



PVT100

Humidity and temperature transmitter

User guide

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Description

1 Description

1.1 Function

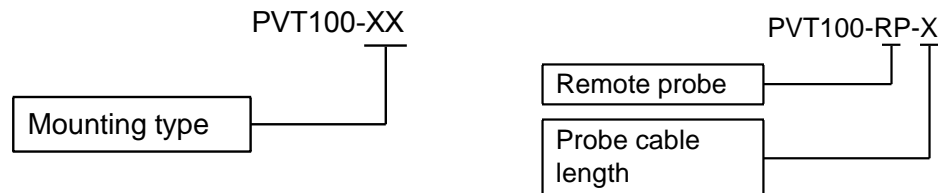
Humidity and temperature transmitter PVT100 is intended for measurement of relative humidity, temperature and dew point of air with high accuracy and stability.

The instrument utilises digital fully calibrated and temperature compensated combined relative humidity and temperature sensors with excellent repeatability and stability. The sensor probes are detachable and fully interchangeable. The range of probes for different applications may be attached to the main unit using standard water- and dustproof M12 connectors.

Two freely configurable 4-20 mA or 0-10 V analog outputs can be used to connect the transmitter to secondary instruments. 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.

1.2 Ordering information

The transmitter PVT100 can be ordered in three different variants depending on the probe mounting (DM, WM and RP):



Mounting type

DM	-	duct-mount
WM	-	wall-mount

Probe cable length

2	-	2.5 m (-40...+80 °C)
5	-	5 m (-40...+80 °C)
T2	-	2.5 m (-40...+120 °C)
T5	-	5 m (-40...+120 °C)

Specification

2 Specification

Table 2.1 Specification

Sensors	combined RH and T sensors
Measurement ranges	0...100% RH / -40...+80(120) °C
Resolution	0.1% RH / 0.1 °C
Accuracy	
RH = 20...80%	±2.5% RH / ±0,5 °C
RH = 5...20% or 80...95%	±3.5% RH / ±0.7 °C
Response time	approx. 15 s
Self-diagnostics	full functionality check at start-up
Warm-up time	≤ 1 s
Power supply	11...30 V DC, nominal 12 / 24 V DC
Power consumption, max.	1.5 W
Fieldbus	
Interface	RS485 (up to 256 units)
Protocol	Modbus RTU
Galvanic isolation	none
Permitted load	
4-20 mA output mode	< (Us – 10.5 V) / 22 mA
0-10 V output mode	> 250 kohm
Probes	
Standard probe SP16	gray painted aluminium body Ø16×L90 mm
IP code	IP54
Measuring range	0...100 % RH, -40...+80 °C
Plug	M12
Heavy duty probe HD16	black painted aluminium body Ø16×L75 mm
IP code	IP54
Measuring range	0...100 % RH, -40...+120 °C
Cable	attached PTFE cable 2.5 m or 5 m
Plug	M12
Probe extension cables	
RPEC-2	PVC, M12 plug and socket, length 2.5 m
RPEC-5	PVC, M12 plug and socket, length 5.0 m
Analog outputs	2 × 4-20 mA / 0-10 V, configurable
Cable connections	screw less terminal blocks
Probe connector	M12, IP68
Enclosure	grey ABS, wall mount, IP65
Dimensions	80 × 82 × 55 mm
Operating environment	industrial indoor and outdoor places
Operating conditions*	See Fig. 2.1

* Normal operating conditions of the device are shown in Fig. 2.1.

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

Specification

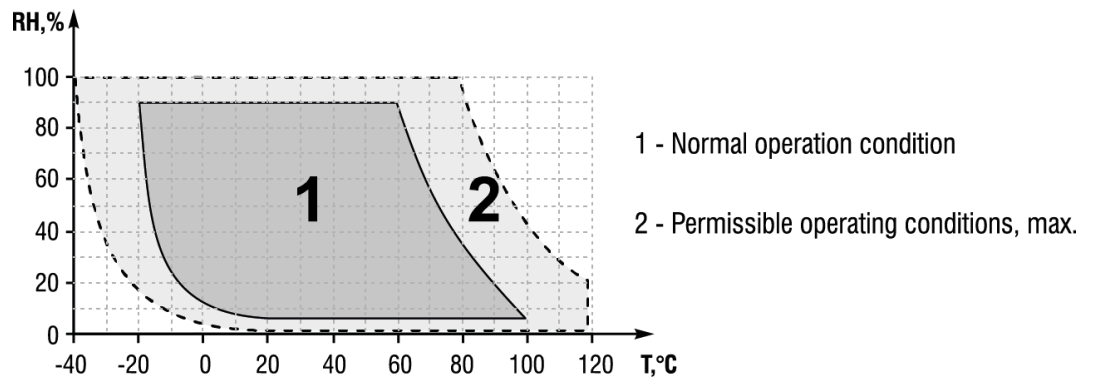


Fig. 2.1 Operating conditions

Safety

3 Safety

Explanation of the symbols and keywords used:



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE

NOTICE indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects.

Installation

4 Installation

To install the device, the following is to be performed:

- Mark and drill four mounting holes on the wall or air duct at the chosen mounting place.
- Unscrew four lid screws and detach the lid from the instrument. Fix the transmitter through mounting holes by screws.
- Connect the power, output and optionally digital interface terminals to relevant devices. PVT100 uses screw less quick connect spring terminals, suitable for wide range of wire cross-sections 0.2...1.5 mm². The recommended wire stripping length is 8...9 mm. Push the spring loaded terminal lever, insert the wire end into terminal hole and release the lever.
- Attach the lid back and tighten it by four screws.

4.1 Wiring

Wire the device in accordance with the Fig. 4.1.

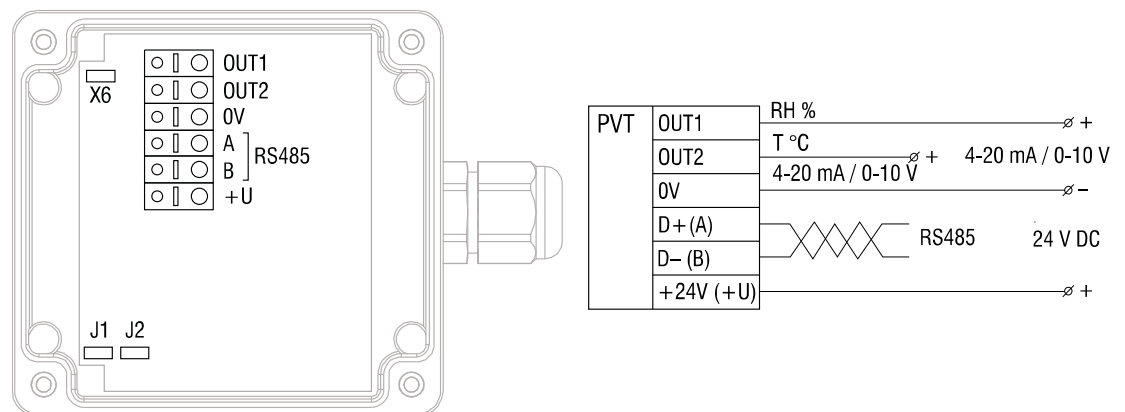


Fig. 4.1 Wiring diagram

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

By default the outputs are assigned:

- OUT1: relative humidity with default scale 0-100 %RH.
- OUT2: temperature with default scale -40...+80(120) °C.

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

5 Sensor probes

The sensor probes SP16 and HD16 (Fig. 5.1) are equipped with a hydrophobic microporous PTFE filter to protect the sensor from dust, dirt and water drops. The round filter is snap-fitted and may be replaced if it gets strongly contaminated.

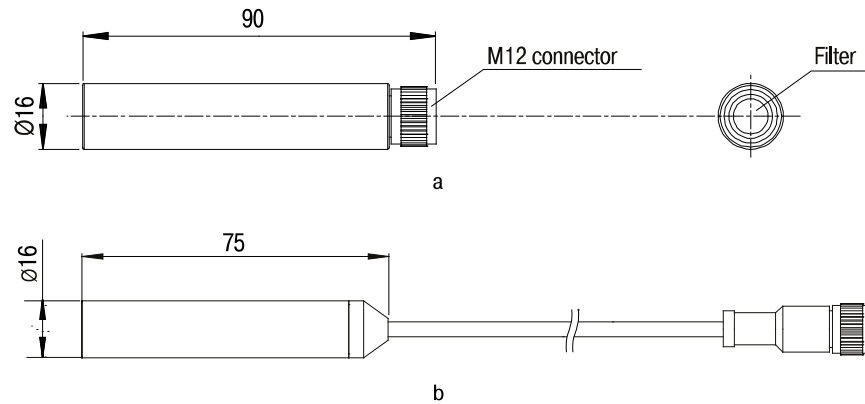


Fig. 5.1 Sensor probes: a – SP16; b – HD16

To replace the PTFE filter, carefully hook the filter near its edge with a small flat screwdriver and pull it off. Place a new filter onto the sensor opening and press it to snap into the groove.



CAUTION

Never stab the filter near its centre, where the sensor is located, as this may damage the sensor.

The recommended orientation of sensor probe is vertical with the sensor tip pointing downwards. This prevents possible accumulation of condensed water on the sensor protection filter. The horizontal orientation is also suitable. Avoid orienting sensor tip upward.

After changing sensor probe check that M12 connector is fully tightened to ensure appropriate electrical contact and protection.

Restore factory settings

6 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.

Maintenance and cleaning

7 Maintenance and cleaning

The humidity and temperature transmitter PVT100 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

8 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: -40...+80 °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

9 Scope of delivery

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Appendix A Dimensions

Appendix A Dimensions

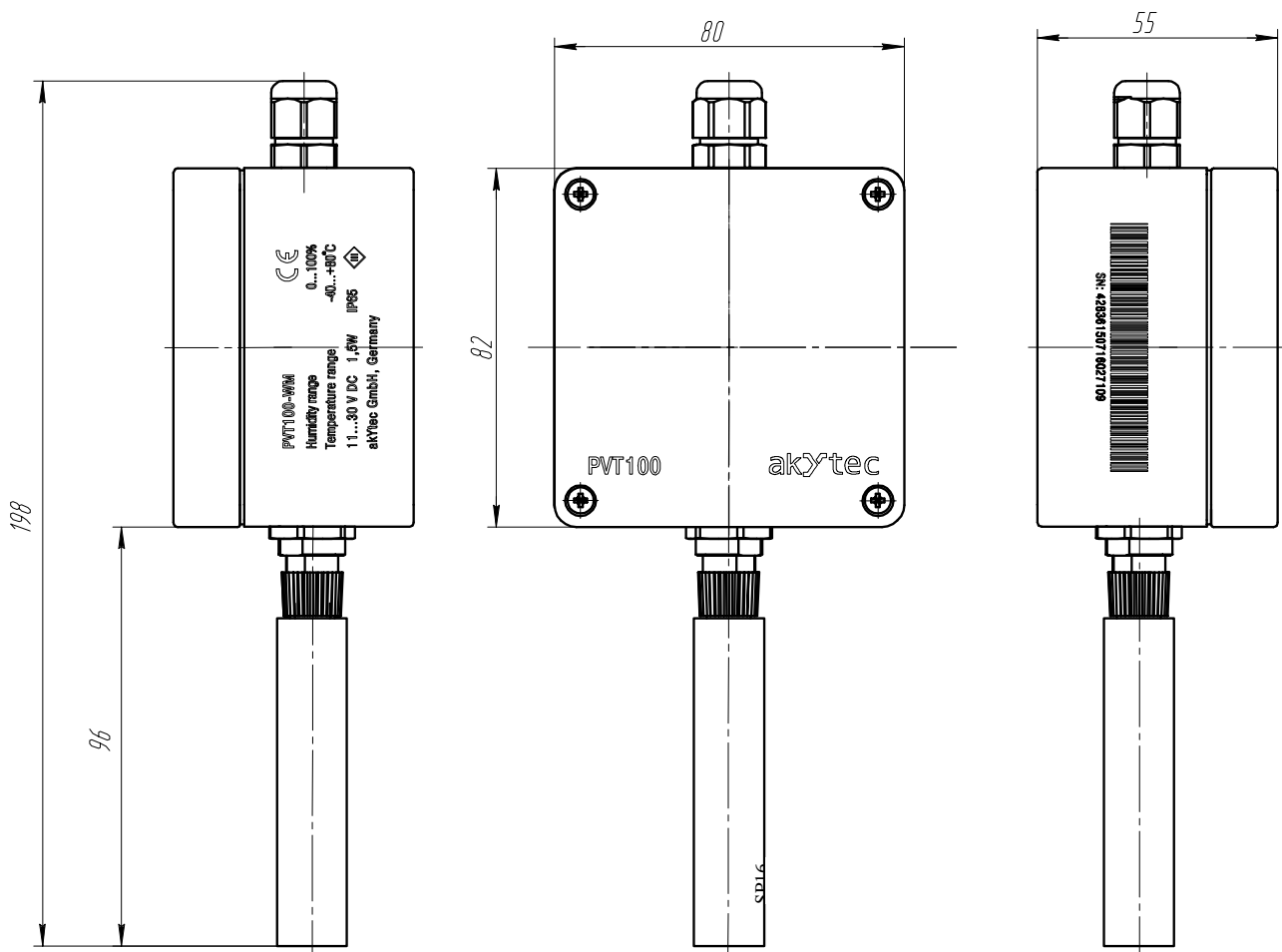


Fig. A.1 Wall-mount version

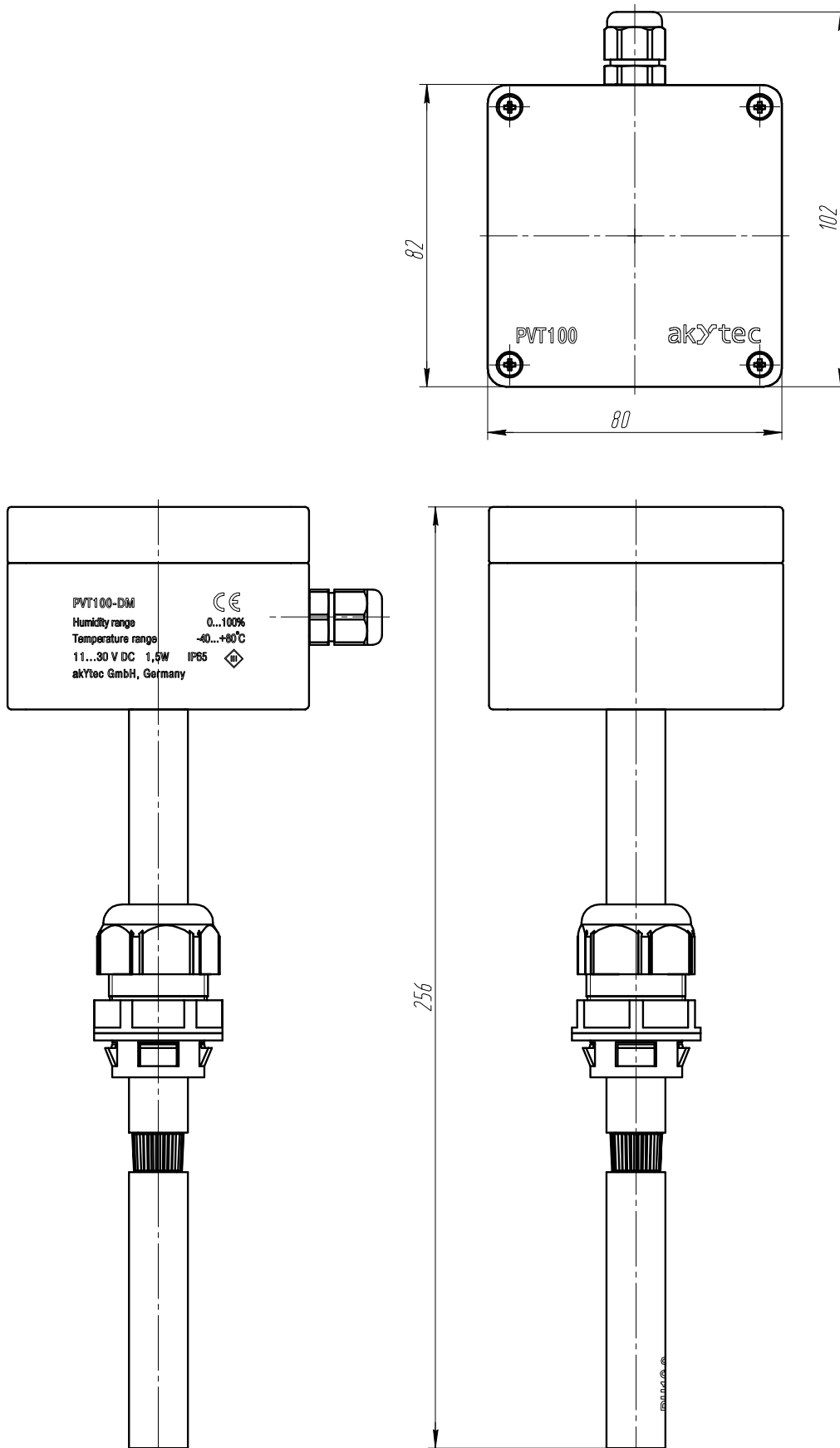


Fig. A.2 Duct-mount version

Appendix A Dimensions

	<i>L, m</i>	<i>L1, m</i>
PVT100-RP-2	2.5	2.7
PVT100-RP-5	5.0	5.2
PVT100-RP-T2	2.5	2.6
PVT100-RP-T5	5.0	5.1

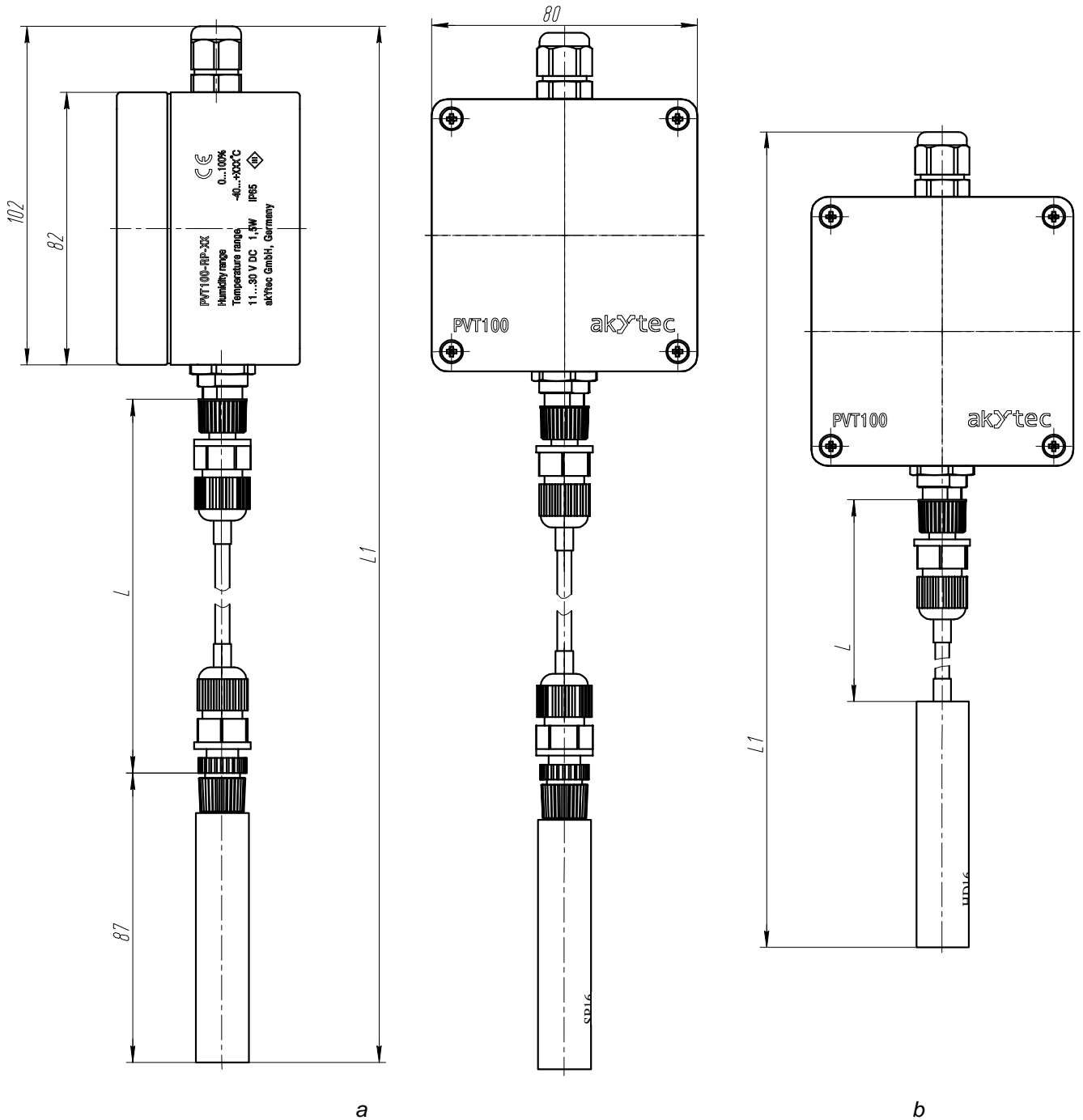


Fig. A.3 Remote probe version:
a – standart probe SP16; b – heavy duty probe HD16

Appendix B Communication protocol

Appendix B Communication protocol

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			
0x0003	(4)0003	R			
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

Appendix B Communication protocol

0x00A3	(4)0163	RW	Slope adjustment for temperature data, % × 1000	-32000...+32000 (-32,000...+32,000 %)	0
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	
				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	

Appendix B Communication protocol

				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...+12000 (-40,00...+120,00 °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)	100
0x0107	(4)0263	RW	0% value for analog output 2	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	-40 (65496)
0x0108	(4)0264	RW	100% value for analog output 2	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	80/120

* - 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