Humidity & Temperature Transmitter

E2227

User Manual

Evikon

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Specifications

Sensor type	Digital combined RH and T sensor
Measurement range	0...95 % RH -20...+70 °C
Resolution	0,01 %RH 0,01 °C
Accuracy	±2,5 % RH / ±0,5 °C ±1,8 % RH / ±0,3 °C on request
Self-diagnostics	Full functionality check at start-up
Warm-up time	≤ 1 s
Response time	<15 seconds
Power supply	11...30 VDC, nominal 24 VDC
Power consumption	< 1,5 VA
Analog outputs	2 × 4-20 mA / 0-10 V, user settable, freely configurable scales
Load resistance	RL < (Us - 2 V) / 22 mA for 4-20 mA RL > 250 kOhm for 0-10 V mode
RS485 fieldbus interface	Up to 256 units on bus (1/8 unit load) no galvanic isolation Modbus RTU protocol support
Cable connections	Screwless spring loaded terminals
Enclosure	White ABS, wall mount, ventilation slots, protection class IP20
Dimensions	H71 × W71 × D27 mm
Weight	<100 g
Operating environment	Residential, business and industrial, indoor spaces
Operating conditions	20...+70 °C, 0...95% RH non-condensing, no aggressive gases
CE marking	According to 2014/30/EU: EN 61000-6-3:2020, EN 61326-1:2013(EMC, emissions) EN 61000-6-1:2019, EN 61000-6-2:2019(EMC, Immunity)

Product description

Humidity and temperature transmitter E2227 is a member of the new PluraSens® family of multifunctional measurement instruments. The device is intended for the measurement of relative humidity and temperature in air and non-aggressive gases indoors with high accuracy and stability. The absolute humidity and dew point values can also be obtained. Target applications are HVAC and building automation management systems.

The device is equipped with a digital combined RH and T sensor. The sensor is temperature compensated to avoid transmitter self-heating effects. Compact wall-mount slotted plastic enclosure provides natural ventilation of the sensor.

Two freely configurable 4-20 mA / 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 support allows direct Fieldbus networking of the transmitter as a Slave unit.

Safety requirements

Always adhere to the safety provisions applicable in the country of use.

Do not perform any maintenance operation with the power on. Do not let water or foreign objects inside the device.

Operating conditions

The device should be used in explosion-safe (non ATEX-rated) indoor areas without aggressive gases, dust or mists in the atmosphere.

Allowable conditions are:

− Temperature in the range of -20...+70 °C;

− Relative humidity in the range of 0...95%, without condensation;

− Atmospheric pressure in the range of 0,9...1,1 atm.

Installation and connection

To ensure representative measurement of temperature and humidity in the room, choose carefully the transmitter installation place. E2227 should not be located in 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. You may need to drill or cut suitable holes in the base for screws and cable. Attach the base to the wall either with double-sided adhesive tape or with two screws (see drawings below).
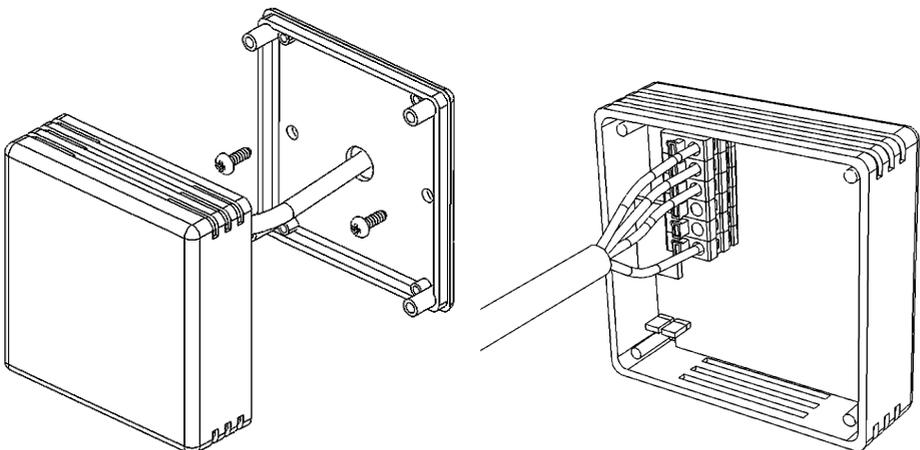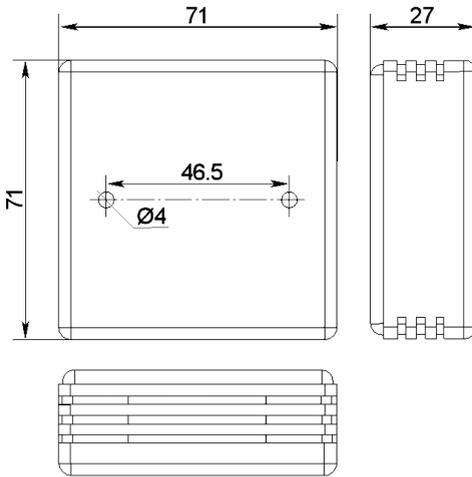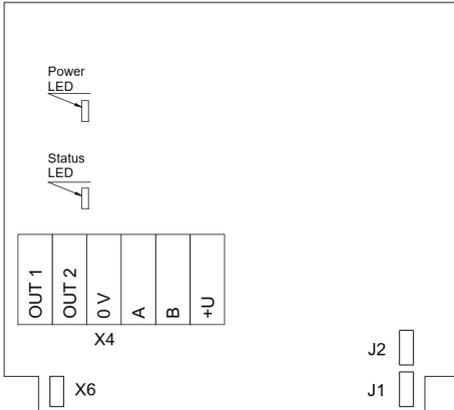
PCB without PSU and relays

Jumpers	
J1	OUT1 type (open: 4-20 mA; closed 0-10 V)
J2	OUT2 type (open: 4-20 mA; closed 0-10 V)
X6	Reset Modbus network parameters to default
X4 terminals	
OUT1	4-20 mA / 0-10 V output
OUT2	4-20 mA / 0-10 V output
0V	0 V / 24 VAC Neutral (optional)
A	RS485 A / Data +
B	RS485 B / Data -
+U	+24 VDC / 24 VAC Phase (optional)

Position the transmitter with the 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 and/or digital interface terminals to the relevant devices as described below.

E2227 uses screwless quick connect spring terminals suitable for a wide range of wires with cross-section 0,2...1,5 mm². We recommend to strip the wire end by 8...9 mm and tin it, or to use the wire end sleeves. To connect the wire, insert the wire end into the terminal hole. To disconnect, push the spring loaded terminal lever, pull the wire out, and release the lever.

Use twisted pair cable, e.g. LiYY TP 2×2×0,5 mm2 or CAT 5, to connect the device to the RS485 network. Use one pair for A and B wires and the second pair for common 0V and power +U wires. to connect the transmitter to the Fieldbus network. polarity must be respected when connecting to an external RS485 network. Overall length of all connections via RS485 interface should not exceed 1200 m.

Note! The outputs are not galvanically isolated from external power supply and share common 0V. Allowed load resistance limits are stated in the Specifications table. To power the instrument from an external power source, connect terminals 0V and +U to the source (see connection diagram).

Both analog outputs can be independently changed between 4-20 mA and 0-10 V type using jumpers J1 (OUT1) and J2 (OUT2). By closing pins on a specific jumper the related output is 0-10 V, with an open jumper the output is 4-20 mA. Power restart is required after changing the position of the jumpers.

By default the output OUT1 is assigned to relative humidity with default scale 0-100 %RH.

By default the output OUT2 is assigned to temperature with default scale 0-100 °C.

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

A LED placed on the PCB of the device to control the connection process. The LED response to different processes is presented in the table below:

Mode	LED mode
During calibration mode or sensor heating period (if activated)	0.5 Hz (50% on, 50% off)
During Modbus communication cycle	Short on-off pulses
Normal operating/measurement	Continuously on or off

Delivery set

- Humidity and temperature transmitter E2227

- Set of mounting accessories (2 screws with plastic dowels)

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.

Return to default settings

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

1. De-energize the device
2. Connect the X6 jumper
3. Turn on the device
4. De-energize the device
5. Disconnect the X6 jumper
6. Turn on the device

NOTE! Cables should be connected/disconnected from PCB when the power supply is unplugged. Connecting or Disconnecting Live wires can result in Corrupt Firmware.

Modbus RTU Communication

Modbus main holding registers (00xxx or 40xxx): 0-based, decimal

Reg	RW	Description
1	R	hardware version
2	R	software version
3	R	product serial number
4	RW	Slave ID [1...247], default 1
5	RW	baud rate, default 9600
6	RW	response delay [1...255] ms, default 10
7	RW	stop bits , parity bit [1,2,3,4], default 1
17	RW	write '42330' to restart
168	RW	integrating time constant [0...32000] s
201	RW	OUT1 parameter, 0:none, 1:T, 2:RH
202	RW	OUT2 parameter, 0:none, 1:T, 2:RH
258	R	temperature, °C×100, signed integer
259	R	humidity, %RH×100, integer
261	RW	OUT1 out 0%, [±1000] °C / %RH
262	RW	OUT1 out 100%, [±1000] °C / %RH
263	RW	OUT2 out 0%, [±1000] °C / %RH
264	RW	OUT2 out 100%, [±1000] °C / %RH

Note! New Slave ID, baud rate and stop bits values apply after restart
Supported Modbus functions: 03 - read multiple registers, 06 - write single register

Communication parameters

Parameter	Permitted values	Default
Supported baud rates	1200, 2400, 4800, 9600, 19200, 38400, 57600	9600
Data bits	8	8
Parity	none / odd / even	none
Stop bits	1, 2	1
Protocol	Modbus RTU	
Modbus functions	03 - Read multiple registers 06 - Write a 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)	

Modbus holding registers

Registers Reg are shown in hexadecimal 0-based format.

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

Reg (hex)	MHR (dec)	RW	Description	Supported values (dec)	Default
0x0004	(4)0005	RW	Slave ID (net address) *	1...247 **	1
0x0005	(4)0006	RW	Baud Rate *	1200, 2400, 4800, 9600, 19200, 38400, 57600	9600
0x0006	(4)0007	RW	Response delay, ms	1...255	10
0x0007	(4)0008	RW	Stop bits, parity bit *	1 no parity bit, 1 stop bit (default after factory reset) 2 no parity bit, 2 stop bits 3 odd parity, 1 stop bit 4 even parity, 1 stop bit NOTE: 3 and 4 are available starting from the Software version 0x214 (dec. 532)	1

0x0011	(4)0018	RW	Restarts counter	write '42330' to restart the device	-
0x00A2	(4)0163	RW	Zero adjustment for temperature data, °C × 100	-32000...+32000 (-320.00...+320.00 °C)	0
0x00A3	(4)0164	RW	Slope adjustment for temperature data, % × 1000	-32000...+32000 (-32.000...+32.000 %)	0
0x00A4	(4)0165	RW	Change rate limit for temperature data, °C × 100 / s	1...32000 (0.01...320.00 °C/s), 0 = no limit	0
0x00A5	(4)0166	RW	Zero adjustment for humidity data, % RH × 100	-32000...+32000 (-320.00...+320.00 % RH)	0
0x00A6	(4)0167	RW	Slope adjustment for humidity data, % × 1000	-32000...+32000 (-32.000...+32.000 %)	0
0x00A7	(4)0168	RW	Change rate limit for humidity data, %RH × 100 / s	1...32000 (0.01...320.00 % RH/s), 0 = no limit	0
0x00A8	(4)0169	RW	Integrating filter time constant for all channels, s	1...32000 (seconds), 0 = no filter	0

Reg (hex)	MHR (dec)	RW	Description	Supported values (dec)	Default
0x00C9	(4)0202	RW	Parameter tied to analog output 1	0 - none 1 - temperature 2 - humidity 3 - dewpoint 4 - absolute humidity 9 - forced Modbus control, value set in MHR (4)0204	2
0x00CA	(4)0203	RW	Parameter tied to analog output 2	0 - none 1 - temperature 2 - humidity 3 - dewpoint 4 - absolute humidity 9 - forced Modbus control, value set in MHR (4)0205	1
0x00CB	(4)0204	RW	Forced value for analog output 1***	0...1000 (0.0%...100.0% of output scale)	0

0x00CC	(4)0205	RW	Forced value for analog output 2***	0...1000 (0.0%...100.0% of output scale)	0
0x00FF	(4)0256	RW	Sensor and analog outputs status	bit [0] = 0 / 1 - sensor present / absent, **read-only!** bit [1] = 0 / 1 - analog outputs deactivated / activated bit[2]= 0/1 - if the sensor is absent, turn signaling off/on at analog output 1, bit[3]=0/1 - if the sensor is 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 -if the sensor is absent, turn signaling off/on at analog output 2 bit[5]=0/1 - in case of sensor absent, turn on signaling with low current/high current at analog output2; if bit[4]=0, this bit will be ignored, bit[6]=0/1 - output 1: current/voltage output, **read-only!** bit[7]=0/1 - output 2: current/voltage output, **read-only!**	
0x0102	(4)0259	R	Measured temperature, °C×100	signed integer, -4000...+12500 (-40.00...+125.00 °C)	-
0x0103	(4)0260	R	Measured humidity, %RH×100	integer, 0...+10000 (0.00...100.00 %RH)	-
0x0104	(4)0261	R	Calculated dewpoint, °C×100	signed integer, -8000...+10000 (-80.00...+100.,00 °C)	-
0x0105	(4)0262	RW	0% value for analog output 1, °C / % RH / g/m^3	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	0
0x0106	(4)0263	RW	100% value for analog output 1, °C / % RH / g/m^3	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	100
0x0107	(4)0264	RW	0% value for analog output 2, °C / % RH / g/m^3	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	0
0x0108	(4)0265	RW	100% value for analog output 2, °C / % RH / g/m^3	signed integer, -1000...+1000 (-1000...+1000 °C/%RH)	100
0x0119	(4)0282	R	Calculated absolute humidity, g/m^3 ×100	0...+32767 (0...327.67 g/m^3)	-

* – The new value is applied after restart.

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

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

Warranty

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

Manufacturer contacts

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