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technology.

# + Datasheet EE431

## Duct and Immersion Temperature Sensor



# EE431

## Duct and Immersion Temperature Sensor

The EE431 duct and immersion sensor reliably measures the temperature (T) in air and liquids and is optimized for building automation, HVAC and process control.

### Analogue, Digital and Passive Outputs

The measured data of the temperature is available at the voltage or current output, as well as on the RS485 interface with Modbus RTU protocol. In addition, EE431 features a wide choice of sensing elements for passive T measurement. An optional display is available for the EE431 with analog output.

### Easy Installation

The device can be mounted either with the plastic mounting flange or via external mounting holes at the enclosure. The innovative immersion well is dedicated for measurement in liquids and allows for fast and safe replacement of the sensor. The EE431 with RS485 interface is appropriate for daisy chain wiring.

### Configurable and Adjustable

An optional adapter /stick and the free Product Configuration Software facilitate the setup and adjustment of the EE431.



EE431 temperature sensor with immersion well



EE431 temperature sensor with mounting flange



EE431 temperature sensor with display

# Features

## Enclosure

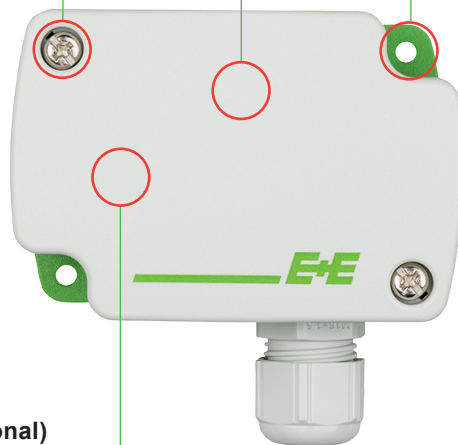
- Protection rating: IP65/Nema 4X
- Polycarbonate (PC)

## Bayonet screws

- Open/close with a ¼ rotation

## External mounting holes

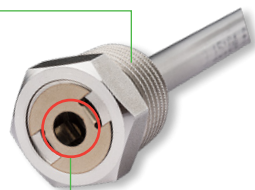
- Mounting with closed cover
- Protection against construction site pollution
- Easy and fast mounting



## LC display (optional)

- 38 x 20 mm (1.5 x 0.8")

## Immersion well

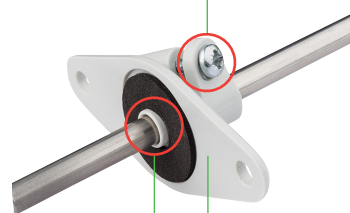


## Innovative mounting spring

- For securing the probe inside the well
- No fastening screw, no tools required

## Screw clamp

- No direct screwing onto probe
- Inclined screw for easy installation



## Mounting flange

## Special sealing

- Foam gasket for good tightness
- No scratching of probe due to alignment notch

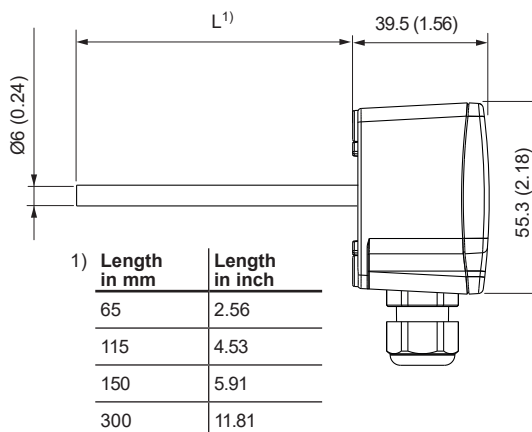
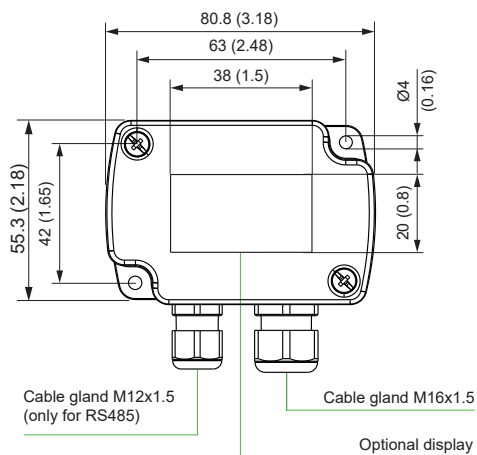
## Test report

According to DIN EN 10204-2.2

# Dimensions

Values in mm (inch)

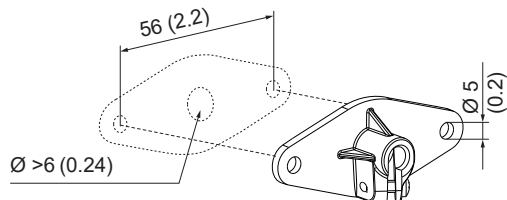
## Temperature sensor



## Mounting accessories

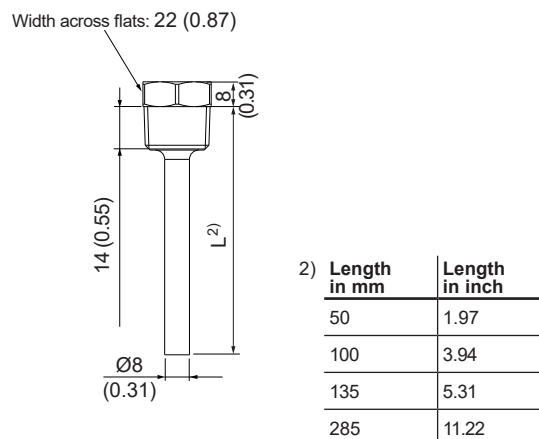
### Mounting flange

(not included in the scope of supply)



### Immersion well

(not included in the scope of supply)



# Technical Data

## Measurands

### Temperature (T) - Active

<b>Measuring range</b>	<b>Duct sensor (probe tip)</b> <b>With immersion well (probe tip)</b>	-40 °C...+110 °C (-40...+230 °F) -40 °C...+130 °C (-40...+266 °F)
<b>Accuracy</b> @ 20 °C (68 °F)	<b>Optional for analogue output</b>	±0.25 °C (0.36 °F) ±0.1 °C (±0.18 °F) <sup>1)</sup>

1) Uncertainty of factory calibration at 20 °C ±0.1 °C (68 °F ±0.18 °F).

### Temperature (T) - Passive

<b>Measuring range</b>	<b>Duct sensor</b> <b>Immersion Sensor with Pt and Ni T sensor</b>	-40 °C...+110 °C (-40...+230 °F) -40 °C...+150 °C (-40...+302 °F)	
<b>Sensor type</b>	<b>Nominal resistance</b>	<b>Sensitivity</b>	<b>Standard</b>
<b>Pt100 DIN B</b>	R <sub>0</sub> : 100 Ω	TC: 3.850 x 10 <sup>-3</sup> /°C	DIN EN 60751
<b>Pt1000 DIN B</b>	R <sub>0</sub> : 1000 Ω	TC: 3.850 x 10 <sup>-3</sup> /°C	DIN EN 60751
<b>NTC10k B3950</b>	R <sub>25</sub> : 10 kΩ ±0.5 %	B <sub>25/85</sub> : 3989 K (B <sub>25/50</sub> : 3950 K ± 1.0 %)	-
<b>NTC20k B4286</b>	R <sub>25</sub> : 20 kΩ ± 0.2 °C	B <sub>25/85</sub> : 4286 K (B <sub>25/85</sub> : 4286 K ± 1.0 %)	-
<b>Ni1000 TK6180 DIN B</b>	R <sub>0</sub> : 1000 Ω	TC: 6180 ppm/K	DIN 43760
<b>Ni1000 TK5000 DIN B</b>	R <sub>0</sub> : 1000 Ω	TC: 5000 ppm/K	DIN 43760

## Outputs

### Analogue

<b>Analogue output</b>	0 - 10 V 4 - 20 mA (2-wire)	-1 mA < I <sub>L</sub> < 1 mA R <sub>L</sub> ≤ 500 Ω	I <sub>L</sub> = load current R <sub>L</sub> = load resistance
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### Digital




<b>Digital interface</b>	RS485 (EE431 = 1 Unit Load)
<b>Protocol</b> <b>Factory settings</b> <b>Supported Baud rates</b> <b>Measured data types</b>	Modbus RTU Baud rate see order information, data bits 8, parity even, 1 stop bit, Modbus address 66 9600, 19200 und 38400 FLOAT32 and INT16

### T Sensor Passive

<b>Sensor connection</b>	2-wire connection
<b>Measuring current, typ.</b>	< 1 mA (according to technical data of the specific T sensing element)

# Technical Data

## General

<b>Power supply</b> class III  USA & Canada: Class 2 supply necessary, max. voltage 30 V DC <b>for output RS485 and 0 - 10 V</b> <b>for output 4 - 20 mA</b>		15 - 35 V DC or 24 V AC $\pm 20\%$ 10 V DC + $R_L \times 20 \text{ mA} < V+ < 35 \text{ V DC}$ $R_L = \text{load resistance}$				
<b>Current consumption,</b> @ 24 V	<b>Voltage output</b>	DC supply max. 1.2 mA AC supply max. 4.6 mA <sub>rms</sub>	with display max. 2.1 mA with display max. 7 mA <sub>rms</sub>			
	<b>Current output</b>	According to output current	According to output current			
	<b>Digital interface</b>	DC supply typ. 3.5 mA AC supply typ. 12 mA <sub>rms</sub>				
<b>Electrical connection</b>		Screw terminals max. 2.5 mm <sup>2</sup> (AWG14)				
<b>Cable glands</b>		M16x1.5 / M12x1.5 / UL94 V-2				
<b>Insulation resistance (probe)</b> @20 °C (68 °F)		>100 MΩ				
<b>LC-display</b>		Available for output A3 and A6 1 line, switchable between °C / °F or according to order code Without backlight Visible area 38 mm x 20 mm (1.5" x 0.8")				
<b>Response time t<sub>63</sub></b> Duct sensor at 3 m/s (590 ft/min) air velocity Immersion sensor in liquid water bath		<1 min <30 s				
<b>Humidity working range</b>		5...95 %RH, non-condensing				
<b>Temperature working range</b>		<b>Duct sensor (probe tip)</b>	<b>With immersion well (probe tip)</b> Active	Passive	<b>Electronics without Display</b>	<b>Electronics with Display</b>
		-40...+110 °C (-40...+230 °F)	-40...+130 °C (-40...+266 °F)	-40 °C...+150 °C (-40...+302 °F)	-40...+70 °C (-40...+158 °F)	-20...+50 °C (-4...+122 °F)
<b>Storage conditions</b>		Without display -30...+70 °C (-22...+158 °F) 5...95 %RH, non-condensing With display -20...+50 °C (-4...+122 °F) 5...95 %RH, non-condensing				
<b>Probe material</b>		Stainless steel (1.4571 / 316Ti)				
<b>Enclosure</b>		Polycarbonate (PC), UL94 V-0 approved IP65/NEMA 4X				
<b>Material Protection rating</b>						
<b>Electromagnetic compatibility</b>		EN 61326-1 FCC Part15 Class B	EN 61326-2-3 ICES-003 Class B	Industrial environment		
<b>Conformity</b>		 				
<b>Configuration and adjustment</b> For 0 - 10 V version and 4 - 20 mA version For digital version		PCS10 Product Configuration Software (free download: <a href="http://www.epluse.com/pcs10">www.epluse.com/pcs10</a> ) and configuration adapter. EE-PCS Product Configuration Software (free download: <a href="http://www.epluse.com/configurator">www.epluse.com/configurator</a> ) and USB-C configuration stick.				

# Technical Data

## Mounting Accessories

### Immersion Well

<b>Material</b>	Brass (nickel-plated) Stainless steel (1.4404 / 316L; tube: 1.4571 / 316Ti)				
<b>Pressure rating</b>	<b>Brass</b>	PN 15 bar (218 psi)			
	<b>Stainless steel</b>	PN 25 bar (363 psi)			
<b>Max. flow speed</b>		<b>50 mm (1.97")</b>	<b>100 mm (3.94")</b>	<b>135 mm (5.31")</b>	<b>285 mm (11.22")</b>
	<b>Brass</b>	26 m/s (5 118 ft/min)	12 m/s (2362 ft/min)	6 m/s (1 181 ft/min)	1 m/s (197 ft/min)
	<b>Stainless steel</b>	29 m/s (5 708 ft/min)	15 m/s (2953 ft/min)	9 m/s (1 771 ft/min)	2 m/s (394 ft/min)

# Ordering Guide

Feature	Description	Code		
<b>Hardware Configuration</b>		<b>EE431-</b>		
	<b>Model</b>	Active	<b>M3</b>	
		Passive		<b>M7</b>
	<b>Output</b>	0 - 10 V	<b>A3</b>	
		4 - 20 mA	<b>A6</b>	
		RS485		<b>J3</b>
	<b>T sensor passive<sup>1)</sup></b> (R-T-characteristics see <a href="http://www.epluse.com/ee431">www.epluse.com/ee431</a> )	Pt100 DIN B		<b>TP2</b>
		Pt1000 DIN B		<b>TP4</b>
		NTC 20k, B4286		<b>TP6</b>
		Ni1000, TK6180 DIN B		<b>TP9</b>
NTC 10k, B3950			<b>TP11</b>	
	Ni1000, TK5000 DIN B		<b>TP19</b>	
<b>Probe length</b>	65 mm (2.56")	<b>L65</b>		
	115 mm (4.53")	<b>L115</b>		
	150 mm (5.91")	<b>L150</b>		
	300 mm (11.81")	<b>L300</b>		
<b>Accuracy</b>	±0.25 °C	<b>No code</b>		
	±0.1 °C <sup>2)</sup>	<b>TT2</b>		
<b>Display</b>	Without display	<b>No code</b>		
	Display	<b>D1</b>		
<b>Output (T) measurand</b>	Temperature [°C]	<b>No code</b>		
	Temperature [°F]	<b>MA2</b>		
<b>Output (T) scaling low</b>	0	<b>No code</b>		
	Value (within the working range)	<b>SALValue</b>		
<b>Output (T) scaling high</b>	50	<b>No code</b>		
	Value (within the working range)	<b>SAHValue</b>		
<b>Protocol</b>	Modbus RTU <sup>3)</sup>		<b>P1</b>	
<b>Baud rate</b>	9600		<b>BD5</b>	
	19200		<b>BD6</b>	
	38400		<b>BD7</b>	

1) Other passive sensor types are available on request from a minimum order quantity of 500 pcs.

2) Uncertainty of factory calibration at 20°C ±0.1°C.

3) Factory settings: Parity even, stop bit 1. Modbus Map and communication setting: see User Guide and Modbus Application Note at [www.epluse.com/ee431](http://www.epluse.com/ee431).

# Order Examples

## EE431-M3J3L300P1BD7

Feature	Code	Description
Model	M3	Active
Output	J3	RS485
Probe length	L300	300 mm (11.81")
Protocol	P1	Modbus RTU
Baud rate	BD7	38 400

## EE431-M3A3L115TT2D1

Feature	Code	Description
Model	M3	Active
Output	A3	0 - 10 V
Probe length	L115	115 mm (4.53")
Accuracy	TT2	±0.1 °C (Uncertainty of factory calibration at 20°C ±0.1°C)
Display	D1	Display

## EE431-M7TP11L65

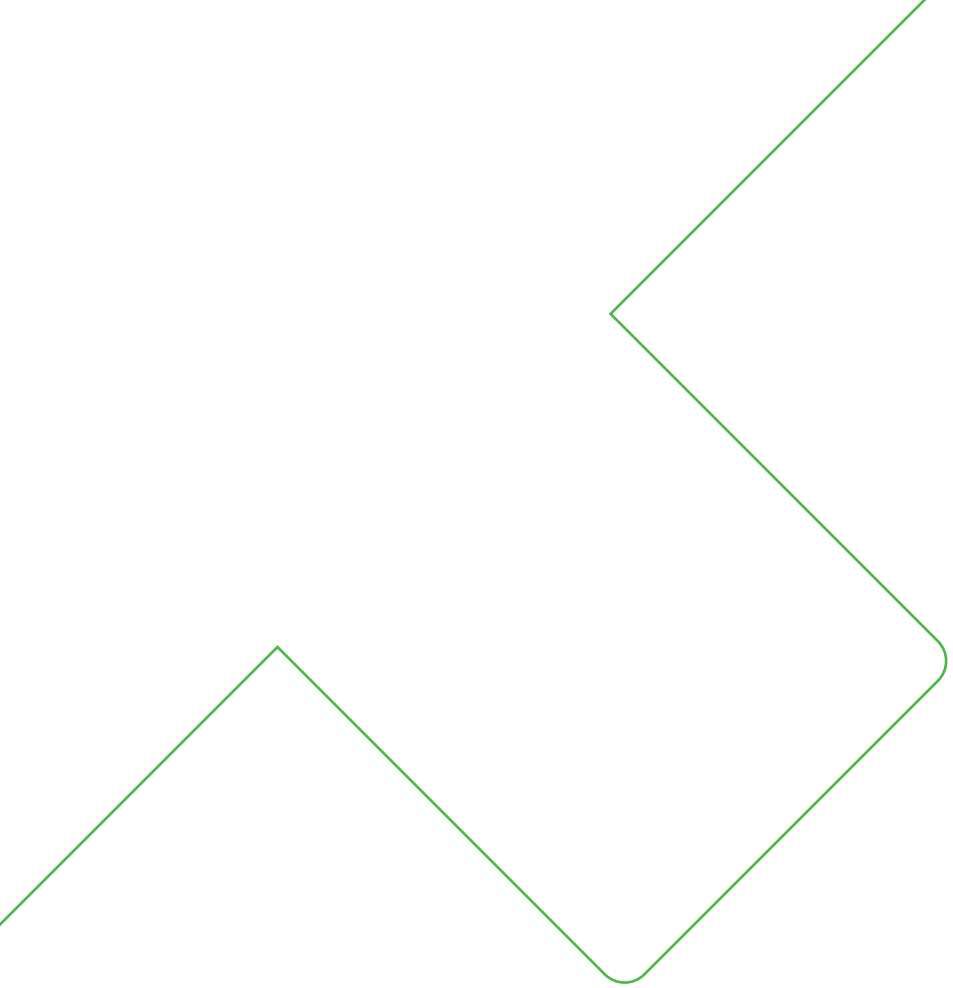
Feature	Code	Description
Model	M7	Passive
T sensor passive	TP11	NTC 10k, B3950
Probe length	L65	65 mm (2.56")



# Accessories

For further information see datasheet [Accessories](#).

Description		Code			
Configuration adapter 0 - 10 V versions and 4 - 20 mA version		HA011023			
USB-C configuration stick for digital version		HA011070			
E+E Product Configuration Software for digital output and for 4 - 20 mA version without display (Free download: <a href="http://www.epluse.com/configurator">www.epluse.com/configurator</a> )		EE-PCS			
E+E Product Configuration Software (Free download: <a href="http://www.epluse.com/pcs10">www.epluse.com/pcs10</a> ) for display and 0 - 10 V versions without display		PCS10			
Power supply adapter for digital output		V03			
Conduit Adapter, M16x1.5 auf 1/2"		HA011110			
Mounting flange		HA401101			
Immersion well - thread R ½" ISO	Length in mm (inch)	50 (1.97")	100 (3.94")	135 (5.31")	285 (11.22")
	Brass	HA400101	HA400104	HA400102	HA400103
	Stainless steel	HA400201	HA400204	HA400202	HA400203
Immersion well - thread ½" NPT	Length in mm (inch)	50 (1.97")	100 (3.94")	135 (5.31")	285 (11.22")
	Brass	HA400111	HA400114	HA400112	HA400113
	Stainless steel	HA400211	HA400214	HA400212	HA400213



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