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Datasheet EE431

Duct and Immersion Temperature Sensor

Modbus

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EE431

Duct and Immersion Temperature Sensor

The EE431 duct and immersion sensor reliably measures the temperature (T) in air and liquids and is optimised 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

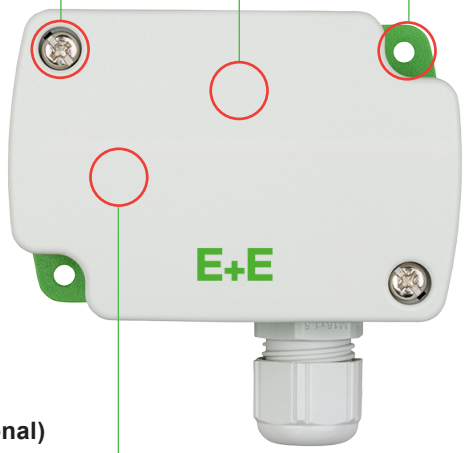
EE431 temperature sensor with display

Features

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

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

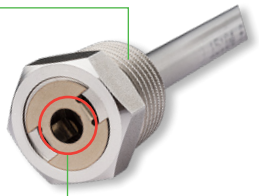
Bayonet screws
- Open / close with a ¼ rotation

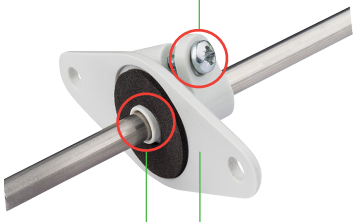


LC display (optional)
- 38 x 20 mm (1.5 x 0.8")

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

Immersion well





Mounting flange

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

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

Test report

According to DIN EN 10204-2.2

Features

Accredited Traceable Calibration Certificate

Internationally recognised certificates for the calibration of measuring instruments from accredited laboratories document the traceability of the measurements to the International System of Units (SI). The E+E Elektronik calibration laboratory offers traceable calibrations.
The E+E calibration laboratory is accredited by Akkreditierung Austria in accordance with DIN EN ISO/IEC 17025 with the identification number 0608. This allows the laboratory to issue ISO 17025 certificates for the measurands humidity, temperature, dew point temperature, air velocity, flow, pressure and CO_2.
Visit www.eplusecal.com for detailed information on calibration and to enquire a certificate of accredited traceable calibration for the EE431 from the E+E Elektronik calibration laboratory.

ISO 9001 Calibration Certificate

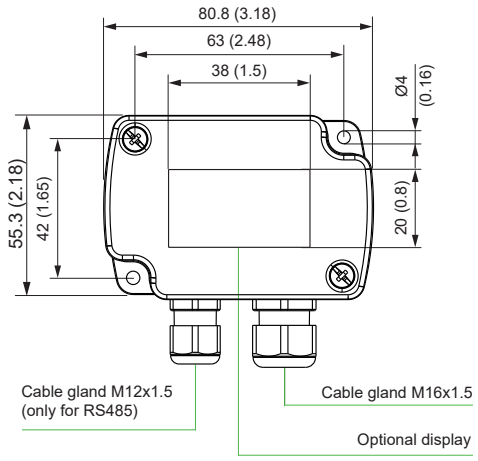
An ISO 9001 calibration certificate documents the comparative measurement of a device against high quality reference equipment (factory level standard). The comparison is performed in accordance with internal procedures that comply with ISO 9001 and provides information on the specimen's measuring accuracy. The reference equipment is traceable to national standards, however, the calibration process is not accredited. Therefore, an ISO 9001 calibration is neither traceable nor internationally comparable.

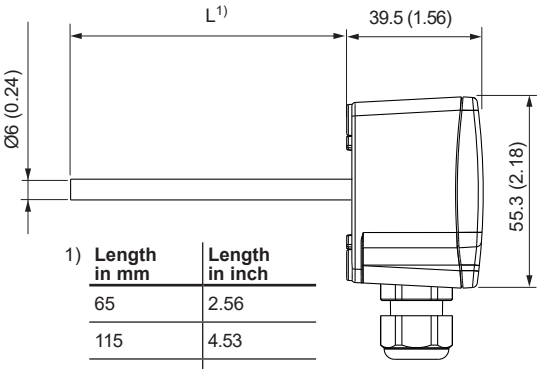
Visit www.epluse.com/iso9001cal for detailed information on calibration and to enquire an ISO 9001 calibration certificate.

Dimensions

Values in mm (inch)

Temperature sensor



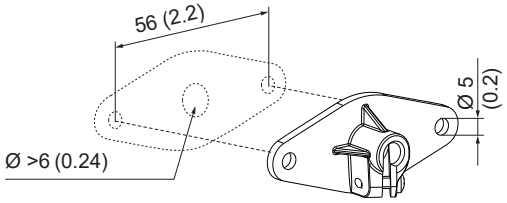


1)

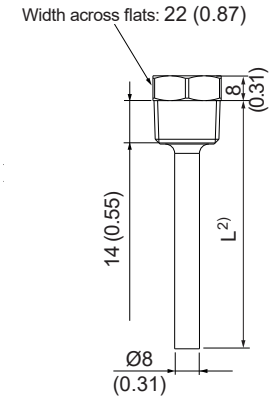
Length in mm	Length in inch
65	2.56
115	4.53
150	5.91
300	11.81

Mounting accessories

Mounting flange
(not included in the scope of supply)



Immersion well
(not included in the scope of supply)



2)

Length in mm	Length in inch
50	1.97
100	3.94
135	5.31
285	11.22

Technical Data

Measurands

Temperature (T) - Active

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

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

Temperature (T) - Passive

Measuring range				
Duct sensor		-40 °C…+110 °C (-40...+230 °F)		
Immersion Sensor with Pt and Ni T sensor		-40 °C…+150 °C (-40...+302 °F)		
Sensor type		**Nominal resistance**	**Sensitivity**	**Standard**
	Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
	Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
	NTC10k B3950	R_{25}: 10 kΩ ±0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-
	NTC20k B4286	R_{25}: 20 kΩ ± 0.2 °C	$B_{25/85}$: 4286 K ($B_{25/85}$: 4286 K ± 1.0 %)	-
	Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760

Outputs

Analogue

Analogue output	0 – 10 V 4 – 20 mA (2-wire)	-1 mA < I_L < 1 mA R_L ≤ 500 Ω	I_L = load current R_L = load resistance

Digital

Digital interface	RS485 (EE431 = 1 Unit Load)
Protocol **Factory settings** **Supported Baud rates** **Measured data types**	Modbus RTU Baud rate see order information, data bits 8, parity even, 1 stop bit, Modbus address 66 9 600, 19 200 und 38 400 FLOAT32 and INT16

T Sensor Passive

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

Technical Data

General

Power supply class III USA & Canada: Class 2 supply necessary, max. voltage 30 V DC **for output RS485 and 0 – 10 V** **for output 4 – 20 mA**		15 – 35 V DC or 24 V AC ±20 % 10 V DC + R_L x 20 mA < V+ < 35 V DC			R_L = load resistance
Current consumption, @ 24 V	**Voltage output**	DC supply max. 1.2 mA AC supply max. 4.6 mA_{rms}	with display max. 2.1 mA with display max. 7 mA_{rms}		
	Current output	According to output current	According to output current		
	Digital interface	DC supply typ. 3.5 mA AC supply typ. 12 mA_{rms}			
Electrical connection		Screw terminals max. 2.5 mm^2 (AWG14)			
Cable glands		M16x1.5 / M12x1.5 / UL94 V-2			
Insulation resistance (probe) @20 °C (68 °F)		>100 MΩ			
LC-display		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")			
Response time t_{63} **Duct sensor at 3 m/s (590 ft/min) air velocity** **Immersion sensor in liquid water bath**		<1 min <30 s			
Humidity working range		5…95 %RH, non-condensing			
Temperature working range		**Duct sensor (probe tip)**	**With immersion well (probe tip) Active**	**Passive**	**Electronics without Display**	**Electronics with Display**
		-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)
Storage conditions	**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				
Probe material		Stainless steel (1.4571 / 316Ti)				
Enclosure	**Material**	Polycarbonate (PC), UL94 V-0 approved				
	Protection rating	IP65 NEMA 4X – not UL approved				
Electromagnetic compatibility		EN 61326-1 FCC Part15 Class A	EN 61326-2-3 ICES-003 Class A	Industrial environment		
Conformity		CE UKCA				
UL complience statement[1)]		c UL us LISTED UL Compliance Statement United States UL Listed, CCN QUYX, Under UL 61010-1, Process Control Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A Canada UL Listed, CCN QUYX7, Under CSA C22.2 No. 61010-1, Signal Equipment; Industry Canada Compliant, ICES-003				
Configuration and adjustment **For 0 – 10 V version and 4 – 20 mA version**		PCS10 Product Configuration Software (free download: www.epluse.com/pcs10) and configuration adapter.				
For digital version		EE-PCS Product Configuration Software (free download: www.epluse.com/configurator) and USB-C configuration stick.				

1) Only for EE431-M3A6 Versions.

Technical Data

Mounting Accessories

Immersion Well

Material		Brass (nickel-plated) Stainless steel (1.4404 / 316L; tube: 1.4571 / 316Ti)			
Pressure rating	**Brass** **Stainless steel**	PN 15 bar (218 psi) PN 25 bar (363 psi)			
Max. flow speed					
		50 mm (1.97")	**100 mm (3.94")**	**135 mm (5.31")**	**285 mm (11.22")**
	Brass	26 m/s (5 118 ft/min)	12 m/s (2 362 ft/min)	6 m/s (1 181 ft/min)	1 m/s (197 ft/min)
	Stainless steel	29 m/s (5 708 ft/min)	15 m/s (2 953 ft/min)	9 m/s (1 771 ft/min)	2 m/s (394 ft/min)

Ordering Guide

	Feature	Description	Code		
			EE431-		
Hardware Configuration	**Model**	Active	M3		
		Passive			M7
	Output	0 – 10 V	A3		
		4 – 20 mA	A6[1]		
		RS485		J3	
	T sensor passive[2] (R-T-characteristics see www.epluse.com/ee431)	Pt100 DIN B			TP2
		Pt1000 DIN B			TP4
		NTC 20k, B4286			TP6
		NTC 10k, B3950			TP11
		Ni1000, TK5000 DIN B			TP19
	Probe length	65 mm (2.56")	L65		
		115 mm (4.53")	L115		
		150 mm (5.91")	L150		
		300 mm (11.81")	L300		
	Accuracy	±0.25 °C	No code		
		±0.1 °C[3]	TT2		
	Display	Without display	No code		
		Display	D1		
Software Setup - Outputs	**Output (T) measurand**	Temperature [°C]	No code		
		Temperature [°F]	MA2		
	Output (T) scaling low	0	No code		
		Value (within the working range)	SAL*Value*		
	Output (T) scaling high	50	No code		
		Value (within the working range)	SAH*Value*		
	Protocol	Modbus RTU[4]		P1	
	Baud rate	9 600		BD5	
		19 200		BD6	
		38 400		BD7	
	Accredited Traceable Calibration Certificate in accordance with DIN EN ISO/IEC 17025		see www.eplusecal.com		
	ISO 9001 Calibration Certificate		see www.epluse.com/iso9001cal		

1) UL certified.
2) Other passive sensor types are available on request from a minimum order quantity of 500 pcs.
3) Uncertainty of factory calibration at 20 °C ±0.1 °C.
4) Factory settings: Parity even, stop bit 1. Modbus Map and communication setting: see User Guide and Modbus Application Note at 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			
USB configuration adapter for version with analogue output		HA011023			
USB-C configuration stick for version with digital output		HA011070			
E+E Product Configuration Software for digital output and for 4 – 20 mA version without display (Free download: www.epluse.com/configurator)		EE-PCS			
E+E Product Configuration Software (Free download: www.epluse.com/pcs10) **for display and 0 – 10 V versions without display**		PCS10			
Power supply adapter 24 V DC		V03			
Conduit adapter US, M16x1.5 – 1/2", plastic		HA011110			
Plastic mounting flange for probes with Ø6 mm (0.24"), with alignment notch		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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