SENECA

Z-PC Line

ZC-24DI

**CANopen/MODBUS I/O Module
24 Digital Inputs**

EN

Installation Manual

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General Specifications

- Twenty-four 16 V_{DC} self-powered digital inputs with shared negative pole.
- Eight digital inputs settable as 32-bit counters with 10 kHz maximum frequency.
- Can Interface with CANopen protocol up to 1 Mbps speed or MODBUS RS485 Interface up to 115 Kbit/s speed.
- CANopen/MODBUS Baud rate and Node ID configurability by DIP-switches or software.
- RS232 Serial Communication with MODBUS-RTU protocol.
- Facilitated power supply and CANopen/MODBUS bus wiring by means of the bus housed in the DIN rail.
- 1500 VAC Isolation among input, power supply and CANopen/MODBUS interface circuits.
- Counters increment individually configurable on the rising or falling edges of the corresponding digital input.
- Overflow indication available for each counter.
- Preset value configurable for each counter.
- Reset and preset commands individually executable on each counter.
- Leds Signallings: Power Supply, Digital Inputs State, CANopen/MODBUS Communication, MODBUS-RTU Communication.

Technical Specifications

INPUTS

Polarity (EN 61131-2 type 2)	Sink (pnp)
Number of channels	24
Number of Counters (if enabled)	8 (32 bit)
U_L (state OFF)	0 - 7 V_{DC}
U_H (state ON)	11 - 30 V_{DC}
Absorbed Current	3 mA (for each input)
V_{MAX}	30 V
Minimum pulse width	250 µs
ON/OFF Delay	Typical: 1.2 ms Maximum: 3 ms
Maximum Counters Frequency	10 kHz

POWER SUPPLY

Voltage	10 - 40 V_{DC}
	19 - 28 V_{AC}
Consumption	Typical: 1.5 W, Max: 2.5 W

ENVIRONMENTAL CONDITIONS

Temperature	-10 - +65°C
Humidity	30 - 90% a 40°C non condensing
Altitude	Up to 2000 m a.s.l.
Storage Temperature	-20 - +85°C
Protection	IP20

CONNECTIONS

Connections	Removable 4-way screw terminals, 3.5 mm pitch
	Rear IDC10 connector for DIN rail
	3.5 mm stereo frontal jack for RS232 (COM) connection

DIMENSIONS / BOX

Dimensions	L: 100 mm; H: 112 mm; W: 35 mm
Box	PBT, black

ISOLATIONS / STANDARDS

Isolations Diagram	Standards
3-Points 1500 V_{AC} isolation:	CE — **The module complies with the following standards:** EN61000-6-4/2002-10 (electromagnetic emission, industrial environment). EN61000-6-2/2006-10 (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".

: 1500 V_{AC} Isolation

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 (the inserting is univocal since the connectors are polarized).
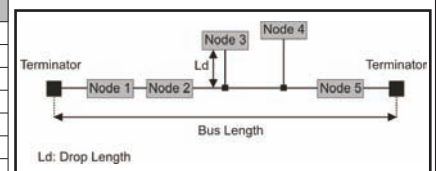2) Tighten the four locks placed at the sides of the rear IDC10 connector to fix the module.
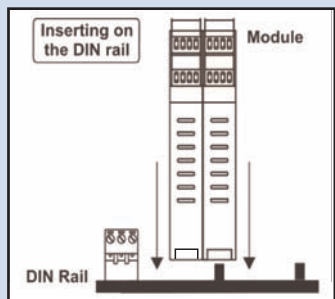
Electrical Connections

POWER SUPPLY AND CAN/MODBUS INTERFACE

Power Supply and CAN/MODBUS interface are available by using the bus for the Seneca DIN rail, by the rear IDC10 connector or by Z-PC-DINAL1-35 accessory.

Rear Connector (IDC10)

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

Z-PC-DINAL1-35 Accessory Use

In case of Z-PC-DINAL-1-35 accessory use, the signals may be provided by terminal blocks. The figure shows the meaning of the terminals and the position of the DIP-switch (present on each DIN rail supports listed on Accessories) for CAN network termination.
GNDSHLD: Shield to protect the connection cables (it is always recommended).
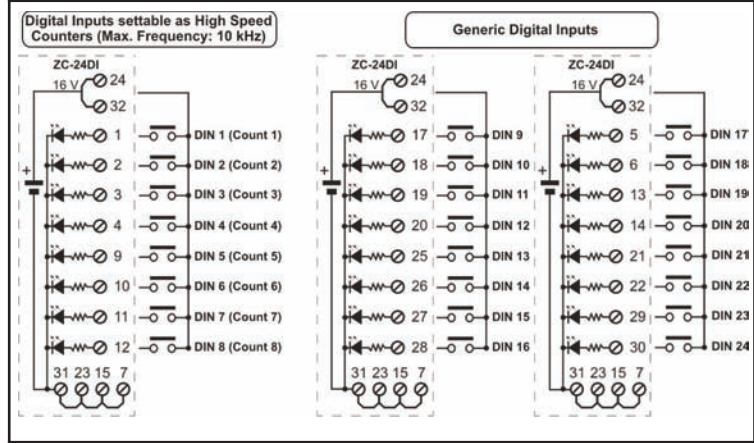

CAN bus Connection Rules

1) Install the modules on the DIN rail (max 120).
2) Connect the remote modules using cables of proper length. On the table the following data about the cables length are provided:
- Bus Length: CAN network maximum length as a function of the Baud rate. It is the lenght of the cables which connect the two bus terminators modules (see Scheme 1).
- Drop Length: maximum length of a drop line (see Scheme 1) as a function of the Baud Rate.

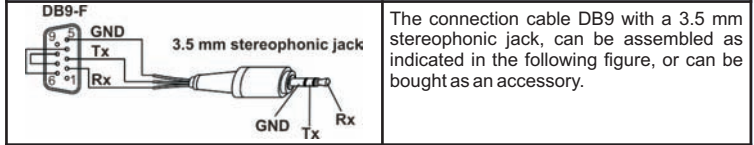| Baud rate	Bus Length	Drop Length
20 kbps	2500 m	150 m
50 kbps	1000 m	60 m
125 kbps	500 m	5 m
250 kbps	250 m	5 m
500 kbps	100 m	5 m
800 kbps	50 m	3 m
1000 kbps	25 m	0.3 m

Scheme 1

Ld: Drop Length

For the best performances, the use of special shielded cables is recommended (BELDEN 9841 cable for example).
3) Terminate the two ends of the CANbus network by setting to ON the DIP-switch present on the DIN rail connection supports (see Accessories) where the two ends are inserted.

DIGITAL INPUTS

RS232 SERIAL PORT

The connection cable DB9 with a 3.5 mm stereophonic jack, can be assembled as indicated in the following figure, or can be bought as an accessory.

DIP-switches Settings

The DIP-switches position defines the module CAN/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:

We underline that on all the DIN rail supports a DIP-switch is present and if it is set to ON position the CAN network termination is inserted.

Programming

PROGRAMMING THROUGH CAN/MODBUS INTERFACE

The module may be programmed/configured through the CAN/MODBUS interface; refer to the User Manual for details about the communication.

Factory Parameters

With all the DIP-switches in OFF position (values from memory), the module is originally programmed as follows:
MODBUS, Baud Rate: 38400, Bit: 8, Parity: None, Stop bit: 1, Address: 1
To switching ON SW2 and SW4 : CANOPEN, Baud Rate: 20 kbps, Address: 127.

PROGRAMMING THROUGH RS232 (FRONTAL JACK)

The module may be programmed/configured through the RS232 interface by using MODBUS-RTU protocol; refer to the User Manual for details about the communication. The connection parameters are the following:
Address: 1, Baud Rate: 2400 Baud, Parity: none, Stop bit: 1.

Significant Components Position

Terminals/Leds/IDC10 Connector/ DIP-switch

The terminals numbering, the leds position on the frontal panel, the rear IDC10 connector (fixing on the DIN rail) and the DIP-switch on the rear side are illustrated below.

IDC10: CAN/MODBUS and Power Supply

LEDs Signallings

LED ERR E RUN: CANOPEN / MODBUS COMMUNICATION STATE

The meaning of leds ERR and RUN is described below; refer to the User Manual for details about the possible state and the flashing modes of the two leds.

LED ERR (Red)	STATE	LED (Red) ERR (CANOPEN) Meaning
OFF	No error	The Device is in working condition.
Single flash	Warning limit reached	At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
Double flash	Error Event	A guard event (NMT-Slave or NMT-master).
Triple flash	Sync Error	The SYNC message has not been received within the communication cycle period time out.
ON	Bus off	The CAN controller is bus off.

LED ERR (Red)		LED (Red) Rx (MODBUS) Meaning
ON		The device is receiving.

LED RUN (Green)	STATE	LED (Green) RUN (CANOPEN) Meaning
Single flash	Stop	The Device is in STOPPED state.
Blinking	Pre-operational	The Device is in the PRE-OPERATIONAL state.
ON	Operational	The Device is in the OPERATIONAL state.

LED RUN (Green)		LED (Green) Tx (MODBUS) Meaning
On		The device is transmitting.

LED FAIL E PWR: DIAGNOSTICA GENERALE DI SISTEMA

LED PWR (Green)	Meaning	LED FAIL (Yellow)	Meaning
ON	Power Supply presence	ON	It indicates data reception on the RS232 port (COM).

LED 01..24: DIGITAL INPUTS STATE

LED 01..24 (Green)	Meaning
ON	**-01..08:** If counters are enabled: the correspondent counter is ON. Otherwise it signals the state of the correspondent generic digital input. **-09..24:** The correspondent generic digital input is ON.

FACTORY SETTINGS

All DIP-switch OFF:
- MODBUS Protocol / - Communication parameters: 38400 8,N,1 Addr. 1
- Filter active on the 24 Digital inputs / - Filter value = 100Hz

All dip switch OFF except SW2 (ON) and SW4 (ON):
- CANopen Protocol / - Communication parameters: 20K Addr. 127
- Filter active on the 24 Digital inputs / - Filter value = 100Hz

Variations of standard parameters are possible by using configuration softwares Z-NET and EASY-Z-PC (www.seneca.it).