

Z-4TC 4 ANALOG INPUT for Thermocouple with Modbus RS485

Installation Manual

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SENECA s.r.l.

Via Germania, 34 - 35127 - Z.I. CAMIN - PADOVA - ITALY
Tel. +39.049.8705355 - 8705359 - Fax +39.049.8706287
For manuals and configuration software, see www.seneca.it

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GENERAL SPECIFICATIONS

- Up to 4 input for measuring thermocouples type J, K, E, N, S, R, B, T.
- Up to 4 input for measuring mV voltage input.
- Sampling time for channels at 240 ms or 480 ms for all channels.
- 1500 V_{AC} input isolation compared with other low-voltage circuits.
- Easy connections for power supply and serial communication by seneca bus that can be mounted on standard DIN 46277 rail.
- Removable terminals with section of 2.5 mm²
- RS485 serial communication with Modbus-Rtu protocol, maximum 64 nodes.
- Module insertion or extraction from seneca bus without interruption for serial communication and power supply.
- Connection distance up to 1200 m.
- RS232 connection on front from 3,5 mm jack connector.
- Low consumption.
- **NEW** Modbus address and Baud rate can be set through DIP-switches.
- Input measure can be set in temperature or mV.
- Programmable filters to stabilize the measured input.
- Cold junction compensation internal.
- Mains electric network frequency rejection > 54 dB.

TECHNICAL FEATURES

Thermocouples inputs

Thermocouples input	J, K, E, N, S, R, B, T.
Number of channel	4
Cold junction error	< 2 °C between 0 .. 50 °C
Input impedance	>10 MΩ
Current test (TC open)	< 200 nA. disactivable
DMRR	> 60 dB (50 Hz); > 54 dB (60 Hz).
Thermal Drift	< 50 ppm/K
Thermocouples Errors	Calibration : 0.1% d.l.; Thermal sense : 0.01%/°C; EMC : 1% d.s.
Sampling time	60 ms / channel o 120 ms / channel

mV-input

Voltage input	Bipolar with ± 160 mV range
Input impedance	> 10MΩ
Resolution	5 μV
mV error	Calibration : 0.1% d.l.; Thermal sense : 0.01%/°C; EMC : 1% d.s.

Power supply

Voltage	10 ..40 V _{DC} 19 ..28 V _{AC} @ 50 ..60 Hz
Consumption	Typical: 1.5 W, Maximum: 2.5 W

Environmental condition

Temperature	-10 ..+65°C
Humidity	30 ..90% a 40°C not condensing
Storage Temperature	-20 ..+85°C
Degree protection	IP20

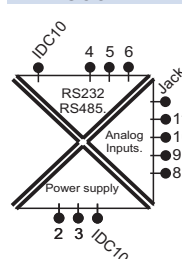
Connections

Connections	Removable 3-way screw terminals, 5,08 pitch Rear IDC10 connector for DIN 46277 rail Frontal jack 3.5 mm
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Box / Dimensions

Dimensions	L: 100 mm; H: 112 mm; W: 17,5 mm
Box	PBT, Black

Isolations 1500 V



Standards

The module is conforming to the following regulations:

- EN 61000-6-4/2002** (electromagnetic emission, industrial environment).
- EN 61000-6-2/2006** (electromagnetic immunity, industrial environment)
- EN61010-1/2001** (safety). All circuits must be isolated from the other circuits under dangerous voltage with double isolation. The power supply transformer must comply with EN60742: "Isolated transformers and safety transformers".

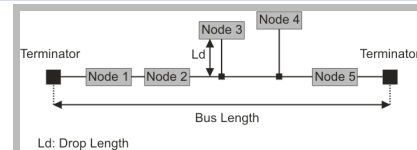
SUPPLEMENTARY NOTE FOR USE:

Use in environment with 2 or less pollution degree.

MODBUS CONNECTIONS

- 1) Connect the module into the DIN rail (max 120)
- 2) Use a cable with a suitable length to connect the remote modules. In the following table there are data relative to:
- Maximum length of the Modbus bus: It defines the connection length between two modules that have bus terminator dip switch on. (see scheme 1).
- Drop length: Maximum length of branch (see scheme 1).

Bus lenght	Drop lenght
1200 m	2 m



Scheme 1

For the maximum performances it's recommended to use a specific shielded cable, as an example BELDEN 9841.

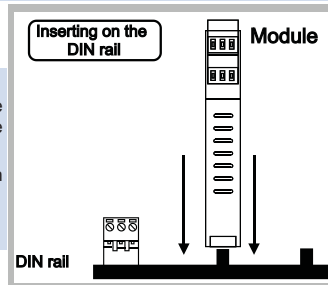
INSTALLATION

The module is designed to be installed, in vertical position, on DIN 46277 rail. For the best module performance and duration, avoid to place cables raceways and other objects that could obstruct ventilation slits. Never install the modules near heat sources. The module installation is advised in the bottom of the control panel.

Inserting in the DIN rail

How the picture shows:

- 1) Insert the module IDC10 rear connector on the DIN rail free slot (inserting is univocal because connectors are polarized).
- 2) The module can be fixed on the DIN rail through the clench of the two hooks in the bottom.

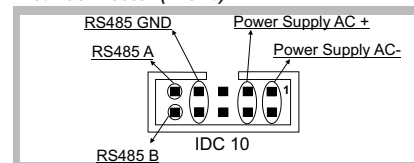


ELECTRICAL CONNECTIONS

Power supply and Modbus interface

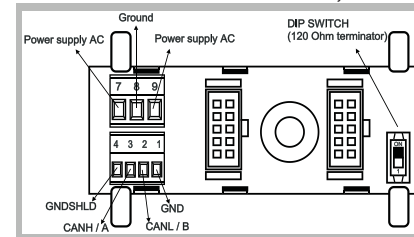
Power Supply and Modbus interface are available by using the bus for the Seneca DIN rail, by the rear IDC10 connector or by Z-PC-DINAL2-17.5 accessory.

Rear connector (IDC10)



The picture shows the meaning of the IDC10 connector pins.
This connector can be used in alternative to the screw terminals blocks

Utilizzo Accessorio Z-PC-DINAL2-17,5

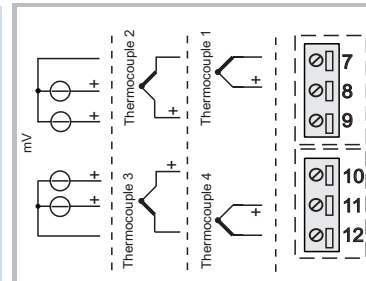


If Z-PC-DINAL2-17,5 accessory is used, the power supply signals and communication signals may be provided by the terminals block into the DIN rail support. In the figure are shown the meaning and the position of the terminal blocks. The DIP-switch that set the 120 Ω terminator is used only for CAN communication. GNDSHLD: Shield to protect the connection cables (recommended).

Input

The module accept in input, the following types of thermocouples: J, K, E, N, S, R, B, T.
Although the module can be used to read voltage with ± 160 mV range.

The ground is internally connect and share in all analog input channel, it's available at 7 and 12 screw terminals.
1,5 kV isolation is guaranteed between power supply and serial communication circuits.



NOTE: To avoid measurement errors caused by external disturbances are recommended short-circuit the thermocouple input channels not used.

Power supply

Screw terminal 2 and 3 are the alternative to seneca DIN rail bus to provide the power supply at the module. **The upper limits must not be exceeded otherwise the module can be damaged.** If the power supply source is not protected against overload, a safety fuse with a maximum acceptable value of **2.5 A**, must be installed in the power supply line.

RS485

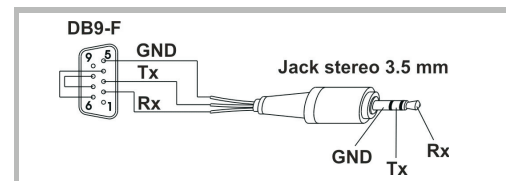
Connection for RS485 communication with the Modbus Master system is the alternative to Z-PC-DINx bus.
Note: the indication of RS485 connection polarity is not standard so for some masters may be inverted.

RS232

RS232 port can be used to communicate and also to program the module. Z-NET or EASY Z-PC are the Seneca configuration softwares. RS232 communication use the following communication parameters:

2400,8,N,1

RS232 and RS485 port use the same Modbus protocol. When RS232 communication is established, the serial RS485 bus network will be not enable. The RS485 port will return automatically active some seconds after the last data packed received from RS232 port. The 3,5 mm DB9 jack stereo connector for RS232 communication can either be assembled as indicated in the following figure or purchased as an accessory (cod. PM001601).



DIP-SWITCHES SETTING

The DIP-switches positions defines the Modbus communication parameter: Address and Baud rate. In the following table the Baud rate and address value are listed as a function of the DIP-switches position:

DIP-switches table

POSITION	BAUD RATE	POSITION	ADDRESS	POSITION	TERMINATOR
00xxxxxxx	9600	xx000001xx	# 1	xxxxxxx0	Disable
01xxxxxxx	19200	xx000010xx	# 2	xxxxxxx1	Enable
10xxxxxxx	38400		
11xxxxxxx	57600	xx111111xx	# 63		

POSITION	BAUD RATE	POSITION	ADDRESS
xx000000	From EEprom	xx000000	From EEprom

Note: when DIP-switches from 3 to 8 are in OFF, communication settings are retrieved from EEprom

Nota 2: The termination of RS485 communication must be enabled only to the ends of the communication line.

MODBUS REGISTER AND LED SIGNALLINGS

Holding register

Register	Name	Description
40013	CH 1	Measured value of channel selected input. 1 bit = 5 μ or 0.1°C
40014	CH 2	See before.
40015	CH 3	See before.
40016	CH 4	See before.

LEDs signalling

LED	STATE	Meaning of LEDS
PWR	On	Power supply presence.
FAIL	Blinking	Error settings.
	On	Fault/Failure.
RX	Blinking	Received data from RS485.
	On	Verify the connection.
TX	Blinking	Trasmitted data from RS485.
	On	Out of order

FACTORY SETTING AND ADVANCED SETTING

Factory settings

Tutti i DIP-switch in OFF:

- Modbus protocol: - Communication parameters: 38400 8,N,1 Addr. 1
- Input channel 1 : mV
- Input channel 2 : mV
- Input channel 3 : mV
- Input channel 4 : mV
- Signal sampling time for all channels: 280 ms

Advanced settings

Inputs channels can be sete in current or voltage.

Signal sampling time can be set at 240 ms or 480 ms.

Possibility to set a filters for the inputs measured.

Possibility to disable the current test for thermocouples.

THERMOCOUPLE RANGE

TC TYPE	Admitted Range	Linearization Error	TC TYPE	Admitted Range	Linearization Error
J	-210..1200 °C	0,05 °C	S	-50..1768 °C	0,02 °C
K	-200..1372 °C	0,05 °C	R	-50..1768 °C	0,02 °C
E	-200..1000 °C	0,02 °C	B	250..1820 °C ⁽³⁾	0,03 °C
N	-200..1300 °C	0,04 °C	T	-200..400 °C	0,04 °C

Variations of standard parameters are possible by using configuration softwares Z-NET and EASY-Z-PC (www.seneca.it).
For more information about a list of all register and their function consult the USER manual

