SENECA

Z-PC Line

EN

Z-D-IO

MODULE: 6 DIGITAL INPUTS, 2 RELAY OUTPUTS, MODBUS COMMUNICATION ON RS485

Installation Manual

Contents:

- General characteristics
- Technical specifications
- Installation rules
- Electrical connections
- Digital inputs
- Digital outputs
- DIP-switch settings
- Modbus connections rules
- Module configuration
- Alarm delay DIP-Switch (SW2-3 e SW2-4)
- Logical schemes
- LEDs Signallings
- Factory settings



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For a manual and configuration software, see www.seneca.it

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General Specifications

• 6 opto-insulated digital inputs with a common contact. Internal or external power supply of inputs selectable with a jumper.
• Protection of inputs by TVS 600 W/ms transient suppressors.
• Insulation of the 1500 Vac inputs with respect to the remaining low voltage circuits.
• 2 SPST relay outputs with common contact, capacity of 2 AAC1 250 Vac. Selection of N.O. or N.C. contact for each relay with a jumper.
• 3750 Vac insulation between the outputs and the remaining low voltage circuits.
• Internal logic for commanding motors, pneumatic valves and motorised valves, with management of thermal protection, feedback, travel limit and alarm.
• RS485 serial communication with Modbus-Rtu protocol, 64 nodes maximum (without repeater). Configurable via dip-switch also.
• Communication times shorter than 10 ms (@ 38400 Baud).
• Connection distance up to 1200 m.
• Pull-out terminals, with 2.5 mm^2 cross-section
• Facilitated wiring of power supply and serial connection by means of a bus which can be housed in the DIN guide.
• Module can be fitted on and removed from bus without interrupting communication or power supply to the system.

Technical specifications

INPUTS

Type input	Reed, Contact, Proximity PNP, NPN (with external resistoor) etc...
Number of Channels	6
Discrimination limits	according to IEC1131.2 tipo 1
Transition level	10 V_{DC} , 3 mA ± 10%
Minimum pulse lenght	20 ms

OUTPUTS

Outputs	2 SPST relay outputs with common contact, capacity 5A_{AC1} 250Vac. Internal jumpers for selecting an NO or NC contact for each relay.
Number of Channels	2
Operate / release time delay	5/2 ms

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POWER SUPPLY

Voltage	10 ..40 V_{DC} 19 ..28 V_{AC} a 50 ..60 Hz
Consumption	Typical: 1.5 W, Max: 2.5 W

ENVIRONMENTAL CONDITION

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

CONNECTIONS

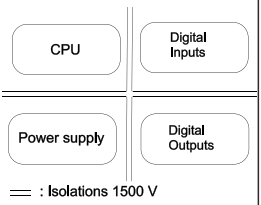
Connections	Removable 3-way crew terminals, 3,5 pitch
	Rear IDC10 connector for DIN 46277 rail

DIMENSIONS / BOX

Dimensioni	L: 100 mm; H: 112 mm; W: 17,5 mm
Contenitore	PBT, colore nero

ISOLATIONS

1500 V_{AC} a tre punti:



STANDARDS

The module complies with the following standards:

CE

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

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

EN61010-1 (safety). All circuits must be isolated from the other circuits under dangerous voltage with double isolation.

ADDITIONAL NOTES :
Use in Pollution Degree 2 Environment .
Power Supply must be Class 2.
When supplied by an Isolated Limited Voltage/Limited Current power supply a fuse rated max 2.5 A shall be installed in the field.

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Installation Rules

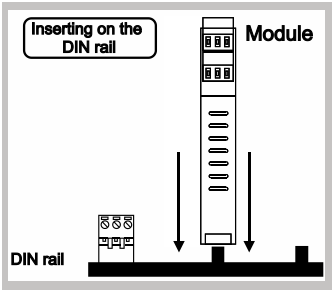
The module is designed to be installed in vertical position on a DIN 46277 rail. In order to ensure optimum performance and the longest working life, the module(s) must be supplied adequate ventilation and no raceways or other objects that obstruct the ventilation slots. Never install modules above sources 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 two locks placed at the sides of the rear IDC10 connector to fix the module.

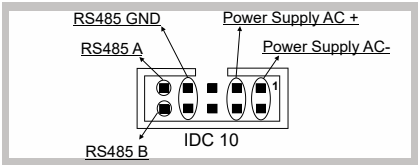


Electrical Connections

POWER SUPPLY AND MODBUS INTERFACE

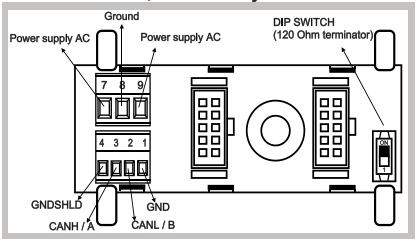
Power Supply and CAN/MODBUS interface are available by using the bus for the Seneca DIN rail, by the rear IDC10 connector or by Z-PC-DINAL2-17,5 accessory.

Rear Connector (IDC10)



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

Z-PC-DINAL2-17,5 Accessory Use



In case of Z-PC-DINAL-2-17,5 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 network termination (not used in case of Modbus network).
GNDSHLD: Shield to protect the connection cables (recommended).

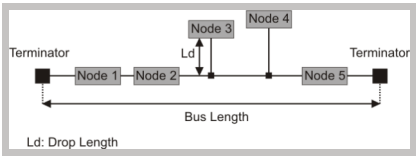
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Modbus connection rules

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: Modbus 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 2 m (see Scheme 1).

Bus lenght	Drop lenght
1200 m	2 m

Scheme 1



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

DIP-switch 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 SWITCH STATUS

POSITION	BAUD RATE	POSITION	ADDRESS	POSITION	TERMINATOR
00xxxxxx	9600	xx000001	# 1	none	See J4
01xxxxxx	19200	xx000010	# 2	none	See J4
10xxxxxx	38400	.....	.....		
11xxxxxx	57600	xx111111	# 63		

POSITION	BAUD RATE	POSITION	ADDRESS
xx000000	From EEprom	xx000000	From EEprom

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

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Digital Inputs

Sensors REED, PROXIMITY PNP, NPN, contact, can be connected to the input terminals. The power supply to these sensors can be obtained directly from the Z-D-IO Module (factory configuration),or it can be externally supplied.
Procedure for modifying the configuration of the inputs: open the side lid and shift the configuration jumper J1 to position Int for internal power supply, or in position Ext for external power supply (see fig. 2).

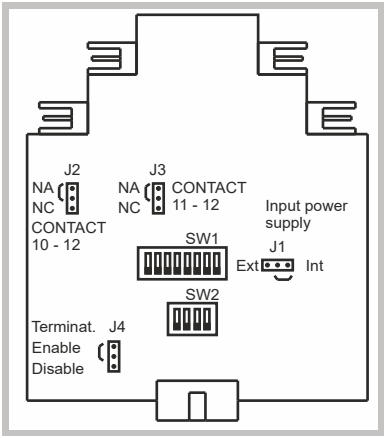
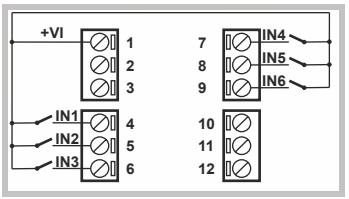


fig.2

Internal Power supply



Exsternal Power supply

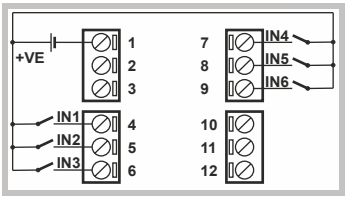


fig.3

For the meanings of the inputs, see section "Module Configuration".

Digital outputs

The relay outputs can be configured to use the NO contact (factory configuration), or the NC contact. To change the output configuration, open the side lid and shift the configuration jumpers J2 and J3 (see fig.2).

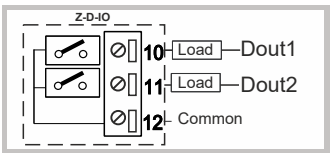


fig.4

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Module configuration (DIP-Switch SW2)

The module can be configured by the SW2 Dip-switch in order to function in four different operating modes:

- I/O MODE

- MOTOR COMMAND MODE

- PNEUMATIC VALVE COMMAND MODE

- MOTORISED VALVE COMMAND MODE

I/O MODALITY

INPUTS

Terminal	Meaning	Type
4 - 1	IN 1	N.O.
5 - 1	IN 2	N.O.
6 - 1	IN 3	N.O.
7 - 1	IN 4	N.O.
8 - 1	IN 5	N.O.
9 - 1	IN 6	N.O.

OUTPUTS

Terminal	Meaning	Type
10 - 12	OUT 1	N.D. (**)
11 - 12	OUT 2	N.D. (**)

SETTING OF DIP-SWITCH SW2



MOTOR COMMAND MODE

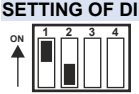
INPUTS

Terminal	Meaning	Type
4 - 1	Local / Remote	N.O.
5 - 1	Start (*)	N.O.
6 - 1	Stop (*)	N.C.
7 - 1	Thermal protection	N.C.
8 - 1	Feedback	N.O.
9 - 1	Silence alarm	N.O.

OUTPUTS

Teminal	Meaning	Type
10 - 12	Alarm	N.E. (**)
11 - 12	Start	N.D. (**)

SETTING OF DIP-SWITCH SW2



PNEUMATIC VALVE COMMAND MODE

INPUTS

Terminal	Meaning	Type
4 - 1	Local / Remote	N.O.
5 - 1	Activation (*)	N.O.
6 - 1	Return (*)	N.C.
7 - 1	Return Travel-Limit	C.I.P.(***)
8 - 1	Activation Travel-Limit	C.I.P.(***)
9 - 1	Silence alarm	N.O.

OUTPUTS

Terminal	Meaning	Type
10 - 12	Alarm	N.E. (**)
11 - 12	Start	N.D. (**)

SETTING OF DIP-SWITCH SW2



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MOTORISED VALVE COMMAND MODE

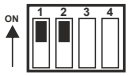
INPUTS

Terminal	Meaning	Type
4 - 1	Local / Remote	N.O.
5 - 1	Activation (*)	N.O.
6 - 1	Return (*)	N.C.
7 - 1	Return Travel-Limit	C.I.P.(***)
8 - 1	Activation Travel-Limit	C.I.P.(***)
9 - 1	Not used	N.O.

OUTPUTS

Terminal	Meaning	Type
10 - 12	Return	N.D. (**)
11 - 12	Start	N.D. (**)

SETTING OF DIP-SWITCH SW2



(*) These commands are effective only if the Local / Remote input is in Local position (open contact). If the Local / Remote input is in Remote position (closed contact), the respective commands are sent to the module by writing in the respective registers.

(**) N.D. = Normally de-energised relay N.E. = Normally energised relay.
(***) CIP = Closed in position

MOTORS COMMAND LOGIC (in LOCAL mode)

To start the motor, close the "START" input. The module controls if the "THERMAL PROTECTION" and "STOP" inputs are closed - in this situation it enables the "START" output.
After the programmed time (see DIP-switches SW2-3 and 4 and modbus 40005 register) the closure of the “FEEDBACK” input is verified. If still open, the module enables the "ALARM" output (the "START" output remains enabled).
If the "THERMAL PROTECTION" input opens during operation, the "ALARM" output is immediately enabled, and the "START" output is disabled.
To silence the alarm, close the "SILENCE ALARM" input.
To stop the motor, open the"STOP" input - the module disables the "START" output.
The "FEEDBACK" input must open within the programmed time, otherwise the module enables the "ALARM" output.

PNEUMATIC VALVE COMMAND LOGIC (in LOCAL mode)

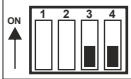
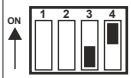
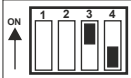
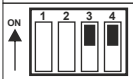
To enable the pneumatic valve, close the "ACTIVATION" input. The module controls if the "RETURN" input is closed - in this situation it enables the "ACTIVATION" output.
After the programmed time (see DIP-switches SW2-3 and 4 and modbus 40006 register), the opening of the "ACTIVATION TRAVEL-LIMIT" input is verified. If it is still closed, the module enables the "ALARM" output (the "ACTIVATION " output remains enabled).
To silence the alarm, close the "SILENCE ALARM" input.
If you open the "RETURN" input, the module disables the "START " output.
The "RETURN TRAVEL-LIMIT" input must open within the programmed time, otherwise the module enables the "ALARM" output.
An incongruous situation of the travel-limit devices (simultaneous opening of the two inputs "ACTIVATION TRAVEL-LIMIT" and "RETURN TRAVEL-LIMIT") immediately activates the "ALARM" output and lights up the "FAIL" LED..

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MOTORISED VALVE COMMAND LOGIC (in LOCAL mode)

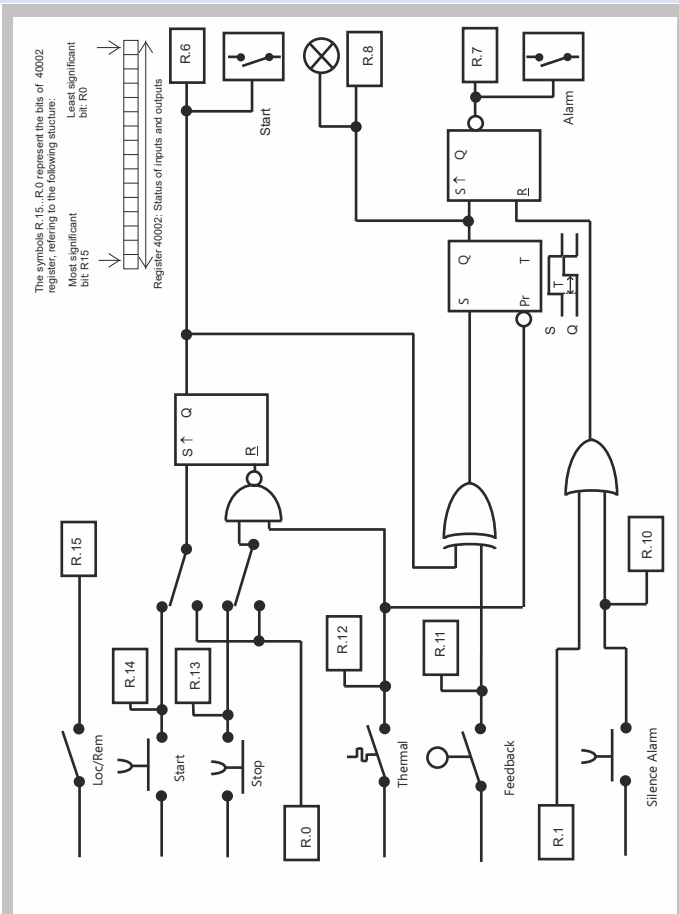
To enable the motorised valve, close the "ACTIVATION" input. The module controls if the "RETURN" input is closed, and in this situation, it disables the "RETURN" output, (if it was enabled) and enables the "ACTIVATION " output.
After the programmed time (see DIP-switches SW2-3 and 4 and modbus 40007 register), the opening of the "ACTIVATION TRAVEL-LIMIT" input is verified. If it is still closed, the module disables the "ACTIVATION" output and activates the alarm (Modbus and LED only).
If you open the "RETURN" input, the module disables the "ACTIVATION" output (if it was enabled), and enables the "RETURN" output.
After the programmed time, the opening of the "RETURN TRAVEL-LIMIT" input is verified - if it is closed, the module enables the alarm.
An incongruous situation of the travel-limit devices (simultaneous opening of the two inputs "ACTIVATION TRAVEL-LIMIT" and "RETURN TRAVEL-LIMIT") immediately activates the alarm (only modbus and LED).

Alarm delay DIP-Switches (SW2-3 and SW2-4)

SW2-3 e SW2-4		Motor	Pneu. Valv.	Mot. Valv.
	Alarm delay from EEprom	10 s (default)	10 s (default)	10 s (default)
	Alarm delay “short”		4 s	15 s
	Alarm delay “medium”	5 s	30 s	120 s
	Alarm delay “long”	30 s	120 s	300 s

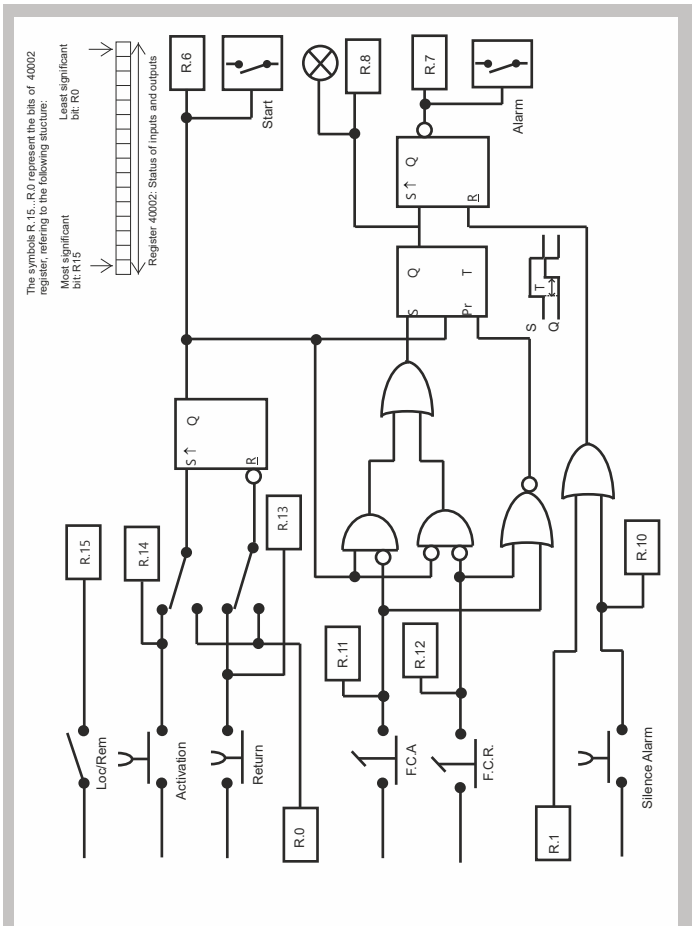
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Z-D-IO : MOTOR CONTROL LOGIC



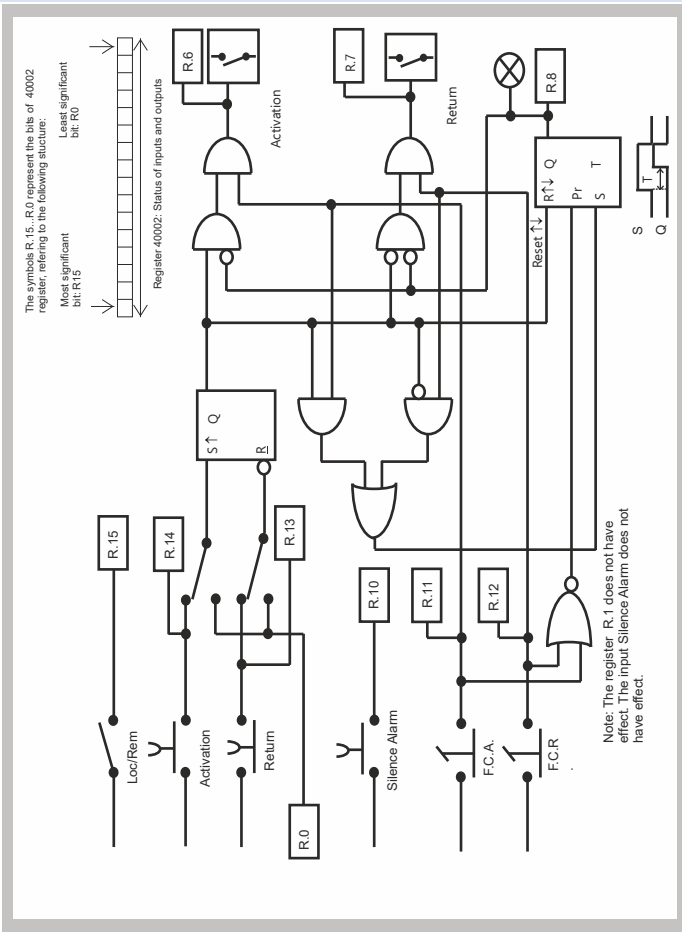
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Z-D-IO: PNEUMATIC VALVE LOGIC



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Z-D-IO: MOTORISED VALVE LOGIC



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LEDS Signallings

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

Factory settings

All DIP-switch OFF:

- Modbus protocol / Communication parameters: 38400, 8,N,1 Addr. 1
- Sensor power supply: INTERNAL
- Digital outputs: DISABLE
- Modality Type: I/O MODALITY
- Alarm delay: 10 s

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



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