USER MANUAL

Z-4AI

SENECA s.r.l.

Via Austria, 26 – 35127 – Z.I. CAMIN – PADOVA – ITALY

Tel. +39.049.8705359 – 8705408 Fax. +39.049.8706287

Web site: www.seneca.it

Support: supporto@seneca.it (IT), support@seneca.it (Other)

Sales: commerciale@seneca.it (IT), sales@seneca.it (Other)

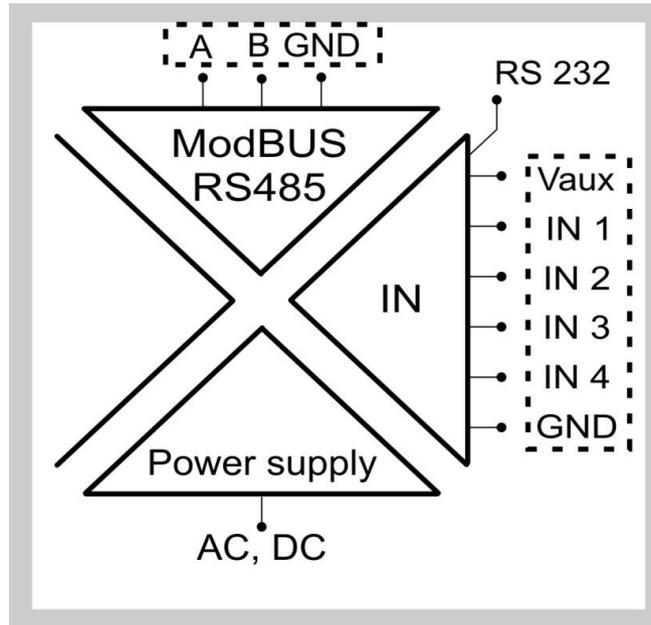MI002571

Seneca Z-PC Line module: **Z-4AI**

The Z-4AI module acquires up to 4 single-ended input signals (voltage or current type) and it converts them to a digital format (normalized measure).

General characteristics

- Each input configurable in voltage/current type
- Each input can be enable/disable
- Each input value can be scaled
- Modbus RTU communication
- Address and baud-rate configurable also by Dip-Switches
- Complete configuration from Easy Setup or ZNET software

Features

INPUT	
Number	4
Resolution	16 bits (15+1 sign). If Electrical End-Scale (E.E.S.)<2V, resolution=60µV; if 2V<E.E.S.<10V, resolution=300µV
Sampling time	Configurable between: 120 ms or 60 ms
Accuracy	Initial: 0.1% of E.E.S.. If E.E.S.<2V, accuracy=2mV; if 2V<E.E.S.<10V, accuracy=10mV
	Linearity: 0.03% of E.E.S. (see initial accuracy)
	Zero: 0.05% of E.E.S. (see initial accuracy)
	Thermal stability: < 100 ppm/°K
	EMI: < 1%
Protection	± 30Vdc and 25mA
Voltage-type IN	Bipolar with E.S.S./E.E.S.(Electrical Start/End Scale) configurable between: ± 10Vdc. Input impedance: > 100 kΩ
Current-type IN	Bipolar with E.S.S./E.E.S. configurable between: ±20mA.Internal shunt:50Ω. To enable these shunts, use the «Analog inputs» Dip-Switches
Internal supply Vaux	The #7 screw terminals: power 13V to max90mA
CONNECTIONS	
RS485 interface	IDC10 connector for DIN 46277 rail (back-side panel) or (alternative) the screw terminals: 4(GND), 5(B), 6(A)
RS232 interface	Jack stereo 3.5mm connector: plugs into COM port
1500 Vac ISOLATIONS	
	Between: power supply, ModBUS RS485, analog input

POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Min: 0.5W; Max: 2W (to power 4 current loop)

The power supply transformer necessary to supply the module must comply with EN60742 (Isolated transformers and safety transformers requirements). To protect the power supply, it is recommended to install a fuse.

Input connections

It is possible to connect two types of sensors to the Z-4AI module:

- **passive sensors**, indicated with "S" label (these sensors have to be supplied: by a module external voltage Vext or by the module internal voltage Vaux);
- **active sensors**, indicated with "voltage generator" or "current generator" label (these sensors have already been supplied).

In the following figure are shown five possible sensor connections.

Vaux* (supplied from module) = 13 Vdc
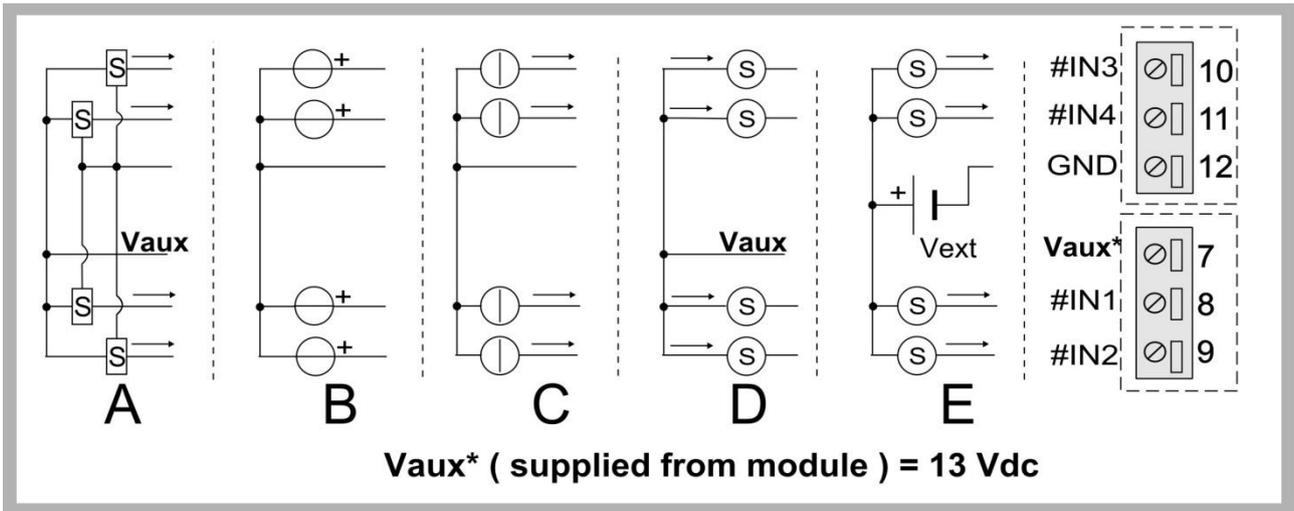
	Acquired signal	Up to	Connection modality	Sensors power supply
A	Voltage or current type	4 passive sensors	3-wire	Vaux (*)
B	Voltage type	4 sensors as voltage generator	2-wire	/
C	Current type	4 sensors as current generator	2-wire	/
D	Current-active type	4 passive sensors	2-wire	Vaux (*)
E	Current-passive type	4 passive sensors	2-wire	Vext (connect "-" to GND)

☞ (*) **A and D connections are possible only if the absorbed currents sum from all sensors: <90mA.**

Dip-switches table

☞ In the following tables: box without circle means Dip-Switch=0 (OFF state); box with circle means Dip-Switch=1 (ON state).

BAUD-RATE (Dip-Switches: DIP-SWITCH STATUS)		
1	2	Meaning
		Baud-rate=9600 Baud
	●	Baud-rate=19200 Baud
●		Baud-rate=38400 Baud
●	●	Baud-rate=57600 Baud

ADDRESS (Dip-Switches: DIP-SWITCH STATUS)						
3	4	5	6	7	8	Meaning
						Address and Baud-Rate are acquired from memory(EEPROM)
					●	Address=1
				●		Address=2
				●	●	Address=3
			●			Address=4
X	X	X	X	X	X	……………………
●	●	●	●	●	●	Address=63

RS485 TERMINATOR (Dip-Switches: DIP-SWITCH STATUS)		
9	10	Meaning
		RS485 terminator disabled
	●	RS485 terminator enabled

INPUT TYPE (Dip-Switches: ANALOG INPUTS)								
1	2	3	4	5	6	7	8	Meaning
								IN 1=voltage
●								IN 1=current
								IN 2=voltage
	●							IN 2=current
								IN 3=voltage
		●						IN 3=current
								IN 4=voltage
			●					IN 4=current

RS485 Register table

Name	Range	Interpretation of register	R/W	Default	Address
MachineID	/	MSB, LSB	R		40001
	Id_Code (Module ID)			0x07	Bit [15:8]
	Ext_Rev (Module version)				Bit [7:0]
FWREV	/	Word	R		40035
	Firmware Code				
Status	/	Bit	R/W		40016
	Input 4 underflow: 0=no; 1=yes			/	Bit 15
	Input 4 overflow: 0=no; 1=yes			/	Bit 14
	Input 3 underflow: 0=no; 1=yes			/	Bit 13
	Input 3 overflow: 0=no; 1=yes is			/	Bit 12
	Input 2 underflow: 0=no; 1=yes			/	Bit 11
	Input 2 overflow: 0=no; 1=yes			/	Bit 10

	Input 1 underflow: 0=no; 1=yes			/	Bit 9
	Input 1 overflow: 0=no; 1=yes			/	Bit 8
	Save configuration in memory (EEPROM): 0=deactivated; 1=activated			0	Bit 7
	These bits aren't used			/	Bit [6:2]
	Reset of filter: 0=deactivated; 1=activated			0	Bit 1
	Reset of module: 0=deactivated; 1=activated			0	Bit 0
Errors	/	Bit	R		40036
	These bits aren't used			/	Bit[15:10]
	Setting error (in memory): 0=there isn't; 1=there is			/	Bit 9
	Calibration error (in memory): 0=there isn't;1=there is			/	Bit 8
	These bits aren't used			/	Bit [7:1]
	ADC error: 0=there isn't; 1=there is			/	Bit 0
Eprflag	/	MSB, LSB	R/W		40003
	These bits aren't used			/	Bit [15:5]
	Parity for RS485: 0=even parity; 1=odd parity			0	Bit 4
	Parity for RS485: 0=there isn't; 1=there is			0	Bit 3
	Delay for RS485 (delay of communication response: pauses between the end of Rx message and the start of Tx message): 0=there isn't; 1=there is			0	Bit 2
	Sampling time: 0=120 ms; 1=60 ms			0	Bit 1
	Compatibility with: 0=Z-4AI-0; 1=Z-4AI-1			1	Bit 0
Baudrate Address	/	MSB, LSB	R/W		40002
	Baud-rate for RS485 (baud-rate of module/node if parameters are configured by memory modality): 0=4800; 1=9600; 2=19200; 3=38400; 4=57600; 5=115200; 6=1200; 7=2400			38400	Bit [15:8]
	Address for RS485(address of module if parameters are configured by memory modality):from 0x01=1 to 0xFF=255			1	Bit [7:0]
INType	/	Bit	R/W		40025
	These bits aren't used			/	Bit [15:4]
	Input 4-type: 0=voltage; 1=current			0	Bit 3
	Input 3-type: 0=voltage; 1=current			0	Bit 2
	Input 2-type: 0=voltage; 1=current			0	Bit 1
	Input 1-type: 0=voltage; 1=current			0	Bit 0
INPUT 1					
IN 1	Between: IN 1-NSS, IN 1-NES (if bit 40003.0=0); unchangeable between: 0,10000 (if bit40003.0=1)	Word	R		40017
	Normalized measure of input 1			/	
IN1-FILTER	Between: 0, 6	Word	R/W		40004
	Filter applied to input 1 signal: 0=deactivated; 1=filtering min-value; 6=filtering max-value			0	
IN 1-ESS	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40012
	Electrical Start Scale (E.S.S.) of input 1 [mV or µA]			0 [mV]	
IN 1-EES	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40008
	Electrical End Scale (E.E.S.) of input 1 [mV or µA]			10000 [mV]	
IN 1-NSS	±32000	Word	R/W		40030
	Normalized Start Scale (N.S.S.) of input 1			0	
IN 1-NES	±32000	Word	R/W		40026
	Normalized End Scale (N.E.S.) of input 1			10000	

	INPUT 2				
IN 2	Between: IN 2-NSS, IN 2-NES (if bit 40003.0=0); unchangeable between: 0,10000 (if bit40003.0=1)	Word	R		40018
	Normalized measure of input 2				
IN2-FILTER	Between: 0, 6	Word	R/W		40005
	Filter applied to input 2 signal: 0=deactivated; 1=filtering min-value; 6=filtering max-value			/	
IN 2-ESS	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40013
	Electrical Start Scale (E.S.S.) of input 2 [mV or µA]			0 [mV]	
IN 2-EES	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40009
	Electrical End Scale (E.E.S.) of input 2 [mV or µA]			10000 [mV]	
IN 2-NSS	±32000	Word	R/W		40031
	Normalized Start Scale (N.S.S.) of input 2			0	
IN 2-NES	±32000	Word	R/W		40027
	Normalized End Scale (N.E.S.) of input 2			10000	
	INPUT 3				
IN 3	Between: IN 3-NSS, IN 3-NES (if bit 40003.0=0); unchangeable between: 0,10000 (if bit40003.0=1)	Word	R		40019
	Normalized measure of input 3				
IN3-FILTER	Between: 0, 6	Word	R/W		40006
	Filter applied to input 3 signal: 0=deactivated; 1=filtering min-value; 6=filtering max-value			/	
IN 3-ESS	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40014
	Electrical Start Scale (E.S.S.) of input 3 [mV or µA]			0 [mV]	
IN 3-EES	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40010
	Electrical End Scale (E.E.S.) of input 3 [mV or µA]			10000 [mV]	
IN 3-NSS	±32000	Word	R/W		40032
	Normalized Start Scale (N.S.S.) of input 3			0	
IN 3-NES	±32000	Word	R/W		40028
	Normalized End Scale (N.E.S.) of input 3			10000	
	INPUT 4				
IN 4	Between: IN 4-NSS, IN 4-NES (if bit 40003.0=0); unchangeable between: 0,10000 (if bit40003.0=1)	Word	R		40020
	Normalized measure of input 4				
IN4-FILTER	Between: 0, 6	Word	R/W		40007
	Filter applied to input 4 signal: 0=deactivated; 1=filtering min-value; 6=filtering max-value			/	
IN 4-ESS	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40015
	Electrical Start Scale (E.S.S.) of input 4 [mV or µA]			0 [mV]	
IN 4-EES	±10000 [mV] (if voltage), ±20000 [µA] (if current)	Word	R/W		40011
	Electrical End Scale (E.E.S.) of input 4 [mV or µA]			10000 [mV]	
IN 4-NSS	±32000	Word	R/W		40033
	Normalized Start Scale (N.S.S.) of input 4			0	
IN 4-NES	±32000	Word	R/W		40029

Normalized End Scale (N.E.S.) of input 4	10000	

LEDs for signalling

In the front-side panel there are 4 LEDs and their state refers to important operating conditions of the module.

LED	LED status	Meaning
PWR	Constant light	The power is on
ERR	Blinking light	The module has at least one of the errors described in RS485 Registers table
RX	Constant light	Verify if the bus connection is corrected
	Blinking light	The module received a data packet
TX	Blinking light	The module sent a data packet

Filter

A filter can be configured from Easy Setup or ZNET4 software. The filter effect is represented in the following table:

Filter Value	Conversion time 60 ms	Conversion time 120 ms
	Response time at 62% of final value [s]	
0	0,24	0,48
1	0,48	0,96
2	0,72	1,44
3	1,2	2,4
4	2,6	5,3
5	5	10
6	10	20

The filter is an exponential $(1 - e^{(-\frac{t}{\tau})})$ of the first order.

Easy-SETUP

To configure the Seneca Z-PC Line modules, it is possible to use Easy-SETUP software,

Free-downloadable from the www.seneca.it; the configuration can be performed by RS232 or RS485 bus communication.