

UTx00 Communicative outdoor temperature sensor



UT200

UT100

Summary UTx00 are communicative outdoor temperature sensors for universal usage. They use Modbus RTU / RS485.

Applications

- HVAC systems – temperature measurement outdoors or in harsh environment
- Temperature monitoring systems

Functions The UT100 uses an external Pt1000 element or passive sensor (must be ordered separately) and has no external stem. It can be used with special passive sensors, such as with pendulum or ball temperature sensors RPTF1 and RPTF2. The UT200 contains a stainless stem with a Pt1000 measuring element.

The main part of the device is an AFE (analog front end), which converts the resistance of the Pt1000 measuring element to a 16 bit digital value. This value is linearised and readable over a Modbus register (the Modbus table is in a separate document, see also below).

The measured value is delivered with 0,01 °C resolution.

Installation Use a flat screwdriver to open the cover of the plastic housing. Connect the cabling according to the terminal description. Recommended wire crosssection is 0,35 - 1,5 mm² (outer cable diameter 4 - 8 mm). To keep the protection degree, the cable gland must be fastened and the cover put back after installation. The sensors are fixed to wall or any other flat surface using two screws (not attached).

The sensors are intended for operation in a normal, non-aggressive environment. They can be installed in any position. No maintenance is necessary.

Technical data	Power	10 ... 35 V DC, 14 ... 24 V AC
	Measuring range	-30 ÷ +100 °C
	Consumption	typically 0,25 W; max. 1,5 W
	Communication	RS485, Modbus RTU (slave)
	Communication parameters	selectable baudrate 1200, 2400, 4800, 9600, 19200 bps no parity, 8 bits, 1 stop bit
	Measuring element (UT200 only)	Pt1000, 3850 ppm/°C
	Long-term stability of Pt1000 (UT200 only)	0,05 % / 10000 h
	Accuracy class (UT200 only)	B ($\pm 0,3 + 0,005 * t $)[°C]
	A/D converter accuracy	0,1 % of measuring range
	Response time (60 %)	less than 9 s
	Cover	polyamide
	Dimensions	70 x 63 x 33 mm, see drawing below
	Protection degree	IP65 (EN 60529)
	Terminals	screw terminals for wires 0,35 - 1,5 mm ² ; outer cable diameter 4 - 8 mm
	Measuring stem (UT200 only)	stainless steel 17240; 25 mm length
	Insulation resistance	higher than 200 MOhm
	Environmental conditions (according to EN 60721-3-4; grade IE41)	sensor temperature -30 ÷ +100 °C; humidity 10 ... 100 % rH; atmospheric pressure 70 – 106 kPa

Measuring accuracy

Please consider that the cable resistance (between the A/D converter and Pt1000 sensor) may cause a measuring error. The error increases with increasing cable length and decreasing wire cross-section.

For a 50 m cable and Pt1000 sensor:
 cable with 0.5 mm² cores ... error +0.9 K
 cable with 0.75 mm²... error +0.6 K
 cable with 1 mm²... error +0.44 K.

For other cable lengths the errors can be calculated on a linear basis.

Limitations

Note that the device may not work properly or may be damaged if the defined operation conditions are not maintained.

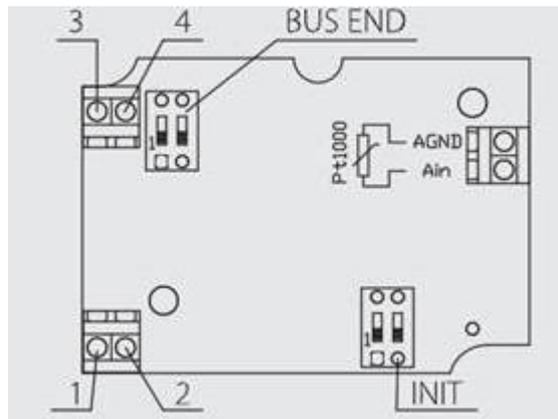
The measuring accuracy and / or correct function can be compromised:

- If the defined operating conditions are not kept.
- If the sensor is mechanically stressed (only UT200).
- At places with explosion hazard.
- In a chemically aggressive environment.
- At exposition to direct light or irradiation (lights, radiators, sun).
- At places where no free air flow is ensured (niches, ...).
- At places where the sensor may be influenced by warm air coming from inside of the building (above doors and windows, air outlets, chimneys, piping etc.).
- If the cable is pulled in parallel with power cabling (danger of induction), a safe distance is about 50 cm depending on the character of the electromagnetic emissions.

Calibration

Initial calibration according to Czech law 505/1990, § 10.

Terminals



Terminals and connectors:

1	G power
2	G0 power
3	K+ communication RS485+
4	K- communication RS485-
Ain	analogue input for a measuring element Pt1000
AGND	analogue input for a measuring element Pt1000

Switches

BUS END:	both ON terminate the bus (set if the device is the first or the last on the bus)
INIT:	sets the initial communication parameters: Modbus address 1, baudrate 9600 bps.

The devices are set to the initial communication parameters by default. INIT the device only if the factory default settings shall be retrieved. Proceed as follows:

- connect the device over RS485 to a PC with configuration software ModComTool
- set the INIT switch to ON
- connect power (to terminals G, G0)
- search the device in the program (Scan)
- set INIT to OFF
- in ModComTool double click the device
- click to the „Initialization“ button in ModComTool
- switch the power off and on again.

LED indicators

PWR	green, power on
RS485 TX	red; transmission on the bus

Modbus

The sensor is addressed over the ModComTool. Default Modbus address is 1, communication parameters 9600, N, 8, 1. Measured temperature is in **register 6** formatted as follows:

$$\text{register value} = (\text{measured value in } ^\circ\text{C} + 50) * 100$$

thus

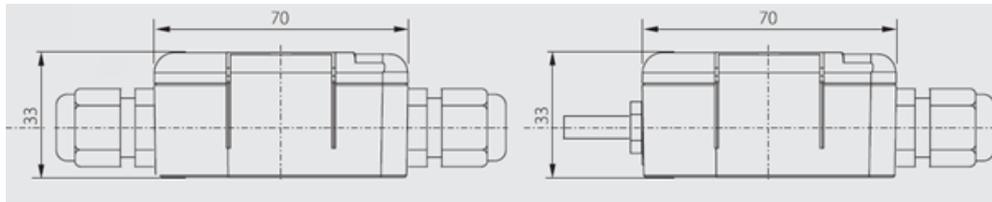
$measured\ value\ in\ ^\circ C = (register\ value / 100) - 50$

Examples:

0000 hex = 0 dec = -50.00 °C

3A98 hex = 15000 dec = 100.00 °C

Dimensions



UT100

UT200

Conformance with standards

EMC EN 61000-6-2 ed.3:2005, EN 55022 ed.3:2010

Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014

Dangerous substances EN 50581:2012

CZ and EU laws

NV č. 17/2003 Sb., technical requirements on low-voltage electrical devices

NV č. 616/2006 Sb., technical requirements on products regarding their electromagnetic compatibility

NV č. 481/2012 Sb., limitation of usage of dangerous substances in electrical and electronic devices

Council Directive 2006/95/EC, health and low voltage equipment safety

Council Directive 2004/108/EC, electromagnetic compatibility

Council Directive 2011/65/EC, certain hazardous substances in electrical and electronic equipment

Changes in versions

10/2016 — First release of the data sheet.

05/2018 – Change technical data.