IB IL RTD 4/PT1000-ECO



Inline ECO, temperature measurement terminal, analog RTD inputs: 4 (Pt 1000)

Data sheet
107139_en_01

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1 Description

The terminal is designed for use within an Inline station.
It is used to acquire signals from resistive temperature sensors.
The measured values are depicted in standardized representation format.
Inline ECO terminals are approved for the temperature range from 0°C to +55°C. The electronics base and Inline connector are supplied as standard.

Features

- 4 analog inputs
- Connection of sensors in 2-conductor technology
- Supported sensors: Pt 1000
- Data format: standardized representation
- Diagnostic information in the process data word
- Diagnostic indicator

Observe these notes

This data sheet is only valid in association with the IL SYS INST UM E user manual.

Make sure you always use the latest documentation.
It can be downloaded at: phoenixcontact.com/product/2702501

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3 Ordering data

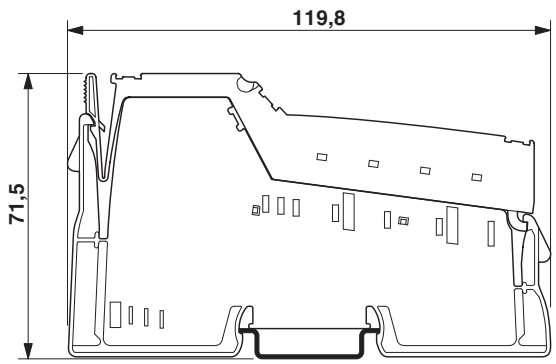
Description	Type	Item no.	Pcs./Pkt.
Inline, Temperature measurement terminal, Analog RTD inputs: 4 (Pt 1000), connection technology: 2-conductor, transmission speed in the local bus: 500 kbps, degree of protection: IP20, including Inline connector	IB IL RTD 4/PT1000-ECO	2702501	1

Documentation	Type	Item no.	Pcs./Pkt.
User manual, English, Automation terminals of the Inline product range	IL SYS INST UM E	-	-
Data sheet, English, INTERBUS addressing	DB GB IBS SYS ADDRESS	-	-

Additional ordering data	
For additional ordering data (accessories), go to:	www.phoenixcontact.com/product/2702501

4 Technical data

Dimensions (nominal sizes in mm)



Width	12.2 mm
Height	119.8 mm
Depth	71.5 mm

General data	
Color	Housing: pale green (RAL 6021)
Weight	60 g (with connector)
Ambient temperature (operation)	0 °C ... 55 °C
Ambient temperature (storage/transport)	-25 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (according to DIN EN 61131-2)
Permissible humidity (storage/transport)	10 % ... 95 % (according to DIN EN 61131-2)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III (IEC 61140, EN 61140, VDE 0140-1)
Overvoltage category	II (IEC 60664-1)
Degree of pollution	2 (EN 60664-1)
Mounting type	DIN rail mounting

Connection data: Inline connector	
Connection method	Spring-cage connection
Conductor cross section, rigid	0.08 mm² ... 1.5 mm²
Conductor cross section, flexible	0.08 mm² ... 1.5 mm²
Conductor cross section [AWG]	28 ... 16
Stripping length	8 mm

Interface: Inline local bus	
Number of interfaces	2
Connection method	Inline data jumper
Transmission speed	500 kbps

Communications power (U_L)	
Supply voltage	7.5 V DC (via voltage jumper)
Current consumption	typ. 56 mA max. 85 mA

Supply of analog modules (U_{ANA})	
Supply voltage	24 V DC (via voltage jumper)
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 7.3 mA max. 14 mA

Power dissipation	
Maximum power dissipation for nominal condition	0.95 W

Analog RTD inputs	
Number of inputs	4 (Pt 1000)
Connection method	Inline connector
Connection technology	2-conductor, shielded
Sensor types (RTD) that can be used	Pt 1000 (IEC 60751/EN 60751)
A/D converter resolution	24 bit
A/D conversion time	typ. 120 ms
Scan repeat time	typ. 650 ms (all four measuring channels)
Data formats	Standardized representation
Process data update	< 10 ms
Input filter	Digital filter
Input filter time	120 ms (per channel)
Tolerance, relative	typ. 0.2 % (of measuring range final value, at T_A = 25°C)
Overload protection	max. ±40 V DC, 1 min.
Transient protection	Suppressor diode
Nominal value of the current sources	210 µA (pulsed current, the data is valid during the sampling phase)

Programming data (INTERBUS, local bus)	
ID code (hex)	7E
ID code (dec.)	126
Length code (hex)	04
Length code (dec)	04
Process data channel	64 bit
Input address area	8 Byte
Output address area	0 Byte
Parameter channel (PCP)	0 Byte
Register length (bus)	64 bit

Configuration and parameter data in a PROFIBUS system	
Required parameter data	1 Byte
Required configuration data	4 Byte

Error messages to the higher level control or computer system	
Failure of the internal I/O supply	I/O error message sent to the bus coupler
Checksum error	I/O error message sent to the bus coupler

Electrical isolation/isolation of the voltage areas	
Test section	**Test voltage**
Bus logic (local bus, communications power)	500 V AC, 50 Hz, 1 min
Analog I/O	500 V AC, 50 Hz, 1 min
Functional ground	500 V AC, 50 Hz, 1 min

Conformance with EMC Directive 2014/30/EU	
Immunity test in accordance with EN IEC 61000-6-2	
Electrostatic discharge (ESD) IEC 61000-4-2	Criterion B, ±6 kV contact discharge, ±8 kV air discharge
Electromagnetic fields IEC 61000-4-3	Criterion A, Field intensity: 10 V/m
Fast transients (burst) IEC 61000-4-4	Criterion B, ±2 kV
Transient overvoltage (surge) IEC 61000-4-5	Criterion B, supply lines DC: ±1 kV/±1 kV (symmetrical/asymmetrical), shielded I/O cables: ±1 kV
Conducted interference IEC 61000-4-6	Criterion A, Test voltage 10 V
Noise emission test in accordance with EN IEC 61000-6-4	Class A

Approvals and manufacturer's declarations	
The latest documents can be found at:	www.phoenixcontact.com/product/2702501

5 Temperature measuring ranges

Supported measuring ranges			
Sensor type	**Standard and manufacturer specification**	**Measuring range**	
		Lower limit	**Upper limit**
Pt 1000	IEC 60751/EN 60751	-200 °C	+850 °C

6 Tolerance data

6.1 Tolerances in 2-conductor technology at 25°C

Area	Measuring range		Absolute tolerance		Relative tolerance (with reference to MRFV)	
	Lower limit	**Upper limit**	**Typical**	**Maximum**	**Typical**	**Maximum**
Practice	-200 °C	+400 °C	±0.8 K	±1.7 K	±0.1 %	±0.2 %
Standard	-200 °C	+850 °C	±1.7 K	±3.4 K	±0.2 %	±0.4%

MRFV= Measuring range final value

The relative tolerances refer to the measuring range final value of +850°C.

Typical tolerance values are measured application values that are based on the maximum variance of all test objects.

The **maximum tolerance values** represent the worst-case measurement inaccuracy. They contain the theoretical maximum possible tolerances in the corresponding measuring ranges as well as the theoretical maximum possible tolerances of the calibration and test equipment.

6.2 Drift response

Measuring range	Drift (typical)	Drift (maximum)
Pt 1000	±30 ppm/K	±100 ppm/K

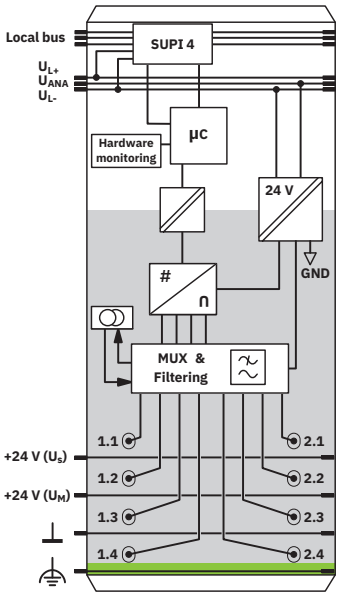
6.3 Tolerances influenced by electromagnetic interference

Type of electromagnetic interference		Typical deviation in %
Electromagnetic fields	EN 61000-4-3/IEC 61000-4-3	< 1 %
Fast transients (burst)	EN 61000-4-4/IEC 61000-4-4	< 1 %
Conducted interference	EN 61000-4-6/IEC 61000-4-6	< 1 %

The typical deviation refers to the measuring range final value.

7 Internal circuit diagram

Figure 1 Internal wiring of the terminal points

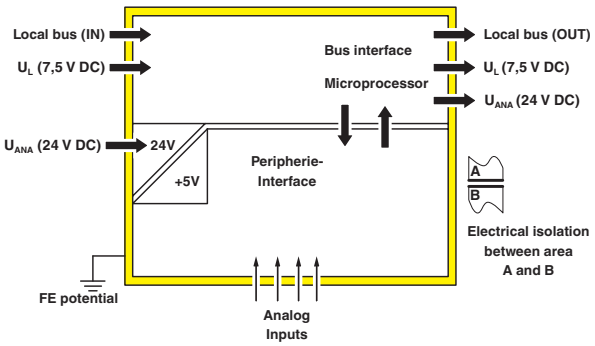


Key:

SUPI 4	Protocol chip
Supervisor	Hardware monitoring
µC	Microprocessor
	Electrical isolation for data or power supply
#	Analog/digital converter
	Current source for the sensor supply
	Low pass filter
	Electrically isolated areas

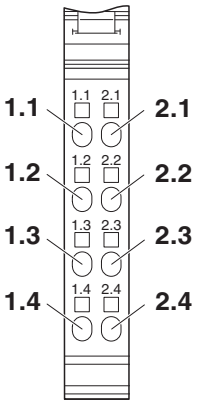
8 Electrical isolation

Figure 2 Electrical isolation of the individual function areas



9 Terminal point assignment

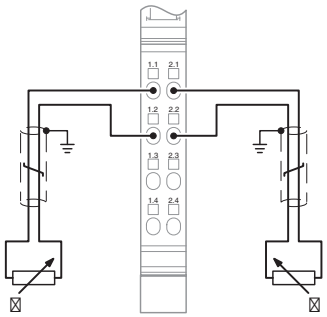
Figure 3 Terminal point assignment



Terminal point	Signal	Description	Channel
1.1	IN01+	RTD input	1 +
1.2	IN01-	RTD input	1 -
1.3	IN02+	RTD input	2 +
1.4	IN02-	RTD input	2 -
2.1	IN03+	RTD input	3 +
2.2	IN03-	RTD input	3 -
2.3	IN04+	RTD input	4 +
2.4	IN04-	RTD input	4 -

10 Connection example

Figure 4 Connecting the sensors



11 Safety note

WARNING: risk of electric shock

No isolating voltage for safe isolation is specified between the analog inputs and the local bus.

- Please take this into consideration during configuration.
- If required, provide signals with safe isolation (e.g., for thermistor detection).

12 Installation instructions

High current flowing through potential jumpers U_M and U_S leads to a temperature rise in the potential jumpers and inside the terminal. To keep the current flowing through the potential jumpers of the analog terminals as low as possible, always place the analog terminals after all the other terminals at the end of the main circuit (for the sequence of the Inline terminals: see also IL SYS INST UM E user manual).

13 Connection notes

Observe the connection notes by the sensor manufacturer.

Shielding

Always connect the analog sensors using shielded, twisted pair cables.

Use cable LiYCY n*2*0.5 mm², for example.The larger the conductor cross section, the fewer measuring errors due to the cable resistance.

To achieve the lowest measuring tolerances, always connect channel 1. If channel 1 is not connected, short circuit it.

In environments with high levels of interference, unshielded cables may cause values to be outside the specified tolerance limits.

For installation in a control cabinet: Connect the cable shield to the functional ground at a suitable point immediately after entry into the control cabinet. Route the cable in the control cabinet in a shielded manner.

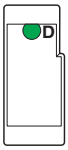
If a closed control cabinet is not available, connect the shield to a shield bus.

Connect the shielding using suitable accessories. This can be found on the item page at www.phoenixcontact.com/products under “Accessories”.

In general, you can use Phoenix Contact products for shielding, see www.phoenixcontact.com/webcode/#0845.

14 Local diagnostic indicator

Figure 5 Local diagnostic indicator



Designation	Color	Meaning
D	green	Diagnostics (bus and logic voltage)

For detailed information on diagnostics, please refer to the IL SYS INST UM E user manual.

15 Process data

The terminal uses four words of IN process data.

Each channel is mapped to a word.

The measured values are transmitted to the higher-level system via the input process data words.

Order of the process data words

Word	0	1	2	3
Channel	1	2	3	4

The measured values are depicted in standardized representation format.

In this format, data is standardized to the measuring range. Data is represented in such a way that it indicates the corresponding value without conversion.

The measured value is represented in bits 14 to 0. An additional bit (bit 15) is available as a sign bit.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
V	Analog value														

V Sign bit

In standardized representation format, a diagnostic code is mapped to the input data in the event of an error.

Code (hex)	Cause
8001	Measuring range exceeded (overrange)
8002	Wire break
8004	Measured value invalid or no valid measured value available
8010	Parameter table invalid
8020	Faulty supply voltage
8040	Device faulty
8080	Below measuring range (underrange)

16 Representation of measured values

Input data		Temperature
hex	dec	°C
8001	Measuring range exceeded (overrange)	> upper limit value
2134	8500	+850.0 (= upper limit value)
03E8	1000	+100.0
0001	1	+0.1
0000	0	0
FFFF	-1	-0.1
FC18	-1000	-100.0
F830	-2000	-200.0 (= lower limit value)
8080	Below measuring range (underrange)	< lower limit value