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IN, OUT1, OUT2, power supply are isolated (1500Vac)

IN, OUT1, OUT2 are:

- Analog and universal
- Setting by Dip-Switches

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2. PRELIMINARY WARNINGS

- Before carrying out any operation it's mandatory to read all the content of this user Manual. Only electrical-skilled technicians can use the module described in this user Manual.
- Only the Manufacturer is authorized to repair the module or to replace damaged components.
- No warranty is guaranteed in connection with faults resulting from improper use, from modifications or repairs carried out by Manufacturer-unauthorised personnel on the module, or if the content of this user Manual is not followed.

3. DESCRIPTION AND CHARACTERISTICS

3.1 MODULE DESCRIPTION
The Z170REG module acquires 1 universal input signal and converts it to an analog format, sent through 2 universal output signals (regardless and isolated with each other).

3.2 GENERAL CHARACTERISTICS AND FEATURES

- It's possible to choose if the input is: voltage type, current type, potentiometer type, thermocouple (TC) type, RTD (Resistance Temperature Detector) type
- It's possible to choose if each output is: voltage type, active/passive current type
- 1500 Vac insulation between: input, power supply, output 1 and output 2 (figure 1)
- It's possible to power the sensor if input is in current type modality (max17V)
- It's possible to configure by Dip-Switch or by software (Easy, available on www.seneca.it)
- modality: input-type, outputs-type, start/end scale of each selected input and outputs-type
- It's possible to configure by software (Easy): input filter, rejection, burn-out, etc.

4. TECHNICAL SPECIFICATIONS

4.1 INPUTS	
Number	1
Resolution	14 bits
Sampling time	Configurable between: 5 ms («Fast» rejection=max velocity), 16.66 ms (rejection to 60Hz) or 20 ms (rejection to 50Hz)
Filter	Level configurable between: 0(no filter is applied) - 19
Response time	Sampling time + 6 ms
Voltage-type IN (1)	
Scale range is configurable: from 0V to 10V. Input impedance: 120kΩ. Automatic detection if a over-scala input occurs	
Current-type IN (mA-passive module/mA-active module) (1)	
Scale range is configurable: from 0mA to 20mA. Internal shunt: 50Ω. It's possible to power the sensor by itself (mA-passive module) or module (mA-active module) using #7 screw terminal (max 25mA to max 17V short-circuit protected). Automatic detection if a over-scala input occurs	
Potentiometer-type IN (1)	
Scale range is configurable: from 1 kΩ to 100 kΩ (with parallel resistor R _e = 330 Ω to connect externally). Excitation current: 1 mA. Input impedance: > 5 MΩ. Automatic detection if a over-scala input occurs	
Thermocouple-type IN (1)	
For TC type: J, K, R, S, T, B, E, N. Input impedance: > 5 MΩ. Automatic detection if a burn-out occurs	
RTD-type IN (1)	
For RTD type: PT100, PT500, PT1000, NI100. Resistance measure (for 2, 3, 4-wires connection) and wire-resistance measure. Excitation current: 1.1 mA (PT100) and 0.11 mA (PT1000, PT500). Automatic detection if a burn-out occurs	

Errors related to measuring range	Accuracy	Thermal stability	Linearity error	EMI
Voltage or current- input type	0.1%	0.01%/°K	0.05%	<1% (2)
TC- input type: J, K, E, T, N	0.1%	0.01%/°K	0.2°C	<1% (2)
TC- input type: R, S	0.1%	0.01%/°K	0.5°C	<1% (2)
TC- input type: B (3)	0.1%	0.01%/°K	1.5°C	<1% (2)
Cold junction compensation (for TC- input type)	2°C between 0-50°C			
RTD- input type (4)	0.1%	0.01%/°K	0.02% (if t>0°C) / 0.05% (if t<0°C)	<1% (5)

- (1) For the input scale ranges, see tables 3-4 (description of all start/end-scale settings by Dip-Switches modality for each selected input type)
- (2) Influence of wire resistance: 0.1 uV/Ω
- (3) Output zero if t < 400°C
- (4) For RTD type: PT100, PT500, PT1000, NI100. All the errors have to be calculated with reference to resistive value
- (5) Influence of wire resistance: 0.005 %/Ω, max 20 Ω

4.2 OUTPUTS	
Number	2
Resolution	14 bits
Signal-amplitude limiting	The output signal can be amplitude-limited by a «limiter» (for each output)
Voltage-type OUT	Configurable between: 0-10 V (minimum resistance that can be connected: 20kΩ)
Current-type OUT (active or passive)	Configurable between: 0-20 mA (maximum resistance that can be connected: 600 Ω, max 13V). «Active current»=the output: already powered on, needs to be connected to the passive module (es. multimeter); «passive current»=the output: powered off, needs to be connected to the active module (es. active input of a PLC)

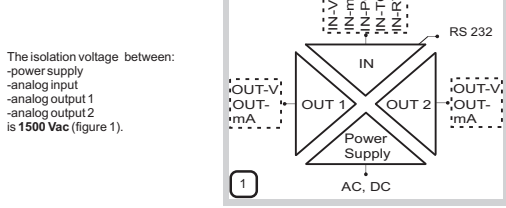
Errors related to max measuring range	Accuracy	Thermal stability	Linearity error	EMI
Voltage-type OUT (6)	0.1%	0.01%/°K	0.01%	< 1%
Current-type OUT (6) (active or passive) (6)	0.1%	0.01%/°K	0.01%	< 1%

(6) These values have to be added to the errors of the selected input.

4.3 CONNECTIONS

RS232 interface Jack stereo 3.5mm connector: plugs into COMport (front-side panel)

4.4 1500 Vac INSULATIONS



4.5 POWER SUPPLY	
Supply voltage	10 - 40 Vdc or 19 - 28 Vac (50Hz-60Hz), between 2-3 screw terminals
Power-supply unit	Class 2
Power consumption	Min: 0.5 W; Max: 2 W

The power supply transformer must comply with EN60742 (Isolated transformers and safety transformers requirements). If the module is powered by an isolated limited voltage/limited current power supply, install a 2.5A-max rated fuse.

4.6 MODULE CASE	
Box	PBT, black
Dimensions	Width W = 100 mm, Height H = 112mm, Depth D = 17.5 mm
Terminal board	Removable 3-way screw terminals: pitch 5.08mm, sections 2.5mm ²
Protection class	IP20 (International Protection)

4.6 ENVIRONMENTAL CONDITIONS	
Operating temperature	-10°C ... +65°C
Humidity	30 ... 90% to 40°C not condensing (during operation)
Max environment pollution degree	2 (during operation)
Storage temperature	-20°C ... +85°C

4.7 STANDARDS	
The module complies with the following standards:	
-EN 61000-6-4/2007 (electromagnetic emission, in industrial environment)	
-EN 61000-6-2/2006 (electromagnetic immunity, in industrial environment)	
-EN 61010-1/2001 (safety). All electrical circuits must be isolated with double isolation from other circuits with dangerous voltage.	

5. PRELIMINARY INSTRUCTIONS FOR USE

- The module is designed to be installed on DIN 46277 rail in vertical position.
- It is forbidden to place anything that could obstruct the ventilation slits. It is forbidden to install the module near heat sources.
- «Severe operating conditions» are defined as follows:
 - high power supply voltage: exceed 30 Vdc or exceed 26 Vac;
 - the module power the sensor;
 - active current-type output (the output: has already powered on, needs to be connected to passive module).
- If the modules are installed side by side, separate them by at least 5 mm in the following cases:
 - the operating temperature exceeds 45°C and at least one of the severe operating conditions exists; or
 - the operating temperature exceeds 35°C and at least two of the severe operating conditions exist.

6. ELECTRICAL CONNECTIONS

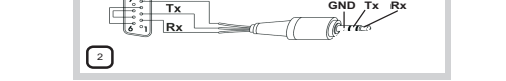
6.1 SAFETY MEASURES BEFORE USE

- Power off the module before connecting: RS232 serial interface, input, outputs.
- To satisfy the electromagnetic compliance requirements:
 - use shielded cables for signal transmission;
 - connect the shield to a earth wire used specifically for instrumentation;
 - insert space between these shielded cables and other cables used for power appliances (inverters, motors, induction ovens, etc...).

6.2 RS232 SERIAL INTERFACE

The module is designed to data interchange according to the ModBUS protocol rules, implemented by RS232 serial interface. If the module is connected to RS232 interface-port, its (unchangeable) communication parameters have a register data structure equal to 8N1.

The module has a Jack stereo connector in order to connect its to RS232-bus communication (figure 2).



6.3 CONNECTIONS

Power on the module with < 40 Vdc or < 28 Vac voltage supply. These upper limits must not be exceeded to avoid serious damage to the module.

7.2 DIP-SWITCH TABLES

The module acquires the parameters through Dip-Switches, if the module Dip-Switches are configured as shown in the following tables 1, 2, 3, 4. For whatever other Dip-Switches configuration, ALL parameters are acquired from memory, regardless of the Dip-Switches configuration.

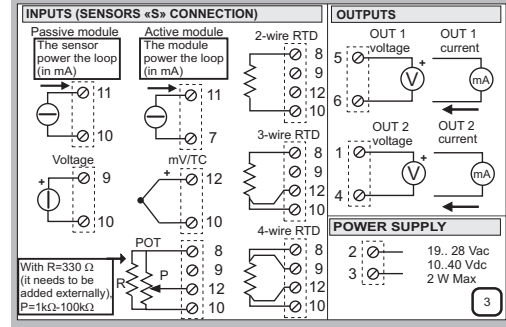
In the following tables: box without circle means Dip-Switch=0 (OFF state); box with circle means Dip-Switch=1 (ON state).

Table 1 - INPUT TYPE (Dip-Switches SW1: TYPE INPUT)

1	2	3	4	5	Meaning
					• Voltage-type input
					• Current-type input
					• Potentiometer-type input (POT)
					• Thermocouple J-type input (TC J)
					• Thermocouple K-type input (TC K)
					• Thermocouple R-type input (TC R)
					• Thermocouple S-type input (TC S)
					• Thermocouple T-type input (TC T)
					• Thermocouple B-type input (TC B)
					• Thermocouple E-type input (TC E)
					• Thermocouple N-type input (TC N)
					• PT100 (RTD)-type input: 2 wires connection
					• PT100 (RTD)-type input: 3 wires connection
					• PT100 (RTD)-type input: 4 wires connection
					• NI100 (RTD)-type input: 2 wires connection
					• NI100 (RTD)-type input: 3 wires connection
					• NI100 (RTD)-type input: 4 wires connection
					• PT500 (RTD)-type input: 2 wires connection
					• PT500 (RTD)-type input: 3 wires connection
					• PT500 (RTD)-type input: 4 wires connection
					• PT1000 (RTD)-type input: 2 wires connection
					• PT1000 (RTD)-type input: 3 wires connection
					• PT1000 (RTD)-type input: 4 wires connection

Table 2 - OUTPUT 1 AND 2 TYPE (Dip-Switches SW2: TYPE OUTPUT)

1	2	3	4	5	Meaning
					• Voltage-type output 1: 0 - 10 V
					• Voltage-type output 1: 0 - 5 V
					• Current-type output 1: 0 - 20 mA
					• Current-type output 1: 4 - 20 mA
					• Voltage-type output 2: 0 - 10 V
					• Voltage-type output 2: 0 - 5 V
					• Current-type output 2: 0 - 20 mA
					• Current-type output 2: 4 - 20 mA
					• If current-type output: active current
					• If current-type output: passive current



7. PARAMETERS FOR USE

7.1 SETTING PARAMETERS

Parameters	Modality	Options
Input type	Software/ DipSwitch	Voltage-Current-Potentiometer-TC-RTD; if Dip-Switch modality, see table 1
Input filter	Software	Activated/Deactivated; if activated: from 0 to 19
Input start/end scale	Software/ DipSwitch	If Dip-Switch modality, see tables 3-4
Output 1, 2 type	Software/ DipSwitch	Voltage-Current (active, passive); if Dip-Switch modality, see table 2
Output 1, 2 start/end scale	Software/ DipSwitch	If Dip-Switch modality, see table 2
Output 1, 2 limiters	Software	Activated/Deactivated; if deactivated, output limits are: if OUT=voltage, [0V; 10.5V]; if OUT=current, [0mA; 21mA]
Network frequency rejection/sampling time (for TC-type input Cold junction compensation)	Software	No rejection: 5ms («Fast»); 50Hz-rejection: 20ms; 60Hz-rejection: 16.66ms
Detection of input fail: over-scala input error or burn-out error	Software	Activated/Deactivated (for OUT1 and OUT2); if activated, the two «Fault values» (for each output) have to be configured

Table 3 - START-SCALE VALUES FOR SELECTED INPUT TYPE

SW1	8	Voltage	Current	POT	TC J	TC K	TC R	TC S	TC T
6	7	0 V	0 mA	0%	200 °C	200 °C	0 °C	0 °C	200 °C
		0.5 V	1 mA	10%	100 °C	100 °C	100 °C	100 °C	100 °C
		1 V	2 mA	20%	0 °C	0 °C	200 °C	200 °C	-50 °C
		2 V	3 mA	30%	100 °C	100 °C	300 °C	300 °C	0 °C
		4 V	4 mA	40%	200 °C	200 °C	400 °C	400 °C	50 °C
		5 V	5 mA	50%	300 °C	300 °C	600 °C	600 °C	100 °C
		10 V	10 mA	60%	500 °C	500 °C	800 °C	800 °C	150 °C

SW1 Table 3 - START-SCALE VALUES FOR SELECTED INPUT TYPE

6	7	8	TC B (°)	TC E	TC N	PT100	NI100	PT500	PT1000
			0 °C	-200 °C	-200 °C	-200 °C	-50 °C	-200 °C	-200 °C
			500 °C	-100 °C	-100 °C	-100 °C	-30 °C	-100 °C	-100 °C
			800 °C	0 °C	0 °C	-50 °C	-20 °C	-50 °C	-50 °C
			700 °C	100 °C	100 °C	0 °C	0 °C	0 °C	0 °C
			800 °C	150 °C	200 °C	50 °C	20 °C	50 °C	50 °C
			1000 °C	200 °C	300 °C	100 °C	30 °C	100 °C	100 °C
			1200 °C	400 °C	500 °C	200 °C	50 °C	200 °C	200 °C

SW2 Table 4 - END-SCALE VALUES FOR SELECTED INPUT TYPE

6	7	8	Voltage	Current	POT	TC J	TC K	TC R	TC S	TC T
			0.5 V	1 mA	40%	100 °C	200 °C	400 °C	400 °C	50 °C
			1 V	2 mA	50%	200 °C	400 °C	600 °C	600 °C	100 °C
			2 V	3 mA	60%	300 °C	600 °C	800 °C	800 °C	150 °C
			3 V	4 mA	70%	400 °C	800 °C	1000 °C	1000 °C	200 °C
			4 V	5 mA	80%	500 °C	1000 °C	1200 °C	1200 °C	250 °C
			5 V	10 mA	80%	800 °C	1200 °C	1400 °C	1400 °C	300 °C
			10 V	20 mA	100%	1000 °C	1300 °C	1750 °C	1750 °C	400 °C

SW2 Table 4 - END-SCALE VALUES FOR SELECTED INPUT TYPE

6	7	8	TC B	TC E	TC N	PT100	NI100	PT500	PT1000
		</							

7.4 DEFAULT CONFIGURATION

The default configuration for the communication parameters is shown in the following table.

Communication	Data structure of register	Baud-rate	Address of node
RS232	8N1	9600 (unchangeable)	1 (unchangeable)

Data structure of register equal to 8N1 means that the register is structured as follows: 8 data bits, no parity control (N), 1 stop bit.

The default configuration for the setting parameters is shown in the following table (if configuration modality by software).

Input type	Current
Input filter	Deactivated
Input Start-scale/End-scale	0 [mA]/20 [mA]
Output 1 type/Output 2 type	Active current
Output 1 and 2 Start-scale	0 [mA]
Output 1 and 2 End-scale	20 [mA]
Output 1 and 2 Limiters	Deactivated
Limit inferior for Output 1 and 2 Limiters	0 [mA]
Limit superior for Output 1 and 2 Limiters	20 [mA]
Network frequency Rejection/sampling	Deactivated/sampling time=5ms
Cold Junction compensation (for TC-type input)	Deactivated
Detection of input fail: over-scale input error (if voltage, current, potentiometer-type) or burn-out error (if TC, RTD-type)/Fault values	Deactivated/Fault values=0[mA]

Active current means output already powered on, needs to be connected to the passive module.

The default configuration for the setting parameters is shown in the following table (if configuration modality by Dip-Switches).

Input filter	Deactivated
Output 1 and 2 Limiters	Deactivated (only if current-type output 4-20mA, limiter is activated; limit inferior-superior of output:3.6-20.4mA)
Network frequency Rejection/sampling	If IN=voltage, current, potentiometer: no rejection, sampling time=5ms; if IN=TC, RTD: rejection=50Hz, sampling time=20ms
Cold Junction compensation (for TC-type input)	Activated
Detection of input fail: over-scale input error (if voltage, current, potentiometer-type) or burn-out error (if TC, RTD-type)/Fault values	If IN=voltage, current, potentiometer: deactivated; if IN=TC, RTD: activated, Fault values=output end scale+5% of output scale range

The values of setting parameters configured by Dip-Switches modality has priority over the values stored in memory EEPROM.



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8. DECOMMISSIONING AND DISPOSAL

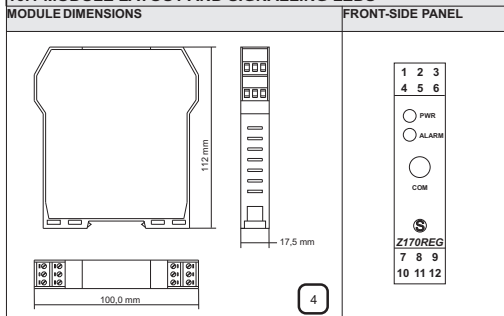
Disposal of Electrical & Electronic Equipment (Applicable throughout the European Union and other European countries with separate collections programs). This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical & electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of the product, please contact your local city office, waste disposal service of the retail store where you purchased this product.

9. PURCHASE ORDER CODE

Order code	Specification
Z170REG	DC universal duplicator / isolator
Easy Z170REG	Configuration software
PM001601	Programming cable

10. MODULE LAYOUT

10.1 MODULE LAYOUT AND SIGNALLING LEDs



In the front-side panel there are 2 LEDs and their state refers to important operating conditions of the module (figure 4).

LED	LED state	Meaning
PWR	Turned on (green light)	The module power is on
ALARM	Turned on (yellow light)	There is an alarm
	Turned off	There isn't an alarm



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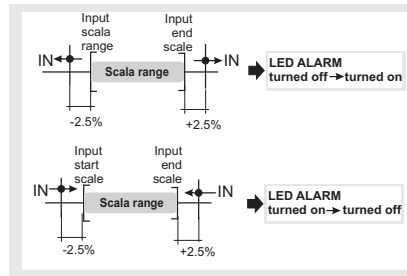
If there is an alarm, the module has at least one of the following errors:

Tipo di errore	Descrizione	Tipo di ingresso interessato
Input error	The amplitude of the acquired input signal is less than (greater than) the input start scale (end scale) or the TC/RTD sensor is damaged	Voltage, current, potentiometer, thermocouple, thermoresistance
Loss of data error		All
Input temperature-acquired error	The cold-junction internal sensor is damaged	Thermocouple

If the amplitude of the acquired input signal IN is between the input start scale and input end scale, the output is directly proportional to the input.

If the amplitude of the acquired input signal IN exceeds the interval [input start scale-2.5% of input scale range, input end scale+2.5% of input scale range], the LED ALARM switches from turned off to turned on and the software signals that there is a input error.

If the amplitude of the acquired input signal IN decreases into the interval [input start scale-2.5% of input scale range, input end scale+2.5% of input scale range], the LED ALARM switches from turned on to turned off and the software signals that there isn't a input error.



If the amplitude of the acquired input signal IN exceeds the hardware module limits too (see the following table), the software will also signal that there is a error fail.

Input type	Module hardware limits
Voltage	0V; 10.5V
Current	0mA; 21mA
Potentiometer	0; 100%
Thermocouple	If TC J: -210°C; 1200°C. If TC K: -270°C; 1370°C. If TC R: -50°C; 1760°C. If TC S: -50°C; 1760°C. If TC T: -270°C; 400°C. If TC B: 0; 1820°C. If TC E: -270°C; 1000°C. If TC N: -270°C; 1300°C
Thermoresistance	If RTD=NI100: -60°C; 250°C If RTD=PT100, RTD=PT500, RTD=PT1000: -200°C; 600°C

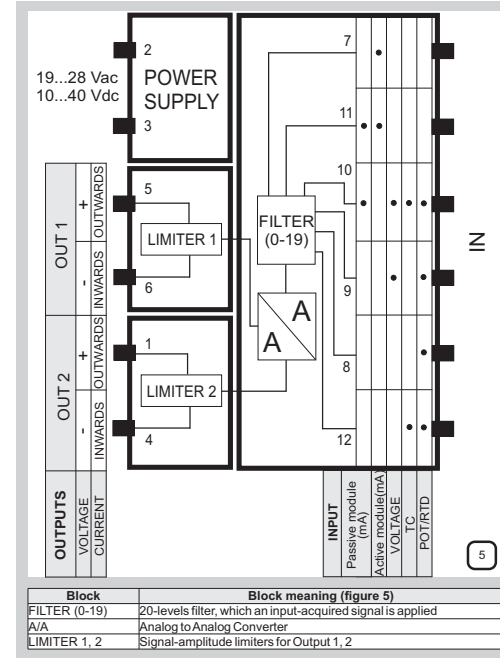
If the LED ALARM is turned on (there is a input error or there is a fail error) and if detection of input fail is activated, the module overwrites the outputs with «Fault values».



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10.2 BLOCK DIAGRAM



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