Temperature converter
TR_PT-ICR-01
User Manual

Content

1 TR_PT-ICR-01

Is essentially a device for measuring the temperature and converting the measured values into electrical signal. In addition to its primary function, the device can perform several additional.

Temperature measurement

The device is capable of accepting a signal from the two-wire and three-wire probes following types:

1. Pt100 in range of -200 do 850°C

2. Pt1000 in range of -200 do 850°C

3. Ni1000 in range of -60 do 250°C

Measurement accuracy is 0,5%.

1.1 Current measurement

The device has input for measuring current signals. Current input range is from 0 to 20mA. When active, the current measurement is not possible to measure the resistance and vice versa.

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 Measurement accuracy is 0,5%.

1.2 Current output

The level of the measured values of the input signal is signaled by a single current output. User over the parameters of the input signal range that will be displayed and the range of output current. Maximum output current range is 0 to 20mA. However the situation unlinked temperature probes (if the type of input signal temperature) is signaled with 23mA.

The ratio of the input signal according to the output depends on 4 parameters:

1. The minimum output current

2. The maximum output current

3. The minimum temperature input or current

4. The maximum temperature input or current

Based on these parameters, a true linear scaling function of the input signal to the output so that the minimum input signal corresponds to the minimum and maximum output current maximum

Precision, current output is 0,5%.

1.3 **Digital output**

The device has two digital outputs intended for generating an alarm. The outputs are relay type. Parameters of alarm functions for both outputs are set through the registers.

1.4 **Communication**

The device has a RS485 communication port. The communication protocol is Modbus RTU. The communication port used to access registers for device parameterization and reading the measured values.
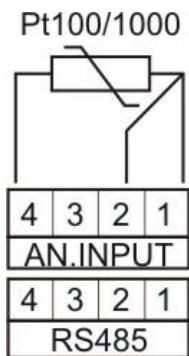
2 **Wiring**
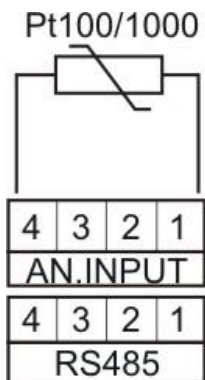

Figure 2-1 Connecting three-wire probe
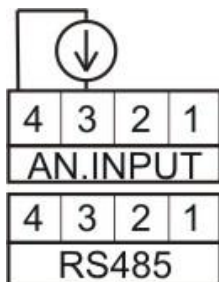

Figure 2-2 Connecting two-wire probe

Figure 2-3 Connect the current input
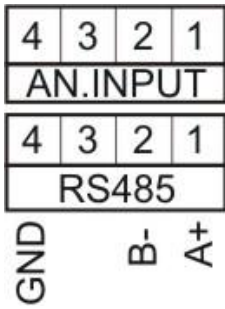
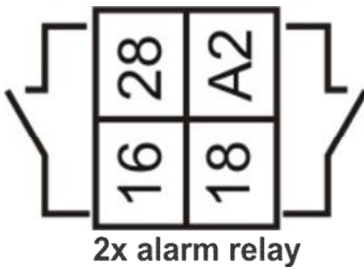*Figure 2-4 Connect the current output*

Figure 2-5 Connect communication

Figure 3-6 Connect alarm output

3 Communication and folders registers

3.1 Communication parametersje

1. Physically a field of communication and the RS485 protocol is Modbus RTU.

2. The parameters of communication are: speed – 1200, 4800, 9600, 19200, 38400, 57600, 115200.

3. Without parity

4. Two stop bits

5. Address – 0 to 247

3.2 Functions

Modbus registers can be accessed using the following functions:

1. Read Holding Registers (0x03)

2. Write Single Register (0x06)

3. Write Multiple Registers (0x10)

3.3 Register maps

The table below shows the Modbus registers are present on the device with their addresses and access rights.

Entry into the parameter registers resulting in the entry into the flash device.

Try entry in the registers marked with R (read only) is ignored.

From the register with address 0 to the one with the address 44 there are more registers that are not used. Requirements for admission to these registers are ignored, while in reading them from reading value is 0.

At the address 200 is a special register in which is stored the measurement result. This is a copy of the register with the measurement temperature in how the device is configured to measure the temperature or register with the measured current in how the device is configured. The Registrar can only be read and Read Holding Registers with function with a length of reading 1 and address 200 (0xC8).

Adr	Name	Access	Flash	Opseg	NOTE
0	Correction	R/W	Yes	-20 .. 20[1]	Correction of the measured temperature of the -2 do 2°C.
2	Filter depth	R/W	Yes	0 .. 127	The depth of the digital filter for averaging the value in this register +1.
4	Maximal output current	R/W	Yes	Minimal output current .. 2000[2]	Maximum output current. This parameter can not be adjusted so that it is lower than the minimum output current.
6	Minimal output current	R/W	Yes	0 .. Maximal output current[2]	The minimum output current. This parameter can not be adjusted so that it is higher than the maximum output current.
8	Lock register	R/W	Yes	0 .. 50	Register for locking parameter access - Not supported in this version of the software!
10	Input type	R/W	Yes	0 .. 25	It is possible to enter all the values from the range but are supported: 1: Pt100, -200 .. 200°C * 2: Pt100, -200 .. 600°C * 14: Pt1000, -200 .. 850°C * 15: Ni1000, -60 .. 250°C * 20: Struja, 4 .. 20mA 21: Struja, 0 do 20mA For the admission type temperature probe is automatically adjusted and its scope. The user could then modify the scope of registration in the appropriate registers.
12	Maximal temperature	R/W	Yes	Minimal temperature .. 9999[1]	The maximum temperature to be measured and through which the converted value of the current output. This parameter can not be adjusted so that it is lower than the minimum temperatures.
13	Maximal input current	R/W	Yes	Minimal input current .. 2000[2]	The maximum current to be measured. This parameter can not be adjusted so that it is lower than the minimum output current
14	Minimal temperature	R/W	Yes	-1999 .. Maksimal temperature[1]	The minimum temperature that is measured and through which the converted value of the current output. This parameter can not be adjusted so that it is higher than the maximum temperature.

Adr	Name	Access	Flash	Opseg	NOTE
15	Minimal input current	R/W	Yes	0 .. Maximal input current[2]	The minimum current that is measured. This parameter can not be set so that it is higher than the maximum output current
16	Address	R/W	Yes	0 .. 247	Take care that the address 0 according to standard is not supported. After you enter a new address must reset the device to a new parameter applied.
18	Speed of communication	R/W	Yes	0 .. 7	The selected speed for Modbus communication: 0: 1200 1 i 2: 4800 3: 9600 4: 19200 5: 38400 6: 57600 7: 115200 After you enter a new speeds must reset the device to a new parameter applied.
19	Type of device	R	Yes	255	
20	Softtware version	R	Yes	0x0100	
21	Device ID	R	Yes		Unique Device ID
26	Calibration value	R/W	Ne		The register used during calibration device
27	Measured probe raw	R	Ne		Raw value (in increments) measured at the entrance temperature measurement
28	Measured resistance	R	Ne	[3] [4]	Measured resistance probe at the entrance temperature measurement
29	Measured temperature	R	Ne	[1]	Measured temperature
30	Measured I in raw	R	Ne		Raw value (in increments) measured at current input
31	Measured input current	R	Ne	[2]	Measured current at current input
32	Output current	R	Ne	[2]	The current at the current output

Adr	Name	Access	Flash	Opseg	NOTE
33	Status	R	Ne		Status register. The meaning of the bits: b0: Temperature Probe shorted. b1: temperature probe is Unlinked.b4: struja ulaza je manja od dozvoljene. b5: struja ulaza je veća od dozvoljene. b9: loši parametri u flešu uređaja b10: problem u merenju temperature. b12: alarm 1 je aktivan. b13: alarm 2 je aktivan.
34	Command register	R/W	Ne		It is used in the process of calibration devices - Do not enter during normal operation!
35	Alarm 1 function	R/W	Yes	0 .. 5	The function of the first digital alarm output:0: Off 1: Absolute High 2: Absolute Low 3: Deviation hi/low 4: Band 5: On/Off
36	Alarm 1 polarity output	R/W	Yes	0 .. 1	he polarity of the first digital alarm output: 0: NC 1: NO
37	Alarm 1 value 1	R/W	Yes	-1999 .. 9999[1]	The first alarm digital output - alarm value for alarm types 1, 2 and 5. The lower the alert threshold for the alarm type 3 and 4th
38	Alarm 1 value 2	R/W	Yes	-1999 .. 9999[1]	The first alarm digital output - higher value for alarm alarm type 3 and 4th
39	Alarm 1 hysteresis	R/W	Yes	0 .. 9999[1]	Hysteresis for the first alarm digital output.

Adr	Name	Access	Flash	Opseg	NOTE
40	Alarm 2 function	R/W	Yes	0 .. 5	The function of the second digital alarm output: 0: Off 1: Absolute High 2: Absolute Low 3: Deviation hi/low 4: Band 5: On/Off
41	2 Alarm output polarity	R/W	Yes	0 .. 1	Polarity other digital alarm output: 0: NC 1: NO
42	Alarm 2 value 1	R/W	Yes	-1999 .. 9999[1]	The second alarm digital output - alarm value for alarm types 1, 2 and 5. The lower alarm limit for alarm type 3 and 4th
43	Alarm 2 value 2	R/W	Yes	-1999 .. 9999[1]	The second alarm digital output - higher value for alarm alarms type 3 and 4th
44	Alarm 2 hysteresis	R/W	Yes	0 .. 9999[1]	Hysteresis for second alarm digital output.

Note 1: The device displays the temperature and keeps the format T [° C] * 10

Note 2: The device displays the current and stored in a format I [mA] * 100 000

Note 3: If set temperature measurement using a Pt100 probe in the registry The measured resistance is shown the measured resistance multiplied by 100 (two decimal places). In the case of Pt and Ni1000 probes in the registry shows the measured resistance multiplied by 10 (one decimal place).

Note 4: Due to the limited width of Modbus registers if the measured resistance over 327,67☐ in case of Pt100 probes or 3276,7☐ in the case of Pt and Ni 1000 probes display value will be invalid (negative). The drive is still properly switch in temperature.Digitalni alarmni izlazi

The device has two digital alarm outputs. The outputs are relay type.

The function of each output separately adjusted using a set of five registers. Outputs perform its function only if the device is set to measure the temperature.

While entering the parameters for alarm function is carried out to verify any meaningfulness of the same!

Outputs are able to perform the following functions:

3.4 Absolute High Alarm

Number of alarm functions is 1.

By temperature increase, when it becomes greater than the value 1 alarm is triggered. At decreasing temperature, when it becomes lower than the value 1 - hysteresis alarm is deactivated.
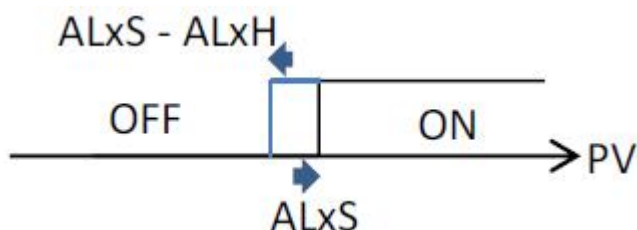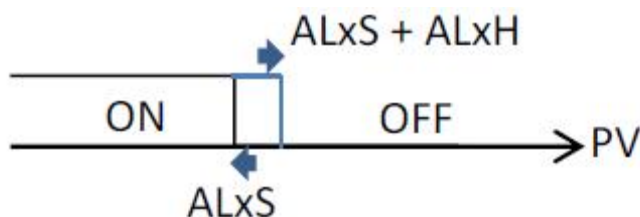

3.5 Absolute High Alarm with hysteresis

Number of alarm functions is 2.

By temperature increase, when it becomes greater than the value 1 + hysteresis alarm is deactivated.

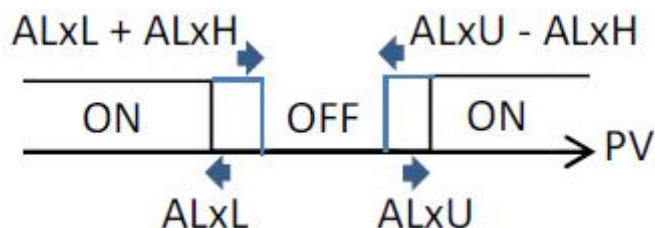At decreasing temperature, when it becomes lower than the value of one alarm is activated.

3.6 Deviation High/Low Alarm

Broj alarmne funkcije je 3.

Pri porastu temperature, kada postane viša od vrednost 1 + histerezis alarm se deaktivira. Pri daljem porastu kada postane viša od vrednost 2 alarm se aktivira.

Pri opadanju temperature, kada postane niža od vrednost 2 – histerezis alarm se deaktivira a kad padne ispod vrednost 1 alarm se aktivira.

3.7 Band Alarm

Number of alarm functions is 4.

By temperature increase, when it becomes greater than the value of one alarm is activated. With a further increase when it becomes higher than the value of 2 + hysteresis alarm is deactivated.

At decreasing temperature, when it becomes lower than the value 2 alarm is activated when the value falls below 1 - hysteresis alarm is deactivated.
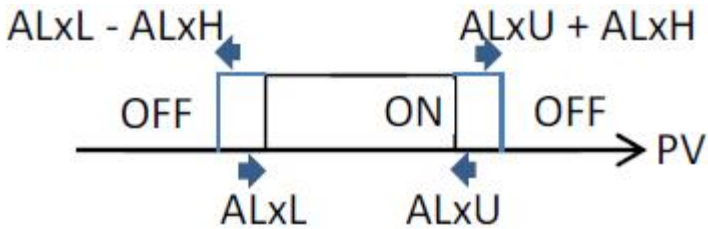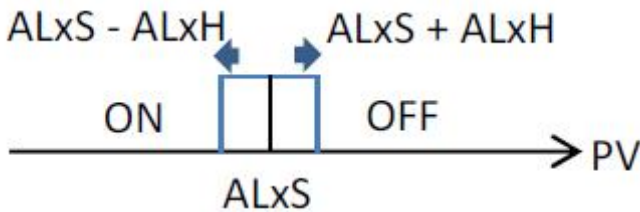

3.8 On/OFF Alarm

Number of alarm functions is 5.

While the temperature rises alarm is active until the temperature reaches a value of 1 + hysteresis when it becomes inactive.

The temperature drops the alarm becomes active when the temperature becomes lower than the value of 1 - hysteresis.

4 Izmene

Rev.	Dat. rev	Opis izmena	Autor
1.0	19/10/14	The initial version	Uglješa Tomanović
1.1	20/10/14	Add connectivity schemes and explanation of f-a transfer from the entrance to the exit.	Uglješa Tomanović
1.2	18/11/14	Changed resolution measurement of resistance and issued a warning to exit out of range while displaying the same.	Uglješa Tomanović