SENECA

Z-PC Line

EN

# Z-8AI-1

## 8 ANALOG INPUT Module voltage-current with Modbus RS485

# Installation Manual

***Contents:***


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CSQ IQNet

azienda con sistema di gestione per la qualità certificato

ISO 9001:2008


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## GENERAL SPECIFICATIONS

- Voltage or current inputs with programmable range: ± 2 Vdc, ± 10 Vdc e ± 20 mA at 16 bits resolution.
- The module's auxiliary power supply can be supplied to all 8 current loop at the same time.
- The Modbus address and the Baud rate can be set through DIP-switches.
- The total cycle time can be set for all channels at 480 ms or 960 ms.
- Current input with internal shunt that can be selected through DIP-switches.
- Current input impedance ~ 50 Ω.
- 1500 V output isolation compared with other low voltage circuits.
- Easy connections for power supply and serial communication through Seneca bus that can be mounted on IEC EN 60715 rail bus.
- Removable terminals with section of 2.5 $mm^2$.
- RS485 serial communication with Modbus-Rtu protocol, maximum 64 nodes.
- Module insertion to and extraction from seneca bus without communication and power supply interruption.
- Connection distance up to 1200 m.
- RS232 port with jack 3,5 mm frontal connector, with communication's automatic switching.
- The device parameters can be set via the configuration software.

## TECHNICAL FEATURES

| Inputs | |
|---|---|
| Voltage input | Bipolar with programmable Full Scale at ± 2 Vdc, and ± 10 Vdc. Input impedance: >100 kΩ. |
| Current input | Bipolar with programmable Full Scale at ± 20 mA. The 50 Ω internal shunt can be selected by DIP- switches. Available power supply of 90 + 90 mA at 13 V . |
| Number of input channels | 8 |
| Overload input protection | ± 30 Vdc or 25 mA |
| Inputs resolution | 15 bit + sign. |
| Voltage and current accuracy | Initial: 0.1% of Full Scale.<br>Linearity: 0.03% of range.<br>Zero: 0.05% of range.<br>TC: 100 ppm, EMI: 1 % |
| Sampling time | 120 ms/channel o 60 ms/channel. |

| Power supply | |
|---|---|
| Voltage | 10 – 40 Vdc; 19 - 28 Vac 50 – 60 Hz |
| Consumption | Typical: 1.5 W, Maximum: 3.5 W |



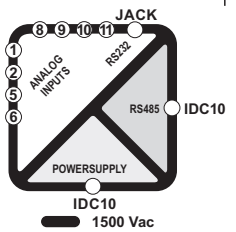
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| Environmental condition | |
|---|---|
| Temperature | -20 – +65°C (UL: -10 - 55 °C ) |
| Humidity | 30 – 90% a 40°C not condensing |
| Storage Temperature | -20 – +85°C |
| Degree protection | IP20 |

| Connections | |
|---|---|
| Power supply, Inputs, RS485 | Removable 3-way screw terminals, 5,08 pitch |
| RS485 Interface | IDC10 connector for DIN 46277 rail / terminals 4, 5 and 6 |
| RS232 Interface | Frontal jack 3.5 mm connector |

| Box / Dimensions | |
|---|---|
| Dimensions | L: 100 mm; H: 112 mm; W: 17.5 mm |
| Box | PA6, Black |

## Isolations 1500 Vac




## Standards

**The module complies with the following standards:**

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**EN61000-6-4** (electromagnetic emission, industrial environment).

**EN61000-6-2** (electromagnetic immunity, industrial environment)

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**EN61010-1** (safety).

One maximum 2.5A fuse must be installed near the module.

**ADDITIONAL NOTES** :
Use in environment with 2 or less pollution degree.

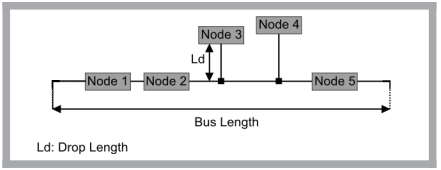
## *MODBUS CONNECTIONS RULES*

1) Connect the module into the DIN rail (max 120)
2) Please use cables with a suitable length to connect the remote modules.
The following table contains information data on the allowed cable lengths:
-Bus Length: MODBUS Maximum bus length depending on the Baud Rate.
It defines the connection length between two modules that have the bus terminator DIP-switch switched ON. (see scheme 1).
-Drop Lenght: Maximum lenght of branch (see scheme 1).



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| Bus Length | Drop Lenght |
|---|---|
| 1200 m | 2 m |




***Scheme 1***

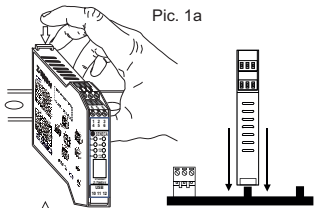
In order to obtain maximum performances it's recommended to use a specific shielded cable, as an example BELDEN 9841.

## *INSTALLATION RULES*

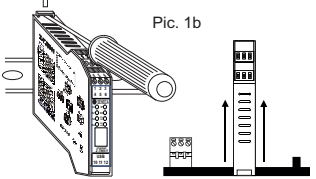
The module is designed to be installed, in vertical position, on DIN rail IEC EN 60715. In order to ensure optimum performance and a longest working life, the module(s) must be provided with adequate ventilation and no raceways or other objects that obstruct the ventilation slots. **Never install the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

***Inserting on and removal from DIN rail* IEC EN 60715.**

Pic. 1a



Pic. 1b



Inserting on the DIN rail.
1) Like the picture Pic. 1b shows: Pull the two locks placed at the sides of the rear IDC10 connector outwards.

2) Insert the module rear IDC10 connector on a DIN rail free slot like the picture Pic 1a shows. (there's only one way to insert the module because of polarized connector)

3) The module can be fixed on the DIN rail by pressing the two hooks located on the rear of the module like the picture Pic 1a shows.

Removal from the DIN rail.
Like the picture Pic. 1b shows:

1) Pull the two locks placed at the sides of the rear IDC10 connector outwards levering with a screwdriver.

2) Gently pull out the module from the DIN rail.

## *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.

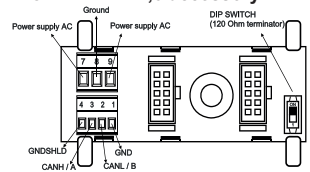


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## Power supply

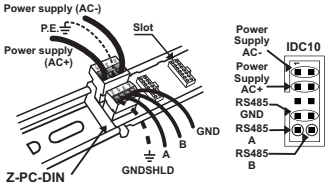
The supply voltage must be between 10 to 40 Vdc (Any polarity), or between 19 e 28 Vac. **These upper limits must not be exceeded to avoid serious damage to the module.** It's necessary to protect the power supply source against any failure of the module using appropriately sized fuse.

### Z-PC-DINAL2-17,5 accessory



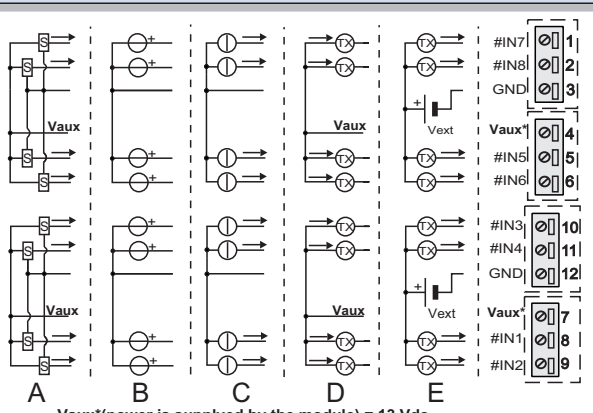

If Z-PC-DINAL1-35 accessory is used, the power supply and communication signals may be provided by the terminals block into the DIN rail support. The figure shows the meaning of the terminal blocks and the position of the DIP-switch (not used for the Modbus network).
GNDSHLD: Shield to protect the connection cables against interference (recommended).

### *Rear connector (IDC10)*




The IDC10 connector located on the rear of the module will be inserted on a free slot of Z-PC-DIN accessory.
In the figure you can see the meaning of the IDC10 connector pins if you want to provide signals through them.

## Inputs




**Vaux*(power is supplyed by the module) = 13 Vdc**

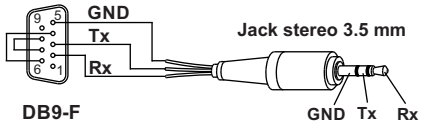



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A) **Voltage** input with **sensor's power supply from MODULE (13 Vdc)**
B) **Voltage** input with **sensor's power supply NOT from MODULE**
C) **Current** input with **sensor's power supply NOT from MODULE**
D) **Current** input with **sensor's power supply from MODULE (13 Vdc)**
E) **Current** input with **external power supply for sensors.**

## RS232

RS232 port can be used to communicate and also to program the module. EASY SETUP is the Seneca configuration software. RS232 serial communication port 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 be assembled as indicated in the following figure or purchased as an accessory (cod. CS-JACK-DB9F).




## *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 depending from the DIP-switches position:

| SW1 POSITION | BAUD RATE | SW1 POSITION | ADDRESS | SW1 POS. | TERMINA-TOR |
|---|---|---|---|---|---|
| 1 2 3 4 5 6 7 8 | | 1 2 3 4 5 6 7 8 | | 9 10 | |
| ▯▯ x x x x x x | 9600 | x x ▯ ▯ ▯ ▯ ▯ ▮ | # 1 | x ▯ | Disabled |
| ▯▮ x x x x x x | 19200 | x x ▯ ▯ ▯ ▯ ▮ ▯ | # 2 | x ▮ | Enabled |
| ▮▯ x x x x x x | 38400 | x x . . . . . | # . . | ▮↑ | **ON** |
| ▮▮ x x x x x x | 57600 | x x ▮ ▮ ▮ ▮ ▮ ▮ | # 63 | | |
| x x ▯ ▯ ▯ ▯ ▯ ▯ | From EEPROM | x x ▯ ▯ ▯ ▯ ▯ ▯ | From EEPROM | ▯↓ | **OFF** |

**1st Note**: **DIP-switches must be set while the module is powered down, otherwise, the module may be damaged.**
**2nd Note**: when DIP-switches from 3 to 8 are in OFF, comunication settings are recovered from EEprom.
**3rd Note:** The termination of RS485 communication must be enabled only to the ends of the communication line.

## DIP-switches Inputs setting

| SW2 DIP Switch | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Channel |
| ● | ● | ● | ● | ● | ● | ● | ● | Current input |
| | | | | | | | | Voltage Input |

| Key | | |
|---|---|---|
| ↑ | ON | ● |
| ↓ | OFF | |

The dip switch selection must be compatible with the Modbus registers setting.
The description of Modbus registers are avaiable on USER MANUAL.

## *MAIN MODBUS REGISTERS*

### *Holding register*

| Register | Name | Description |
|---|---|---|
| **40003** | **IN CH 1** | Channel value of measurement with scale ± 10000 normalized. |
| **40004** | **IN CH 2** | Channel value of measurement with scale ± 10000 normalized. |
| **40005** | **IN CH 3** | Channel value of measurement with scale ± 10000 normalized. |
| **40006** | **IN CH 4** | Channel value of measurement with scale ± 10000 normalized. |
| **40007** | **IN CH 5** | Channel value of measurement with scale ± 10000 normalized. |
| **40008** | **IN CH 6** | Channel value of measurement with scale ± 10000 normalized. |
| **40009** | **IN CH 7** | Channel value of measurement with scale ± 10000 normalized. |
| **40010** | **IN CH 8** | Channel value of measurement with scale ± 10000 normalized. |

## LED SIGNALLINGS

| *LED* | *State* | *Meaning of LEDs* |
|---|---|---|
| PWR | On | Power supply presence. |
| FAIL | Blinking | Failure or malfunction. |
| RX | Blinking<br>On | Received data.<br>Verify the connection. |
| TX | Blinking | Trasmitted data. |

## *PURCHASE ORDER CODE*

| Order code | Description |
|---|---|
| Z-8AI | 8 ANALOG INPUTS Voltage/Current MODULE RS485 |
| CS-JACK-DB9F | SERIAL CABLE PC- Z-8AI |



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## FACTORY SETTING AND ADVANCED SETTING

### Default condition for the configuration parameters of the module:

***All DIP-switches at OFF position***

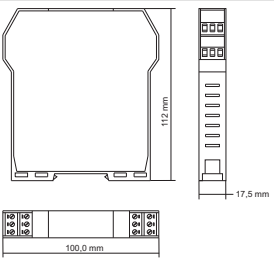
| | |
|---|---|
| Comunication parameters: | 2400 8,N,1 Addr. 1 |
| Type of input channel from 1 to 4: | VOLTAGE ± 10 V |
| Type of input channel from 5 to 8: | VOLTAGE ± 10 V |
| Numeric representation of input measurement: | ± 10000 mV |
| Sampling time: | 120 ms |

### Advanced settings

- Input channels are configurable for current or voltage.
- Possibility to set the scale of measure with value IS (start scale ) and FS (full scale ): ± 10000 mV or 0 – 20000 µA.
- Possibility to set the representation of the measure with an IST (start technical scale) and FST (full technical scale) value : ± 32000
- Possibility to enable or disable every single channel.

## MODULE LAYOUT

### MODULE DIMENSIONS




### FRONTAL PANEL




Variations of standard parameters are possible by using configuration software: EASY-SETUP available at: www.seneca.it.
For more information about a list of all register and their function please see the USER MANUAL.

## DECOMMISSIONING AND DISPOSAL



Disposal of Electrical & Electronic Equipment (Applicable throughout the European Union and other European countries with separate collections programs). This symbol, found on your producr 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 & electronic equipment. By ensuring this product is didposed 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 the product, please contact your local city office, waste disposal service of the retail store where you purchased this product.



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