Universal process indicator
User guide

1. Recycling and disposal

The device is considered an electronics device for disposal in terms of European Directive 2012/19/EU and may not be disposed of as domestic garbage.

- Dispose of the device through channels provided for this purpose.
- Comply with all local and currently applicable laws and regulations.

2. Introduction

This manual describes the functions, configuration, mounting and operating instructions of the ITP17 universal process indicator (hereinafter referred to as the device).
Connection, setup and maintenance of the device must be performed only by fully qualified personnel after reading this user guide.

3. Terms and abbreviations

PC – personal computer
akYtec Tool Pro – configuration software
USB (Universal Serial Bus) – serial communication interface

4. Overview

The device is designed to measure and indicate signals of resistance temperature detectors (RTD), thermocouples (TC), pyrometers, DC voltage and DC signals (U / I signals).
Functions:

- measuring and displaying a measured value on the digital display;
- signalling by color-coded indication about exceeding the set thresholds of the measured value;
- signalling when the value is in the critical zone;
- setting of the measured value according to the on/off- law using a discrete output based on a transistor switch;
- indication of a break or short circuit in the "device-sensor" communication line.

5. Specifications

Table 1 Specifications

Parameter	Value
Electrical	
Power supply	24 (10..30) VDC
Power consumption, max.	1 W
Appliance class	III
Galvanic isolation between domain of combined power and output interface and input domain	500 V
Input signals	
Number	1
Input resistance at voltage measuring, min.	100 kΩ
Input voltage drop (at current measuring), max.	1.6 V
Input signals supported	see *Section 7*
Sampling time, max.	1 s
Full-scale accuracy , max. RTD, U / I signals TC, pyrometers	 ± 0,25 % ± 0,5 %
Temperature influence	0,2 of full-scale accuracy limit/ 10 °C
Output	
NPN transistor, loading capacity	200 mA, 42 VDC
Length of signal line, max.	30 m
Configuration interface	
Connector for configuration with akYtec Tool Pro	micro-USB
Display	
Indicator	one 4–digit and 7–segment indicator
Colors	3
Character height	14 mm
Mechanical	
Dimensions	48 × 26 × 72 mm
IP code (front / rear)	(IP65 / IP20)
MTBF	100000 hours
Average service life	12 years
Weight	approx. 150 g

6. 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 2 Environmental conditions

Condition	Permissible range
Ambient temperature	-40…+60 °C
Relative humidity	30…80 % (non-condensing)
Transportation and storage temperature	-25 … +55 °C
Transportation and storage relative humidity	5…95 % (non-condensing)
Altitude	up to 2000 m ASL
EMC emission / immunity	conforms to IEC 61000-6-3-2016

NOTE
When operating the device at an altitude above 1000 m above sea level, it is necessary to take into account the reduction of the electrical insulation as well as the reduction in the cooling effect of the air.

7. Input signals

Table 3 Signals and sensors

Indication	Description	Measurement range*
RTD		
C 50	Cu50 (α = 0,00426 °C^{-1})	–50...+200 °C
50C	50M (α = 0,00428 °C $^{-1}$)	–180...+200 °C
P 50	Pt50 (α = 0,00385 °C^{-1})	–200...+850 °C
50P	50P (α = 0,00391 °C $^{-1}$)	–200...+850 °C
C 100	Cu100 (α = 0,00426 °C^{-1})	–50...+200 °C
100C	100M (α = 0,00428 °C^{-1})	–180...+200 °C
P 100	Pt100 (α = 0,00385 °C $^{-1}$)	–200...+850 °C
100P	100P (α = 0,00391 °C $^{-1}$)	–200...+850 °C
100n	100N (α = 0,00617 °C $^{-1}$)	–60...+180 °C
P500	Pt500 (α = 0,00385 °C $^{-1}$)	–200...+850 °C
500P	500P (α = 0,00391 °C $^{-1}$)	–200...+850 °C
C500	Cu500 (α = 0,00426 °C $^{-1}$)	–50...+200 °C
500C	500M (α = 0,00428 °C $^{-1}$)	–180...+200 °C
500n	500N (α = 0,00617 °C $^{-1}$)	–60...+180 °C
C 1.0	Cu1000 (α = 0,00426°C^{-1})	–50...+200 °C
1.0C	1000M (α = 0,00428 °C^{-1})	–180...+200 °C
P 1.0	Pt1000 (α = 0,00385 °C^{-1})	–200...+850 °C
1.0P	1000P (α = 0,00391 °C^{-1})	–200...+850 °C
1.0n	1000N (α = 0,00617 °C^{-1})	–60...+180 °C
TC		
tC.L	L	–200...+800 °C
tP.HR	K	–200...+1300 °C
tC.J	J	–200...+1200 °C
tC.n	N	–200...+1300 °C
tC.t	T	–200...+400 °C
tC.S	S	0...+1750 °C
tC.r	R	0...+1750 °C
tC.b	B	+200...+1800 °C
tC.A1	A-1	0...+2500 °C
tC.A2	A-2	0...+1800 °C
tP.A3	A-3	0...+1800 °C
TC in accordance with DIN 43710		
tC.dL	L	–200...+900 °C
I signals**		
0.5	0…5 mA ****	0...100 %
0.20	0…20 mA ****	0...100 %
4.20	4…20 mA	0...100 %
U signals**		
U-55	-50...+50 mV***, ****	0...100 %
U0.1	0…1 V ****	0...100 %
U0.10	0…10 V ****	0...100 %
U2.10	2…10 V ****	0...100 %
Pyrometers		
Pyr.1	RK-15	+400...+1500 °C
Pyr.2	RK-20	+600...+2000 °C
Pyr.3	RS-20	+900...+2000 °C
Pyr.4	RS-25	+1200...+2500 °C

NOTE
* At the temperature over 999,9 and under -199,9ºC the value of the least significant digit equals 1ºC.
** The values depend on the *d.Lo* and *d.Hi* parameters.
*** Accuracy is not standardized.
**** For correct line-break detection when operating with a voltage/current signal source, the source output must be shunted with a 10 kΩ resistor. Without this shunt, line-break detection may not operate correctly.

8. Safety

WARNING
Dangerous voltage!
Electric shock could kill or seriously injure.
All work on the device must be performed by a fully qualified electrician.
Ensure that the mains voltage matches the voltage marked on the device.
Ensure that the device is provided with its power supply line and electric fuse.
The device may not be used in aggressive environments, in atmospheres in which there are chemically active substances.
The output port and internal electrical elements of the device must be protected from the humidity.

NOTICE
De-energize the device before working on it. Switch on the power supply only after completing all work on the device.

9. Mounting

To mount the device:

1. Prepare the mounting cutout with Ø of 22.5 mm in the switchboard where the device should be mounted (see *Fig. 2*).
2. Carefully position the supplied gasket (see *Fig. 1*).
3. Place the device with the installed gasket in the prepared mounting cutout and tighten the nut (included in the scope of delivery) to fix the device.

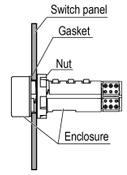


Fig. 1 Mounting

NOTICE
Do not use any tools to tighten the nut. Tighten the nut only by hand.

Removing proceeds in the reverse order.

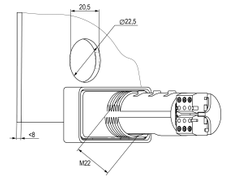


Fig. 2 Mounting cutout

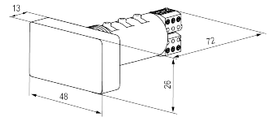


Fig. 3 Dimensions

10. Connection

10.1 General information

Signal cables should be routed separately from the power supply cables as well as from the cables which are sources of high-frequency and impulse interference.
For high-quality clamping and reliable electrical connections, it is recommended to use:

- copper multicore wires, diameter after tinning - 0.9 mm (17 cores, AWG 22) or 1.1 mm (21 cores, AWG 20);
- copper wires with single-wire cores, diameter from 0.51 to 1.02 mm (AWG 24-18).

The ends of the wires should be stripped of insulation by 8 ± 0.5 mm (see *Fig. 4*) and, if necessary, tinned.

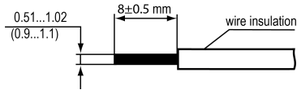


Fig. 4 Wire preparation

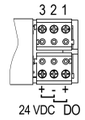


Fig. 5 Terminal assignments

10.2 Wiring

CAUTION
To protect the device input from the influence of industrial electromagnetic interference, the “device-sensor” communication lines should be shielded. To protect the device input circuits from possible breakdown by static electricity charges accumulated on the “device-sensor” communication lines, their wires should be connected to the shield ground screw for 1–2 s before connecting to the device terminal block.

Connect the “device – sensor” communication lines to the primary converter and the device input and connect the device to the power supply (see *Fig. 6*).

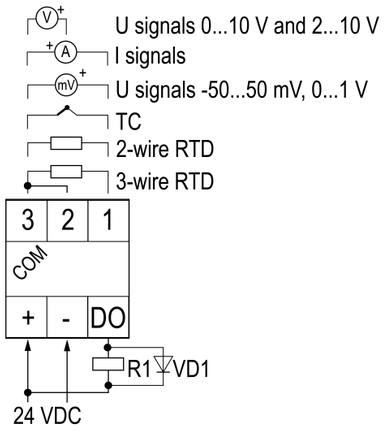


Fig. 6 Wiring diagram

To protect the device against microseconds’ impulse noise of the output device (open collector) on the terminals "DO" and "-", it is recommended to use connecting lines no longer than 30 meters or install devices for protection against impulse noise on the DC line.
The VD1 diode should be located as close as possible to the terminals of the relay winding.
The parameters of the diode are selected in accordance with the following rules:

- the reverse voltage of the diode must be at least *1.3 U_{PS}*;
- the forward current of the diode must be at least *1.3 R1* (1.3 of the relay coil current).

11. Indication and control

The 4-digit and 7-segment indicator on the front panel is designed to display measured values, alarms and device parameters. The segments of the digital indicator can light up in one of the following colors (see *Section 14*):

- green;
- red;
- yellow.

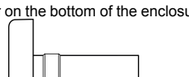


Fig. 7 Control buttons

Table 4 Function buttons

Button	Description
M+ ⏫ together	Press for 3 s to enter the service menu
⏫ or ⏬	• Select parameter; • Change the parameter value Press and hold the button to speed up the process of change

There is a micro-USB connector on the bottom of the enclosure.

Fig. 8 Micro-USB connector

12. Error indication and remedy

Being powered the device starts to operate. If the indicated values do not correspond to the real measured values, check the following:

- sensor function and communication line integrity;
- correctness of sensor connection;
- settings of scaling parameters (*d.Lo* and *d.Hi*).

Table 5 Error indication and remedy

Indication	Description	Remedy
HHHH	The measured input value is above the upper limit	Check the sensor code and measured value compliance
LLLL	The measured input value is below the lower limit	
Hi	The calculated value exceeds the maximum possible positive value that can be displayed on 4 digits of the indicator	Readjust the *dP.t* parameter
Lo	The calculated value is less than the minimum possible negative value that can be displayed on 4 digits of the indicator	
⊢⊣	Sensor break	Check the signal line. If the signal line isn’t broken and the connection is correct, contact akYtec service staff
Er.[ ]	Cold junction sensor (CJS) failure	Contact akYtec service staff

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13. Main menu

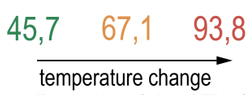
Table 6 Main menu

Indication	Description	Permissible values	Factory settings
inP	Input signal	see *section 7*	4...20 mA
Fd	Digital filter time constant	0…10 s	0
SQrt	Square root function (for U signals)	on/oFF	oFF
d.Lo	Signal lower limit (for I / U signals)	–1999...9999	0
d.Hi	Signal upper limit (for I / U signals)	–1999...9999	100
dP.t	Decimal point position	auto 0 0.0 0.00 0.000	----.-
2U3U	RTD connection: 2–wire or 3–wire	2-Ln 3-Ln	3-Ln
Corr	Offset correction of the measured input value: $T = T_{MEAS} + Corr$	–1999 ...9999	0
Cnt	Control function: OFF / Heating / Cooling / Alarm within limits (П) / Alarm outside limits (U) (see *Fig. 10*)	oFF/HEAt/ CooL/nU	U
SP.Lo	Setpoint lower limit	–1999...9999	0
SP.Hi	Setpoint upper limit	–1999...9999	30
A.HYS	Hysteresis. When “Alarm within limits (П)” or “Alarm outside limits (U)” are selected, the hysteresis blocks the actuation of the output unit with minor fluctuations at the SP.Lo and SP.Hi boundary. The parameter is not displayed when Cnt = oFF/HEAt/CooL	0...9999	0
oUt.E	Output device state in case of sensor failure	on/oFF	oFF
d.FnC	Flashing function	on/oFF	oFF
Zon.1	Thresholds for changing the color of indicator zones	-1999...9999	0
Zon.2			50
Zon.3			80
Zon.4			100
Zon.5			100
CoL.1	Indicator zone color	Grn/rEd/YEL	Grn
CoL.2			YEL
CoL.3			rEd
CoL.4			rEd
CoL.d	Basic indication color outside color zones	Grn/rEd/YEL	Grn
br.r	Brightness of red*	0...100	100
br.G	Brightness of green*	0...100	100
br.y	Brightness of yellow*	0...100	100
bL.Yr	Balance of red/green in yellow*	0...100	100

NOTE
* The parameter doesn’t change by resetting to factory settings.

14. Alarm settings

Color indication
You can set the indicator color modes depending on the input value using Zon.n and COL.n parameters. Zon. n parameters must be recorded sequentially from the lowest to the highest.



Zon.1 = 50.0; Zon.2 = 80.0; Zon.3 = 100.0; CoL.1 = YELL; CoL.2 = rEd; CoL.d=Grn

Fig. 9 Changing of indication color

Alarm logic
The output device can be used for control or alarm indication.
You can select the alarm logic with the Cnt parameter (see *Table 6*) in accordance with *Fig. 10*.

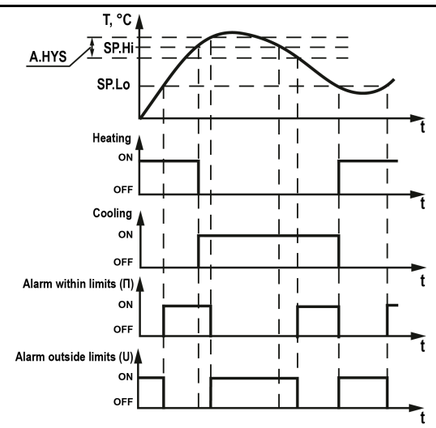


Fig. 10 Output device logic

15. Service menu

Table 7 Service menu

Indication	Description
dEv.t	Device type
vEr.F	Firmware version
CJS.E	Cold junction sensor on/ off
d.rSt	Reset to factory settings: Current state: **0**. When it is set to **1**, all device settings are reset to default values and the device restarts

16. Configuration using akYtec Tool Pro

You can configure the device using *akYtec Tool Pro* software.
To connect the device to *akYtec Tool Pro*:

1. Connect the device to a PC with the USB — micro USB cable.
2. Start *akYtec Tool Pro*.
3. Click **Add devices**.
4. Select the COM port assigned to the device in the **Interface** drop-down menu of the **Network parameters** tab. You can check the port number and name in Windows Device Manager.



Fig. 11 Interface selection

5. Select **Modbus RTU** in the **Protocol** drop-down menu.

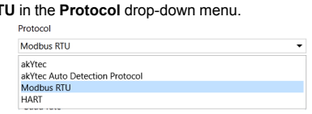


Fig. 12 Protocol selection

6. Select the necessary device in the **Measuring devices** category of the **Devices** drop-down menu.

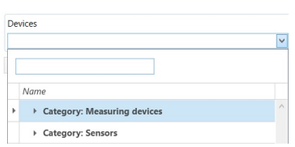


Fig. 13 Device selection

7. If the device is connected for the first time, select **Manually** in the **Connection setup** tab and set the following values:

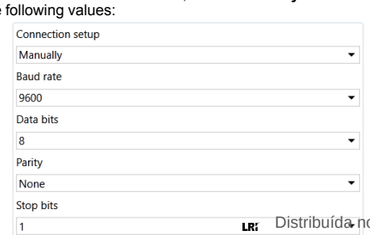


Fig. 14 Connection setup

8. Select **Find device**.
9. Enter the address of the connected device (default address — **16**).

NOTE
The device is available under addresses from 1 up to 255.

10. Click **Search**. The device with the address will be displayed in the window.
11. Select the checkbox next to the device and click the **OK** button.

To get more information about the connection and operation of the device, use the HELP menu of akYtec Tool Pro or press **F1** to call up **HELP** in the program.

17. Maintenance

The safety requirements must be observed when the maintenance is carried out.

WARNING
Cut off all power before maintenance.

The maintenance includes:

- cleaning the housing and terminal blocks from dust, dirt and debris
- checking the device fastening
- checking the wiring (connecting wires, terminal connections, absence of mechanical damages).

NOTICE
The device should be cleaned with a dry or slightly damp cloth only. No abrasives or solvent-containing cleaners may be used.

18. Transportation and storage

Pack the device in such a way as to protect it reliably against impact for storage and transportation. The original packaging provides optimum protection.
If the device is not taken immediately after delivery into operation, it must be carefully stored at a protected location. The device should not be stored in an atmosphere with chemically active substances.
The environmental conditions must be taken into account during transportation and storage.

NOTICE
The device may have been damaged during transportation.
Check the device for transport damage and completeness!
Report the transport damage immediately to the shipper and akYtec GmbH!

19. Scope of delivery

ITP17 universal process indicator	1 pc.
User guide	1 pc.
Set of mounting elements	1 pc.

NOTE
The manufacturer reserves the right to make additions to the scope of delivery.

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