



PVT10

Humidity and temperature transmitter

User guide

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Description

1 Description

Humidity and temperature transmitter PVT10 is intended for measurement of relative humidity, temperature and dew point of air ensuring high accuracy and stability. The transmitter is designed for indoor use (at home and office, in HVAC and building automation systems, e.g. in hotels, museums or datacenters). Compact wall-mount plastic enclosure provides natural sensor ventilation.

The instrument utilises digital fully calibrated and temperature compensated combined relative humidity and temperature sensors with excellent repeatability and stability.

Two freely configurable 4-20 mA or 0-10 V analog outputs can be used to connect the transmitter to secondary devices like display panels or controllers. Each output can be independently assigned either to temperature, relative humidity or dew point channel. RS485 interface with industry-standard Modbus RTU protocol allows direct Fieldbus networking of the transmitters.

Warranty

2 Warranty

This product is warranted to be free from defects in material and workmanship for a period of one year from the date of original sale. During this warranty period Manufacturer will, at its option, either repair or replace product that proves to be defective. This warranty is void if the product has been operated in conditions outside ranges specified by Manufacturer or damaged by customer error or negligence or if there has been an unauthorized modification.

Specification

3 Specification

Table 3.1 General technical data

Sensors	combined RH and T sensors
Measurement ranges	0...95% RH / -20...+70 °C
Resolution	0.1% RH / 0.1 °C
Accuracy	
RH = 20...80%	±3%
RH = 5...20% or 80...95%	±4%
T = -20...+70 °C	±0.5 °C
Response time	approx. 15 s
Self-diagnostics	full functionality check at start-up
Warm-up time, max.	1 s
Power supply	12 / 24 (11.5...30) V DC
Power consumption, max.	1.5 W
Analog outputs	2x 4-20 mA / 0-10 V, user settable, freely configurable scales
Fieldbus	
Interface	RS485
Protocols	Modbus RTU
Galvanic isolation	none
Permitted load	
4-20 mA	< (Us – 10.5 V) / 22 mA
0-10 V	> 250 kohm
Cable connections	screwless terminal blocks
Enclosure	white ABS, wall mount, IP20
Dimensions	71 x 71 x 27 mm
Operating environment	industrial indoor places
Operating conditions*	See Fig. 3.1
CE marking	Conformance to 2014/30/EU and EN61326-1 requirements

* Normal operating conditions of the device are shown in Fig. 3.1.

Any long-term use of the device (>50 h) at maximum permissible operating conditions can result in the deterioration of the measurement accuracy.

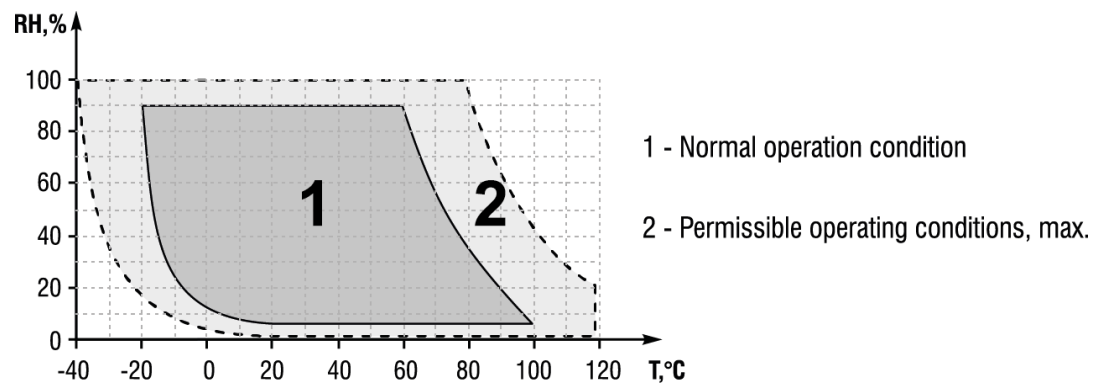






Fig. 3.1 Operating conditions

Safety

4 Safety

Explanation of the symbols and keywords used:

- | | |
|--|--|
|  DANGER | <i>DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</i> |
|  WARNING | <i>WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</i> |
|  CAUTION | <i>CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.</i> |
|  NOTICE | <i>NOTICE indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects.</i> |

Installation

5 Installation

To ensure representative measurement of temperature and humidity in the room, choose carefully the transmitter installation place. PVT10 should not be located at direct sunlight, near heat sources or air conditioning units, near doors and windows, in places where air circulation is limited, or on poorly insulated and cold external walls.

Detach the base from the enclosure by pulling gently along the four guiding pins (Fig. 5.1). Fix the base on the wall either by double-sided adhesive tape or by screws. You may need to drill suitable holes or cutouts in the base for screws and cable.

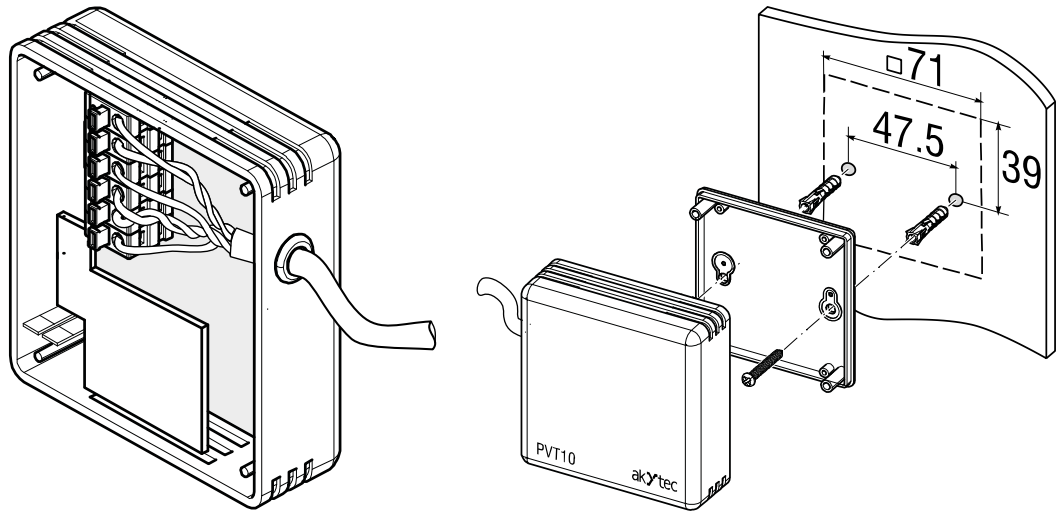


Fig. 5.1 Device mounting

Orient the transmitter with ventilation slots upwards and downwards to ensure proper air convection for faster response and higher accuracy. Plug the power cable and connect the analog outputs or digital interface terminals to the relevant devices (Fig. 5.2). PVT10 uses screwless quick connect spring terminals suitable for wide range of wire cross-sections $0.2...1.5 \text{ mm}^2$. The recommended wire stripping length is $8...9 \text{ mm}$. Push the spring loaded terminal lever, insert the wire end into terminal hole and release the lever.

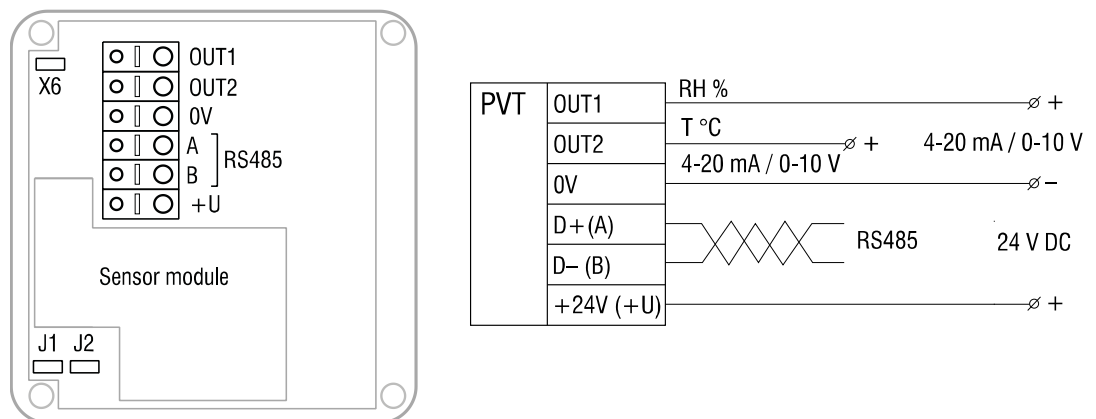


Fig. 5.2 Wiring

The type of each analog output can be independently changed between 4-20 mA and 0-10 V with jumpers J1 (OUT1) and J2 (OUT2):

- closed jumper: 0-10 V
- opened jumper: 4-20 mA

Installation

By default the outputs are assigned:

- OUT1: to relative humidity with default scale 0 - 95 % RH
- OUT2: to temperature with default scale -20...+70 °C

The output assignments and scales can be changed by Modbus commands.

As the humidity and temperature sensor module is located inside the enclosure and attached to the motherboard, the sensors may be subject to transmitter self-heating effects. If 4-20 mA or 0-10 V analog outputs are used, powering from 12 V DC voltage is recommended for less self-heating of the instrument and achieving higher accuracy. If only RS485 interface is used, 24 V DC supply voltage is also appropriate. For wiring of RS485 lines use twisted pair cable, like LiYY TP 2 x 2 x 0.5 mm² or CAT 5. Use one pair for D+(A) and D-(B) wires and the second pair for common 0V and power +U wires.

After wiring and setting output options attach the enclosure back to the base.

6 Emergency mode

The current outputs of the transmitter may be programmed via Modbus commands to signal if the connection with the sensor is lost. The signal may be set to 3.8 mA or 21.5 mA. See the table of Modbus registers for more information (Appendix B2).

Restore factory settings

7 Restore factory settings

To reset the device's Slave ID, baud rate and sbit number to factory settings, proceed as follows:

- Turn off the power supply
- Set the jumper on the terminal X6
- Turn on the power supply
- Turn off the power supply
- Remove the jumper on the terminal X6
- Turn on the power supply.

8 Maintenance and cleaning

The humidity and temperature transmitter PVT10 is maintenance-free. If needed the housing of the device can be cleaned using a damp cloth and non-aggressive cleaning solutions, in switched-off state.

Transport and storage

9 Transport and storage

The device packaging must ensure a shockproof transport and storage. The original packaging offers an optimal protection.

If the device is not taken into service immediately after delivery, it must be carefully stored in a safe and protected place.

Storage temperature range: -20...+70 °C.

**WARNING**

Remove all the adherent media rests on the process connection before storing the device after operation. This is particularly important if the medium is hazardous to health, e.g. radioactive, carcinogenic, toxic, caustic, etc.

**NOTICE**

***The device may have been damaged while shifting.
Check the device for transport damages and completeness!
Report the transport damage immediately to the shipper and akYtec GmbH!***

Scope of delivery

10 Scope of delivery

- | | |
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| – PVT10 | 1 |
| – User guide | 1 |
| – Mounting kit | 1 |

Appendix A Dimensions

Appendix A Dimensions

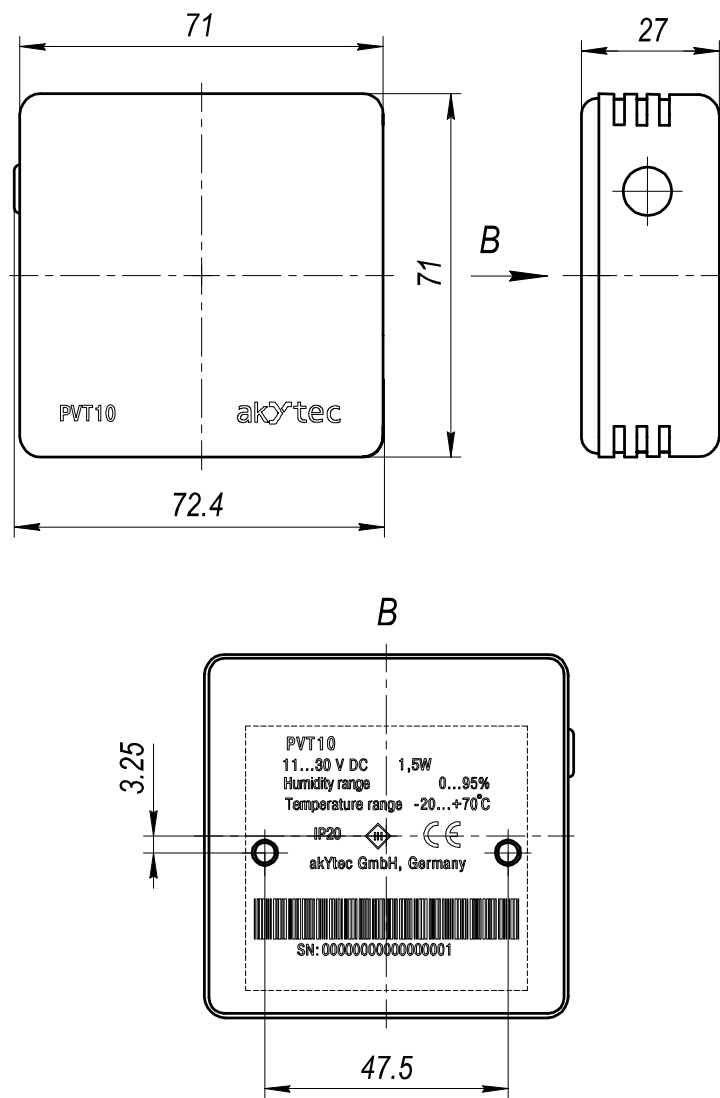


Fig. A.1

Appendix B Connection to the Computer

Appendix B Connection to the Computer

B.1 Communication parameters

Parameter	Supported values	Default value
Baud rate	1.2...57.6 kbit/s	9.6 kbit/s
Data bits	8	8
Parity	none	none
Stop bits	1, 2	1
Protocol	Modbus RTU	
Modbus functions	03 - read multiple registers 06 - write single register	
Error codes	01 - illegal function 02 - illegal data address 03 - illegal data value 04 - slave device failure (details of last error 04 can be read from register 0x0008)	

B.2 Modbus registers

Registers Reg are shown in hexadecimal 0-based format.

Modbus holding register numbers are shown in decimal 1-based format, and may be addressed either from 00001 or 40001 base.

Address		RW	Description	Supported values (dec)	Default
hex	dec				
0x0001	(4)0001	R	Product version	-	PV
0x0002	(4)0002	R			T1
0x0003	(4)0003	R			0
0x0004	(4)0004	RW	Slave ID (net address) *	1...247 **	16
0x0005	(4)0005	RW	Baud rate *	1.2...57.6 kbit/s	9.6
0x0006	(4)0006	RW	Response delay, ms	10...255	10
0x0007	(4)0007	RW	Stop bits *	1, 2	1
0x0008	(4)0008	R	Last error code	1...255	0
0x0010	(4)0016	R	Software version	520 (dec), 208 (hex)	520
0x0011	(4)0017	RW	Restarts counter	write '42330' to restart device (no response will follow)	-
0x0099	(4)0153	RW	Temperature compensation parameter	-32000...+32000	0
0x00A2	(4)0162	RW	Zero adjustment for temperature data, °C × 100	-32000...+32000 (-320.00...+320.00 °C)	0
0x00A3	(4)0163	RW	Slope adjustment for temperature data, % × 1000	-32000...+32000 (-32.000...+32.000 %)	0

Appendix B Connection to the Computer

Address		RW	Description	Supported values (dec)	Default
hex	dec				
0x00A4	(4)0164	RW	Change rate limit for temperature data, °C × 100 / s	1...32000 (0,01...320.00 °C/s), 0 - no limit	0
0x00A5	(4)0165	RW	Zero adjustment for humidity data, %RH × 100	-32000...+32000 (-320.00...+320.00 %RH)	0
0x00A6	(4)0166	RW	Slope adjustment for humidity data, % × 1000	-32000...+32000 (-32.000...+32.000 %)	0
0x00A7	(4)0167	RW	Change rate limit for humidity data, %RH × 100 / s	1...32000 (0.01...320.00 %RH/s), 0 - no limit	0
0x00A8	(4)0168	RW	Integrating filter time constant for all channels, s	1...32000 (seconds), 0 - no filter	0
0x00C9	(4)0201	RW	Parameter tied to analog output 1	0 - none	2
				1 - temperature	
				2 - humidity	
				3 - dew point	
				9 - forced Modbus control, value set in (4)0203	
0x00CA	(4)0202	RW	Parameter tied to analog output 2	0 - none	1
				1 - temperature	
				2 - humidity	
				3 - dew point	
				9 - forced Modbus control, value set in (4)0204	
0x00CB	(4)0203	RW	Forced value for analog output 1***	0...1000 (0.0%...100.0% of output scale)	0
0x00CC	(4)0204	RW	Forced value for analog output 2***	0...1000 (0.0%...100.0% of output scale)	0
0x00FF	(4)0255	RW	Sensor and analog outputs status	bit [0] = 0/1 – sensor present / absent	010110 22d
				bit [1] = 0/1 - analog outputs deactivated / activated	
				bit[2]= 0/1 - in case of sensor absent, turn signaling off/on analog output1	
				bit [3] = 0/1 – in case of sensor absent, turn on signaling with low current/high current on analog output1; if bit [2] = 0 – this bit will be ignored	
				bit[4]=0/1 - in case of sensor absent, turn signaling off/on analog output2	

Appendix B Connection to the Computer

Address		RW	Description	Supported values (dec)	Default
hex	dec				
				bit[5]=0/1 - in case of sensor absent, turn on signaling with low current/high current on analog output2; if bit[4]==0 this bit will be ignored bit [6] = 0/1 – current/voltage output detected on output1, read-only Bit [7] = 0/1 – current/voltage output detected on output2, read-only	
0x0102	(4)0258	R	Measured temperature, °C×100	signed integer, -4000...+12500 (-40.00...+125.00 °C)	-
0x0103	(4)0259	R	Measured humidity, %RH×100	signed integer, 0...+10000 (0.00...100.00 %RH)	-
0x0104	(4)0260	R	Calculated dew point, °C×100	signed integer, -8000...+10000 (-80.00...+100.00 °C)	-
0x0105	(4)0261	RW	0% value for analog output 1	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	0
0x0106	(4)0262	RW	100% value for analog output 1	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	95
0x0107	(4)0263	RW	0% value for analog output 2	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	-20 (65516)
0x0108	(4)0264	RW	100% value for analog output 2	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	70

* The new value is applied after restart.

** Broadcast slave ID 0 can be used to assign a new ID to device with unknown ID. When addressing by ID 0 the device shall be the only Modbus instrument in the network. The device will not respond to Master command when addressed by ID 0.

*** This value is dynamic and not kept in EEPROM after restart.