EE23

Humidity / Temperature Sensor for Industrial Applications

The EE23 is optimized for reliable and cost effective use in industrial applications. In addition to highly accurate measurement of relative humidity (RH) and temperature (T), the sensor also calculates the dew point (Td) and the frost point temperature (Tf).

Measurement Performance

The EE23 employs high-end E+E humidity sensing elements manufactured in state-of-the-art thin film technology, which are the prerequisite for outstanding accuracy.

Long Term Stability

The E+E proprietary coating protects the sensing elements against corrosive and electrically conductive pollution, which leads to outstanding long-term stability even in harsh environment. With the appropriate choice of filter cap, the EE23 tackles even challenging industrial applications.

Outputs and Power Supply

The measured data is available on two voltage or current outputs as well as on the display. Additional features like alarm (relay) output and integrated supply module 100 - 240 V AC facilitate the use of the EE23 in a wide range of applications.

Easy Installation and Service

The modular, three parts design of the IP65 / NEMA 4 enclosure, available in polycarbonate or metal, facilitates easy installation, service and replacement.

The enclosure consists of the back cover with the terminals for wiring, the pluggable active part with the electronics and the probe, and the front cover. Once installed, the active part of EE23 can be plugged on and off without rewiring. The plastic enclosure is appropriate also for mounting onto DIN rails.

Type T1

Type T2

Type T4 / T5

Remote Probe and Accessories

The remote probe with cable length up to 10m (32.8 ft) together with a wide choice of accessories such as mounting flanges or brackets, drip water protection or radiation shield allow for easy integration of the EE23 into any measurement task.

User Configurable

The user can easily perform a two-point humidity and temperature adjustment. The analogue and alarm outputs can be freely configured.

Features

- **Temperature range -40...180 °C** (-40...356 °F)
- **Outstanding long term stability**
- **Calculation of dew point and frost point temperature**
- **Easy mounting and maintenance**
- **Alarm output**
- **Inspection certificate according to DIN EN 10204-3.1**

Protective Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the sensing elements, their leads and soldering points. The coating substantially extends sensor lifetime and ensures optimal measurement performance in corrosive environment (salts, off-shore applications). Additionally, it improves the sensors' long term stability in dusty, dirty or oily applications by preventing stray impedance caused by deposits on the active sensor surface or on the electrical connections.

Technical Data

Measurands

Relative Humidity

Working range		0...100 %RH

Accuracy[1] (including hysteresis, non-linearity and repeatability, traceable to intern. standards, administrated by NIST, PTB, BEV...)

-15...40 °C (5...104 °F)	≤90 %RH	± (1.3 + 0.3 %*mv) %RH
-15...40 °C (5...104 °F)	>90 %RH	± 2.3 %RH
-25...70 °C (-13...158 °F)		± (1.4 + 1 %*mv) %RH
-40...180 °C (-40...356 °F)		± (1.5 + 1.5 %*mv) %RH

Temperature dependence electronics, typ.	± 0.015 %RH/°C
Response time t_{90} with metal grid filter at 20 °C (68 °F)	< 15 sec.

Temperature

Probe working range			
	EE23-T1	-40...60 °C	(-40...140 °F)
	EE23-T2	-40...80 °C	(-40...176 °F)
	EE23-T4	-40...120 °C	(-40...248 °F)
	EE23-T5	-40...180 °C	(-40...356 °F)

Accuracy
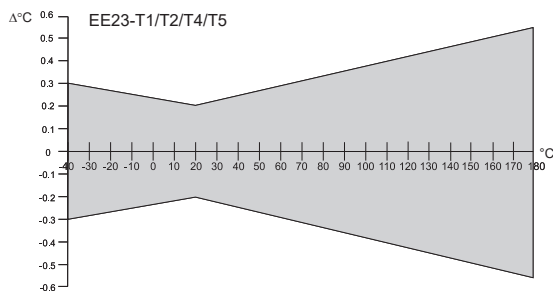
Temperature dependence of electronics, typ.	0.002 °C / °C

Output Scale Span

		from	up to				Units
			EE23-T1	**EE23-T2**	**EE23-T4**	**EE23-T5**	
Humidity	RH	0	100	100	100	100	[%RH]
Temperature	T	-40 (-40)	60 (140)	80 (176)	120 (248)	180 (356)	[°C] ([°F])
Dew point temperature	Td	-40 (-40)	60 (140)	80 (176)	100 (212)	100 (212)	[°C] ([°F])
Frost point temperature	Tf	-40 (-40)	0 (32)	0 (32)	0 (32)	0 (32)	[°C] ([°F])

Outputs

0 - 10 V	-1 mA < I_L < 1 mA
0 - 20 mA / 4 - 20 mA	R_L < 470 Ω

General

Power supply class III ⏣[2]	15 - 35 V DC or 15 - 28 V AC
	100 - 240 V AC, 50/60 Hz supply module (optional)

Current consumption for voltage output
for DC supply	≤ 25 mA	(with alarm module ≤ 35 mA)
for AC supply	≤ 45 mA$_{rms}$	(with alarm module ≤ 70 mA$_{rms}$)

Current consumption for current output
for DC supply	≤ 55 mA	(with alarm module ≤ 65 mA)
for AC supply	≤ 100 mA$_{rms}$	(with alarm module ≤ 120 mA$_{rms}$)

Enclosure material / Protection rating	Polycarbonate / IP65 / NEMA 4X
	$AlSi_9Cu_3$ / IP65 / NEMA 4
Cable gland	M16x1.5 cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	Screw terminals max. 1.5 mm² (AWG 16)
Working temperature range of electronics	-40...60 °C (-40...140 °F)
Working temperature range with display	-30...60 °C (-22...140 °F)
Storage temperature range	-40...60 °C (-40...140 °F)
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial Environment
	FCC Part15 Class A ICES-003 Class A

UK CA   C E

Alarm Module[3]

Output	SPDT-Switch max. 250 V AC/8A or 28 V DC/8A
	Threshold Hysteresis
Setting range	10...95 %RH 3...15 %RH
Setting accuracy	± 3 %RH

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
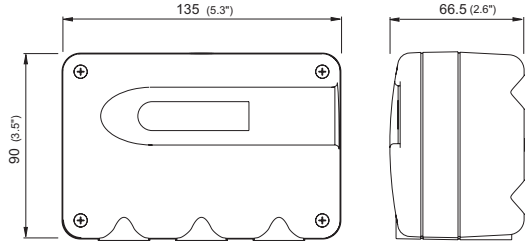2) USA & Canada: class 2 supply required, max. supply voltage 30 V DC
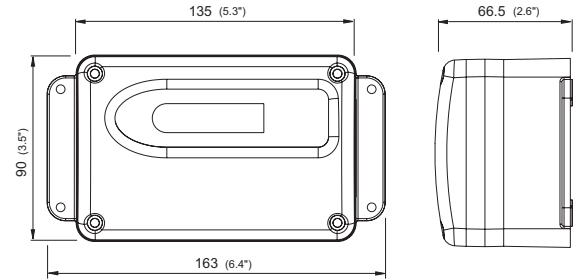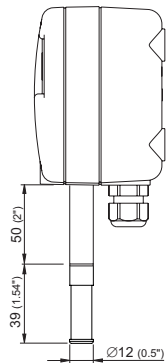3) Only for types T1, T2, T4

Dimensions
Values in mm (inch)

Enclosure:

Polycarbonate (PC)

135 (5.3")
66.5 (2.6")
90 (3.5")

Metal

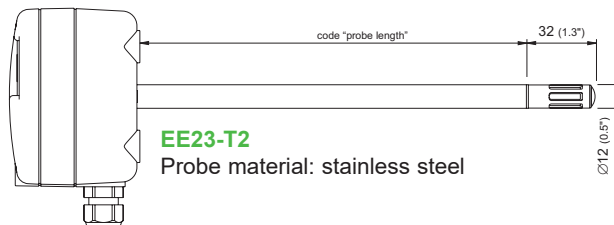135 (5.3")
66.5 (2.6")
90 (3.5")
163 (6.4")

Probes:

EE23-T1
Probe material: PC

50 (2")
39 (1.54")
Ø12 (0.5")
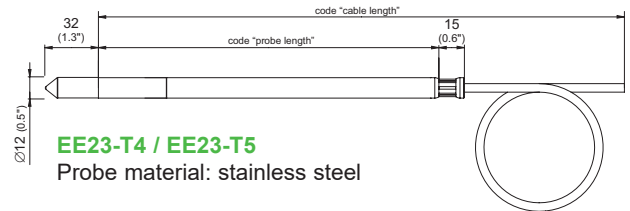
EE23-T4 / EE23-T5
Probe material: stainless steel

code "cable length"
32 (1.3")
15 (0.6")
code "probe length"
Ø12 (0.5")

EE23-T2
Probe material: stainless steel

code "probe length"
32 (1.3")
Ø12 (0.5")

Accessories
(For further information, see data sheet "Accessories")

- Mounting flange   (HA010201)
- Bracket for installation onto mounting rails*   (HA010203)
- Drip water protection   (HA010503)
- Radiation shield   (HA010502)
- Calibration set (see data sheet „Calibration Kit")   (HA0104xx)
- Stainless steel wall mounting clip Ø12 mm (0.5")   (HA010225)

*Note: Only for plastic enclosure

Ordering Guide

			EE23-			
			T1 wall mount	**T2** duct mount	**T4** remote probe up to 120 °C (248 °F)	**T5** remote probe up to 180 °C (356 °F)
Hardware Configuration	**Type[1]**					
	Enclosure	Polycarbonate	no code			
		Metal (AlSi$_9$Cu$_3$)	HS3			
	Filter	Plastic - metal grid (up to 120 °C / 248 °F)	F3	F3	F3	F3
		Stainless steel sintered	no code	no code	no code	no code
		PTFE	F5	F5	F5	F5
		Stainless steel grid (up to 180 °C / 356 °F)				F9
	Cable length (incl. probe length)	2 m (6.6 ft)			K2	K2
		5 m (16.4 ft)			K5	K5
		10 m (32.8 ft)			K10	K10
		65 mm (2.55")		L65	L65	L65
		200 mm (7.87")		no code	no code	no code
		400 mm (15.75")		L400	L400	L400
	Electrical connection	Standard[2]	no code			
		1 plug for power supply and outputs	E4			
	Optional features	LC Display	D1	D1	D1	D2[4]
		E+E sensor coating	C1	C1	C1	C1
		Alarm outputs for RH[3]	AM2	AM2	AM2	
		Integrated power supply 100 - 240 V AC, 50/60 Hz[3]	AM3	AM3	AM3	AM3
Setup - Analogue outputs[1]	**Output signal**	0-10 V	GA3			
		0-20 mA	GA5			
		4-20 mA	GA6			
	Output 1	Relative humidity RH [%]	no code			
		Other measurand (xx see measurand code below)	MAxx			
	Scaling 1 low	0	no code			
		Value	SAL Value			
	Scaling 1 high	100	no code			
		Talue	SAH Value			
	Output 2	Temperature T [°C]	no code			
		Temperature T [°F]	MB2			
		Other measurand (xx see measurand code below)	MBxx			
	Scaling 2 low	Value	SBL Value			
	Scaling 2 high	Value	SBH Value			
	Display mode	Measurand output 1 + 2 alternating	DT2	DT2	DT2	
		Measurand output 1	DT3	DT3	DT3	
		Measurand output 2	DT4	DT4	DT4	

Measurand Code

		xx
Relative humidity	[%]	10
Temperature	[°C]	1
	[°F]	2

		xx
Dew point Td	[°C]	52
	[°F]	53
Frost point Tf	[°C]	65
	[°F]	66

1) For T1, T2 and T4 adjustment changes on the electronics board- see operation manual
   For T5 adjustment and configuration changes by E+E PCS Software only - see operation manual
2) Standard = 2 x M16 cable glands, except for AM3 option: 2 plugs for power supply and outputs
3) With electrical connection standard only (no plug options possible) / combination alarm output and integrated power supply is not possible
4) Measurand on display can be selected with push buttons

Order Example

EE23-T4HS3F3K2D1GA3SBL0SBH50DT2

Type:	Remote probe up to 120 °C (248 °F)		Output signal:	0 - 10 V
Enclosure:	Metal (AlSi$_9$Cu$_3$)		Output 1	Relative humidity [%]
Filter:	Plastic - metal grid		Scaling 1 low:	0
Cable length:	2 m (6.6 ft)		Scaling 1 high:	100
Probe length:	200 mm (7.87")		Output 2:	Temperature [°C]
Electrical connection:	Standard		Scaling 2 low:	0
Optional feature:	LC Display		Scaling 2 high:	50
			Display mode:	Measurand output 1 + 2 alternating