°C
Pt200	(IEC60751, a=0.00385)	-200 to +850°C
Pt500	(IEC60751, a=0.00385)	-200 to +850°C
Pt1000	(IEC60751, a=0.00385)	-200 to +850°C
Pt10	(JIS1604, a=0.003916)	-200 to +850°C
Pt50	(JIS1604, a=0.003916)	-200 to +850°C
Pt100	(JIS1604, a=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

2.7.2 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

2.7.3 Input Thermocouple

T/C B	Pt30Rh-Pt6Rh (IEC 60584-1)	400 to +1800°C
T/C C	W5Re/W26Re (ASTM E 988)	0 to +2315°C
T/C D	W3Re/W25Re (ASTM E 988)	0 to +2315°C
T/C E	NiCr-CuNi (IEC 60584-1)	-200 to +1000°C
T/C G	W/W26Re (Not an ASTM symbol)	-32 to +2300°C
T/C J	Fe-CuNi (IEC 60584-1)	-200 to +1000°C
T/C K	NiCr-Ni (IEC 60584-1)	-200 to +1350°C
T/C L	Fe-CuNi (DIN 43710)	-200 to +900°C
T/C N	NiCrSi-NiSi (IEC 60584-1)	-200 to +1300°C
T/C R	Pt13Rh-Pt (IEC 60584-1)	-50 to +1750°C
T/C S	Pt10Rh-Pt (IEC 60584-1)	-50 to +1750°C
T/C T	Cu-CuNi (IEC 60584-1)	-200 to +400°C
T/C U	Cu-CuNi (DIN 43710)	-200 to +600°C
Input impedance		>10 MΩ
Maximum sensor wire resistance		500 Ω (total sensor loop)
Cold Junction Compensation (CJC)		Internal, remote (Pt100) or fixed

2.7.4 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)

2.7.5 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)

2.7.6 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

2.7.7 General data

Adjustable damping time		0 to 60 s
Update time		~200 ms
Isolation		1500 VAC 1 min, Ex 500 VAC 1min.
Intrinsic safety	ProfIPAQ-HX	ATEX: II 1G / 2D, FISCO, Ex ia IIC T4-T6
		FM (Approvals pending): Class I-III, Div. 1, Gr. A-G, FISCO
Non-Incendive	ProfIPAQ-H	ATEX: II 3 GD, FNICO, Ex nL IIC T4-T6
		FM (Approvals pending): Class I-III, Div. 2, Gr. A- G, FNICO
Power supply	From segment coupler	9 to 32 VDC, Non-I.S. appl. (30 VDC Non-Incendive)
		9 to 17.5 VDC, I.S. applications
	Current consumption	~11mA
	FDE (Fault Disconnect Equipment)	<22mA
Connection head		DIN B or larger

2.7.8 Environment conditions (also see Ex data)

Ambient temperature	Storage	-40 to +85°C
	Operating	-40 to +85°C

2.7.9 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

2.7.10   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)

2.8 Dimensions
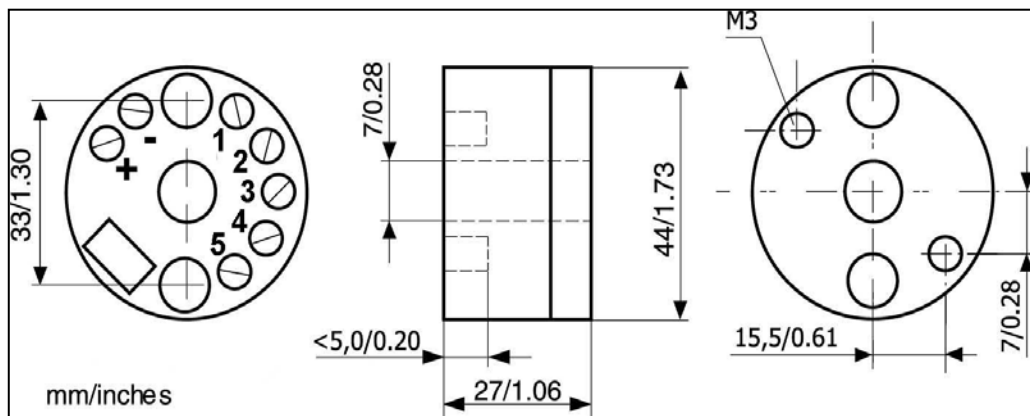
2.8.1 ProfIPAQ-H/-HX

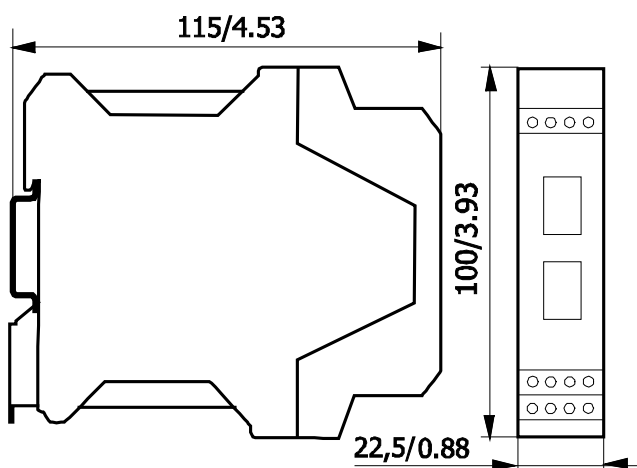**Figure 7** Dimension ProfIPAQ-H/-HX

2.8.2 ProfIPAQ-L

Figure 8 Dimension ProfIPAQ-L

2.9 <u>Service and repair</u>

ProfIPAQ does not contain any serviceable parts inside and cannot be repaired. A defective unit is sent to INOR Process AB or the local distributor for exchange. A clear description of the malfunction must be attached for warranty claims.

2.10 <u>Ordering information</u>
ProfIPAQ-H _____70PPH00001

ProfIPAQ-HX_____70PPHX0001

ProfIPAQ-L_____70PPL00001

2.11 <u>Accessories</u>
PC Configuration kit (software/cable)_____70CFG00092
Standard mounting set (screws, springs and locking washer)__70ADA00017
LCD-W12 indicator_____70LCDW1201
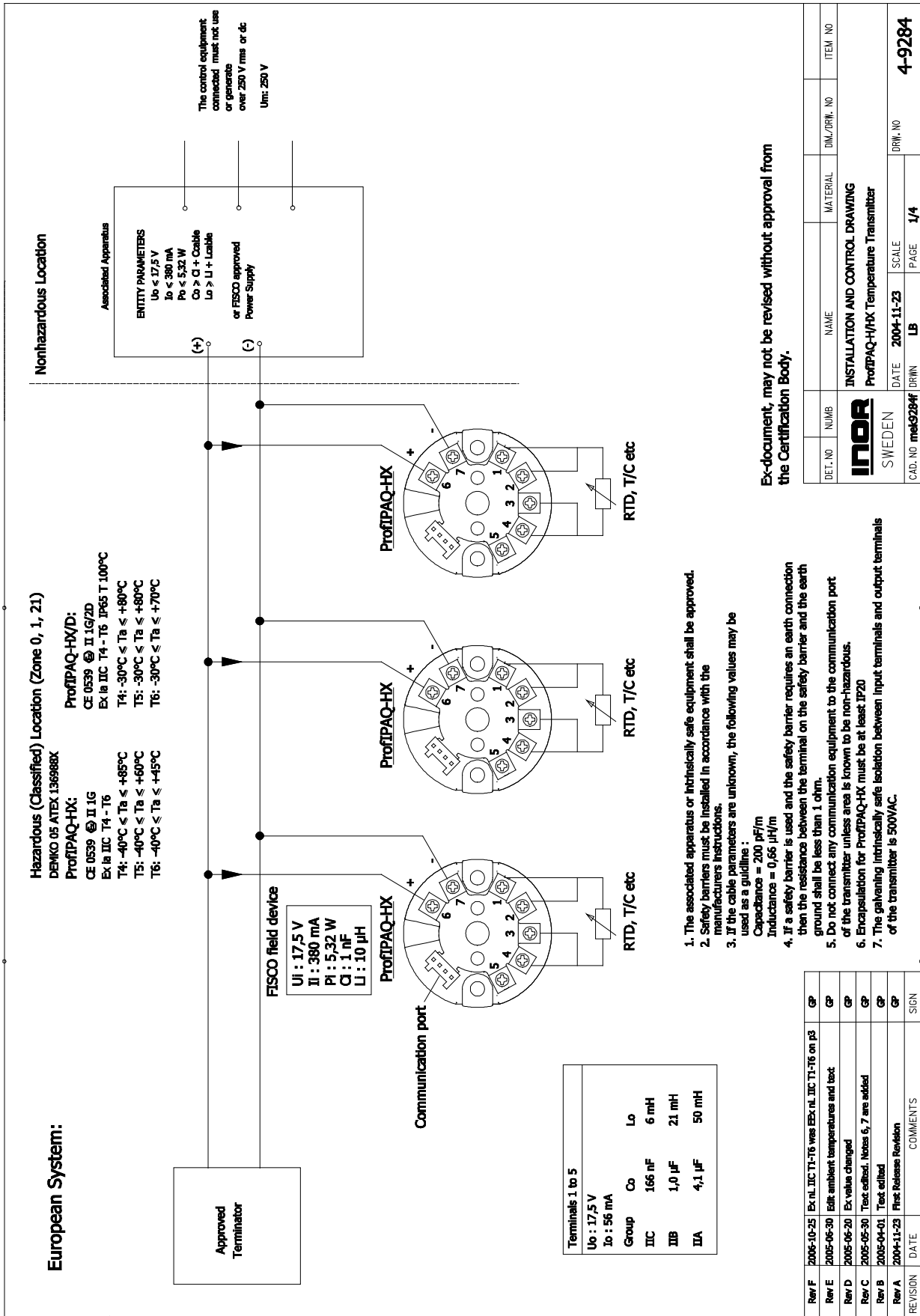
3 Control Drawings for installation guidance

Figure 9 Control / Installation Drawing Zone 0, Zone 1

16

European System:

Hazardous (Classified) Location (Zone 2, 22)

DEMKO 05 ATEX 136998X

ProfiPAQ-H:
CE Ex II 3G
Ex nL IIC T1 - T6
T1 - T4: -40°C ≤ Ta ≤ +85°C
T5: -40°C ≤ Ta ≤ +85°C
T6: -40°C ≤ Ta ≤ +75°C

ProfiPAQ-H/D:
CE Ex II 3GD
Ex nL IIC T1 - T6 IP54 T100°C
T1 - T4: -30°C ≤ Ta ≤ +80°C
T5: -30°C ≤ Ta ≤ +80°C
T6: -30°C ≤ Ta ≤ +75°C

Nonhazardous Location

The control equipment connected must not use or generate over 250 V rms or dc

Power Supply Class 2

or FNICO approved Power Supply

(+)
(-)

ProfiPAQ-H

RTD, T/C etc

ProfiPAQ-H

RTD, T/C etc

ProfiPAQ-H

RTD, T/C etc

FNICO field device
Ui : 30 V
Ci : 1 nF
Li : 10 µH

Communication port

Approved Terminator

Terminals 1 to 5		
Uo : 3,3 V		
Io : 0,4 mA		
Group	Co	Lo
IIC	500 µF	375 mH
IIB	500 µF	375 mH
IIA	500 µF	375 mH

1. Safety barriers must be installed in accordance with the manufacturers instructions.
2. If the cable parameters are unknown, the following values may be used as guideline:
   Capacitance = 200 pF/m
   Inductance = 0,66 µH/m
3. Do not connect any communication equipment to the communication port of the transmitter unless area is known to be non-hazardous.
4. The galvaning intrinsically safe isolation between input terminals and output terminals of the transmitter is 500VAC.

Ex-document, may not be revised without approval from the Certification Body.

REVISION	DATE	COMMENTS	SIGN
Rev F	2006-10-25	Ex nL IIC T1-T6 was EEx nL IIC T1-T6 on p3	GP
Rev E	2005-06-30	Edit ambient temperatures and text	GP
Rev D	2005-06-20	Ex value changed	GP
Rev C	2005-05-30	Text edited. Note 4 is added	GP
Rev B	2005-04-01	Text Ci, Li and Uo edited	GP
Rev A	2004-11-23	First Release Revision	GP

DET. NO	NUMB	NAME	MATERIAL	DIM./DRW. NO	ITEM NO

INSTALLATION AND CONTROL DRAWING
ProfiPAQ-H/HX Temperature Transmitter

SWEDEN

DATE	2004-11-23	DRWN	LB	SCALE	DRW. NO
CAD. NO	mek9284f			PAGE 3/4	4-9284

ITEM NO: 4-9284

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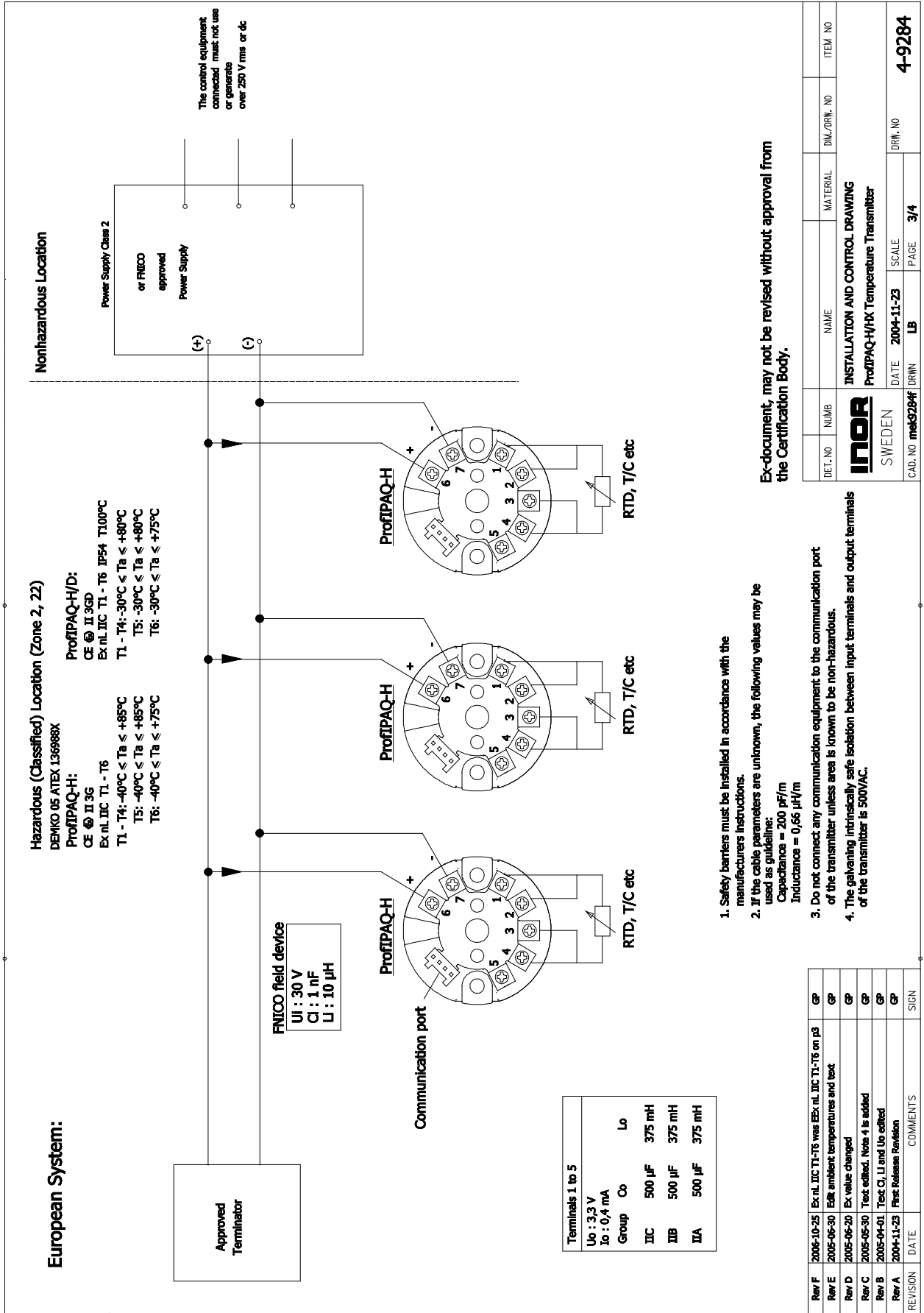
Figure 10 Control / Installation Drawing Zone 2

17

Part 2

4 ProfIPAQ Software and Programming

4.1 INOR PC configuration software ProfiSoft

INOR PC configuration software ProfiSoft is used to configure the ProfIPAQ via the PC, so that the configuration can be done before installation of the device in the PROFIBUS net. To communicate with the ProfIPAQ transmitter with the ProfiSoft software a standard PC and a special communication cable is needed. This communication cable between the PC and the ProfIPAQ transmitter is a special cable called IPRO-X, Part no 70IPRX0002, and is part of the PC Configuration kit 70CFG00092.

As all ProfIPAQ units as default have the address 126 it is recommended to change to the correct (desired) address before installing the unit in the PROFIBUS system. This address change is easily done with the help of INOR ProfiSoft.

4.1.1 Installation

To install the ProfiSoft distributed on a CD, insert the CD in the CD slot of the PC, and the autorun will start the installation program. Follow the instructions on the screen. In case the autorun feature is disabled on your PC, execute D:\ SLCDMENU.EXE (where D: is assumed to be the CD drive). After the installation is completed, you will find the program under C:\Program\INOR\ProfiSoft (the default choice).

The latest version of ProfiSoft can be downloaded from the INOR web-page www.inor.com.

To uninstall ProfiSoft, select *Add/Remove programs* in the *control panel*. Select *ProfiSoft* and click **Add/Remove**.

4.1.2 Overview.

To start ProfiSoft, select *Start – Programs – INOR – ProfiSoft*. There are 10 icons and three tabs.
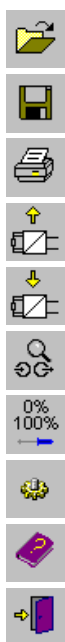
Open saved configuration file.

Save current configuration to a file.

Print current configuration.

Read configuration from transmitter to ProfiSoft.

Transmit current configuration in ProfiSoft to the transmitter.

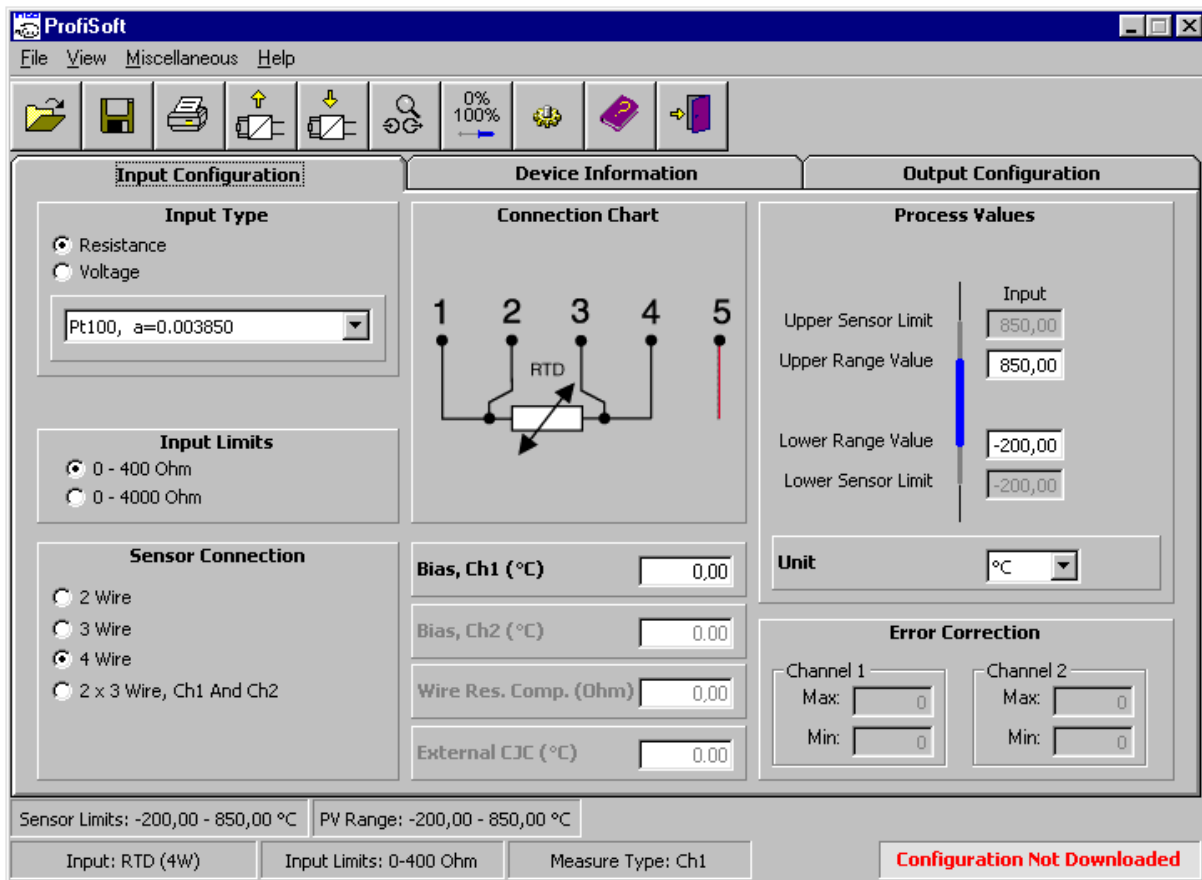View actual input and output signal from transmitter.

Enter error correction mode.

Miscellaneous options.

Help.

Exit the program.

4.1.3 Input configuration

Figure 11 ProfiSoft Input Configuration.

Input Configuration:
Input type: Choose input type (PT100, PT1000, Ni100, Ni1000, ohm, mV, T/C ....).
Input Limits: Select between 0-400 or 0-4000 ohm for resistance input type, and −10 to 100 mV or −10 to 1000 mV for voltage input type.
Sensor Connection: Connection to the sensor, select for 2-, 3-, 4-, 2 x 3-wire connection.
Connection Chart: View the connection for the selected input type.
Bias: Value in temperature that can be algebraically added to process temperature.
Wire res. Comp: Resistance compensation for the wire (in Ohm) when 2 wire connection is used. The resistance is the total wire resistance in the input loop
Ext. CJC: Fixed temperature value of an external reference junction.
Process Values: Set the Upper/Lower range value (max/min value for the process), and the engineering unit.
Error Correction: View if the sensor is corrected (Sensor Error Correction or System Error Correction). Se Error Correction for more information
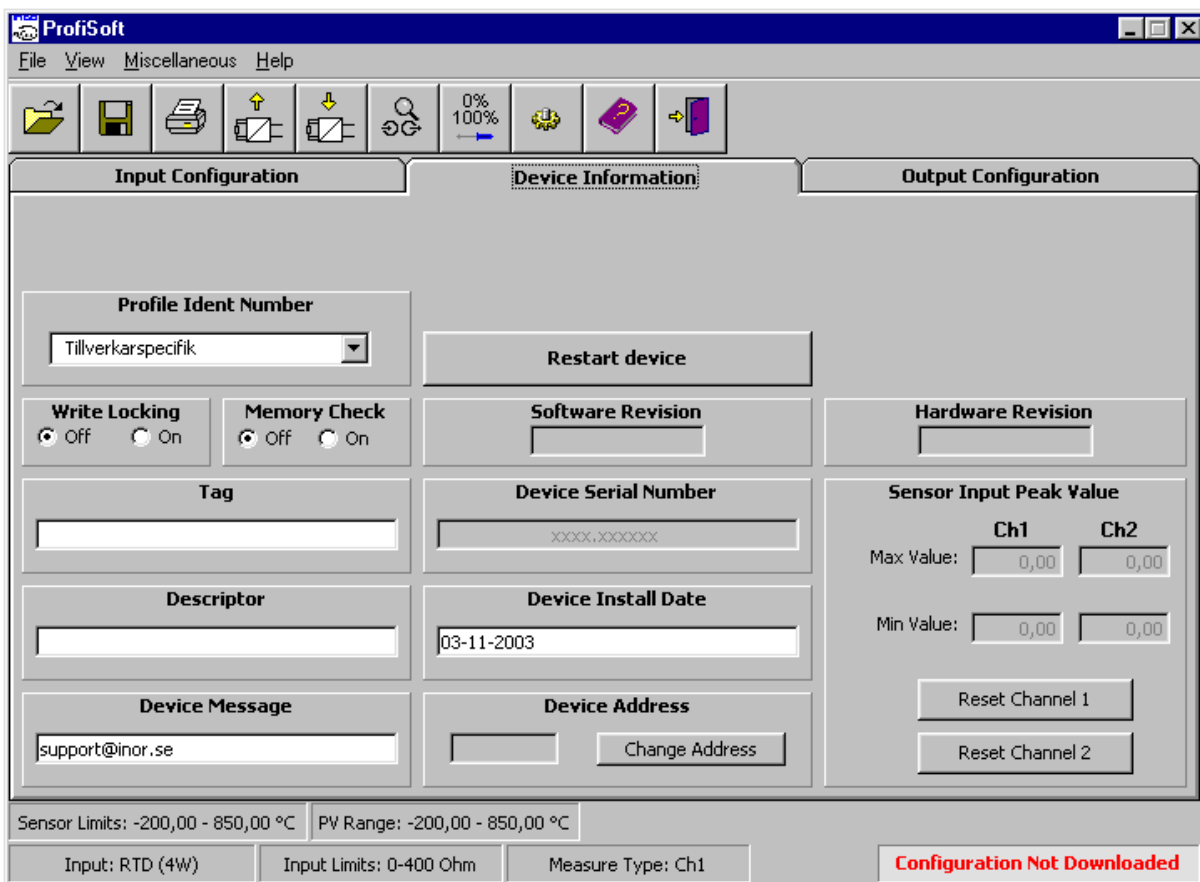
4.1.4 <u>Device information</u>

Figure 12 ProfiSoft Device Information.

Device Information:

Profile Ident Number: Select PROFIBUS Profile Ver 3.0 or Manufacture Profile.

Write locking: Software write protection.

Memory Check: Check the EEPROM status at startup (this increases the startup time).

Tag: Text field can be used in any way. A recommended use is a s a unique label for a field device in the plant.

Descriptor: Text that is associated with the Field Device.

Device Message: Text that is associated with the Field Device.

Restart device: Starts the device with the new values in EEPROM.

Software Revision: This revision corresponds to the software or firmware that is embedded in the Field Device.

Device Serial Number: Uniquely identifies the field (read only).

Device Install Date: Date on which the device was installed.

Device Address: The PA address for the device (se Change Address for changing the address).

Hardware Revision: Revision that corresponds to the electronics hardware of the Field Device (read only).

Sensor Input Peak Value: Sensors highest/lowest peak value. Shows the transmitters measured process Max/Min value when on-line. Press Reset button to reset the selected channels Max and Min values.

4.1.5 Output configuration
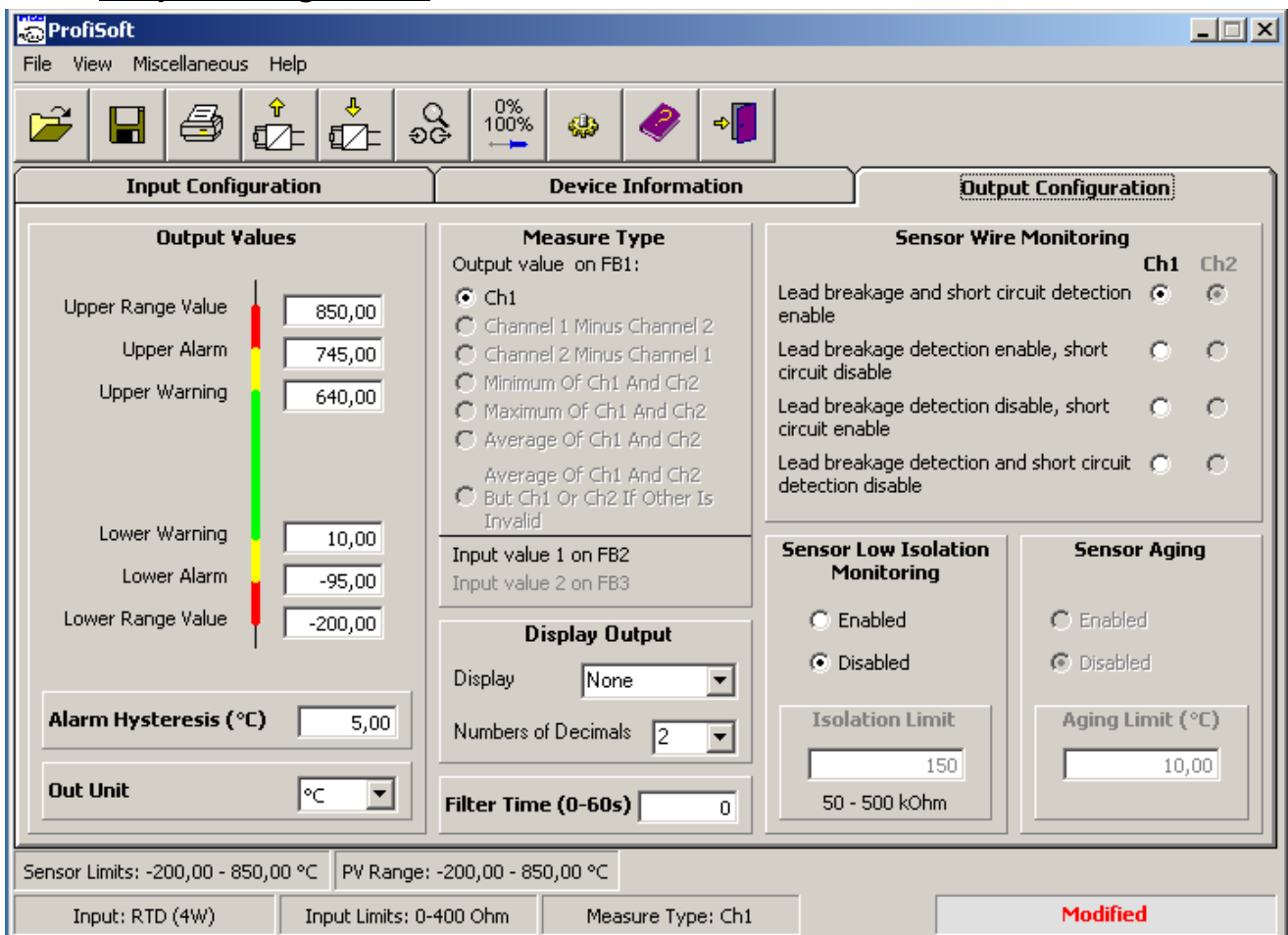
Figure 13 ProfiSoft Output Configuration.

Output Configuration:

Output Values: The setting for the lower/higher alarm and warning limits.

Alarm Hysteresis: Hysteresis expressed in the engineering units of the output value scale. An alarm occurs when a value exceeds an upper limit. The alarm's status remains true until the value drops below the limit minus the alarm hysteresis. The directions are reversed for low limit detection. The hysteresis is also used for the warnings.

Unit: Engineering unit for the output value.

Measure type: If sensor connections are Resistance 2 x 3 Wire or Voltage 2 x T/C, select the type of measuring results (output). The selected Measure type will be valid on FB1 (Function Block 1) while Input channel 1 will be valid on FB2 and Input channel 2 on FB3.

Display Output: Turns the communication port of the transmitter into an output to an LCD-display and sets number of decimals to be shown on the display. Also sets the number of decimals shown in the View Signal window in ProfiSoft.

Filter Time: This parameter contains the time constant for the rise time of the output up to a value of 63,21% resulting from a step at the filter input. The engineering unit of this parameter is always second.

Sensor Wire Monitoring: Enables the lead breakage and short circuit detection.

Sensor Low Isolation Monitoring: A monitoring of the internal isolation level in RTDs and T/Cs. If the isolation falls below the set "Isolation limit", a message will be transmitted.

Sensor Aging: Compare if the input value for channel 1 differs the input value for channel 2. If the difference is larger than the entered limit a status signal is set and can be read by the PLC system. The limit has the same unit as the input signal.
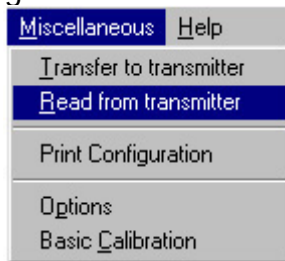
4.1.6 Download and upload configuration to/from ProfIPAQ

Before configuring the ProfIPAQ, setup the PC serial port and power supply to ProfIPAQ.

Use the PROFIBUS connection or connect an external power supply (9 to 32 VDC) to the PROFIBUS connections 6 and 7. To setup the serial port, select *Miscellaneous – Options (Settings)*, and mark which communication port to use, Click *OK*.

We recommend uploading the configuration from the ProfIPAQ, before adjusting the parameters, to minimize the risk for unwanted changes, and then download the configuration to the ProfIPAQ. It's possible to read the configuration with the PC software ProfiSoft while the device communicates through the PROFIBUS, but this increases the PC communication time from appr. 15 sec up to appr. 210 sec, depending on actions on the bus. ProfiSoft ask if the communication over the PROFIBUS should be disconnected. If this is done, the device make a complete restart after reading, and will start the PROFIBUS communication again. Download a new configuration will disconnect the device before downloading, and then make a complete restart before start communicate over the PROFIBUS.

Upload configuration from ProfIPAQ to PC:

Figure 14 ProfiSoft Upload Configuration.
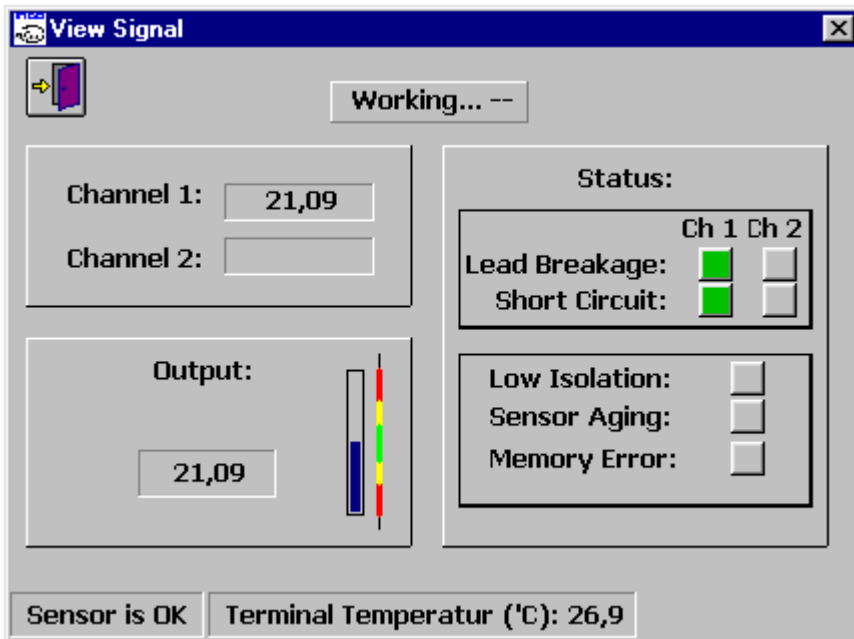
Download configuration to ProfIPAQ:
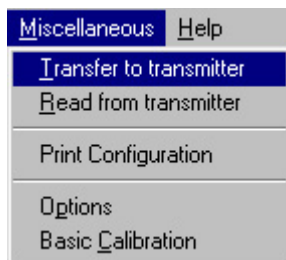
Figure 15 ProfiSoft Download Configuration.

4.1.7 <u>View temperature</u>

To view the input signal, terminal temperature, output signal and the status from ProfIPAQ:

Figure 16 ProfiSoft View Input signal.

ProfiBus output:
Output → FB1
Channel 1 → FB2
Channel 2 → FB3

Figure 17 ProfiSoft Input signal.

4.1.8 <u>Change address with ProfiSoft</u>

To change the device address, click the button *Change address* on Device information tab.

Figure 18 ProfiSoft Change Address.

Write the new address (we recommended between 1 – 125) and press OK.
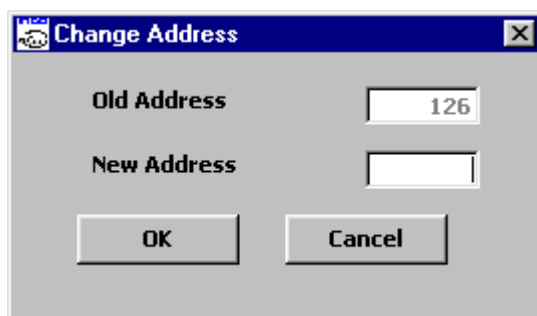

Figure 19 ProfiSoft New Address.

4.1.9 Customized Linearization, Datapair

In transmitters from the ProfIPAQ family the customized linearization is described with datapairs, and if two input channels are used they will both use the same linearization table. If you choose the customized linearization, press the Enter Datapair button and a new window will appear (se figure 20 Enter Datapair). In this window there are nine icons, and their functions are (from the left):

Open a saved datapair configuration file and load it into ProfiSoft configuration.

Save current datapair configuration to a file on the PC.

Print current datapair configuration from the datapair window.

Sort entered datapairs, in ascending order.

Reset all entered datapairs values to 0.

Insert row. Will insert a new row before the selected cell (moves the selected cell to next datapair). This moves all datapairs after the selected one step ahead and the last datapair (if more than 50) will be lost.

Delete row will delete the selected datapair, and move all of the following datapairs one step forward.

OK saves the datapairs temporary on the PC, for downloading later on, as long as the ProfiSoft is activated. It will not download the datapairs to the device. This is useful when configuring more than one device with the same datapairs.

Exit the Enter Datapair function, without saving the datapair configuration.

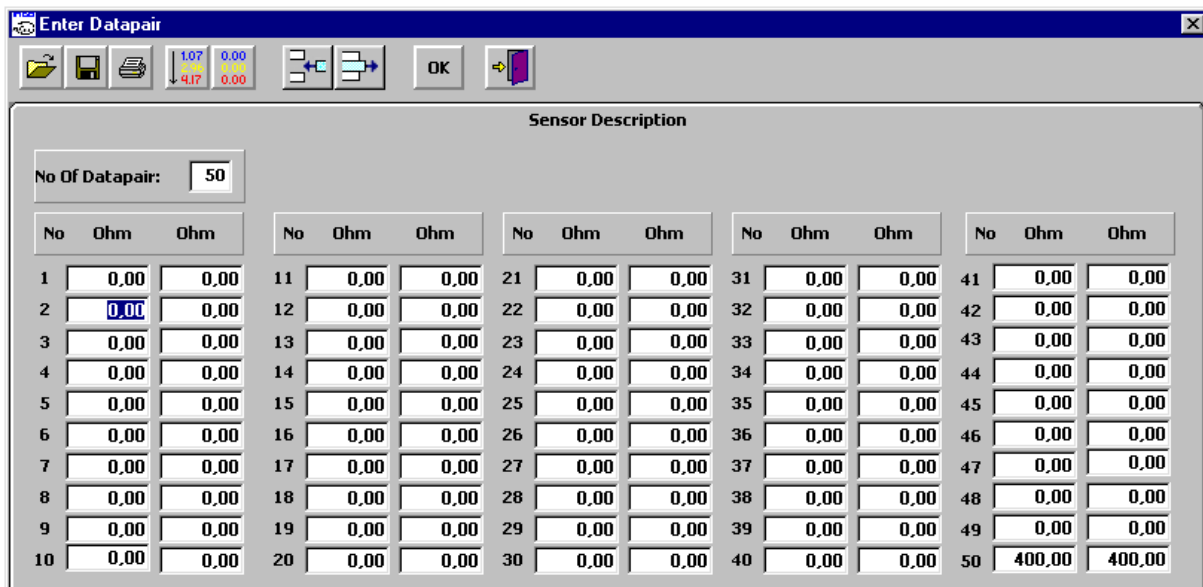**Figure 20** Enter Datapair

The sensor function can be described by 2 to 50 datapairs. These datapairs does not have to be evenly spread over the linearization interval.

Note: It is not allowed to have any double datapairs that describes the same point. There must not be e.g. more than one datapair describing the point (0,0). The function described must also be continuously increasing.

24

4.1.10   Error Correction

Performs a fine adjust of the transmitter when known inputs can be applied or when a sensor calibration protocol is available. To open the Error Correction form (se figure 21 Error Correction), select from the menu 'Miscellaneous-Error Correction' or click the Error Correction icon.
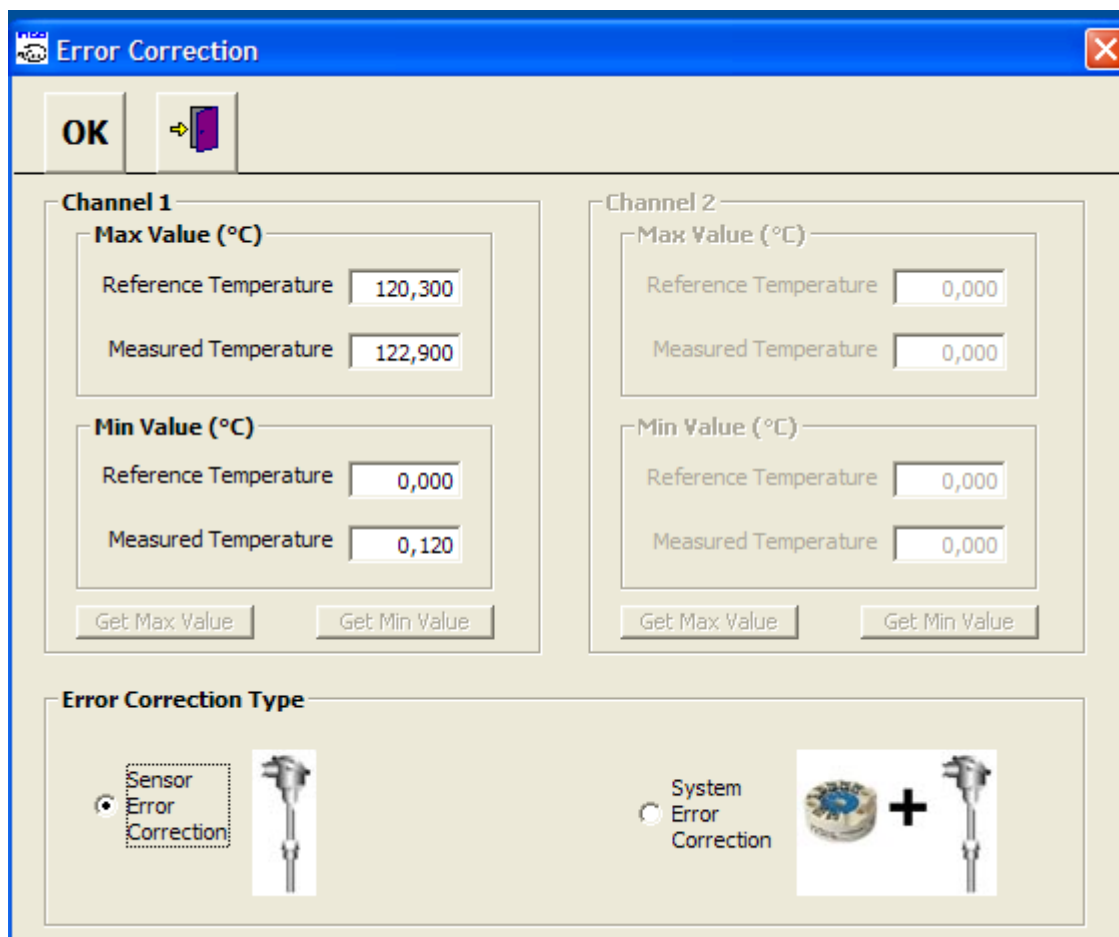

Figure 21 Error Correction

4.1.10.1   Sensor Error Correction

A 2-point sensor error correction can be performed when a sensor calibration protocol is available. The actual temperature and the observed temperature from the calibration protocol are required. You get the best result if the two points are near the limits of the measuring range, because this will give a higher accuracy.

4.1.10.2   System Error Correction

A 2-point system error correction can be performed when two known temperatures can be applied to the sensor connected to the transmitter. The transmitter input value will also have to be measured (this could be done in the Error Correction window). You get the best result if the two points are near the limits of the measuring range, because this will give a higher accuracy.

Note: *If you want to cancel a performed sensor error correction or system error correction, insert the value 0 into the Reference and Measurement Temperature boxes and press OK. Then download the configuration into the transmitter.*

4.1.11   Settings

Select which communication port to use, what language to use and the startup-measuring unit. To save and close the Settings Window, press OK button. By pressing the Exit button, the Settings Window will be closed without saving the option configuration. To set a password for using ProfiSoft, press the Password button.
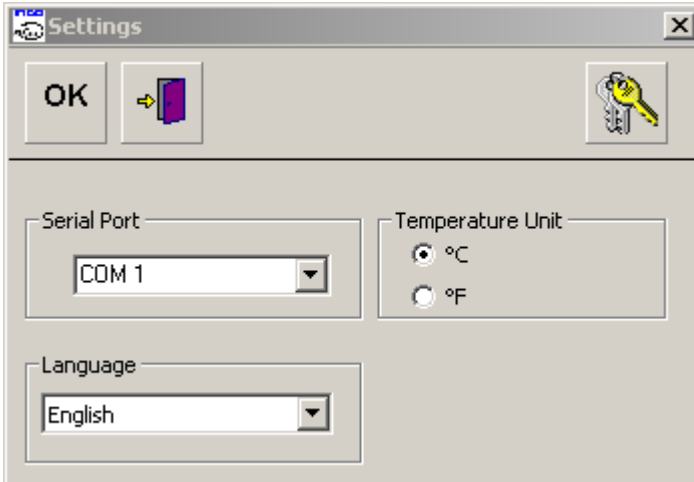
Figure 22 Options

4.1.12   Password

To protect ProfiSoft from unexpected use, there is a possibility to set a password. Each time ProfiSoft start, the user has to enter the password. To set a password, press the password button on form Settings, or select from the menu *Miscellaneous – Password*. If there is no password, and you like to add one, leave the *field Old Password* empty. If there is a password, and you wouldn't like to have one, enter the valid password in the field *Old Password*, and leave the fields *New Password* and *Confirm Password* empty.

Figure 23 Password

5 ProfIPAQ in a ProfiBus system

5.1 DDL-file

   INOR supplies a DDL-file (EDD) that supports the ProfIPAQ transmitters. EDD is an electronic device data sheet ((E)DDL = (Electronic) Device Description Language), used in the acyclic communication with the Profibus device. A EDD typically describes the application-related parameters and functions of a field device such as configuration parameters, ranges of values, units of measurement, default values, etc. A EDD is a versatile source of information for engineering, commissioning, runtime, asset management, and documentation. The DDL/EDD-file can be described as a device driver file that describes the device characteristics to a universal configuration tool like the Siemens Simatic PDM, where the ProfIPAQ DDL is integrated into (from version 5.1). If you are using another universal managing system the ProfIPAQ DDL can be downloaded from INOR webb-page www.inor.com and installed into your system.

5.2 GSD-file

   GSD is a readable ASCII text file and contains both general and device-specific specifications for cyclic communication to a PLC (Programmable Logic Controller). For more technical information on the GSD file see the Profibus organisation webb-page www.profibus.com. The ProfIPAQ GSD file can be downloaded from INOR webb-page www.inor.com or from the Profibus webb-page www.profibus.com and installed into your system.

5.3 PROFIBUS/ProfIPAQ parameters

ProfIPAQ have the possibility to send 3 function blocks (if they are selected in the PLC program) to the PLC (cyclic communication). The function blocks contain 5 bytes, the first 4 bytes are the value, and the last byte is the status.

	Value (4 bytes)	Status (1 byte)
FB1	Output Value	Se table FB1 Status
FB2	Input Value Channel 1	Se table FB2 Status
FB3	Input Value Channel 2	Se table FB3 Status

Table 1 ProfIPAQ parameters

Status (Hex)	Description
0x80	God
0x84	Active Block Alarm
0x89	Active Advisory Alarm. Below Lower Limit Alarm (Lower Warning)
0x8A	Active Advisory Alarm. Over Upper Limit Alarm (Upper Warning)
0x8D	Active critical alarm. Below Lower Limit Value (Lower Alarm)
0x8E	Active critical alarm. Over Upper Limit Value (Upper Alarm)

Table 2 FB1 Status

Status (Hex)	Description
0x00	God
0x01	Underrange
0x02	Overrange
0x04	Lead Breakage
0x08	Short Circuit
0x40	Sensor Isolation
0x80	Sensor Aging

Table 3 FB 2 Status

Status (Hex)	Description
0x00	God
0x01	Underrange
0x02	Overrange
0x04	Lead Breakage
0x08	Short Circuit

Table 4 FB 3 Status

There is also some diagnostic information and extended diagnostic information (the extended information is only available if the profile ident is selected to Manufacture).

Status (Hex)	Description
0x10	Memory Error
0x20	Failure in measurement

Table 5 DIAGNOSIS(0)

Status (Hex)	Description
0x08	Warmstart carried out
0x10	Coldstart carried out
0x80	IDENT_NUMBER_Violation

Table 6 DIAGNOSIS(1)

Status (Hex)	Description
	NOT_USED

Table 7 DIAGNOSIS(2)

Status (Hex)	Description
0x80	Extension available

Table 8 DIAGNOSIS(3)

Status (Hex)	Description
0x01	RJ Error
0x20	Sensor aging
0x40	Memory error
0x80	Sensor isolation

Table 9 DIAGNOSIS_EXTENSION(0)

Status (Hex)	Description
0x01	Underrange
0x02	Overrange
0x04	Lead breakage
0x08	Short breakage

Table 10 DIAGNOSIS_EXTENSION(1) channel 1

Status (Hex)	Description
0x01	Underrange
0x02	Overrange
0x04	Lead breakage
0x08	Short breakage

Table 11 DIAGNOSIS_EXTENSION(2) channel 2

These diagnostic bits are defined in the GSD-file. By using the GSD, the diagnostic information description will be readable from the PLC. The diagnostic information is also available for the acyclic communication through the parameters INPUT_FAULT_GEN, INPUT_FAULT_1 for channel 1 and INPUT_FAULT_2 for channel 2

Status (Hex)	Description
0x01	RJ Error
0x20	Sensor aging
0x40	Memory error
0x80	Sensor isolation

Table 12 INPUT_FAULT_GEN

Status (Hex)	Description
0x01	Underrange
0x02	Overrange
0x04	Lead breakage
0x08	Short breakage

Table 13 INPUT_FAULT_1

Status (Hex)	Description
0x01	Underrange
0x02	Overrange
0x04	Lead breakage
0x08	Short breakage

Table 14 INPUT_FAULT_2

6 Appendix A. Parameter table

The ProfIPAQ parameters can be accessed by using the acyclic communication. The parameters are listed in the following table:

Slot No.	Abs Ind No.	Real Ind No.	Attribute Name	Obj Type	DataType	Store	Size	Access
6.1 Function Block Analog Input								
0	16	0	BLOCK_OBJECT	RECORD	DS_32	STORE_C	20	READ
0	17	1	ST_REV	SIMPLE	U16	STORE_N	2	READ
0	18	2	TAG_DESCR	SIMPLE	OCSTR	STORE_S	32	RW
0	19	3	STRATEGY	SIMPLE	U16	STORE_S	2	RW
0	20	4	ALERT_KEY	SIMPLE	U8	STORE_S	1	RW
0	21	5	TARGET_MODE	SIMPLE	U8	STORE_S	1	RW
0	22	6	MODE_BLK	RECORD	DS_37	STORE_D	3	READ
0	23	7	ALARM_SUM	RECORD	DS_42	STORE_D	8	READ
0	24	8	BATCH	RECORD	DS_67	STORE_S	10	RW
0	26	10	OUT	RECORD	DS_33	STORE_D	5	READ
0	27	11	PV_SCALE	ARRAY	FLOAT	STORE_S	8	RW
0	28	12	OUT_SCALE	RECORD	DS_36	STORE_S	11	RW
0	29	13	LIN_TYPE	SIMPLE	U8	STORE_S	1	RW
0	30	14	CHANNEL	SIMPLE	U16	STORE_S	2	RW
0	32	16	PV_FTIME	SIMPLE	FLOAT	STORE_S	4	RW
0	33	17	FSAVE_TYPE	SIMPLE	U8	STORE_S	1	RW
0	34	18	FSAVE_VALUE	SIMPLE	FLOAT	STORE_S	4	RW
0	35	19	ALARM_HYS	SIMPLE	FLOAT	STORE_S	4	RW
0	37	21	HI_HI_LIM	SIMPLE	FLOAT	STORE_S	4	RW
0	39	23	HI_LIM	SIMPLE	FLOAT	STORE_S	4	RW
0	41	25	LO_LIM	SIMPLE	FLOAT	STORE_S	4	RW
0	43	27	LO_LO_LIM	SIMPLE	FLOAT	STORE_S	4	RW
0	46	30	HI_HI_ALM	RECORD	DS_39	STORE_D	16	READ
0	47	31	HI_ALM	RECORD	DS_39	STORE_D	16	READ
0	48	32	LO_ALM	RECORD	DS_39	STORE_D	16	READ
0	49	33	LO_LO_ALM	RECORD	DS_39	STORE_D	16	READ
0	50	34	SIMULATE	RECORD	DS_50	STORE_S	6	RW
0	51	35	OUT_UNIT_TEXT	SIMPLE	OCSTR	STORE_S	16	RW
6.2 Transducer Block Temperature Device (thermocouple + thermoresistance + R + DC V)								
0	61	0	BLOCK_OBJECT	RECORD	DS_32	STORE_C	20	READ
0	62	1	ST_REV	SIMPLE	U16	STORE_N	2	READ
0	63	2	TAG_DESCR	SIMPLE	OCSTR	STORE_S	32	RW
0	64	3	STRATEGY	SIMPLE	U16	STORE_S	2	RW
0	65	4	ALERT_KEY	SIMPLE	U8	STORE_S	1	RW
0	66	5	TARGET_MODE	SIMPLE	U8	STORE_S	1	RW
0	67	6	MODE_BLK	RECORD	DS_37	STORE_D	3	READ
0	68	7	ALARM_SUM	RECORD	DS_42	STORE_D	8	READ
0	69	8	PRIMARY_VALUE	SIMPLE	DS_33	STORE_D	5	READ
0	70	9	PRIMARY_VALUE_UNIT	SIMPLE	U16	STORE_S	2	RW
0	71	10	SECONDARY_VALUE_1	SIMPLE	DS_33	STORE_D	5	READ
0	72	11	SECONDARY_VALUE_2	SIMPLE	DS_33	STORE_D	5	READ
0	73	12	SENSOR_MEAS_TYPE	SIMPLE	U8	STORE_S	1	RW
0	74	13	INPUT_RANGE	SIMPLE	U8	STORE_S	1	RW
0	75	14	LIN_TYPE	SIMPLE	U8	STORE_S	1	RW
0	80	19	BIAS_1	SIMPLE	FLOAT	STORE_S	4	RW
0	81	20	BIAS_2	SIMPLE	FLOAT	STORE_S	4	RW
0	82	21	UPPER_SENSOR_LIMIT	SIMPLE	FLOAT	STORE_N	4	READ
0	83	22	LOWER_SENSOR_LIMIT	SIMPLE	FLOAT	STORE_N	4	READ
0	85	24	INPUT_FAULT_GEN	SIMPLE	U8	STORE_D	1	READ

0	86	25	INPUT_FAULT_1	SIMPLE	U8	STORE_D	1	READ
0	87	26	INPUT_FAULT_2	SIMPLE	U8	STORE_D	1	READ
0	88	27	SENSOR_WIRE_CHECK_1	SIMPLE	U8	STORE_S	1	RW
0	89	28	SENSOR_WIRE_CHECK_2	SIMPLE	U8	STORE_S	1	RW
0	90	29	MAX_SENSOR_VALUE_1	SIMPLE	FLOAT	STORE_N	4	RW
0	91	30	MIN_SENSOR_VALUE_1	SIMPLE	FLOAT	STORE_N	4	RW
0	92	31	MAX_SENSOR_VALUE_2	SIMPLE	FLOAT	STORE_N	4	RW
0	93	32	MIN_SENSOR_VALUE_2	SIMPLE	FLOAT	STORE_N	4	RW
0	94	33	RJ_TEMP	SIMPLE	FLOAT	STORE_D	4	READ
0	95	34	RJ_TYPE	SIMPLE	U8	STORE_S	1	RW
0	96	35	EXTERNAL_RJ_VALUE	SIMPLE	FLOAT	STORE_S	4	RW
0	97	36	SENSOR_CONNECTION	SIMPLE	U8	STORE_S	1	RW
0	98	37	COMP_WIRE1	SIMPLE	FLOAT	STORE_S	4	RW
0	99	38	COMP_WIRE2	SIMPLE	FLOAT	STORE_S	4	RW
0	100	39	EMISSIVITY	SIMPLE	FLOAT	STORE_S	4	RW
0	101	40	PEAK_TRACK	SIMPLE	U8	STORE_S	1	RW
0	102	41	DECAY_RATE	SIMPLE	FLOAT	STORE_S	4	RW
0	103	42	PEAK_TIME	SIMPLE	FLOAT	STORE_S	4	RW
0	104	43	TRACK_HOLD	SIMPLE	U8	STORE_S	1	RW
0	105	44	SPECT_FLT_SET	SIMPLE	U8	STORE_S	1	RW
0	106	45	TAB_ENTRY	SIMPLE	U8	STORE_D	1	RW
0	107	46	TAB_X_Y_VALUE	ARRAY	FLOAT	STORE_D	8	RW
0	108	47	TAB_MIN_NUMBER	SIMPLE	U8	STORE_N	1	READ
0	109	48	TAB_MAX_NUMBER	SIMPLE	U8	STORE_N	1	READ
0	110	49	TAB_OP_CODE	SIMPLE	U8	STORE_D	1	RW
0	111	50	TAB_STATUS	SIMPLE	U8	STORE_S	1	READ
0	112	51	TAB_ACTUAL_NUMBER	SIMPLE	U8	STORE_N	1	READ

6.3 Physical Block Transmitter

| 0	126	0	BLOCK_OBJECT	RECORD	DS_32	STORE_C	20	READ
0	127	1	ST_REV	SIMPLE	U16	STORE_N	2	READ
0	128	2	TAG_DESCR	SIMPLE	OCSTR	STORE_S	32	RW
0	129	3	STRATEGY	SIMPLE	U16	STORE_S	2	RW
0	130	4	ALERT_KEY	SIMPLE	U8	STORE_S	1	RW
0	131	5	TARGET_MODE	SIMPLE	U8	STORE_S	1	RW
0	132	6	MODE_BLK	RECORD	DS_37	STORE_D	3	READ
0	133	7	ALARM_SUM	RECORD	DS_42	STORE_D	8	READ
0	134	8	SW_REVISION	SIMPLE	VISTR	STORE_C	16	READ
0	135	9	HW_REVISION	SIMPLE	VISTR	STORE_C	16	READ
0	136	10	DEVICE_MAN_ID	SIMPLE	U16	STORE_C	2	READ
0	137	11	DEVICE_ID	SIMPLE	VISTR	STORE_C	16	READ
0	138	12	DEVICE_SER_NUM	SIMPLE	VISTR	STORE_C	16	READ
0	139	13	DIAGNOSIS	SIMPLE	OCSTR	STORE_D	4	READ
0	140	14	DIGNOSIS_EXTENSION	SIMPLE	OCSTR	STORE_D	6	READ
0	141	15	DIAGNOSIS_MASK	SIMPLE	OCSTR	STORE_C	4	READ
0	142	16	DIAGNOSIS_MASK_EXT	SIMPLE	OCSTR	STORE_C	6	READ
0	143	17	DEVICE_CERTIFICATION	SIMPLE	VISTR	STORE_C	32	READ
0	144	18	WRITE_LOCKING	SIMPLE	U16	STORE_N	2	RW
0	145	19	FACTORY_RESET	SIMPLE	U16	STORE_S	2	RW
0	146	20	DESCRIPTOR	SIMPLE	OCSTR	STORE_S	32	RW
0	147	21	DEVICE_MESSAGE	SIMPLE	OCSTR	STORE_S	32	RW
0	148	22	DEVICE_INSTALL_DATE	SIMPLE	OCSTR	STORE_S	16	RW
0	149	23	LOCAL_OP_ENA	SIMPLE	U8	STORE_N	1	RW
0	150	24	IDENT_NUMBER	SIMPLE	U8	STORE_S	1	RW
0	151	25	HW_WRITE_PROTECTION	SIMPLE	U8	STORE_D	1	READ

7 Appendix B. PROFIBUS Cabling

7.1 Shielding and grounding

Proper electrical installation is necessary to prevent errors due to sensor lead resistance and electrical noise. Shielded, twisted cable should be used for best results in electrically noisy environments. All power to the transmitter is supplied over the signal wiring. Signal wiring should be shielded, twisted pair for best results. Do not run unshielded signal wiring in conduit or open trays with power wiring or near heavy electrical equipment.

The standard EN 61158-2 states that all bus interfaces must be isolated from local ground. To provide optimal system electromagnetic compatibility, it is very important that system components, and particularly the lines connecting the components, are shielded and that these shields provide as complete an electric protective envelope as possible.

The importance of this requirement increases with the signal frequencies processed in the system. With regard to the fieldbus, this means that ideally the cable shields are connected to the field devices' housings (or other protective coverings) which are frequently made of metal. Since these are usually connected with local ground or with the protective conductor, the shield of the bus cable is grounded several times. This method provides optimum electromagnetic compatibility and protection of personnel (Figure 24), and can be used as desired in systems with optimum equipotential bonding.

1 Power supply
2 Main cable / Trunk cable
3 Junction box
4 Stub cable / Spur
5 Field device
6 Equipotential Bonding
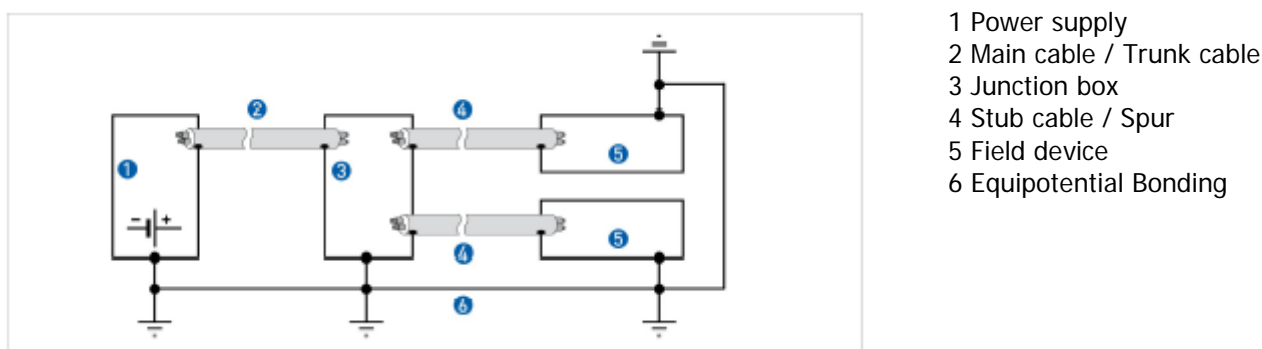
Figure 24 Ideal combination of shielding and grounding (principle guidelines).

Cable parameters for Ex-use
Rc (loop cable resistance): 15 – 150 Ω/km
Lc (loop cable inductance): 0.4 – 1 mH/km
Cc (loop cable capacitance): 45 – 200 nF/km

The maximum cable length of each spur (from junction box to field device, see figure 24) in a FISCO/FNICO system is 60 m in IIC and IIB according to IEC 60079-27.
In the same way the maximum length of each trunk cable (from Power Supply to Junction box, see figure 24), including the length of all connected spurs, is 1 km in Gas group IIC and 5 km in Gas group IIB.
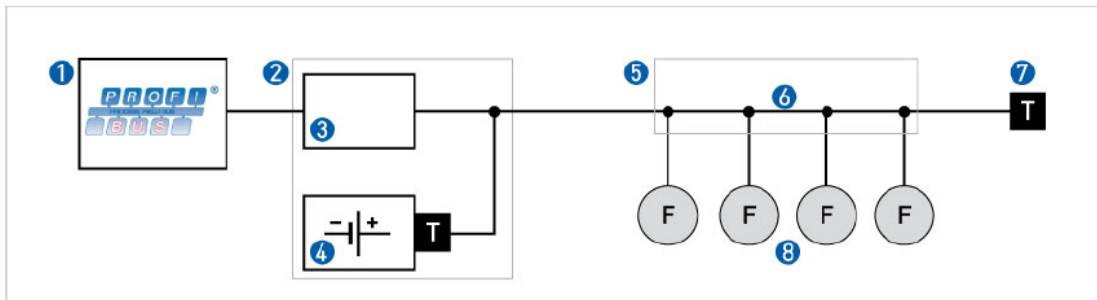
7.2 <u>Termination</u>

Bus line termination [T] consists of a series circuit of one capacitor and one film resistor in both ends of the main bus line.

Permissible values:

R = 100 Ω ±2 %

C = 1 μF ±20 %

It is common that one of the Line terminations is included in the Segment Coupler.

Figure 25 Typical fieldbus architecture.

1 ProfiBus DP Component	5 Junction boxes
2 DP / PA Segment Coupler (including 3 and 4)	6 PA Segment
3 Signal coupler	7 Bus line termination
4 Power supply device	8 Field devices

Figure 25 shows a typical PROFIBUS architecture. The field devices with low power consumption (e.g., pressure and temperature measuring transmitters) are powered by a two-wire bus. Signal transmission is also performed over the bus. A non ex-installation allows up to 32 devices per segment, depending on the power capacity of the segment coupler. In an Ex-installation normally 10 units can be connected in each segment.

For more information concerning PROFIBUS installation, see the PROFIBUS homepage www.profibus.com.

8 <u>WARRANTY</u>

INOR Process AB, or any other affiliated company within the INOR Group (hereinafter jointly referred to as "INOR"), hereby warrants that the Product will be free from defects in materials or workmanship for a period of five (5) years from the date of delivery ("Limited Warranty"). This Limited Warranty is limited to repair or replacement at INOR's option and is effective only for the first end-user of the Product. Upon receipt of a warranty claim, INOR shall respond within a reasonable time period as to its decision concerning:

1 Whether INOR acknowledges its responsibility for any asserted defect in materials or workmanship; and, if so,

2 the appropriate cause of action to be taken (i.e. whether a defective product should be replaced or repaired by INOR).

This Limited Warranty applies only if the Product:

1 is installed according to the instructions furnished by INOR;

2 is connected to a proper power supply;

3 is not misused or abused; and

4 there is no evidence of tampering, mishandling, neglect, accidental damage, modification or repair without the approval of INOR or damage done to the Product by anyone other than INOR.

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Products that are covered by the Limited Warranty will either be repaired or replaced at the option of INOR. Customer pays freight to INOR, and INOR will pay the return freight by post or other "normal" way of transport. If any other type of return freight is requested, customer pays the whole return cost.