SENECA

Serie Z

EN

# Z109REG-BP

## UNIVERSAL CONVERTER WITH ISOLATED BIPOLAR OUTPUT

# Installation Manual

***Contents:***


- General specifications
- Technical specifications
- Installation rules
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CE


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Manuals and configuration software are available at www.seneca.it


CSQ IQNet ISO 9001:2008


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## GENERAL SPECIFICATIONS

- Universal input: voltage (mV⎓), current (mA⎓), thermocouples TC, thermoresistances RTD, potentiometer, rheostat, NTC.
- Measurement and re-transmission on isolated analog bipolar output, with voltage output or current.
- DIP-switch for selecting: type of input, START-END, output mode (zero elevation, scale inversion), output voltage type (mA or V ).
- Removable terminals with section of 2.5 $mm^2$
- Possibility of USB configuration.
- Sensor powered by 2 / 3 wire technique is available: 20V⎓ Max stabilised, 20mA Max with short-circuit protection (terminal 7).
- 3-point insulation: 1500V∿.
- Front panel indicating: power on, off scale or setting error and alarm status.
- Facility for programming the following through PC: START-END scale, additional input types, square root extraction, filter, burn-out etc. (See: www.seneca.it)

## TECHNICAL SPECIFICATIONS

### Universal Input

| | |
|---|---|
| **Sampling frequency** | Variable from 240 sps with 11 bit + sign resolution to 15 sps with 15 bit + sign resolution (tipical values). |
| **Filter** | The input signal filter level can be enabled and configured: from 0.5 to 60 sec. |
| **Response time** | 35 ms with 11 bit resolution, 140 ms with 16 bit resolution ( for measures: voltage, current and potentiometer) |
| **Voltage input mode** | Bipolar from 75 mV to 20 V with 9 scales, input impedance: 1 MΩ. Max resolution 15 bit + sign. |
| **Current input mode** | Bipolar up to 20 mA. Internal shunt ~50 Ω. Max resolution 1 μA. Powered sensor loop: from sensor to module (passive module) or from module to sensor(actvive module) by terminal 7 (Max 25 mA⎓ a Max 20 V⎓) with short-circuit protection. Automatic input out of range detection. |
| **thermoresistances (RTD) input mode** | RTD type: PT100, PT500, PT1000, NI100, KTY81, NTC, KTY84 -130/-150. Resistance measure 2, 3 or 4 wires and resistance wire measure. Energising current: 0.56 mA. Resolution 0.1 °C. Automatic burn-out detection. For NTC resistance value < 25kΩ. NTC, KTY81 and KTY84 configurable only by software. |
| **thermocouples (TC) input mode** | TC type: J, K, R, S, T, B, E, N. Input impedance: > 5 MΩ. Automatic burn-out's detection. Resolution 2.5 μV. |
| **Potentiometer input mode** | Excitation voltage of 300mV. Potentiometer input value from 500 Ω to 100 kΩ (a R = 500 Ω parallel circuit must be added). Automatic input out of range detection. |
| **Rheostat input** | Input rheostat value: from 500 Ω to Max 25 kΩ |

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

(1) Influence of wire resistances: 0.1 uV/Ω
(2) Output zero if t < 250°C
(3) RTD type: PT100, PT500, PT1000, NI100
All the errors have to be calculated with reference to resistive value.
(4) Influence of wire resistances: 0.005 %/Ω, max 20 Ω

| Outputs | |
|---|---|
| Channel numbers | 1 |
| Output type | Current: -20 – +20 mA, Maxium load resistance 500 Ω<br>Voltage: -10 – +10 V, minimum load resistance 1 kΩ |
| Resolution | 5 µA / 2.5 mV. |

| Errors | Accuracy | Thermal stability |
|---|---|---|
| **Voltage output** | 10 mV | 0.5mV/K |
| **Current output** | 20 µA | 1µA/K |

| Environmental conditions | |
|---|---|
| Temperature | -20 – +65°C |
| Humidity | 30 – 90% a 40°C not condensing |
| Altitude | Up to 2000m a.s.l. |
| StorageTemperature | -20 – +85°C |
| Protection degree | IP20 |
| Data Memory | EEPROM for all configuration data; storage time: 40 years. |



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## Power supply

| | |
|---|---|
| Voltage | 10 – 40 V⎓; 19 - 28 V∿ 50 – 60 Hz |
| Consumption | Max: 2W |

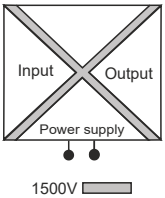
## Electrical connections

| |
|---|
| Removable 3-way screw terminals 5 mm pitch |
| MicroUSB frontal plug |

## Dimensions / Module box

| | |
|---|---|
| Dimensions | L: 100 mm; H: 112 mm; W: 17,5 mm |
| Module box | PA6, black |

## Isolations 1500 V




## Standards

**The module complies with the following standards:**

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

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

**EN61010-1** (safety).

**ADDITIONAL NOTES**:
One max 2.5A fuse must be installed near the module.

## *INSTALLATION RULES*

The module is designed to be installed, in vertical position, on DIN 46277 rail. For the best module performance and long life, avoid to place cables raceways and other objects that could obstruct ventilation slits.
Never install the modules near heat sources. We suggest to install the module in the bottom of the control panel.

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## SELECTION: INPUT / MEASURING SCALE

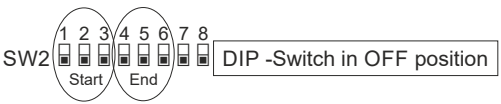
The type of input is selected by setting the SW1 DIP-Switches group at the side of the module.
Each type of input is matched with a number of beginnings scale (START) and full scale (END) selectables with the SW2 DIP-Switches group.
The frames above show the START or END values for every selected input.

| SW1 | INPUT TYPE |
|---|---|
| 1 2 3 4 | |
| | V |
| | Ω / Rheostat |
| | mA |
| | NI100 |
| | PT100 |
| | PT500 |
| | PT1000 |
| | Tc J |

| SW1 | INPUT TYPE |
|---|---|
| 1 2 3 4 | |
| | Tc K |
| | Tc R |
| | Tc S |
| | Tc T |
| | Tc B |
| | Tc E |
| | Tc N |
| | Potentiometer |

| SW2 | START |
|---|---|
| 1 2 3 | |
| | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7 |
| | 8 |

| SW2 | END |
|---|---|
| 4 5 6 | |
| | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7 |
| | 8 |




| SW2 DIP | N° | Voltage | | Resistance / Rheostat | | Current | | Potentiometer | | NI100 (RTD) | | PT100 (RTD) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | END | START | END | START | END | START | END | START | END | START | END |
| | 1 | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) |
| | 2 | 0 V | 100 mV | 0 Ω | 1 kΩ | 0 mA | 1 mA | 0 % | 40 % | -50°C | 20°C | -200°C | 50°C |
| | 3 | 400 mV | 200 mV | 0.5 kΩ | 2 kΩ | 1 mA | 2 mA | 10 % | 50 % | -30°C | 40°C | -100°C | 100°C |
| | 4 | 1 V | 500 mV | 1 kΩ | 3 kΩ | 4 mA | 3 mA | 20 % | 60 % | -20°C | 50°C | -50°C | 200°C |
| | 5 | 2 V | 1 V | 2 kΩ | 5 kΩ | -1 mA | 4 mA | 30 % | 70 % | 0°C | 80°C | 0°C | 300°C |
| | 6 | -5 V | 5 V | 5 kΩ | 10 kΩ | -5 mA | 5 mA | 40 % | 80 % | 20°C | 100°C | 50°C | 400°C |
| | 7 | -10 V | 10 V | 10 kΩ | 15 kΩ | -10 mA | 10 mA | 50 % | 90 % | 30°C | 150°C | 100°C | 500°C |
| | 8 | -20 V | 20 V | 15 kΩ | 25 kΩ | -20 mA | 20 mA | 60 % | 100 % | 50°C | 200°C | 200°C | 600°C |

| SW2 DIP | N° | PT500 (RTD) | | PT1000 (RTD) | | Thermocouple J | | Thermocouple K | | Thermocouple R | | Thermocouple S | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | START | END | START | END | START | END | START | END | START | END | START | END |
| | 1 | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) |
| | 2 | -200°C | 0°C | -200°C | 0°C | -200°C | 100°C | -200°C | 200°C | 0°C | 400°C | 0°C | 400°C |
| | 3 | -100°C | 50°C | -100°C | 50°C | -100°C | 200°C | -100°C | 400°C | 100°C | 600°C | 100°C | 600°C |
| | 4 | -50°C | 100°C | -50°C | 100°C | 0°C | 300°C | 0°C | 600°C | 200°C | 800°C | 200°C | 800°C |
| | 5 | 0°C | 150°C | 0°C | 150°C | 100°C | 400°C | 100°C | 800°C | 300°C | 1000°C | 300°C | 1000°C |
| | 6 | 50°C | 200°C | 50°C | 200°C | 200°C | 500°C | 200°C | 1000°C | 400°C | 1200°C | 400°C | 1200°C |
| | 7 | 100°C | 300°C | 100°C | 300°C | 300°C | 800°C | 300°C | 1200°C | 600°C | 1400°C | 600°C | 1400°C |
| | 8 | 150°C | 400°C | 200°C | 400°C | 500°C | 1000°C | 500°C | 1300°C | 800°C | 1750°C | 800°C | 1750°C |



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| SW2 DIP | N° | Thermocouple T | | Thermocouple B | | Thermocouple E | | Thermocouple N | |
|---|---|---|---|---|---|---|---|---|---|
| | | START | END | START | END | START | END | START | END |
| | 1 | (*) | (*) | (*) | (*) | (*) | (*) | (*) | (*) |
| | 2 | -200°C | 50°C | 0°C | 500°C | -200°C | 50°C | -200°C | 200°C |
| | 3 | -100°C | 100°C | 500°C | 600°C | -100°C | 100°C | -100°C | 400°C |
| | 4 | -50°C | 150°C | 600°C | 800°C | 0°C | 200°C | 0°C | 600°C |
| | 5 | 0°C | 200°C | 700°C | 1000°C | 100°C | 300°C | 100°C | 800°C |
| | 6 | 50°C | 250°C | 800°C | 1200°C | 150°C | 400°C | 200°C | 1000°C |
| | 7 | 100°C | 300°C | 1000°C | 1500°C | 200°C | 600°C | 300°C | 1200°C |
| | 8 | 150°C | 400°C | 1200°C | 1800°C | 400°C | 800°C | 500°C | 1300°C |

(*) START or END
are set in memory with the PC or with a programming push buttons.

**Beware:**
**DIP-switches must be set while the module is powered down, otherwise, the module may be damaged.**

## SELECTION: OUTPUT TYPE

SW2 DIP-switches group numbers 7 and 8 enable you to set the output mode: voltage or current and the output mode: normal or reversed.

| SW2 | OUTPUT TYPE |
|---|---|
| 7 | Current |
| | Voltage |

| SW2 | OUTPUT TYPE |
|---|---|
| 8 | Normal |
| | Reversed |

## SETTING START AND END AT WILL

The START and END push-buttons under the SW2 DIP-switch group allow to set the beginning and end scale at will within the scale pre-set through the dip-switches.
To obtain this facility it is necessary to use a suitable signal generator, able to furnish the desired values of beginning and end scale.
The procedure is following:

1. Set to SW1 the type of input desired, set to SW2 a START and END measurement which include the required beginning and end values.
2. Power up the module.
3. Supply a calibrator or simulator of the signal you wish to measure and re-transmit.
4. Set the required START value on the calibrator (or other instrument).
5. Press the START push-button for at least 3 sec.
The green LED on the front panel flashes to indicate the value has been stored.
6. Set the required END value on the calibrator (or other instrument)
7. Press the END push-button for at least 3 sec.
The green LED on the front panel flashes to indicate the value has been stored.
8. Cut power to the module and set to OFF position the dip-switches of group SW2,
Like in **SW2 DIP** frame: START and END values row n°1 (*).

The module is now configured for the required start and end scale.
To reprogram it (e.g. for a different type of input) repeat the whole procedure.

## FRONTAL LEDs INDICATIONS'S

| LED | STATE | MEANING OF LEDs |
|---|---|---|
| PWR Green | On | Power supply presence |
| PWR Green | Flashing (freq: 1 Flash./sec) | Out of range, Burn Out |
| PWR Green | Flashing (freq ≈ 2 Flash./sec) | DIP-Switch setting Error's |
| ALARM Yellow | On | Internal fault |



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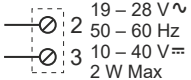
## ADVANCED SETTINGS

By using a PC and downloadable softwares from www.seneca.it , it is possible to set other normally fixed parameters in addition to start and end scale:

- Additional input types.
- Digital filter (normally disabled).
- Square root extraction (normally disabled).
- Negative burn-out (normally positive).
- Start and end scale of the analog output.
- Value of the analog output in case of error.
- Rejection programmable for 50 or 60 Hz mains frequency (normally set to 50 Hz).
- Sampling frequency/resolution (normally set to 15 sps/16 bit).
- 3 or 4 wires measure for thermal resistance (normally set to 3 wires).
- The instructions for setting and USB cable are supplied as a KIT available on request.

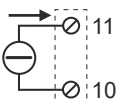
## ELECTRICAL CONNECTIONS

### Power supply

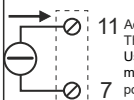



The supply voltage must be between 10 to 40 V⎓ (Any polarity) or between 19 e 28 V~. **The upper limits must not be exceeded to avoid serious damage to the module.** It's necessary to protect the power supply source against any failure of the module using appropriately sized fuse (Max = 2.5A).

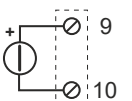
### Universal input



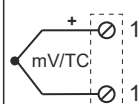

Passive current input (-20 – +20 mA). The sensor supplies the current loop. Use this connection if the input current come from outside.



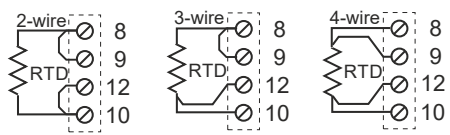

Active current input (-20 – +20 mA). The module supplies the current loop. Use this connection with 2 wire measurement. The transducer is powered by the module Z109REG-BP.



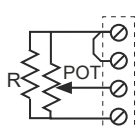

Voltage input (-20 – +20 V⎓)
Full scale > 150 mV



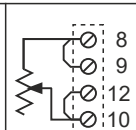

Thermocouple input type: J, K, R, S, T, B, E and N. Input voltage for Full scale < 150 mV




Thermoresistance input type: PT100, NI100, PT500 and PT1000. The two-wire connection can also be used for NTC and KTY




Potentiometer input: One R = 500Ω resistance parallel circuit is needed. Potentiometer value must be from1 kΩ to 100kΩ

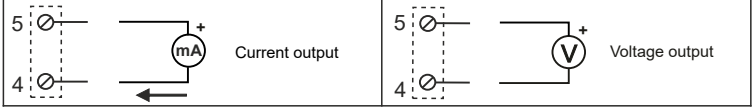



Rheostat input: values from 500 Ω to 25 kΩ are needed



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## Output




## DEFAULT CONDITIONS

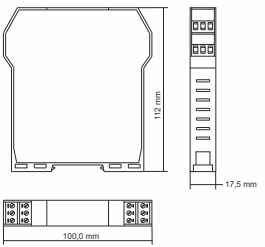
| | |
|---|---|
| Input type / Start – End range | Voltage / -10 V – +10 V |
| Input filter (acquired signal) | Disabled |
| Output type / Start – End range | Voltage / -10 V – +10 V |
| Reiection at mains frequency / Sampling time | Reiection = 50Hz / Sampling time = 20ms |
| Cold junction compensation ( for RTc input) | Disabled |

## PURCHASE ORDER CODE

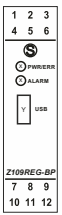
| Order code | Description |
|---|---|
| Z109REG-BP | Bipolar universal converter with galvanic separation |
| KIT-USB | USB cable and configuration software |
| CAVO-USB-A-MICRO-B | USB / microUSB cable |

## MODULE LAYOUT

### MODULE DIMENSIONS




### FRONT PANEL




Variations of standard parameters are possible by software (see www.seneca.it).
For more information about a list of all register and their function consult the USER manual.

## 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.



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