SENECA

Z-PC Line

EN

# Z-3AO

## 3 analog outputs module with RS485 serial interface MODBUS RTU protocol

# Installation Manual

***Contenuti:***




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CSQ IQNet ISO 9001:2008

Before executing any operation it's mandatory to read all the content of this user Manual. Only electrical-skilled technicians can use the module described in this user Manual.

Only the Manufacturer is authorized to repair the module or to replace damaged components.

No warranty is guaranteed in connection with faults resulting from improper use, from modifications or repairs carried out by Manufacturer-unauthorised personnel on the module, or if the content of this user Manual is not followed.

## *GENERAL SPECIFICATIONS*

- 3 current or voltage analog outputs with 12 bit resolution.
- Start/end scale voltage programmable between: -10 – +10 V, 0 – +10 V or +2 – +10 V.
- Start/end scale current programmable between 0 – 20 mA o 4 – 20 mA
- 1500V ∿ insulation between: analog outputs and remaining low voltage circuits.
- Outputs protection via 400W/ms TVS transient current suppressors; PTC load protection.
- Negative common connection.
- Removable terminals with section of 2.5 $mm^2$.
- Fast response time (step 10-90%): < 50 ms.
- Power supply and serial connection wiring facilitated by means of a bus that can be housed in the DIN guide.
- RS485 serial communication with Modbus-Rtu protocol, maximum 64 nodes.
- RS232 serial connection on frontal panel with Modbus protocol for serial communications and also for programming.
- Insertion and extraction from bus without interruption of communication or of system power supply.
- Communication times below 10 ms (@ 38400 Baud).
- Connection distance up to 1200 m.
- DIP-Switch settings for Module address and Baud rate.

## *TECHNICAL SPECIFICATIONS*

| **Outputs** | |
|---|---|
| Voltage output | -10 – 10 V, 0 – 10 V, 2 – 10 V. Output impedance > 600 Ω |
| Current output | 0 – 20 mA, 4 – 20 mA. Output impedance < 600 Ω |
| Number of output channels | 3 |
| Voltage output resolution | 12 bit (5 mV) |
| Current output resolution | 12 bit (5 µA) |
| Voltage output accuracy | Calibration Max: 0.2% of E.E.S., typical: 0.1% of E.E.S.<br>Linearity: 0.05% of Electical End Scale (E.E.S.)<br>Thermal stability: 0.01%/°C of E.E.S. |
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## Power supply

| | |
|---|---|
| Supply voltage | 10 – 40 V⎓; 19 – 28 V∿ 50 – 60 Hz |
| Power consumption | Typical: 1,5 W @ 24V⎓, Max: 3.2 W |

## Environmental Conditions

| | |
|---|---|
| Temperature | -10 – +65°C (-10 – +55 °C UL) |
| Humidity | 30 – 90% a 40°C not condensing |
| Altitude | Up to 2000 m. a.s.l. |
| Storage temperature | -20 – +85°C |
| Protection degree | IP20 |

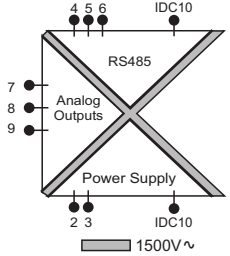
## Connections

| |
|---|
| Removable 3-way screw terminals, 5 mm pitch |
| Rear IDC10 connector for DIN 46277 rail |
| Frontal jack 3.5 mm |

## Dimensions / Box

| | |
|---|---|
| Dimension | Width W = 100 mm, Height H = 112mm, Depth D = 17.5mm |
| Box | PBT, Black |

## Isolation 1500 V∿




## Standards

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

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

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

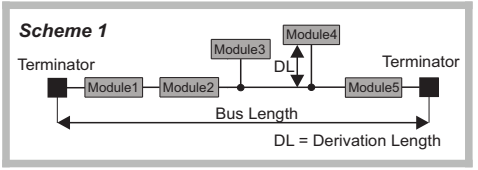
**EN61010-1** (safety).

**ADDITIONAL NOTES** :
Use in Pollution Degree 2 Environment .
Power Supply must be Class 2.
A max 2.5 A rated fuse shall be installed near the module.

## Modbus connection rules

1) Install the modules on the DIN rail (max 120).
2) Connect the remote modules using cables of proper length. The following table show the cables length
- Bus Length: Modbus network maximum length as a function of the Baud rate. This is the lenght of the cables which connect the two bus terminators modules (see Scheme 1).
- Derivation Length: Derivation line Maximum length as a function of the Baud Rate .

| Bus lenght | Derivation lenght |
|---|---|
| 1200 m | 2 m |



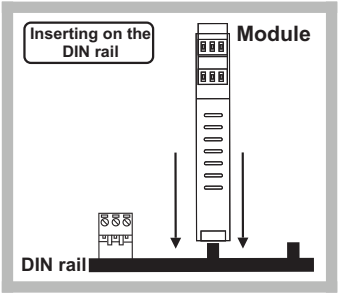

For the best performances, the use of special shielded cables is recommended (BELDEN 9841 cable for example)

## Installation Rules

The module is designed to be installed in vertical position on a DIN 46277 rail. In order to ensure optimum performance and the longest working life, the module(s) must be supplied adequate ventilation and no raceways or other objects that obstruct the ventilation slots. Never install modules above sources of heat; we recommend installation in the lower part of the control panel.

### *Inserting on the DIN rail*

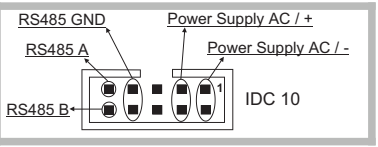
As it is illustrated in the next figure:
1) Insert the rear IDC10 connector on a DIN rail free slot (there's only one way to insert the module because of polarized connector).
2) Tighten the two locks placed at the sides of the rear IDC10 connector to fix the module.




## Electrical Connections

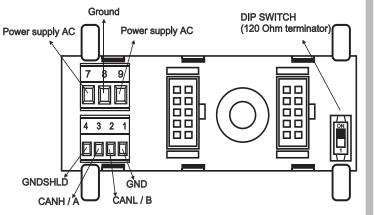
### Power supply and MODBUS interface

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.



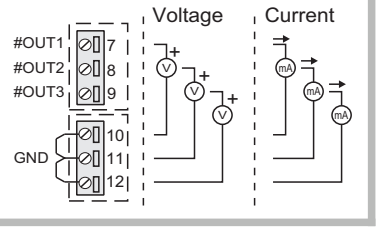

### *Rear Connector (IDC10)*

In the figure the meaning of the IDC10 connector pins is showed, if the user decides to provide the signals directly through it.




### *Z-PC-DINAL2-17,5 Accessory Use*

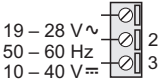
If Z-PC-DINAL2-17.5 accessory is used, the signals may be provided by terminal blocks. The figure shows the meaning and position of terminals and the DIP-switch (present on each DIN rail supports listed on Accessories) for network termination (not used in case of Modbus network).
GNDSHLD: Shield to protect the signals of the connecting cables against interference (recommended).




### *Analog outputs*

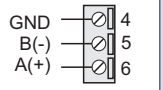
The screw terminals 10, 11 and 12 are internally connected between themselves.
The outputs available to the screw terminals 7, 8 and 9 can be set for current or voltage via DIP-switches.

## *Power supply*




Terminals 2 and 3 can be used to power supply the module as an alternative to the Z-PC-DINx bus connection. The supply voltage must be from 10 to 40 V⎓ or from 19 to 28 V~. **The upper limits must not be exceeded to avoid serious damage to the module.** If the power supply source is not protected against overload, a safety fuse appropriately sized (Max = 2.5 A) must be installed near the module.

## *MODBUS RS485*

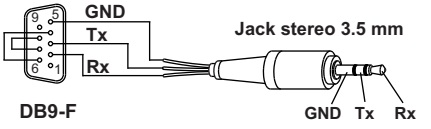



Connection for RS485 communication using the Modbus master system as an alternative to the Z-PC-DINx bus.
Note: the indication of the RS485 connection polarity is not standardised and in some masters may be inverted.

## *MODBUS RS232*

The module is designed to exchange data according to the protocol MODBUS.
**The RS232 communication has priority over the RS485 communication.**
This RS232 serial port can be used for communication but also to program the module.
The RS232 serial port uses the following communication parameters: **2400,8,N,1**
The RS232 COM port behaves exactly like that of the RS485 bus except for the communication parameters. When using the RS232 bus will be idle, it will automatically reactivate a few seconds after the last message on the COM port.
EASY SETUP is the configuration software for this module.

**RS232 SERIAL PORT**
The module is equipped with a female Jack connector that allows the connection to the RS232 communication bus.
The connection cable DB9 with a 3.5 mm stereo Jack, can be assembled as indicated in the following figure or it can be bought as an accessory:(cod.PM001601).




## *DIP-Switches settings*

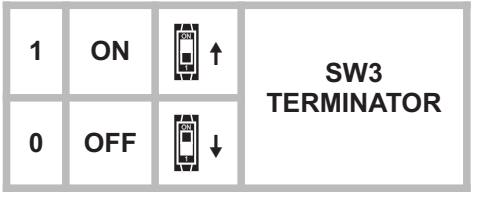
The DIP-switches position defines the module Modbus communication parameters: address and Baud Rate.
In the following figure the Baud Rate and address values are listed as a function of the DIP-switches position:

### *DIP-Switches status*

| SW1 POSITION 1 2 3 4 5 6 7 8 | BAUD RATE | SW1 POSITION 1 2 3 4 5 6 7 8 | ADRESS | SW3 POSITION | TERMINATOR |
|---|---|---|---|---|---|
| ▪▪x x x x x x | 9600 | x x ▪▪▪▪▪▪ | # 1 | ▪ | Disabled |
| ▪▫x x x x x x | 19200 | x x ▪▪▪▪▪▫ | # 2 | ▫ | 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 |

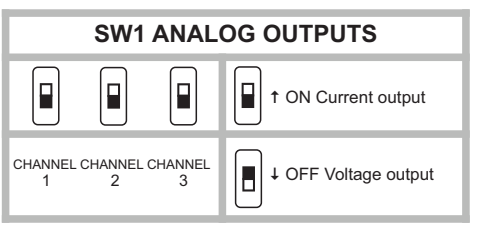
**Note**: when switches from 3 to 8 are in OFF, comunication settings are retrieved from EEPROM

## *RS485 line terminator*




The RS485 line termination must be carried out only at the ends of the communication line.

## *Selection of the outputs type*




On the side of the module there are three switches, which allow you to choose independently for each channel the output type.
This output (voltage or current) is automatically recognized by the module.
**It is recommended to set DIP-switch when module is switched off.**

## *Analog outputs*

**MODBUS registers: Holding registers**

| Register | Name | Description |
|---|---|---|
| **40005** | **OUT CH1** | Analog output's value: the allowed values are:<br>from 0 to 10000 current output: 0 – 20 mA, 4 – 20 mA or else<br>from -10000 to 10000 voltage output: 0 – 10V, 2 – .10V, -10 – +10V<br>in relation to the state of the flags register EPRFLG.<br>The value stored in the EEPROM it will be used as the default power-up and default timeout, only if the safety function is enabled (please see USER MANUAL). |
| **40006** | **OUT CH2** | As above. |
| **40007** | **OUT CH3** | As above. |

## Advanced configurations

- Facility to set SS (start scale ) and ES (end scale) of the desired output.
- Facility to set a security timer that after a programmed time sets the outputs in a predefined security status.
- Facility to set the security status of the outputs, this will be activated when a communication failure happens for a period equal to the setted time in safety timer.

## Frontal panel LEDs signallings

| LED | STATUS | *Meanings of LED* |
|---|---|---|
| PWR Green | On | Power supply presence. |
| FAIL Yellow | Blinking | error settings. |
| FAIL Yellow | On | Malfunction or fault. |
| RX Red | Blinking | Receiving data from RS485. |
| RX Red | On | Verifying the connection. |
| TX Red | Blinking | Sending data to RS485. |
| TX Red | On | Verifying the connection. |

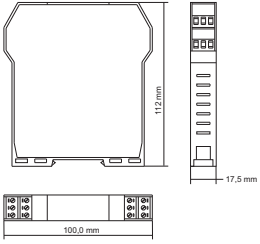
## Default Conditions

**Module factory settings parameters:**

| | |
|---|---|
| All DIP-Switches position: | OFF |
| Communication parameters Modbus Protocol: | 38400 8,N,1 Addr. 1 |
| Output channel 1: | CURRENT 4 - 20 mA |
| Output channel 2: | CURRENT 4 - 20 mA |
| Output channel 3: | CURRENT 4 - 20 mA |
| Time out : | DISABLED |

## Module Layout

**MODULE DIMENSIONS**




**FRONT PANEL**


Variation of standard parameters are possible by using configuration software (see: www.seneca.it).
For more information about a list of all registers and their functions refer to the USER MAUNAL.

## 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 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 the product, please contact your local city office, waste disposal service of the retail store where you purchased this product.