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…240V 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.

Remote Probe and Accessories

The remote probe with cable length up to 20m (65.6 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.
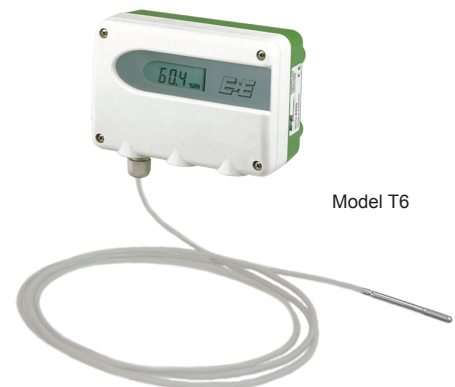

Model T1

Model T2

Model T4/T5

Model T6

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 active surface and leads of the sensing elements. The coating extends substantially the lifetime and the measurement performance of the E+E sensor in corrosive environment. Additionally, it improves the sensor's long term stability in dusty, dirty or oily applications by preventing stray impedances caused by deposits on the active sensor surface.

Technical Data

Measurands

Relative Humidity

			EE23-T1/T2/T4/T5	EE23-T6
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	± (1.8 + 0,3%*mv) % RH
-15...40°C (5...104°F)	>90% RH		± 2.3% RH	± 2.8% RH
-25...70°C (-13...158°F)			± (1.4 + 1%*mv) % RH	± (1.9 + 1%*mv) % RH
-40...180°C (-40...356°F)			± (1.5 + 1.5%*mv) % RH	± (2 + 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/T6	-40...80°C	(-40...176°F)
	EE23-T4	-40...120°C	(-40...248°F)
	EE23-T5	-40...180°C	(-40...356°F)

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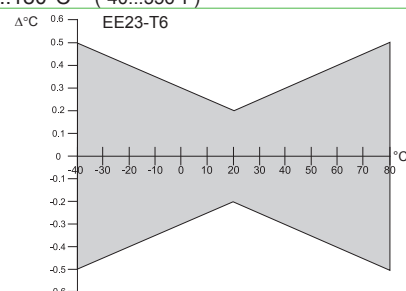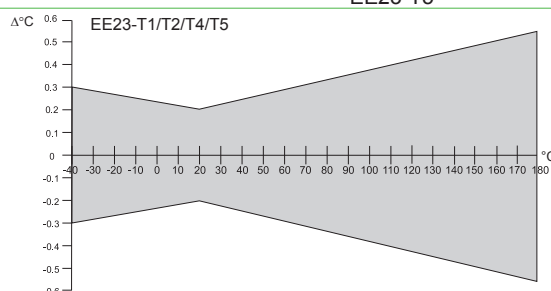
Temperature dependence of electronics	typ. 0.002°C/°C

Output Scale Span

		from	up to				units
			EE23-T1	EE23-T2/T6	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 - 1 V	-0.5 mA < I_L < 0.5 mA
0 - 5 / 0 - 10 V	-1 mA < I_L < 1 mA
0 - 20mA / 4 - 20 mA	R_L < 470 Ohm

General

Supply voltage
for 0 -1 V / 0 - 5 V outputs	10.5 - 35V DC or 12 - 28V AC
for 0 - 10 V / 0 - 20 mA / 4-20 mA outputs	15.0 - 35V DC or 15 - 28V AC
	100...240V AC, 50/60Hz supply module (optional)

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

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

Enclosure / protection class	PC or Al Si 9 Cu 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)
CE compatibility according	EN61326-1 EN61326-2-3 ICES-003 ClassB
	Industrial Environment FCC Part15 ClassB

CE

Alarm Module[2]

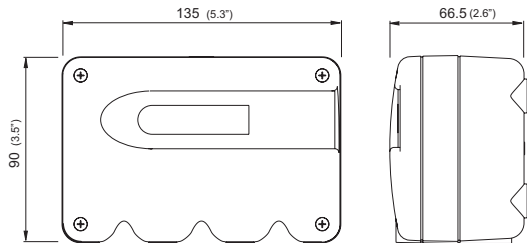|		
Output	SPDT-Switch max. 250V AC/8A or 28V DC/8A	
	threshold	hysteresis
Setting range	10...95% RH	3...15% RH
Setting accuracy	± 3% RH	

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).
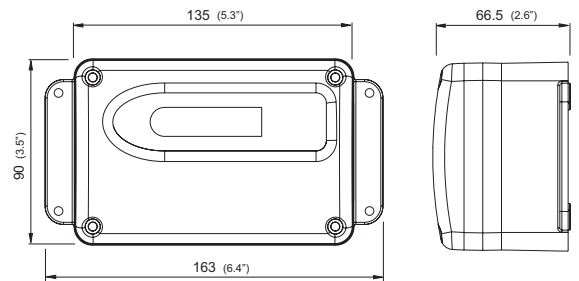2) only for models T1, T2, T4 and T6.
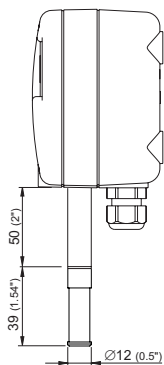
Dimensions in mm (inch)

Enclosure:

Polycarbonate (PC)

Metal

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

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

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

EE23-T2
Probe material: stainless steel

code "probe length"
32 (1.3")
Ø12 (0.5")
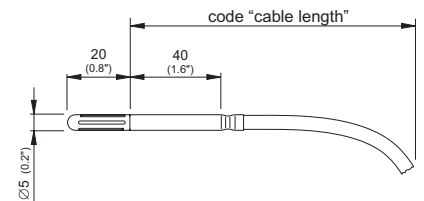
EE23-T6
Probe material: stainless steel

code "cable length"
20 (0.8")
40 (1.6")
Ø5 (0.2")

Accessories (Additional information see data sheet "Accessories")

- Mounting flange	(HA010201)
- Mounting flange 5mm for model T6 only	(HA010208)
- 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

		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)	**T6** miniature probe
Model[1]						
Enclosure	polycarbonate	**no code**				
	metal (Al Si 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**	
	H$_2$O$_2$	**F12**	**F12**	**F12**	**F12**	
	stainless steel membrane Ø 5 mm					**F17**
Cable length (incl. probe length)	2 m (6.6 ft)			**K2**	**K2**	**K2**
	5 m (16.4 ft)			**K5**	**K5**	**K5**
	10 m (32.8 ft)			**K10**	**K10**	**K10**
	20 m (65.6 ft)			**K20**		**K20**
Probe length	40 mm (1.57")					**L40**
	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	cable glands	**no code**				
	1 plug for power supply and outputs[2] [3]	**E4**				
Optional features	LC Display	**D1**	**D1**	**D1**	**D2**[4]	**D1**
	E+E sensor coating	**C1**	**C1**	**C1**	**C1**	
	alarm outputs for RH[2]	**AM2**	**AM2**	**AM2**		**AM2**
	integrated power supply 100...240 V AC, 50/60 Hz[3]	**AM3**	**AM3**	**AM3**	**AM3**	**AM3**
Output Signal	0-1 V	**GA1**				
	0-5 V	**GA2**				
	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**				
	value	**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**		**DT2**
	measurand output 1	**DT3**	**DT3**	**DT3**		**DT3**
	measurand output 2	**DT4**	**DT4**	**DT4**		**DT4**

Left side groupings: Hardware Configuration; Setup - Analogue outputs[1]

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 T4 and T6 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) Alarm output only available with cable glands (plug option is not possible) / combination alarm output and integrated power supply is not possible
3) Integrated power supply includes 2 plugs for power supply and outputs / combination alarm output and integrated power supply is not possible
4) Measurand on display can be selected with push buttons

Order Example

EE23-T4HS3F3K2D1GA2SBL0SBH50DT2

Type:	remote probe up to 120 °C (248 °F)		Output Signal:	0-5 V
Enclosure:	metal (Al Si 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:	cable glands		Scaling 2 low:	0
Optional feature:	LC Display		Scaling 2 high:	50
			Display mode:	measurand output 1+2 alternating