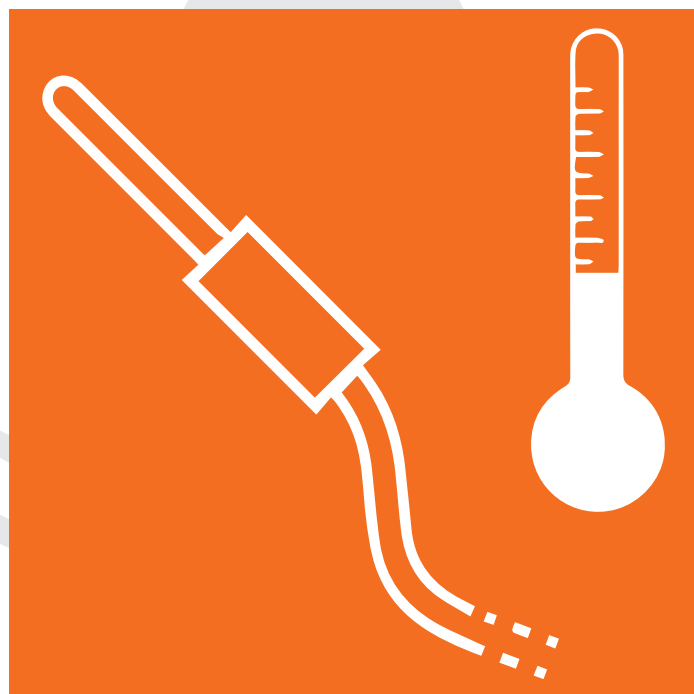


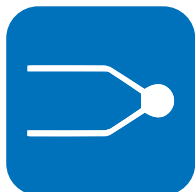
# MODBUS I/O MODULES, 8 CH INPUTS FROM THERMOCOUPLES



## Z-8TC-1, Z-8TC-LAB, Z-8TC-SI, Z-8TC-SI-LAB

Z-8TC-1, Z-8TC-LAB, Z-8TC-SI, Z-8TC-SI-AB are digital converters for thermocouple type J,K,E,N,S,R,B,T,L, with 8 channels measurement. The modules feature RS485 ModBUS RTU communication, cold junction compensation, high accuracy, overall isolation up to 1.5kV. "SI" versions feature higher resolution up to 24 bits. The "LAB" versions feature interchangeable terminals in pairs. Each thermocouple has its own "flying" terminal, which is easy and quick to use particularly for laboratory measurements.

Thermocouple acquisition  
type J,K,E,N,S,R,B,T,L  
(EN600584-1, GOST8.585)



Reading formats  
in voltage (V) or degrees (°C)



High speed  
of acquisition



Protection against  
ESD up to 4kV



Special versions SI  
(highresolution) and LAB  
(interchangeable terminals)



Operating temperature  
-25...+70°C



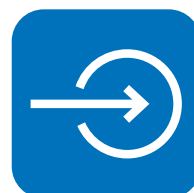
Programmable temperature  
value in case of failure or  
shutdown



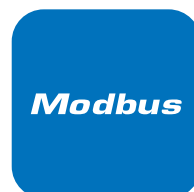
Simplified cabling via BUS  
for DIN rail



Channels independently  
enabled and configurable



MicroUSB and RS485  
ModBUS RTU  
communication interfaces



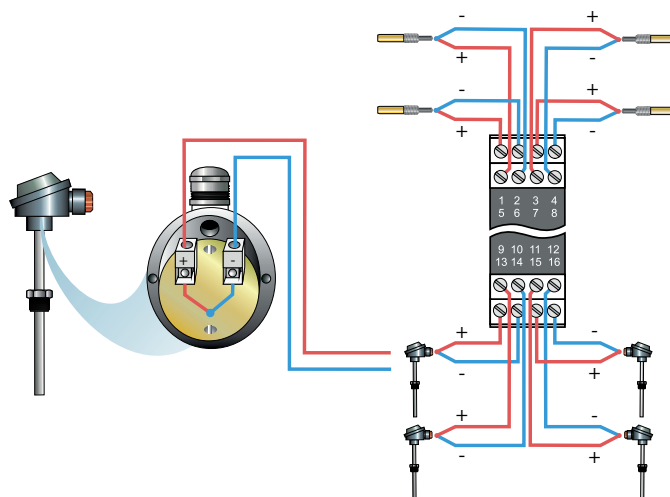
|                                     | Z-8TC-1                                                                                                                                                                                                            | Z-8TC-SI                                                                                                                                                                                                           | Z-8TC-LAB                                                                                                                                                                                                                          | Z-8TC-SI-LAB                                                                                                                                                                                                                       |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |  <p><b>8-CH inputs from thermocouples<br/>@15bits Modbus module</b></p>                                                           |  <p><b>8-CH inputs from thermocouples<br/>@24bits Modbus module</b></p>                                                           |  <p><b>8-CH inputs from thermocouples<br/>@15bits Modbus module,<br/>interchangeable terminals</b></p>                                          |  <p><b>8-CH inputs from thermocouples<br/>@24bits Modbus module,<br/>interchangeable terminals</b></p>                                          |
| <b>GENERAL DATA</b>                 |                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| Power supply                        | 10..40 Vdc; 19..28 Vac (50-60 Hz)                                                                                                                                                                                  | 10..40 Vdc; 19..28 Vac (50-60 Hz)                                                                                                                                                                                  | 10..40 Vdc; 19..28 Vac (50-60 Hz)                                                                                                                                                                                                  | 10..40 Vdc; 19..28 Vac (50-60 Hz)                                                                                                                                                                                                  |
| Power consumption                   | Max 0.6 W                                                                                                                                                                                                          | Max 0.6 W                                                                                                                                                                                                          | Max 0.6 W                                                                                                                                                                                                                          | Max 0.6 W                                                                                                                                                                                                                          |
| Isolation                           | 1,500 Vac 6-way                                                                                                                                                                                                    | 1,500 Vac (power/com/TC); 300 Vac (TC-TC)                                                                                                                                                                          | 1,500 Vac 6-way                                                                                                                                                                                                                    | 1,500 Vac (power/com/TC); 300 Vac (TC-TC)                                                                                                                                                                                          |
| ESD protection                      | 4 kV                                                                                                                                                                                                               | 4 kV                                                                                                                                                                                                               | 4 kV                                                                                                                                                                                                                               | 4 kV                                                                                                                                                                                                                               |
| Status indicators                   | Power supply<br>Error<br>Data transmission<br>Data reception                                                                                                                                                       | Power supply<br>Error<br>Data transmission<br>Data reception                                                                                                                                                       | Power supply<br>Error<br>Data transmission<br>Data reception                                                                                                                                                                       | Power supply<br>Error<br>Data transmission<br>Data reception                                                                                                                                                                       |
| Degree of protection                | IP20                                                                                                                                                                                                               | IP20                                                                                                                                                                                                               | IP20                                                                                                                                                                                                                               | IP20                                                                                                                                                                                                                               |
| Operating tempere                   | -20..+65 °C                                                                                                                                                                                                        | -20..+65 °C                                                                                                                                                                                                        | -20..+65 °C                                                                                                                                                                                                                        | -20..+65 °C                                                                                                                                                                                                                        |
| Storage temperature                 | -20..+85 °C                                                                                                                                                                                                        | -20..+85 °C                                                                                                                                                                                                        | -20..+85 °C                                                                                                                                                                                                                        | -20..+85 °C                                                                                                                                                                                                                        |
| Dimensions                          | 17.5 x 100 x 112 mm                                                                                                                                                                                                | 17.5 x 100 x 112 mm                                                                                                                                                                                                | 17.5 x 100 x 112 mm                                                                                                                                                                                                                | 17.5 x 100 x 112 mm                                                                                                                                                                                                                |
| Weight                              | 140 g                                                                                                                                                                                                              | 140 g                                                                                                                                                                                                              | 140 g                                                                                                                                                                                                                              | 140 g                                                                                                                                                                                                                              |
| Case                                | PA6, color black                                                                                                                                                                                                   | PA6, color black                                                                                                                                                                                                   | PA6, color black                                                                                                                                                                                                                   | PA6, color black                                                                                                                                                                                                                   |
| Connections                         | Removable 4-way terminal block, 3.5mm pitch, max. cable cross section 1.5mm <sup>2</sup><br>IDC10 rear connector for DIN rail<br>Nr.1 Micro USB 2.0 front connector for ModBUS RTU configuration and communication | Removable 4-way terminal block, 3.5mm pitch, max. cable cross section 1.5mm <sup>2</sup><br>IDC10 rear connector for DIN rail<br>Nr.1 Micro USB 2.0 front connector for ModBUS RTU configuration and communication | Removable 4-way terminal block, interchangeable, 3.5mm pitch, max cable cross section 1.5mm <sup>2</sup><br>IDC10 rear connector for DIN rail<br>Nr.1 Micro USB 2.0 front connector for ModBUS RTU configuration and communication | Removable 4-way terminal block, interchangeable, 3.5mm pitch, max cable cross section 1.5mm <sup>2</sup><br>IDC10 rear connector for DIN rail<br>Nr.1 Micro USB 2.0 front connector for ModBUS RTU configuration and communication |
| Mounting                            | 35 mm DIN rail (IEC/EN 60715)                                                                                                                                                                                      | 35 mm DIN rail (IEC/EN 60715)                                                                                                                                                                                      | 35 mm DIN rail (IEC/EN 60715)                                                                                                                                                                                                      | 35 mm DIN rail (IEC/EN 60715)                                                                                                                                                                                                      |
| Data Memory                         | EEPROM for configuration parameters, retention time 10 years                                                                                                                                                       | EEPROM for configuration parameters, retention time 10 years                                                                                                                                                       | EEPROM for configuration parameters, retention time 10 years                                                                                                                                                                       | EEPROM for configuration parameters, retention time 10 years                                                                                                                                                                       |
| Approvals                           | CE, UKCA                                                                                                                                                                                                           | CE, UKCA                                                                                                                                                                                                           | CE, UKCA                                                                                                                                                                                                                           | CE, UKCA                                                                                                                                                                                                                           |
| <b>COMMUNICATION</b>                |                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| Interfaces                          | RS485 (IDC10), 2 fili<br>Micro USB                                                                                                                                                                                 | RS485 (IDC10), 2 fili<br>Micro USB                                                                                                                                                                                 | RS485 (IDC10), 2 fili<br>Micro USB                                                                                                                                                                                                 | RS485 (IDC10), 2 fili<br>Micro USB                                                                                                                                                                                                 |
| Speed                               | Fino a 115 kbps                                                                                                                                                                                                    | Fino a 115 kbps                                                                                                                                                                                                    | Fino a 115 kbps                                                                                                                                                                                                                    | Fino a 115 kbps                                                                                                                                                                                                                    |
| Protocol                            | ModBUS RTU                                                                                                                                                                                                         | ModBUS RTU                                                                                                                                                                                                         | ModBUS RTU                                                                                                                                                                                                                         | ModBUS RTU                                                                                                                                                                                                                         |
| Communication time                  | <10 ms                                                                                                                                                                                                             | <5 ms                                                                                                                                                                                                              | <10 ms                                                                                                                                                                                                                             | <5 ms                                                                                                                                                                                                                              |
| Channel sampling time               | 20..90 ms                                                                                                                                                                                                          | 25..400 ms                                                                                                                                                                                                         | 20..90 ms                                                                                                                                                                                                                          | 25..400 ms                                                                                                                                                                                                                         |
| Distance                            | Fino a 1.200 m                                                                                                                                                                                                     | Fino a 1.200 m                                                                                                                                                                                                     | Fino a 1.200 m                                                                                                                                                                                                                     | Fino a 1.200 m                                                                                                                                                                                                                     |
| Connectivity                        | Max 32 nodi                                                                                                                                                                                                        | Max 32 nodi                                                                                                                                                                                                        | Max 32 nodi                                                                                                                                                                                                                        | Max 32 nodi                                                                                                                                                                                                                        |
| <b>SETTINGS</b>                     |                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| DIP Switch                          | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  |
| EASY SETUP                          | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  |
| Z-NET4                              | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  |
| <b>INPUT / OUTPUT / MEASUREMENT</b> |                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| No. of channels                     | 8 inputs that can be activated and configured individually                                                                                                                                                         | 8 inputs that can be activated and configured individually                                                                                                                                                         | 8 inputs that can be activated and configured individually                                                                                                                                                                         | 8 inputs that can be activated and configured individually                                                                                                                                                                         |
| Type                                | Thermocouple J, K, R, S, T, B, E, N (EN 600584-1, GOST R8 585)<br>Ranges from -210 to + 1820 °C<br>Span: -10.1..81.4 mV<br>Shunt up to 70 mV                                                                       | Thermocouple J, K, R, S, T, B, E, N, L (EN 600584-1, GOST R8 585)<br>Ranges from -210 to + 1820°C<br>Span: -±150mV<br>Shunt up to 70mV                                                                             | Thermocouple J, K, R, S, T, B, E, N (EN 600584-1, GOST R8 585)<br>Ranges from -210 to + 1820 °C<br>Span mV: -10.1..81.4 mV<br>Shunt up to 70mV                                                                                     | Thermocouple J, K, R, S, T, B, E, N, L (EN 600584-1, GOST R8 585)<br>Ranges from -210 to + 1820°C<br>Span: -±150mV<br>Shunt up to 70mV                                                                                             |
| Measurement format                  | Voltage (µV), temperature (°C) on Integer 16 bit and floating point 32 bit, direct or swapped                                                                                                                      | Voltage (µV), temperature (°C) on Integer 16 bit and floating point 32 bit, direct or swapped                                                                                                                      | Voltage (µV), temperature (°C) on Integer 16 bit and floating point 32 bit, direct or swapped                                                                                                                                      | Voltage (µV), temperature (°C) on Integer 16 bit and floating point 32 bit, direct or swapped                                                                                                                                      |
| Safety value                        | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  |
| <b>INPUT PAIR SETTINGS</b>          |                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| Stabilization filter                | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  |
| Rejection                           | 50 / 60 Hz                                                                                                                                                                                                         | 50 / 60 Hz                                                                                                                                                                                                         | 50 / 60 Hz                                                                                                                                                                                                                         | 50 / 60 Hz                                                                                                                                                                                                                         |
| Cold junction comp.                 | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  | x                                                                                                                                                                                                                                  |
| <b>ADC</b>                          |                                                                                                                                                                                                                    |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                    |
| Resolution                          | 15 bit                                                                                                                                                                                                             | 24 bit                                                                                                                                                                                                             | 15 bit                                                                                                                                                                                                                             | 24 bit                                                                                                                                                                                                                             |
| Accuracy class                      | 0,1%                                                                                                                                                                                                               | 0,05%                                                                                                                                                                                                              | 0,1%                                                                                                                                                                                                                               | 0,5%                                                                                                                                                                                                                               |

Technical data and diagrams on this document are to be considered indicative and not binding

## WIRING DIAGRAM

### THERMOCOUPLES

Thermocouples are among the most widely used because they are inexpensive easily replaceable, standardized and suitable for measuring a wide range of temperatures. Their main limitation is accuracy, as they are difficult to obtain errors systematically smaller than one degree centigrade. In addition, thermocouples are nonlinear devices. The principle of operation of the thermocouple was discovered in 1821 by Thomas Johann Seebeck. The Estonian scientist discovered that in a circuit consisting of two conductors of a different nature, subjected to a gradient of temperature, a potential difference is established. It is this phenomenon called the Seebeck effect, to be exploited by the thermocouples.



## TC MATERIALS AND CABLES

| Type | Alloy          | Cables standards |        |           |      |           |        |
|------|----------------|------------------|--------|-----------|------|-----------|--------|
|      |                | ANSI MC96.1      |        | DIN 43710 |      | IEC 584-3 |        |
|      |                | -                | +      | -         | +    | -         | +      |
| J    | Fe-Co          | red              | white  | blue      | red  | white     | black  |
| K    | Cr-Al          | red              | yellow | green     | red  | white     | green  |
| R    | Pt13%Rh-Pt     | red              | black  | white     | red  | white     | orange |
| S    | Pt10%Rh-Pt     | red              | black  | white     | red  | white     | orange |
| T    | Cu-Co          | red              | blue   | brown     | red  | white     | brown  |
| E    | Cr-Co          | red              | purple | black     | red  | white     | purple |
| B    | Pt30%Rh-Pt6%Rh | red              | gray   | red       | gray | white     | gray   |
| N    | Nicrosil-Nisil | red              | brown  | -         | -    | white     | pink   |

### ORDER CODES

| Code         | Descriptoin                                                               |
|--------------|---------------------------------------------------------------------------|
| Z-8TC-1      | 8-CH thermocouples input @15bits Modbus module                            |
| Z-8TC-LAB    | 8-CH thermocouples input @15bits Modbus module, interchangeable terminals |
| Z-8TC-SI     | 8-CH thermocouples input @24bits Modbus module                            |
| Z-8TC-SI-LAB | 8-CH thermocouples input @24bits Modbus module, interchangeable terminals |

### ACCESSORIES

|                  |                                                              |
|------------------|--------------------------------------------------------------|
| CU-A-MICROB      | USB-A Micro USB-B Plug Cable 5 P                             |
| Z-PC-DIN2-17.5   | DIN rail quick mounting bracket 2 slots pitch 17.5mm         |
| Z-PC-DIN8-17.5   | DIN rail quick mounting bracket 8 slots pitch 17.5mm         |
| Z-PC-DINAL2-17.5 | DIN rail quick mounting bracket head + 2 slots 17.5 mm pitch |
| Z-SUPPLY         | Single-phase switching power supply 24V @ 1.5 A              |

### SOFTWARE

|            |                                                        |
|------------|--------------------------------------------------------|
| EASY SETUP | SENECA programmable instruments plug&play configurator |
| Z-NET4     | SENECA system configurator for automation projects     |

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