USER MANUAL

Z-4RTD2

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Seneca Z-PC Line module: **Z-4RTD-2**

The Z-4RTD-2 module acquires up to 4 RTD signals (through 4 inputs regardless and isolated with each other) e it converts them it to a temperature or resistance measure.

General characteristics

- It's possible to choose if the input is RTD-type: PT100, NI100, PT500, PT1000
- It's possible to choose the RTD-measure type: temperature (°C) or resistance (Ω) (for each input)
- It's possible to choose if RTD-wire connection: 2-wire, 3-wire or 4-wire (for each input)
- Wire measure and wire resistance compensation (if 3-wire connection)
- Configuration of a filter applied to each input signal
- It is possible to configure the module (node) address and baud-rate by Dip-Switches
- It is possible to add/remove the module to/from RS485-bus without disconnecting the
- communication or power supply
- It is possible to switch automatically RS485 to RS232 or vice versa

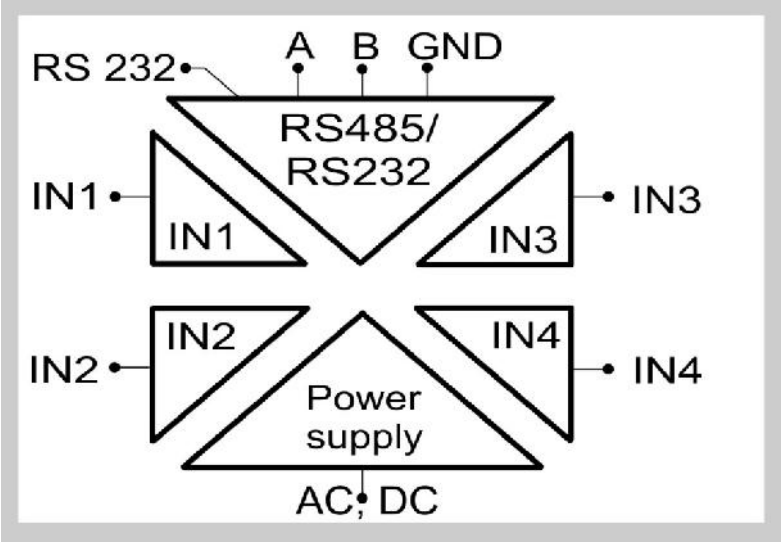
Features

INPUT	
Number	1
Resolution	13bit (if filter=0-1); 14 bit (if filter=2-7)
Sampling frequency	Configurable between: 48Hz (if the filter is deactivated), 20Hz (if filter=1), 11Hz (if filter=2-7)
Rejection	50Hz or 60 Hz
Filter (0-7)	IIR and FIR; configurable between: 0 (deactivated), from 1(min) to 7(max)
Accuracy	Initial:0.05% of 350 Ω (PT100, NI100 end scale); 0.05% of 1850 Ω (PT500, PT1000 end scale)
	Linearity:0.025% of 350 Ω (PT100, NI100 end scale); 0.025% of 1850 Ω (PT500, PT1000 end scale)
	Thermal stability: < 50 ppm/°K
	EMI: < 1%
Protection	This module provides inputs protection against the ESD (up to 4kV)

	Temperature range	**Resistance range (RTD=Rx)**	**Burn-out error if (RTD=Rx)**	**Max wire resistance (Rf)**	**Rated current through RTD**
RTD:PT100-type input (EN 60751)	From -200°C to 650°C	From 18.5Ω to 330Ω	Rx<18 Ω Rx>341 Ω	20 Ω	875µA
RTD:NI100-type input (DIN 43760)	From -60°C to 250°C	From 69Ω to 295Ω	Rx<60 Ω Rx>301 Ω	30 Ω	875µA
RTD:PT500-type input (EN 60751)	From -200°C to 750°C	From 92.5Ω to 1800Ω	Rx<90 Ω Rx>1851 Ω	30 Ω	333µA
RTD:PT1000-type input (EN 60751)	From -200°C to 210°C	From 185Ω to 1850Ω	Rx<180 Ω Rx>1851 Ω	30 Ω	333µA

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CONNECTIONS	
RS485 interface	IDC10 connector for DIN 46277 rail (back-side panel)
RS232 interface	Jack stereo 3.5mm connector: plugs into COMport
1500 Vac ISOLATIONS	
	Between: power supply, ModBUS RS485/RS232, input 1, input 2, input 3, input 4



POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Max: 0.7W

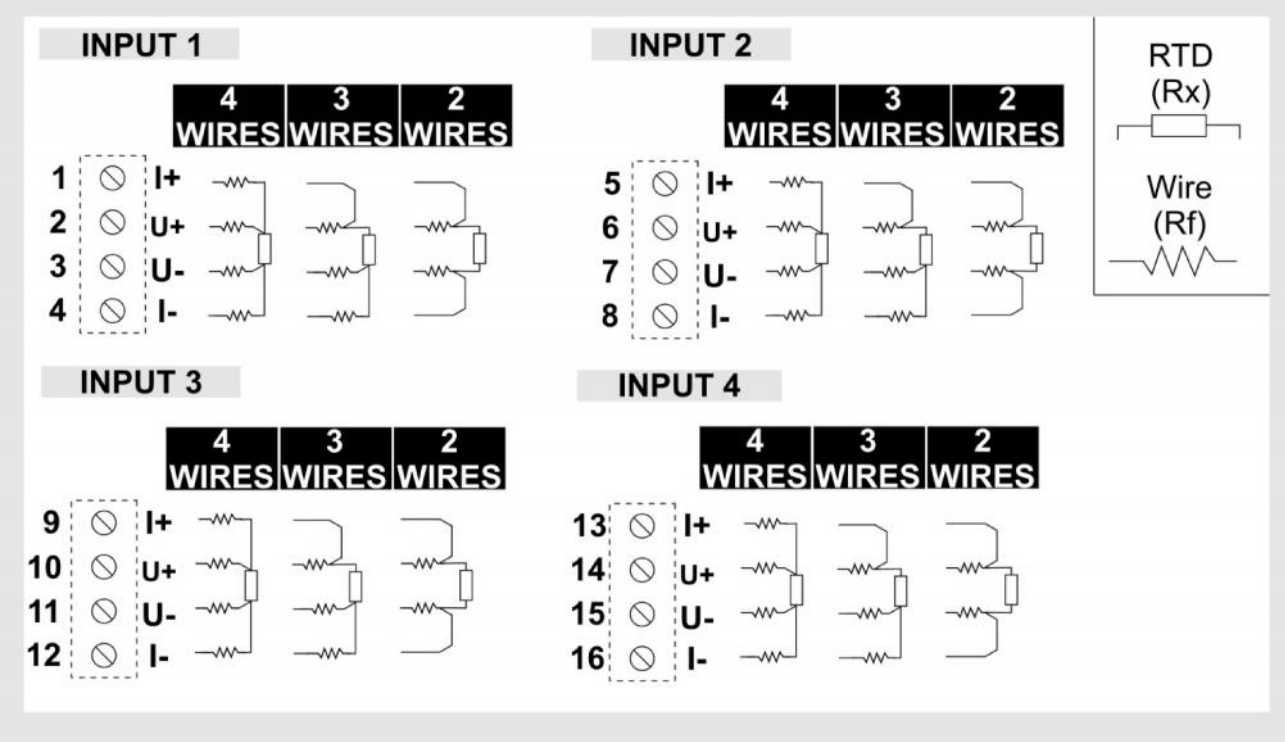
The power supply transformer necessary to supply the module must comply with EN60742 (Isolated transformers and safety transformers requirements). To protect the power supply, it is recommended to install a fuse.

MODULE CASE	
Case-type	PBT, black
Dimensions	Width W = 100 mm, Height H = 112mm, Depth D = 17.5 mm
Terminal board	Removable 4-way screw terminals: pitch 3.5mm, sections 2.5mm^2
Protection class	IP20 (International Protection)

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Input connections

It is possible to connect to Z-4RTD-2 module Platinum or Nichel thermoresistances with 2,3,4 wires.



RTD-wires connection	Distance between RTD and module	Wires compensation	RTD measure (°C-t) depends/does not depend on wire-resistances
2 wires	<10m	NO	Depends
3 wires	>10m	YES (the compensation is performed on the average value of wire resistances)	Does not depend (if the wire resistances are equal)
4 wires	>10m	NO	Does not depend (max accuracy)

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).

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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

RS485 Register table

Name	Range	Interpretation of register	R/W	Default	Address
MachineID	/	MSB, LSB	R		40001
	Id_Code (Module ID)			0x16	Bit [15:8]
	Ext_Rev (Module version)				Bit [7:0]
Errors	/	Bit	R		40002
	Input 1 error: 0=there isn't; 1=there is			/	Bit 15
	Input 2 error: 0=there isn't; 1=there is			/	Bit 14
	Input 3 error: 0=there isn't; 1=there is			/	Bit 13
	Input 4 error: 0=there isn't; 1=there is			/	Bit 12
	Input 1 burn-out error: 0=there isn't; 1=there is			/	Bit 11
	Input 2 burn-out error: 0=there isn't; 1=there is			/	Bit 10
	Input 3 burn-out error: 0=there isn't; 1=there is			/	Bit 9
	Input 4 burn-out error: 0=there isn't; 1=there is			/	Bit 8
	Input 1 temperature-acquired error: 0=there isn't; 1=there is			/	Bit 7
	Input 2 temperature-acquired error: 0=there isn't; 1=there is			/	Bit 6
	Input 3 temperature-acquired error: 0=there isn't; 1=there is			/	Bit 5
	Input 4 temperature-acquired error: 0=there isn't; 1=there is			/	Bit 4
	Initialization error for input 1: 0=there isn't; 1=there is			/	Bit 3
	Initialization error for input 2: 0=there isn't; 1=there is			/	Bit 2
	Initialization error for input 3: 0=there isn't; 1=there is			/	Bit 1

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	Initialization error for input 4: 0=there isn't; 1=there is			/	Bit 0
Errors IN1&IN2	/	Bit	R		40025
	Supply-voltage error for input1: 0=there isn't; 1=there is			/	Bit 15
	RS485-reception error for input1: 0=there isn't; 1=there is			/	Bit 14
	Memory error (EEPROM) for input 1: 0=there isn't; 1=there is			/	Bit 13
	This bit isn't used			/	Bit 12
	RTD (Rx) measure error for input 1: 0=there isn't; 1=there is			/	Bit 11
	Wire-resistance (Rf) measure error for input 1 (if 3-wires connection): 0=there isn't; 1=there is			/	Bit 10
	Acquisition error for input 1: 0=there isn't; 1=there is			/	Bit 9
	CRC EEPROM error for input 1: 0=there isn't; 1=there is. If "1", it is not possible to save in memory (EEPROM)			/	Bit 8
	Supply-voltage error for input2: 0=there isn't; 1=there is			/	Bit 7
	RS485-reception error for input2: 0=there isn't; 1=there is			/	Bit 6
	Memory error (EEPROM) for input 2: 0=there isn't; 1=there is			/	Bit 5
	This bit isn't used			/	Bit 4
	RTD (Rx) measure error for input 2: 0=there isn't; 1=there is			/	Bit 3
	Wire-resistance (Rf) measure error for input 2 (if 3-wires connection): 0=there isn't; 1=there is			/	Bit 2
	Acquisition error for input 2: 0=there isn't; 1=there is			/	Bit 1
	CRC EEPROM error for input 2: 0=there isn't; 1=there is. If "1", it is not possible to save in memory (EEPROM)			/	Bit 0
Errors IN3&IN4	/	Bit	R		40026
	Supply-voltage error for input3: 0=there isn't; 1=there is			/	Bit 15
	RS485-reception error for input3: 0=there isn't; 1=there is			/	Bit 14
	Memory error (EEPROM) for input 3: 0=there isn't; 1=there is			/	Bit 13
	This bit isn't used			/	Bit 12
	RTD (Rx) measure error for input 3: 0=there isn't; 1=there is			/	Bit 11
	Wire-resistance (Rf) measure error for input 3 (if 3-wires connection): 0=there isn't; 1=there is			/	Bit 10
	Acquisition error for input 3: 0=there isn't; 1=there is			/	Bit 9
	CRC EEPROM error for input 3: 0=there isn't; 1=there is. If "1", it is not possible to save in memory (EEPROM)			/	Bit 8
	Supply-voltage error for input4: 0=there isn't; 1=there is			/	Bit 7
	RS485-reception error for input4: 0=there isn't; 1=there is			/	Bit 6
	Memory error (EEPROM) for input 4: 0=there isn't; 1=there is			/	Bit 5
	This bit isn't used			/	Bit 4
	RTD (Rx) measure error for input 4: 0=there isn't; 1=there is			/	Bit 3
	Wire-resistance (Rf) measure error for input 4 (if 3-wires connection): 0=there isn't; 1=there is			/	Bit 2
	Acquisition error for input 4: 0=there isn't; 1=there is			/	Bit 1
	CRC EEPROM error for input 4: 0=there isn't; 1=there is. If "1", it is not possible to save in memory (EEPROM)			/	Bit 0
Configuration	/	Bit	R/W		40041
	Floating point (32bits) registers interpretation. If bit 40041.15=0, FP32bit_MSW is most significant word of 32bits registers and FP32bit_LSW is less significant word of 32bit registers; if bit40041.15=1, FP32bit_LSW is most			0	Bit 15

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	significant word of 32bits registers and FP32bit_MSW is less significant word of 32bit registers				
	These bits aren't used			/	Bit [14:8]
	LED ERR status to signal if there is input 1 error (see bit40002.15): 0=LED ERR "ON" means that there is input 1 error; 1=LED ERR is regardless of input 1 error			0	Bit 7
	LED ERR status to signal if there is input 2 error (see bit40002.14): 0=LED ERR "ON" means that there is input 2 error; 1=LED ERR is regardless of input 2 error			0	Bit 6
	LED ERR status to signal if there is input 3 error (see bit40002.13): 0=LED ERR "ON" means that there is input 3 error; 1=LED ERR is regardless of input 3 error			0	Bit 5
	LED ERR status to signal if there is input 4 error (see bit40002.12): 0=LED ERR "ON" means that there is input 4 error; 1=LED ERR is regardless of input 4 error			0	Bit 4
	Module behavior if there is input 1 error: 0=register 40042 is overwritten in 40003 (word register) and in 40007,40008 (floating point register); 1=content of register 40003 (word) and 40007,40008(FP) is the last measure acquired through input 1 correctly			0	Bit 3
	Module behavior if there is input 2 error: 0=register 40043 is overwritten in 40004 (word register) and in 40009,40010(floating point register); 1= content of register 40004 (word) and 40009,40010(FP) is the last measure acquired through input 2 correctly			0	Bit 2
	Module behavior if there is input 3 error: 0=register 40044 is overwritten in 40005 (word register) and in 40011,40012(floating point register); 1= content of register 40005 (word) and 40011,40012(FP) is the last measure acquired through input 3 correctly			0	Bit 1
	Module behavior if there is input 4 error: 0=register 40045 is overwritten in 40006 (word register) and in 40013,40014 (floating point register); 1= content of register 40006 (word) and 40013,40014(FP) is the last measure acquired through input 4 correctly			0	Bit 0
Baudrate Delay	Delay: from 0x00=0 to 0xFF=255	MSB, LSB	R/W		40036
	Baud-rate for RS485 (baud-rate of module/node if parameters are configurated by memory modality): 0=4800; 1=9600; 2=19200; 3=38400; 4=57600; 5=115200; 6=1200; 7=2400			38400	Bit [15:8]
	Delay for RS485 (delay of communication response: pauses between the end of Rx message and the start of Tx message)			0	Bit [7:0]
Address Parity	Address: from 0x01=1 to 0xFF=255	MSB, LSB	R/W		40035
	Address for RS485 (address of module/node if parameters are configurated by memory modality)			1	Bit [15:8]
	Parity for RS485: 0=there isn't; 1=even parity; 2=odd parity			0	Bit [7:0]
Reset	0xCCCC	Word	R/W		40029
	Reset of module, if reg.40029=0xCCCC			/	
INPUT 1					
IN1 Flags	/	Bit	R/W		40037
	These bits aren't used			/	Bit [15:8]
	RTD-type input. If bit40037.[7:6]=0b00: PT100; if bit40037.[7:6]=0b01: NI100; if bit40037.[7:6]=0b10: PT500; if bit40037.[7:6]=0b11: PT1000			0b00	Bit [7:6]
	Input measure type: 0=temperature; 1=resistance			0	Bit 5
	RTD connection type: 2 or 4 wires (if bit40037.4=0), 3			0	Bit 4

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	wires (if bit40037.4=1)				
	Rejection: 0=50Hz; 1=60Hz			0	Bit 3
	Filter applied to acquired input. To know the configurations of bit40037.[2:0], see table1			0b010	Bit [2:0]
IN1	/	Word	R		40003
	Measure of input 1 [°C/10] (if bit40037.5=0), [Ω/100] (if bit40037.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40037.5=1 and RTD-type is PT1000, PT500)			/	
IN1 MSW		FP32bit_MSW	R		40007
IN1 LSW		FP32bit_LSW	R		40008
	Floating point measure of input 1 [°C] (if bit40037.5=0), [Ω] (if bit40037.5=1 and RTD-type is PT100, NI100), [Ω] (if bit40037.5=1 and RTD-type is PT1000, PT500). To interpret the FP32bit register, see bit40041.15			/	
IN1 wire		Word	R		40016
	Wire-connection measure of input 1 [mΩ]			/	
IN1 Fault	Between: -32000, 32000 (if temperature); 0, 32000 (if resistance)	Word	R/W		40042
	Fault value of input 1 [°C/10] (if bit40037.5=0), [Ω/100] (if bit40037.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40037.5=1 and RTD-type is PT1000, PT500).			8500	
INPUT 2					
IN2 Flags	/	Bit	R/W		40038
	These bits aren't used			/	Bit [15:8]
	RTD-type input. If bit40038.[7:6]=0b00: PT100; if bit40038.[7:6]=0b01: NI100; if bit40038.[7:6]=0b10: PT500; if bit40038.[7:6]=0b11: PT1000			0b00	Bit [7:6]
	Input measure type: 0=temperature; 1=resistance			0	Bit 5
	RTD connection type: 2 or 4 wires (if bit40038.4=0), 3 wires (if bit40038.4=1)			0	Bit 4
	Rejection: 0=50Hz; 1=60Hz			0	Bit 3
	Filter applied to acquired input. To know the configurations of bit40038.[2:0], see table1			0b010	Bit [2:0]
IN2	/	Word	R		40004
	Measure of input 2 [°C/10] (if bit40038.5=0), [Ω/100] (if bit40038.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40038.5=1 and RTD-type is PT1000, PT500)			/	
IN2 MSW		FP32bit_MSW	R		40009
IN2 LSW		FP32bit_LSW	R		40010
	Floating point measure of input 2 [°C] (if bit40038.5=0), [Ω] (if bit40038.5=1 and RTD-type is PT100, NI100), [Ω] (if bit40038.5=1 and RTD-type is PT1000, PT500). To interpret the FP32bit register, see bit40041.15			/	
IN2 wire		Word	R		40017
	Wire-connection measure of input 2 [mΩ]			/	
IN2 Fault	Between: -32000, 32000 (if temperature); 0, 32000 (if resistance)	Word	R/W		40043
	Fault value of input 2 [°C/10] (if bit40038.5=0), [Ω/100] (if bit40038.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40038.5=1 and RTD-type is PT1000, PT500).			8500	
INPUT 3					
IN3 Flags	/	Bit	R/W		40039
	These bits aren't used			/	Bit [15:8]
	RTD-type input. If bit40039.[7:6]=0b00: PT100; if bit40039.[7:6]=0b01: NI100; if bit40037.[7:6]=0b10: PT500; if bit40039.[7:6]=0b11: PT1000			0b00	Bit [7:6]
	Input measure type: 0=temperature; 1=resistance			0	Bit 5

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	RTD connection type: 2 or 4 wires (if bit40039.4=0), 3 wires (if bit40039.4=1)			0	Bit 4
	Rejection: 0=50Hz; 1=60Hz			0	Bit 3
	Filter applied to acquired input. To know the configurations of bit40039.[2:0], see table1			0b010	Bit [2:0]
IN3	/	Word	R		40005
	Measure of input 3 [°C/10] (if bit40039.5=0), [Ω/100] (if bit40039.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40039.5=1 and RTD-type is PT1000, PT500)			/	
IN3 MSW		FP32bit_MSW	R		40011
IN3 LSW		FP32bit_LSW	R		40012
	Floating point measure of input 1 [°C] (if bit40039.5=0), [Ω] (if bit40039.5=1 and RTD-type is PT100, NI100), [Ω] (if bit40039.5=1 and RTD-type is PT1000, PT500). To interpret the FP32bit register, see bit40041.15			/	
IN3 wire		Word	R		40018
	Wire-connection measure of input 3 [mΩ]			/	
IN3 Fault	Between: -32000, 32000 (if temperature); 0, 32000 (if resistance)	Word	R/W		40044
	Fault value of input 3 [°C/10] (if bit40039.5=0), [Ω/100] (if bit40039.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40039.5=1 and RTD-type is PT1000, PT500).			8500	
INPUT 4					
IN4 Flags	/	Bit	R/W		40040
	These bits aren't used			/	Bit [15:8]
	RTD-type input. If bit40040.[7:6]=0b00: PT100; if bit40040.[7:6]=0b01: NI100; if bit40040.[7:6]=0b10: PT500; if bit40040.[7:6]=0b11: PT1000			0b00	Bit [7:6]
	Input measure type: 0=temperature; 1=resistance			0	Bit 5
	RTD connection type: 2 or 4 wires (if bit40040.4=0), 3 wires (if bit40040.4=1)			0	Bit 4
	Rejection: 0=50Hz; 1=60Hz			0	Bit 3
	Filter applied to acquired input. To know the configurations of bit40040.[2:0], see table1			0b010	Bit [2:0]
IN4	/	Word	R		40006
	Measure of input 4 [°C/10] (if bit40040.5=0), [Ω/100] (if bit40040.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40040.5=1 and RTD-type is PT1000, PT500)			/	
IN4 MSW		FP32bit_MSW	R		40013
IN4 LSW		FP32bit_LSW	R		40014
	Floating point measure of input 4 [°C] (if bit40040.5=0), [Ω] (if bit40040.5=1 and RTD-type is PT100, NI100), [Ω] (if bit40040.5=1 and RTD-type is PT1000, PT500). To interpret the FP32bit register, see bit40041.15			/	
IN4 wire		Word	R		40019
	Wire-connection measure of input 4 [mΩ]			/	
IN4 Fault	Between: -32000, 32000 (if temperature); 0, 32000 (if resistance)	Word	R/W		40045
	Fault value of input 4 [°C/10] (if bit40040.5=0), [Ω/100] (if bit40040.5=1 and RTD-type is PT100, NI100), [Ω/10] (if bit40040.5=1 and RTD-type is PT1000, PT500).			8500	

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TABLE 1 – CONFIGURATIONS FOR FILTER APPLIED TO ACQUIRED INPUT IN1 (bit40037.[2:0]), IN2 (bit40038.[2:0]), IN3 (bit40039.[2:0]), IN4 (bit40040.[2:0])			
Bit [2:0]	Filter type	Propagation time (if IN<T)	Propagation time (if IN>T)
0b000	Deactivated	45ms	45ms
0b001	Average (13bits)	236ms	103ms
0b010	Average (14bits)	405ms	179ms
0b011	Average + exp (14bits)	1s	179ms
0b100	Average + exp (14bits)	3s	179ms
0b101	Average + exp (14bits)	8s	179ms
0b110	Average + exp (14bits)	24s	179ms
0b111	Average + exp (14bits)	72s	179ms

Threshold values T: PT100, T=8°C; NI100, T=5°C; PT500, T=9°C; PT1000, T=5°C.

Propagation time: interval time between a step change of input electrical signal and corresponding change of measure in register (at 115kBaud). The propagation times shown in table 1 refer to 50Hz rejection; to obtain the propagation times refer to 60Hz rejection, divide them for 1.2.

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
	Constant light	Module failure
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
	Constant light	Module failure

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.

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