SENECA

Z-PC Line

EN

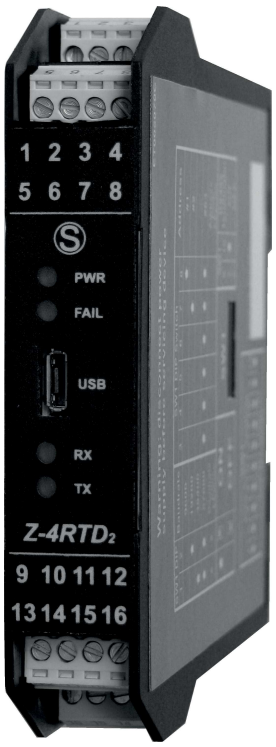
Z-4RTD2

4 Channels RTD input module with RS485 interface

Installation Manual

Contents:

- General description
- Technical specifications
- Connection rules for Modbus and CAN
- Installation rules
- Electrical connections
- Status indications LED
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- Accessories
- Disposal.



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CERTIFICATE N. 9115.SENE - REGISTRATION NUMBER IT-827
azienda con sistema di gestione per la qualità certificato
ISO 9001:2008

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General description

- Digital converter with four measuring channels , for platinum or nickel thermistors, which are independent and isolated from each other.
- 1.5 kV∿ insulation between the inputs, the power supply and serial communication line.
- Easy and fast wiring of power supply and serial communications by means of Seneca bus for DIN rail IEC EN 60715.
- Communication parameters can be configured by DIP-switch or through USB port from PC or Android device.
- 1 RS485 serial communication port with MODBUS-RTU protocol, 32 nodes maximum.
- Inputs protected against ESD.
- High acquisition speed and possible recalibration on the field.
- Measurement of thermistors: PT100, PT500, PT1000, NI100, with 4, 3 or 2 wires wiring.
- Measurement of temperature or resistance.
- Eight level filter programmable in order to stabilise reading.
- 50 Hz or 60 Hz programmable frequency rejection filter.
- The measurement available: floating point, reverse floating-point, fixed point at 16 bits, tenths of degrees with sign for temperature, and tenths of Ohms or hundreds of Ohms for resistance.
- Three selectable acquisition speeds (two with 13 bit resolution, one with 14 bit resolution).
- Programmable value in case of fault or freezing of last reading.
- Compensation of three wire resistor on the average value of the connection resistor.

Technical Specifications

Input *PT100 - EN 60751/A2 (ITS-90)*		**Input *PT500 - EN 60751/A2 (ITS-90)***	
Measuring range:	-200 – +650 °C	Measuring range:	-200 – +750 °C
Resistance range:	18.5 Ω – 330 Ω	Resistance range:	92.5 Ω – 1800 Ω
Fault signalling:	Rx <18 Ω, Rx >341 Ω	Fault signalling:	Rx < 90 Ω, Rx > 1851 Ω
Current on sensor:	875 μA nominal	Current on sensor:	333 μA nominal
Resistance of cables:	20 Ω maximum per wire	Resistance of cables:	30 Ω maximum per wire
Input *PT1000 - EN 60751/A2 (ITS-90)*		**Input *NI100***	
Measuring range:	-200 – +210 °C	Measuring range:	-60 – +250 °C
Resistance range:	185 Ω – 1800 Ω	Resistance range:	69 Ω – 295 Ω
Fault signalling:	Rx <180 Ω, Rx >1851 Ω	Fault signalling:	Rx <60 Ω, Rx >301 Ω
Current on sensor:	333 μA nominal	Current on sensor:	875 μA nominal
Resistance of cables:	30 Ω maximum per wire	Resistance of cables:	30 Ω maximum per wire
Rear IDC10 connector (port RS485)		***Front Micro USB***	
1200 – 115200 Baud.		2400 Baud, Address 01, Parity NO, Stop bit 1, Delay on the answer NO, Time Out 3 s	
Protocol	Modbus-RTU	Protocol	Modbus-RTU

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ADC

Resolution:	14 bit or 13 bit on input range	Calibration Precision:	0.04 % On resistor, with Full Scale of: 350 Ω (PT100, NI100) or 1850 Ω (PT500, PT1000)
Class\Base Precision:	0.05	Linearity:	0.025 % On resistor, with Full Scale of: 350 Ω (PT100, NI100) or 1850 Ω (PT500, PT1000)
Thermal Drift:	< 50 ppm/K		

Power Supply

Voltage	10 – 40 V⎓; 19 – 28 V∿ 50 – 60 Hz
Consumption	0.7 W max

Environmental conditions

Temperature	-20 – +70°C; (-20 à +65°C **UL**) Saving of parameters in EEPROM guaranteed in range 0 - 50°C
Humidity	30 – 90% non-condensing
Altitude	up to 2000 m a.s.l.
Storage temperature	-20 – +85°C
Protection index	IP20

Connections

Removable 4-way screw terminals, max 1.5 mm^2, 3.5 mm pitch.

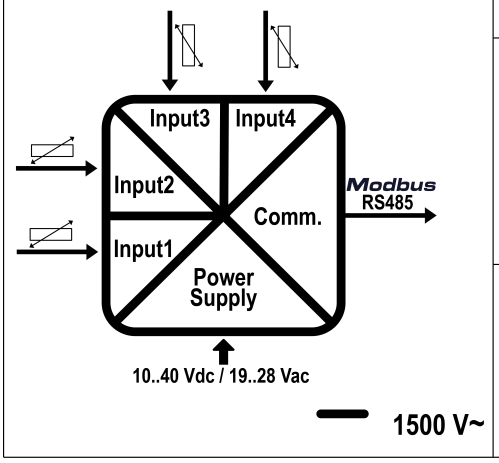
Rear IDC10 connector for DIN rail IEC EN 60715

Micro USB on the front

Overall dimensions / Box

Dimensions and weight	W: 17.5 mm; H: 102.5 mm; D: 112 mm; / 120g.
Box	PA6, black

Insulations



Standards

The instrument complies with the following standards:

CE	**EN61000-6-4** (electromagnetic emission, industrial environment). **EN61000-6-2** (electromagnetic immunity, industrial environment). **EN61010-1** (safety).
c UL us LISTED 3LUT	- Use copper conductors. - Use in Pollution Degree 2 max environment. - The Power Supply must be Class 2

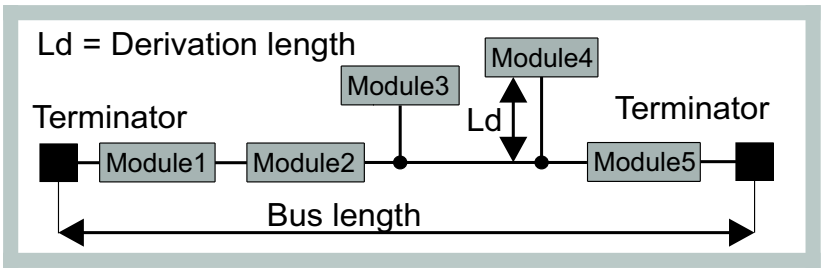
ADDITIONAL NOTES FOR USE:
You must install a 2.5A max delayed fuse, in series to the power supply connection, near the module.

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Connection rules for ModBUS

1) Install modules in the DIN rail
2) Connect the remote modules using cables of proper length.
The following table shows the data for length of cables:
-Bus length: maximum length of the MODBUS network. This is the total length of the cables that connect the two modules on which the bus termination has been inserted.
-Derivation Length: maximum length of a derivation.

Bus Length	Derivation Length	Baud rate
1200 m	2 m	115 kbps



For maximum performance we recommend the use of special shielded cables, such as the BELDEN 9841.

Installation rules

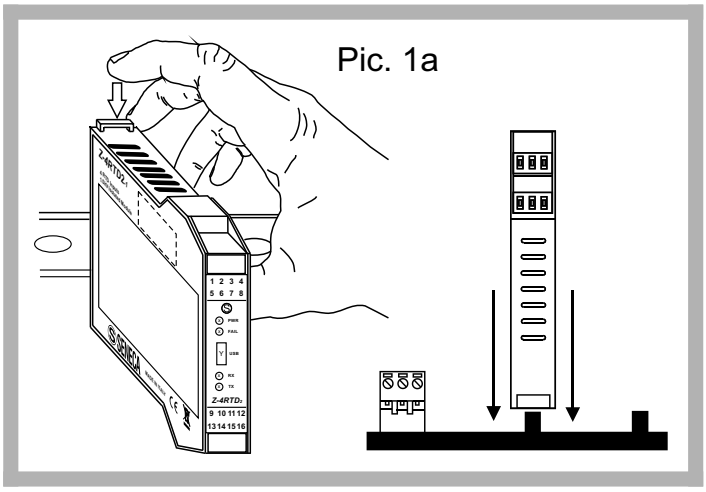
The module is designed to be installed in vertical position on a rail DIN IEC EN 60715. In order to ensure optimum performance and the longest working life, the module(s) must be supplied with adequate ventilation and no raceways or other objects must obstruct the ventilation slots. Never install modules above sources of heat; we recommend installation in the lower part of the control panel.

Insert in the rail DIN IEC EN 60715

1) Move outwards the two hooks on the rear side of the module as shown in Pic. 1b.

2) Insert the module by aligning the IDC 10 back connector to the female connector on the Seneca DIN IEC EN 60715 rail support.

3) To secure the module on the rail support you must tighten the two hooks on the ends of the IDC10 rear connector, as shown in Pic. 1a.

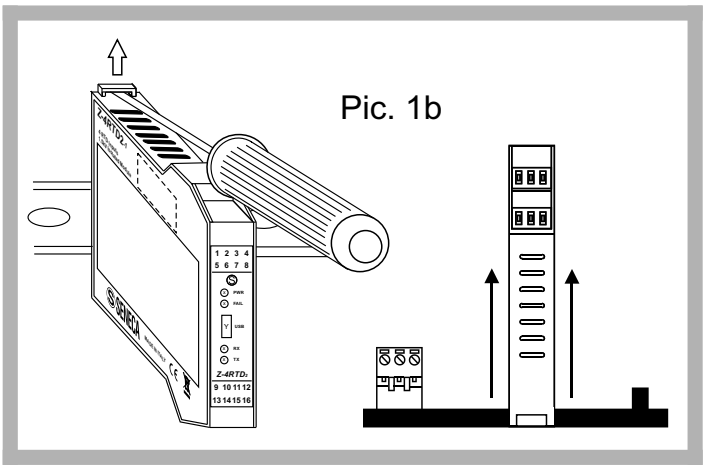


Removal from the rail DIN IEC EN 60715

As illustrated in Pic. 1b:

1) Move outwards the two hooks at the side of the module by levering with a screwdriver.

2) Remove the module from the rail.



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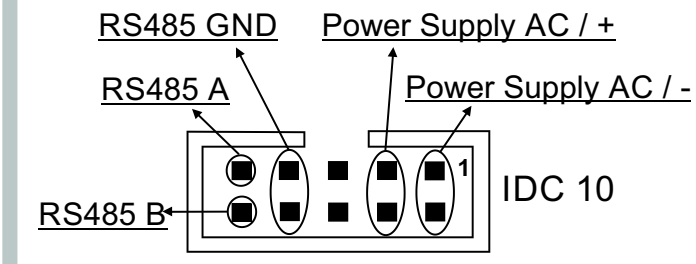
Electrical connections

POWER SUPPLY AND RS485 COMMUNICATION PORT

Power supply and MODBUS interface are available from the bus for Seneca DIN rail through the accessory Z-PC-DINAL1-35 or from the rear IDC10 connector.
Detailed RS485 serial interface information can be found in the USER MANUAL downloadable from the website: www.seneca.it/products/z-4rtd2 .

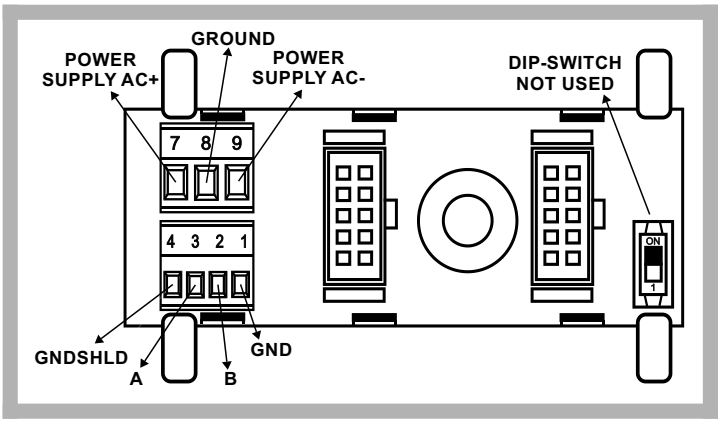
Rear Connector (IDC10)

The figure shows the meaning of the IDC10 connector pins in case you wish to provide the signals directly through it.
The module power supply is available only from the rear connector.



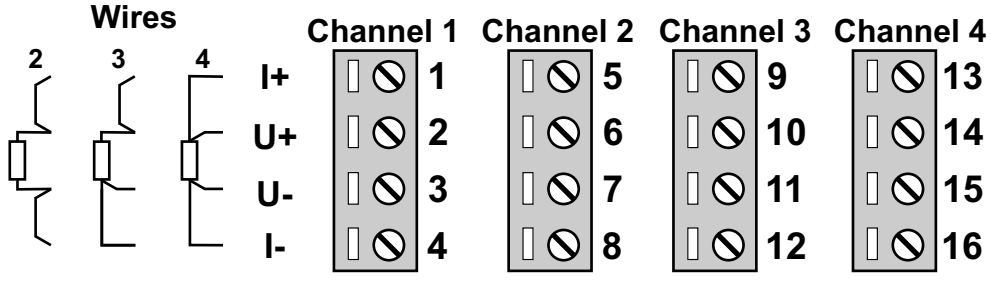
Use of Z-PC-DINAL2-17.5

If you use the Z-PC-DINAL2-17.5 accessory, then the signals can be supplied via terminal blocks.
The figure shows the meaning of the terminals.
GNDSHLD: Shield to protect the connecting cables from interference signals (recommended).



Inputs

The module accepts, at input, temperature probes in platinum and nickel, with 2, 3 or 4 wire connection. **For the electrical connections, we advise you to use shielded cables.**



2 WIRES	This connection can be used for short distances (< 10 m) between module and probe. Remember that this connection introduces a measurement error equal to the resistance of the connection cables.
3 WIRES	A connection to be used for medium distances (> 10 m) between module and probe. The instrument compensates the connection of the resistance cables. To ensure correct compensation, the cables must have the same resistance.
4 WIRES	A connection to be used for long distances (> 10 m) between module and probe. It offers maximum precision, in view of the fact that the instrument reads the resistance of the sensor independently from the resistance of the cables.

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DIP-Switch settings

In the following tables:
The symbol ⬆ corresponds to DIP-Switch = 1 (ON).
No indication correspond to DIP-switch = 0 (OFF)

⬆	**ON**	
	OFF	

DIP-Switch SW1

You must set the DIP-switches with the module powered down and without generation of electrostatic discharges, otherwise the module may be damaged.

1	2	Baud rate	3	4	5	6	7	8	Address	9	Not Used
		9600 Baud							Address and communications parameters from EEPROM	⬆	Always leave to ⬇ OFF ⬇ position
	⬆	19200 Baud						⬆	Fixed Address 01	⬇	
							⬆		Fixed Address 02		
							⬆	⬆	Fixed Address 03	**10**	**TERMINATION RS485**
⬆		38400 Baud				⬆			Fixed Address 04	⬆	Line terminator inserted
			X	X	X	X	X	X	Fixed Address, as from binary representation		
⬆	⬆	57600 Baud								⬇	No line termination
			⬆	⬆	⬆	⬆	⬆	⬆	Fixed Address 63		

Filter Setting

The filtering methods can be set for every channel.
The filter consists of two independent low-pass filters:
-Filter FIR, in moving average, able to increase the noise rejection from the mains power line and to reduce measuring noise.
-Filter IIR exponential, with programmable time constant, able to dampen fluctuations.
If an input variation is higher than threshold **T**, then both filters are forced to quickly adapt to the new value, stabilising it only later on. The filter is set with the three least significant bits of registers MODBUS 40037..40 (refer to section **MODBUS REGISTERS**).
The following is a table containing all filter types. Propagation time (90%), that is the maximum time between the step variation of the input and the variation of the number which represents it in the Modbus register, including the interrogation time of an individual register (at 115 kbaud) is indicated for each filter.
The times shown are for 50 Hz setting (for 60 Hz, you can divide by 1.2).

SET	ADC SAMPLING		FILTER	PROP. TIME 90%	
Value	Bit ADC	Frequency	Type	< T [1]	> T [1]
000	13 bit	48 Hz	Not Present	45 ms	45ms
001	13 bit	20 Hz	Average	236 ms	103ms
010 (Default)	14 bit	11 Hz	Average	405 ms	179ms
011	14 bit	11 Hz	Media+Exp	1 s	179ms
100	14 bit	11 Hz	Media+Exp	3 s	179ms
101	14 bit	11 Hz	Media+Exp	8 s	179ms
110	14 bit	11 Hz	Media+Exp	24 s	179ms
111	14 bit	11 Hz	Media+Exp	72 s	179ms

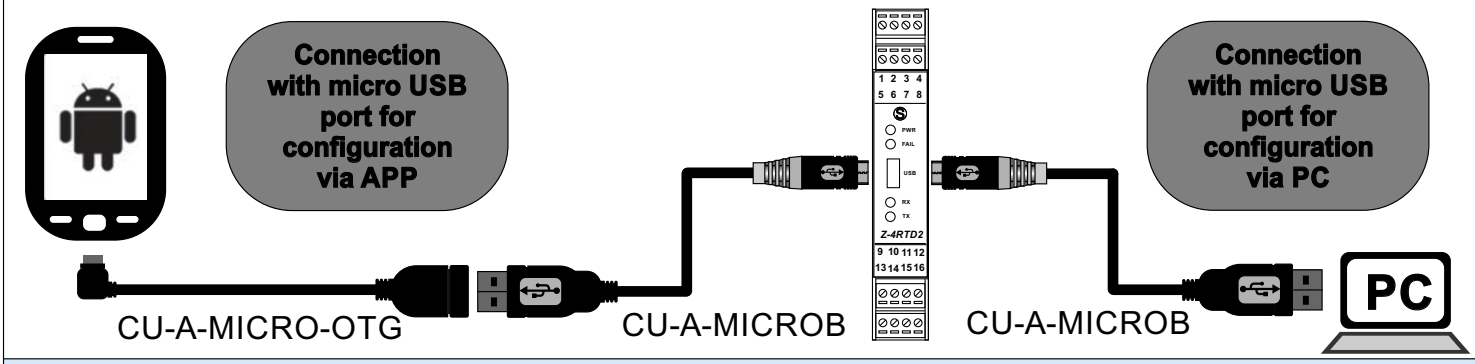
[1] The threshold value depends on the type of RTD: **T_{PT100}= 8 °C, T_{PT500}= 9 °C, T_{PT1000}=5 °C and T_{NI100}= 5 ° C**

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Setting

Micro USB Interface

The module has a Micro USB connector on the front panel and can be configured through applications and / or software



Setting via PC

For tools and more information about this product, please visit the website:
www.seneca.it/products/z-4rtd2 .
The module can be programmed through the RS485 interface via bus on the rear connector: for the first configuration you can use the default settings saved in EEPROM at origin from manufacturer (SW1.–.8 in OFF position) corresponding to:
Address = 001, Baud Rate = 38400 Baud, Parity = none, Number of bits = 8, Stop bit=1.
A second way to program the module is through the micro USB connector on the frontal panel by using a PC or an Android device after installation of the necessary software. For more information visit www.seneca.it/prodotti/z-4rtd2

Factory Configuration

Configuration of the default parameters in the module:

The instrument is configured at the factory with all the DIP-switch in position 0⬇.

	0 OFF	1	2	3	4	5	6	7	8
⬇		⬇	⬇	⬇	⬇	⬇	⬇	⬇	⬇

The position of the dip-switches defines the module's communication parameters.
The default configuration is as follows: Address 1, 38400, no parity, 1 stop bit.

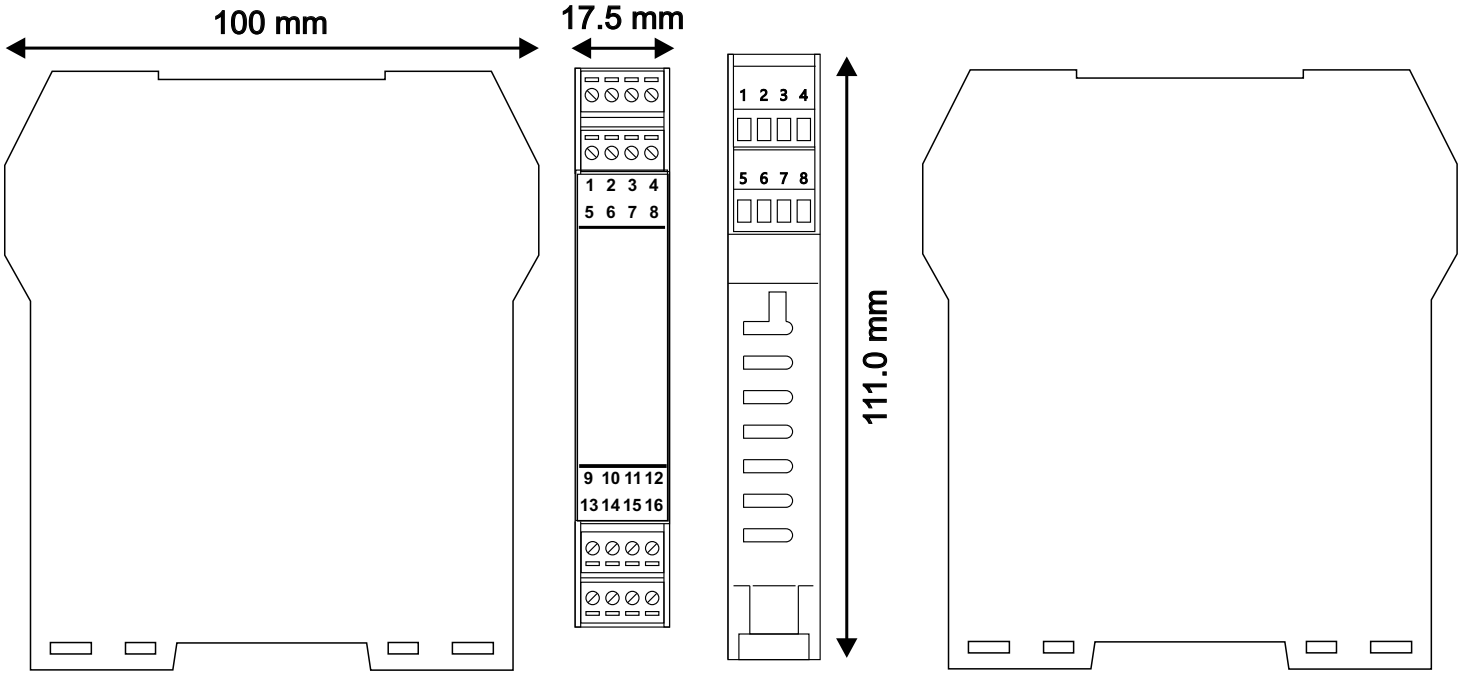
	CH1	CH2	CH3	CH4
Type of sensors	PT100	PT100	PT100	PT100
Type of returned Data item, measured in:	°C	°C	°C	°C
Connection	2/4 wires	2/4 wires	2/4 wires	2/4 wires
Rejection at mains frequency	50 Hz	50 Hz	50 Hz	50 Hz
Word, is transmitted first:	most significant Bit (8 bit)			
Led signalling of faults to the channel	Yes	Yes	Yes	Yes
Value loaded in case of fault	850°C	850°C	850°C	850°C

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Front LED indications

LED	STATUS	Description
PWR Green	On	The device is powered correctly.
FAIL Yellow	On	Fault: Low supply, faulty channel, faulty sensor, internal communication error (they can be deactivated via software).
RX Red	On	It indicates data receiption on RS485 communication port.
TX Red	On	It indicates the data transmission on RS485 communication port.

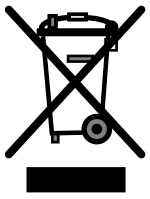
Layout



Accessories

CODE	DESCRIPTION
Z-PC-DINAL1-35	DIN rail support with screw terminals and 1 slot P = 35 mm
Z-PC-DINAL2-	DIN rail support with screw terminals and 2 slots P = 17.5 mm
Z-PC-DIN1-35	DIN rail with 1 slot support for rear connector P = 35 mm
Z-PC-DIN2-17.5	DIN rail with 2 slots support for rear connector P = 17.5 mm
CU-A-MICROB	USB-A Micro USB-B 5 P cable

Disposal



Disposal of Electrical & Electronic Equipment (Applicable throughout the European Union and other European countries with separate collection programs). This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, waste disposal service or thè retail store where you purchased this product.

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