# Dual-channel microprocessor controller
Short guide

## 1. Overview

This short guide familiarizes service personnel with the design and connections of 2TCR1, a dual-channel controller with universal inputs.
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) VAC at 50 (47...63) Hz;<br>24 (21...120) VDC |
| Power consumption, max. | 11 VA;<br>9 W |
| **Inputs** | |
| Number | 2 |
| Maximum permissible voltage at the measuring terminals | 12 V |
| Time to readiness for measuring input signals, max. | 10 min |
| **Outputs** | |
| Number | 2 (see *Table 3*). |
| **Configuration interface** | |
| Type | USB Type-C |
| Data exchange protocol (mode) | Modbus RTU (Slave) |
| **Data exchange interface** | |
| Type | RS485 |
| Data exchange protocol (mode) | Modbus RTU (Slave), Modbus ASCII (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$^{-1}$) | 50C | –180…+200 °C |
| Pt50 (α = 0,00385 °C$^{-1}$) | Pt50 | –200…+850 °C |
| 50P (α = 0,00391 °C$^{-1}$) | 50P | –200…+850 °C |
| Cu50 (α = 0,00426 °C$^{-1}$)[1)] | Cu50 | –50…+200 °C |
| 100M (α = 0,00428 °C$^{-1}$) | 100C | –180…+200 °C |
| Pt100 (α = 0,00385 °C$^{-1}$) | Pt100 | –200…+850 °C |
| 100P (α = 0,00391 °C$^{-1}$) | 100P | –200…+850 °C |
| Cu100 (α=0,00426 °C$^{-1}$)[1)] | Cu100 | –50…+200 °C |
| 100N (α = 0,00617 °C$^{-1}$) | 100n | –60…+180 °C |
| 500M (α = 0,00428 °C$^{-1}$) | 500C | –180…+200 °C |
| Pt500 (α = 0,00385 °C$^{-1}$) | Pt500 | –200…+850 °C |
| 500P (α = 0,00391 °C$^{-1}$) | 500P | –200…+850 °C |
| Cu500 (α = 0,00426 °C$^{-1}$)[1)] | Cu500 | –50…+200 °C |
| 500N (α = 0,00617 °C$^{-1}$) | 500n | –60…+180 °C |
| 1000M (α = 0,00428 °C$^{-1}$) | 1000C | –180…+200 °C |
| Pt1000 (α = 0,00385 °C$^{-1}$) | Pt1000 | –200…+850 °C |
| 1000P (α = 0,00391 °C$^{-1}$) | 1000P | –200…+850 °C |
| Cu1000 (α = 0,00426 °C$^{-1}$)[1)] | Cu1000 | –50…+200 °C |
| 1000N (α = 0,00617 °C$^{-1}$) | 1000n | –60…+180 °C |
| **TC (thermocouples)** | | |
| L | tC.L | –200…+800 °C |
| E | tC.E | –200...+900 °C |
| J | tC.J | –200...+1200 °C |
| S | tC.S | –50...+1750 °C |
| N | tC.n | –200…+1300 °C |
| K | tC.KA | –200...+1360 °C |
| R | tC.r | –50...+1750 °C |
| B | tC.b | +200...+1800 °C |
| A-1 | tC.A1 | 0...+2500 °C |
| A-2 | tC.A2 | 0...+1800 °C |
| A-3 | tC.A3 | 0...+1800 °C |
| T | tC.t | –250...+400 °C |
| **Unified signals** | | |
| 0...1 V | u0.1 | 0...1 V |
| 0...5 mA | i0.5 | 0...5 mA |
| 0...20 mA | i0.20 | 0...20 mA |
| 4...20 mA | i4.20 | 4...20 mA |
| **DC voltage signal** | | |
| –50...+50 mV | u-50 | –50...+50 mV |
| **Unified signals** | | |
| 0…5 V | u 5 | 0…5 V |
| 0…10 V | u 10 | 0…10 V |
| **Pyrometers** | | |
| RK-15 | Pir.1 | +400…+1500 °C |
| RK-20 | Pir.2 | +600…+2000 °C |
| RS-20 | Pir.3 | +900…+2000 °C |
| RS-25 | Pir.4 | +1200…+2500 °C |
| **Non-standard signals** | | |
| Cu53 (α = 0,00426 °C$^{-1}$) | C53 | –50…+200 °C |
| Typ L | tC.dL | 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.<br>Max current 3 A for DC voltage ≤ 30 V |

**NOTE**
* The maximum allowed additional conversion error (reduced to the conversion range), when the ambient temperature changes beyond the normal conditions ( +15...+25 °C) but stays within the range of operating measurement conditions, is no more than 0.5 of the maximum allowed basic conversion error for every 10°C change in ambient temperature.

### 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 61131-2–2017 |
| EMC emission / immunity | |

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

## 3. Mounting

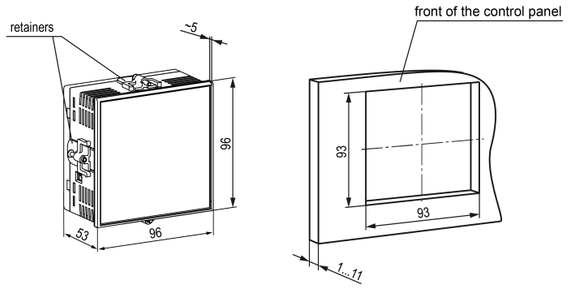


*Fig. 1 Dimensions of P1 enclosure and mounting cutout*

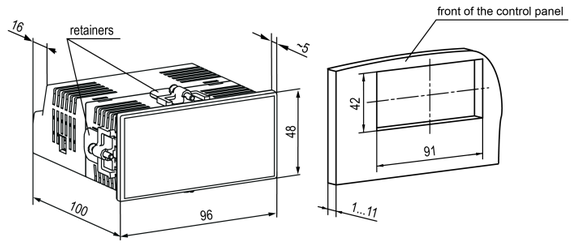


*Fig. 2 Dimensions of P2 enclosure and mounting cutout*

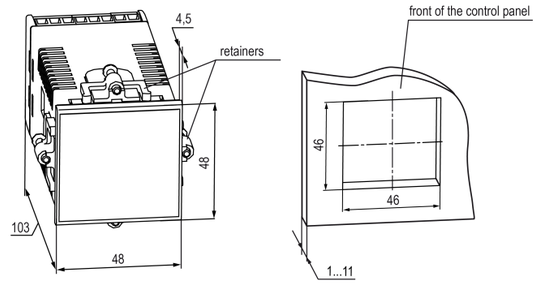


*Fig. 3 Dimensions of P5 enclosure and mounting cutout*

## 4. Sensor connection

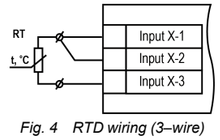


*Fig. 4 RTD wiring (3–wire)*

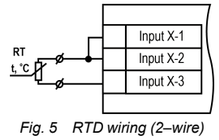


*Fig. 5 RTD wiring (2–wire)*

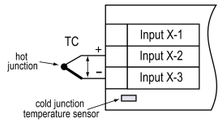


*Fig. 6 TC wiring*

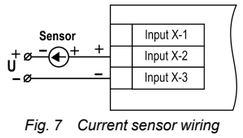


*Fig. 7 Current sensor wiring*

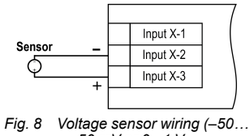


*Fig. 8 Voltage sensor wiring (–50… +50 mV or 0...1 V*

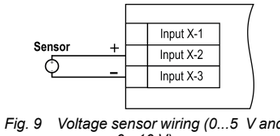


*Fig. 9 Voltage sensor wiring (0...5 V and 0...10 V)*

## 5. Digital outputs

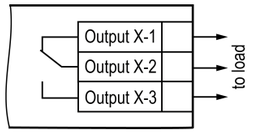


*Fig. 10 Relay output wiring*

## 6. Factory settings restoration

**NOTE**
Restoration of factory settings resets the *PASS* parameter value and *Corr* 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 buttons ▲▲ and MENU/OK on the front panel until you see *dr5t*.
3. Enter password “100” and press the button MENU/OK.
4. Set the *dr5t* parameter value to *on*.
5. The lower indicator will display *r5t* for 5 seconds. Then, the device will restore to factory settings.



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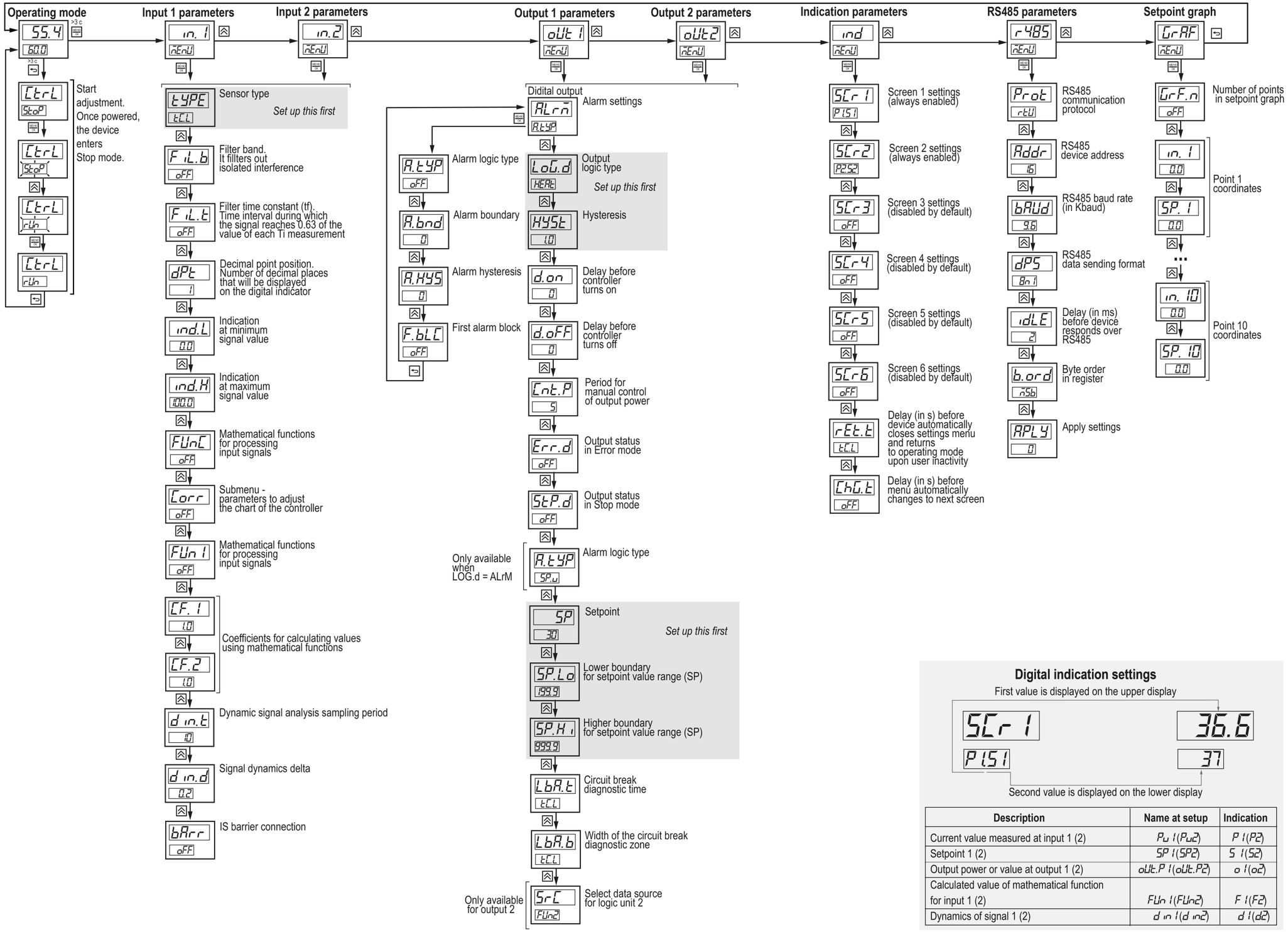
## 7. Parameter setup diagram




### Digital indication settings




| Description | Name at setup | Indication |
|---|---|---|
| Current value measured at input 1 (2) | Pu 1(Pu2) | P 1(P2) |
| Setpoint 1 (2) | SP 1(SP2) | S 1(S2) |
| Output power or value at output 1 (2) | oUt.P 1(oUt.P2) | o 1(o2) |
| Calculated value of mathematical function for input 1 (2) | FUn 1(FUn2) | F 1(F2) |
| Dynamics of signal 1 (2) | d in 1(d in2) | d 1(d2) |



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