

Single-channel microprocessor PID controller

Short guide

1. Overview
This short guide familiarizes service personnel with the design and connections of TCR10, a single-channel microprocessor PID controller.
For the device setup procedure, refer to the user guide available at www.akytec.de.

2. Specifications

2.1 Specifications

Table 1 Specifications

Parameter	Value
Power supply	
Power supply	230 (90...264) V AC at 50 (47...63) Hz 24 (21...120) V DC
Power consumption, max.	11 VA 9 W
Measurement input	
Number	1
Maximum permissible voltage at the measuring terminals	12 V
Time to readiness for measuring input signals, max.	10 min
Digital input	
Number	1
Maximum input current, min.	10 mA
Maximum permissible voltage at terminals	12 V
Switch type	NPN transistor (open collector), switch contact
Galvanic isolation	No
Processing frequency of the digital input signal	1 Hz (no high-frequency signals)
Outputs	
Number	2 (see Table 3)
Configuration interface	
Type	USB Type-C
Data exchange protocol (mode)	Modbus RTU (Client (Slave))
Data exchange interface	
Type	RS485
Data exchange protocol (mode)	Modbus RTU (Client (Slave)), Modbus ASCII (Client (Slave))
Mechanical	
Dimensions	
P1 enclosure	(96 × 96 × 53) ± 1 mm
P2 enclosure	(96 × 48 × 100) ± 1 mm
P5 enclosure	(48 × 48 × 103) ± 1 mm
IP code (front / rear)	IP54 / IP20
Weight (gross / net)	approx. 400 g / 250 g
Average service life	12 years

Table 2 Input signals

Description	Indication	Measurement range
RTD (resistance temperature detectors)		
50M (α = 0,00428 °C ⁻¹)	$50\ C$	−180...+200 °C
Pt50 (α = 0,00385 °C ⁻¹)	$P\ 50$	−200...+850 °C
50P (α = 0,00391 °C ⁻¹)	$50\ P$	−200...+850 °C
Cu50 (α = 0,00426 °C ⁻¹)	$C\ 50$	−50...+200 °C
100M (α = 0,00428 °C ⁻¹)	$100\ C$	−180...+200 °C
Pt100 (α = 0,00385 °C ⁻¹)	$P\ 100$	−200...+850 °C
100P (α = 0,00391 °C ⁻¹)	$100\ P$	−200...+850 °C
Cu100 (α=0,00426 °C ⁻¹)	$C\ 100$	−50...+200 °C
100N (α = 0,00617 °C ⁻¹)	$100\ n$	−60...+180 °C
500M (α = 0,00428 °C ⁻¹)	$500\ C$	−180...+200 °C
Pt500 (α = 0,00385 °C ⁻¹)	$P\ 500$	−200...+850 °C
500P (α = 0,00391 °C ⁻¹)	$500\ P$	−200...+850 °C
Cu500 (α = 0,00426 °C ⁻¹)	$C\ 500$	−50...+200 °C
500N (α = 0,00617 °C ⁻¹)	$500\ n$	−60...+180 °C
1000M (α = 0,00428 °C ⁻¹)	$1000\ C$	−180...+200 °C
Pt1000 (α = 0,00385 °C ⁻¹)	$P\ 1000$	−200...+850 °C
1000P (α = 0,00391 °C ⁻¹)	$1000\ P$	−200...+850 °C
Cu1000 (α = 0,00426 °C ⁻¹)	$C\ 1000$	−50...+200 °C
1000N (α = 0,00617 °C ⁻¹)	$1000\ n$	−60...+180 °C

Description	Indication	Measurement range
TC (thermocouples)		
L	$t\ E\ L$	−200...+800 °C
E	$t\ E\ E$	−200...+900 °C
J	$t\ E\ J$	−200...+1200 °C
S	$t\ E\ S$	−50...+1750 °C
N	$t\ E\ n$	−200...+1300 °C
K	$t\ E\ K$	−200...+1360 °C
R	$t\ E\ r$	−50...+1750 °C
B	$t\ E\ b$	+200...+1800 °C
A-1	$t\ E\ A\ 1$	0...+2500 °C
A-2	$t\ E\ A\ 2$	0...+1800 °C
A-3	$t\ E\ A\ 3$	0...+1800 °C
T	$t\ E\ t$	−250...+400 °C
Unified signals		
0...1 V	$u\ 0...1$	0...1 V
0...5 mA	$i\ 0...5$	0...5 mA
0...20 mA	$i\ 0...20$	0...20 mA
4...20 mA	$i\ 4...20$	4...20 mA
DC voltage signal		
−50...+50 mV	$u\ -5...5$	−50...+50 mV
Unified signals		
0...5 V	$u\ 5$	0...5 V
0...10 V	$u\ 10$	0...10 V
Pyrometers		
RK-15	$P\ r...1$	+400...+1500 °C
RK-20	$P\ r...2$	+600...+2000 °C
RS-20	$P\ r...3$	+900...+2000 °C
RS-25	$P\ r...4$	+1200...+2500 °C
Non-standard signals		
Cu53 (α = 0,00426 °C ⁻¹)	$C\ 53$	−50...+200 °C
Typ L	$t\ E\ d\ L$	0...+900 °C

Table 3 Output

Output type	Specifications
Digital output	
R (electromagnetic relay contacts)	Max current 8 A for AC voltage ≤ 250 V and cos(φ) > 0.9 Max current 3 A for DC voltage ≤ 30 V

2.2 Environmental conditions

The device is designed for natural convection cooling which should be taken into account when choosing the installation site.
The following environmental conditions must be observed:

- clean, dry and controlled environment, low dust level
- closed non-hazardous areas, free of corrosive or flammable gases

Table 4 Environmental conditions

Condition	Permissible range
Ambient temperature	−40...+55 °C
Relative humidity	up to 80 % (at +35 °C or below, non-condensing)
Altitude	up to 2000 m ASL
Vibration / shock resistance	conforms to IEC 61000-6-2:2005
EMC emission / immunity	

i **NOTE**
Requirements regarding external factors are mandatory as they relate to safety requirements.

3. Mounting

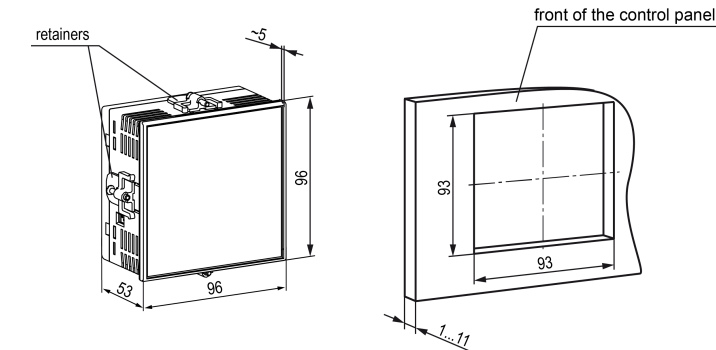


Fig. 1 Dimensions of P1 enclosure and mounting cutout

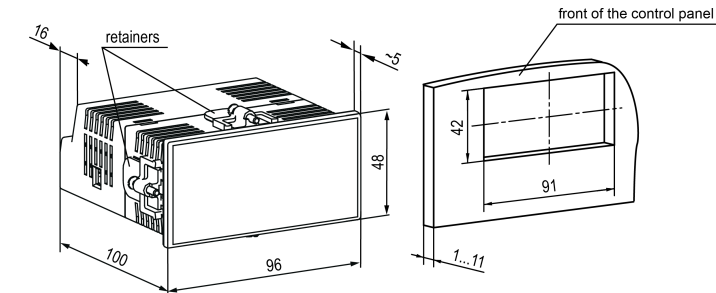


Fig. 2 Dimensions of P2 enclosure and mounting cutout

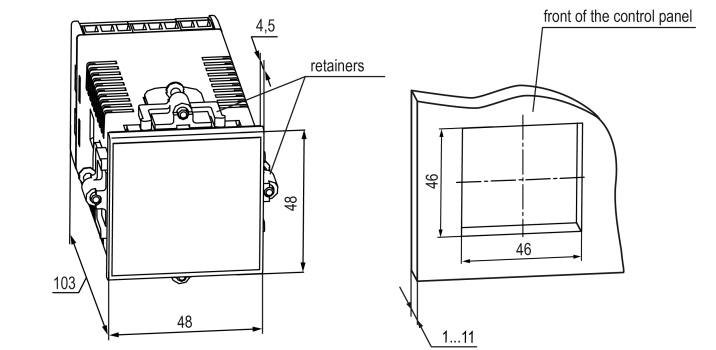


Fig. 3 Dimensions of P5 enclosure and mounting cutout

4. Sensor connection

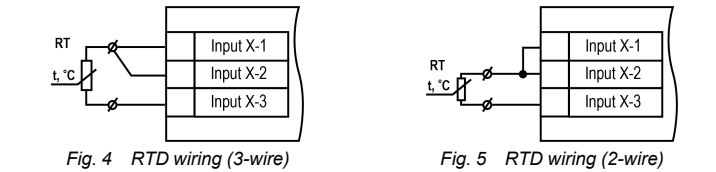


Fig. 4 RTD wiring (3-wire)

Fig. 5 RTD wiring (2-wire)

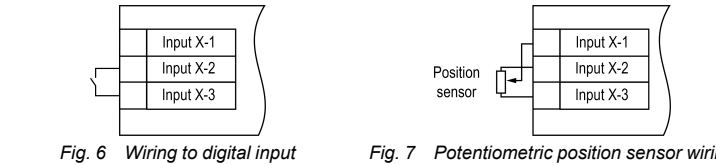


Fig. 6 Wiring to digital input

Fig. 7 Potentiometric position sensor wiring

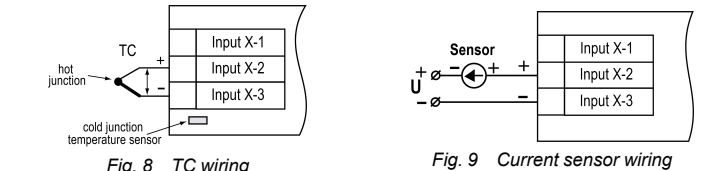


Fig. 8 TC wiring

Fig. 9 Current sensor wiring

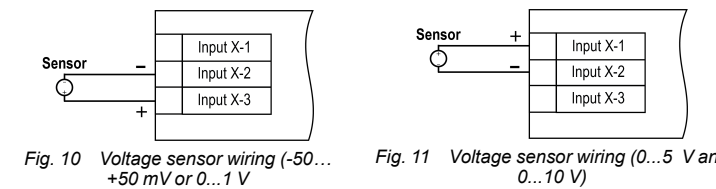


Fig. 10 Voltage sensor wiring (−50...+50 mV or 0...1 V)

Fig. 11 Voltage sensor wiring (0...5 V and 0...10 V)

5. Digital outputs

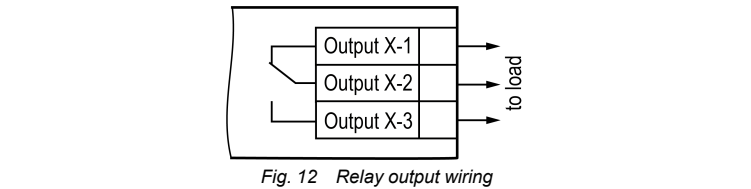


Fig. 12 Relay output wiring

6. Factory settings restoration

i **NOTE**
Restoration of factory settings resets the *PR55* parameter value and *Earr* chart adjustment parameters.

To restore to factory settings:

1. Set the jumper to the terminals:
 - 9 and 10 (13 and 14 for P5 enclosure) for all signals except for 0...10 V
 - 10 and 11 (12 and 13 for P5 enclosure) for signals 0...10 V

! **NOTICE**
Before setting the jumper, make sure the sensor is not connected to input 1.

2. Press and hold the and buttons on the front panel until you see *d.r.5t*.
3. Enter password “100” and press the button.
4. Set the *d.r.5t* parameter value to *on*.
5. The lower indicator will display *r.5t* for 5 seconds. Then, the device will restore to factory settings.

7. Parameter setup diagram

