



USER MANUAL





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MI002571

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

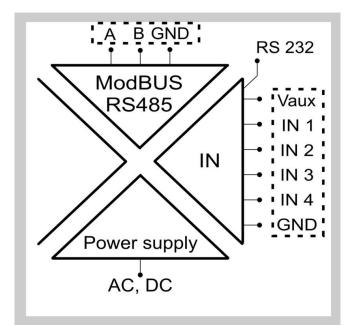
The Z-4AI module acquires up to 4 single-ended input signals (voltage or current type) and it converts them to a digital format (normalized measure).

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</th"></e.e.s.<10v,>			
Sampling time	Configurable between: 120 ms or 60 ms			
Accuracy	Initial: 0.1% of E.E.S If E.E.S.<2V, accuracy=2mV;			
	2V <e.e.s.<10v, accuracy="10mV</th"></e.e.s.<10v,>			
	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: \pm 10Vdc. Input impedance: > 100 k Ω			
Current-type IN	Bipolar with E.S.S./E.E.S. configurable between: ±20mA.Internal			
	shunt:50 Ω . 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	Min: 0.5W; Max: 2W (to power 4 current loop)
consumption	

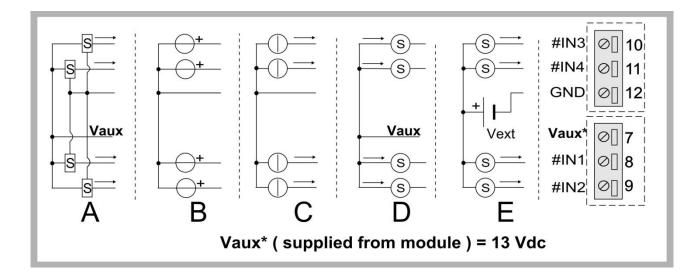
The power supply transformer necessary to supply the module must comply with EN60742 (Isolated transformers and safety transformers requirements). To protect the power supply, it is recommended to install a fuse.

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.



	Acquired signal	Up to	Connection modality	Sensors power supply
Α	Voltage or current type	4 passive sensors	3-wire	Vaux (*)
В	Voltage type	4 sensors as voltage generator	2-wire	/
С	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).

BA	BAUD-RATE (Dip-Switches: DIP-SWITCH STATUS)								
1	2	Me	Meaning						
		Bau	Baud-rate=9600 Baud						
	٠	Βαι	ud-ra	te=19	9200	Baud			
٠		Βαι	ud-ra	te=38	3400	Baud			
٠	•	Βαι	ud-ra	te=57	7600	Baud			
AD	DRE	SS (I	Dip-S	Switc	hes:	DIP-SWITCH STATUS)			
3	4	5	6	7	8	Meaning			
			Address and Baud-Rate are acquired from memory(EEPROM)						
					•	Address=1			
				•		Address=2			
				•	٠	Address=3			
			٠			Address=4			
Х	Х	Х	Х	Х	Х				
٠	•	٠	٠	•	•	Address=63			
RS	RS485 TERMINATOR (Dip-Switches: DIP-SWITCH STATUS)								
9	10	Me	aning)					
		RS	485 t	ermir	nator	disabled			
	٠	RS485 terminator enabled							

INPUT TYPE (Dip-Switches: ANALOG INPUTS)					OG 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
			٠					IN 4=current

RS485 Register table

Name	Range	Interpretation of register	R/W	Default	Address
MachineID	1	MSB, LSB	R		40001
	Id_Code (Module ID)			0x07	Bit [15:8]
	Ext_Rev (Module version)				Bit [7:0]
FWREV	1	Word	R		40035
	Firmware Code				
Status	1	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			1	Bit 9
	Input 1 overflow: 0=no; 1=yes			/	Bit 8
	Save configuration in memory (EEP	ROM): 0=deacti	vated:	0	Bit 7
	1=activated	- ,	,	-	
	These bits aren't used			/	Bit [6:2]
	Reset of filter: 0=deactivated; 1=activ		0	Bit 1	
	Reset of module: 0=deactivated; 1=a		0	Bit 0	
Errors	/ Bit		R		40036
	These bits aren't used			/	Bit[15:10]
	Setting error (in memory): 0=there is			/	Bit 9
	Calibration error (in memory): 0=ther	re isn't;1=there is	6	1	Bit 8
	These bits aren't used			/	Bit [7:1]
Forflog	ADC error: 0=there isn't; 1=there is			/	Bit 0
Eprflag	These bits aren't used	B, LSB	R/W	1	40003
		dd pority		0	Bit [15:5] Bit 4
	Parity for RS485: 0=even parity; 1=o Parity for RS485: 0=there isn't; 1=the			0	Bit 3
	Delay for RS485 (delay of communic			0	Bit 2
	pauses between the end of Rx mess		t of		
	Tx message): 0=there isn't; 1=there i				
	Sampling time: 0=120 ms; 1=60 ms	-		0	Bit 1
	Compatibility with: 0=Z-4AI-0; 1=Z-4A	AI-1		1	Bit 0
Baudrate		B, LSB	R/W		40002
Address					
	Baud-rate for RS485 (baud-rate			38400	Bit [15:8]
	parameters are configurated by				
	0=4800; 1=9600; 2=19200;	3=38400; 4=5	57600;		
	5=115200; 6=1200; 7=2400				
	Address for RS485(address of mod			1	Bit [7:0]
	configurated by memory modal 0xFF=255	ity):irom 0x01=	=1 to		
INType	/ Bit		R/W		40025
	These bits aren't used			1	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	<u>[1]</u>			
IN 1	Between: IN 1-NSS, IN 1- Wor	rd	R		40017
	NES (if bit 40003.0=0);				
	unchangeable between:				
	0,10000 (if bit40003.0=1)				
IN1-FILTER	Normalized measure of input 1 Between: 0, 6 Wor	rd.	R/W	/	40004
	Between: 0, 6WorFilter applied to input 1 signal: 0=dea			0	40004
	min-value; 6=filtering max-value		ing	0	
IN 1-ESS	±10000 [mV] (if voltage), Wor	rd l	R/W		40012
	±20000 [μA] (if current)				10012
	Electrical Start Scale (E.S.S.) of input	ut 1 [mV or µA]		0 [mV]	
IN 1-EES	±10000 [mV] (if voltage), Wor		R/W		40008
	±20000 [µA] (if current)				
	Electrical End Scale (E.E.S.) of input	t 1 [mV or µA]		10000	
				[mV]	
IN 1-NSS	±32000 Wor		R/W		40030
	Normalized Start Scale (N.S.S.) of in			0	
IN 1-NES	±32000 Wor		R/W		40026
	Normalized End Scale (N.E.S.) of inp	out 1		10000	
1				1	1

$\begin{tabular}{ c c c c c } & $IN 2-$ & $IN 2-$ & $Word & R & 4001 \\ \hline NES (if bit 40003.0=0); & $unchangeable & between: $0,10000$ (if bit40003.0=1) & 10000 (if corrent) & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 & 10000 (mV] (if voltage), & $Word & R/W & 40000 & 10000 &$	95 3
$\begin{array}{ c c c c c c c c } \hline IN2-FILTER & Between: 0, 6 & Word & R/W & 4000 \\ \hline Filter applied to input 2 signal: 0=deactivated; 1=filtering & / & & & & & & & & & & & & & & & & & $	3
Filter applied to input 2 signal: 0=deactivated; 1=filtering min-value; 6=filtering max-valueIN 2-ESS±10000 [mV] (if voltage), ±20000 [µA] (if current)WordR/W4001Electrical Start Scale (E.S.S.) of input 2 [mV or µA]0 [mV]4001IN 2-EES±10000 [mV] (if voltage), ±20000 [µA] (if current)WordR/W4000Electrical Start Scale (E.S.S.) of input 2 [mV or µA]0 [mV]4000Electrical End Scale (E.E.S.) of input 2 [mV or µA]1000010000	3
min-value; 6=filtering max-value Word R/W 4001 IN 2-ESS ±10000 [mV] (if voltage), ±20000 [μA] (if current) Word R/W 4001 Electrical Start Scale (E.S.S.) of input 2 [mV or μA] 0 [mV] 0 [mV] 4001 IN 2-EES ±10000 [mV] (if voltage), ±20000 [μA] (if current) Word R/W 4000 Electrical End Scale (E.E.S.) of input 2 [mV or μA] 10000 10000 10000 10000	
±20000 [μA] (if current) Δ Δ 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 4000 Electrical End Scale (E.E.S.) of input 2 [mV or μA] 10000 10000 10000 10000	
IN 2-EES ±10000 [mV] (if voltage), ±20000 [μA] (if current) Word R/W 4000 Electrical End Scale (E.E.S.) of input 2 [mV or μA] 10000 1000	0
±20000 [μA] (if current) Image: Contract of the second seco	0
	9
[mV]	
IN 2-NSS ±32000 Word R/W 4003	1
Normalized Start Scale (N.S.S.) of input 2 0	
IN 2-NES ±32000 Word R/W 4002	7
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)	9
Normalized measure of input 3	
IN3-FILTER Between: 0, 6 Word R/W 4000	6
Filter applied to input 3 signal: 0=deactivated; 1=filtering / min-value; 6=filtering max-value	
IN 3-ESS ±10000 [mV] (if voltage), Word R/W 4001 ±20000 [μA] (if current)	4
Electrical Start Scale (E.S.S.) of input 3 [mV or µA] 0 [mV]	
IN 3-EES ±10000 [mV] (if voltage), Word R/W 4001 ±20000 [μA] (if current)	0
Electrical End Scale (E.E.S.) of input 3 [mV or μA] 10000 [mV]	
IN 3-NSS ±32000 Word R/W 4003	2
Normalized Start Scale (N.S.S.) of input 3 0	
IN 3-NES ±32000 Word R/W 4002	8
Normalized End Scale (N.E.S.) of input 3 10000	
<u>INPUT 4</u>	
IN 4 Between: IN 4-NSS, IN 4- Word R 4002 NES (if bit 40003.0=0); unchangeable between: 0,10000 (if bit40003.0=1)	0
Normalized measure of input 4	
IN4-FILTER Between: 0, 6 Word R/W 4000 Filter applied to input 4 signal: 0=deactivated; 1=filtering / / /	7
min-value; 6=filtering max-value IN 4-ESS ±10000 [mV] (if voltage), Word R/W 4001	5
±20000 [μA] (if current) Δ 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 4001	1
Electrical End Scale (E.E.S.) of input 4 [mV or μA] 10000 [mV]	
IN 4-NSS ±32000 Word R/W 4003	3
Normalized Start Scale (N.S.S.) of input 4 0	
IN 4-NES ±32000 Word R/W 4002	9

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:

		Conversion	Conversion
		time 60 ms	time 120 ms
Filter		Response time	e at 62% of
Value		final value [s]	
			0.40
	0	0,24	0,48
	1	0,48	0,96
	I	0,40	0,30
	2	0,72	1,44
			·
	3	1,2	2,4
	4	2,6	5,3
			10
	5	5	10
	6	10	20
	0	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.