E+E *YOUR PARTNER IN SENSOR TECHNOLOGY*
ELEKTRONIK ®
Ges.m.b.H.

EE23

Humidity / Temperature Transmitter for Industrial Applications

Calculation of Dew Point and Frost Point Temperature

The EE23 series stands for multifunctionality, highest accuracy, easy mounting and service.
The new IP65 water proof housing concept is based on three modules:
- back module with connectors
- middle module which accommodates the electronics
- cover module with optional display

It offers easy installation and the possibility for fast exchange of the sensor unit for service purposes.

For use in harsh industrial environments all models of the EE23 are available in a robust metal housing.

The EE23 can be employed in all common applications by choosing the appropriate housing combination.

- **Model A / B:** wall / duct mounting
- **Model C:** remote sensing probe has a working temperature range –40...120°C (-40...248°F)
- **Model H**: with remote miniature probe for concealed mounting (e.g. in museums) or in tight spaces.

The high quality HC series humidity sensor elements and newest microprocessor technology are the guarantee for:
- best accuracy over the whole working range
- display and output of relative humidity, temperature, dew point and frost point temperature
- small hysteresis
- excellent long term stability
- highest resistance to pollutants.

Easy configuration of the humidity and temperature outputs is made possible by the innovative design of the EE23 electronics. One can select between various current or voltage output signals.

One can very easily perform a two point humidity and temperature adjustment by using two push buttons on the PCB.

Further options are the integrated display, cable outlets via connectors, sensor coating and an hygrostate output for control and alarm purposes.

Model A

Model B


Model C

Model H

Typical Applications

high end HVAC
climate chambers
process technology
dryers
clean rooms
green houses
stocks
meteorology

Features

temperature range -40...120°C (-40...248°F)
traceable calibration
calculation of dew point / frost point temperature
two point humidity and temperature calbration
very easy mounting and maintenance
best accuracy over whole temperature range
remote sensing probe up to 20m (65.6ft)
alarm output

Two Point Adjustment

With an easy routine the user can perform a fast and accurate two point adjustment of relative humidity and temperature.
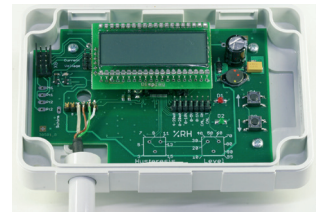

Display

The actual measured data can be indicated on the optional integrated display. It is possible to choose between relative humidity (RH), temperature (T), dew point (Td), frost point (Tf) or an alternating display of two values.


RH: 43.5 %

Alarm Output

Simple control applications can be solved by the optional alarm output of the EE23. The user can set threshold and hysteresis by potentiometers.
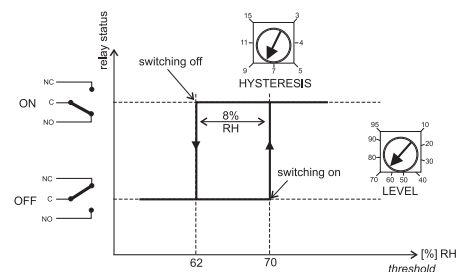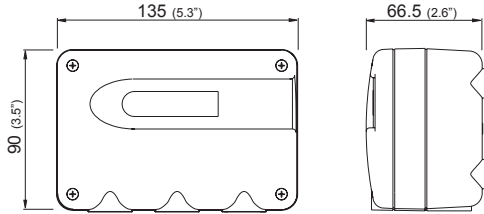

Integrated power supply

A power supply, integrated in the back module of the housing, can be ordered optionally (100...240V AC, 50/60Hz; ordering code V01). The power supply V01 is available for both polycarbonate and metal housing and comes standard with two plugs for supply and outputs to allow an easy connection.
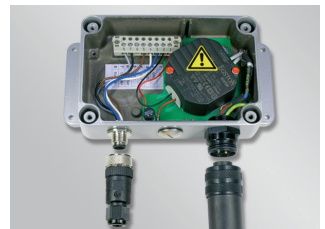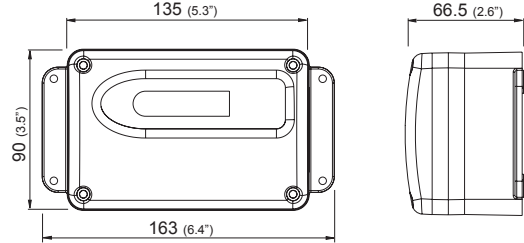
Dimensions in mm

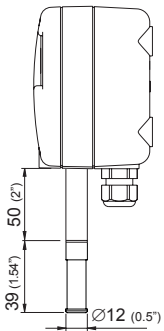### Housing:

polycarbonate housing

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

metal housing

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

For use in harsh industrial environments all models of the EE23 are available in a robust metal housing.
The very smooth surface and the rounded outlines allow for the use in clean rooms as well.

Models:

EE23-xAx
Wall mounting
Probe material: PC

50 (2")
39 (1.54")
⌀12 (0.5")

code "cable length"
32 (1.3")
code "probe length"
15 (0.6")
⌀12 (0.5")
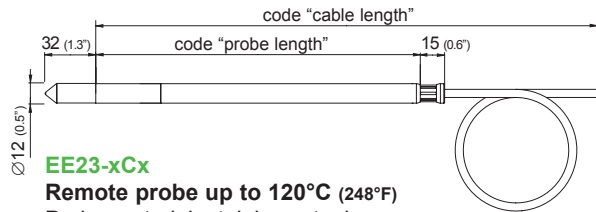
EE23-xCx
Remote probe up to 120°C (248°F)
Probe material: stainless steel

code "probe length"
32 (1.3")
⌀12 (0.5")
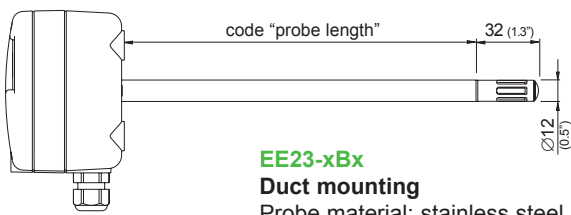
EE23-xBx
Duct mounting
Probe material: stainless steel

EE23-xHx
Remote miniature probe
Probe material: stainless steel

code "cable length"
20 (0.8")
40 (1.6")
⌀5 (0.2")
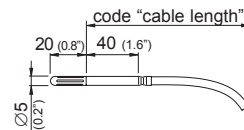
Technical Data

Measured quantities

Relative humidity

|		
Humidity sensor [1]	EE23-xA/B/Cx	HC1000-200
	EE23-xHx	HC105
Working range [1]		0...100% RH

Accuracy [2] (including hysteresis, non-linearity and repeatability, traceable to intern. standards, administrated by NIST, PTB, BEV...)

		EE23-xA/B/Cx	EE23-xHx
-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...120°C (-40...248°F)		± (1.5 + 1.5%*mv) % RH	-

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

Temperature

Temperature sensor element	EE23-xA/B/Cx	Pt1000 (class A, DIN EN 60751)
	EE23-xHx	Pt1000 (class B, DIN EN 60751)

Working range sensing head	EE23-xAx	-40...60°C (-40...140°F)	EE23-xBx	-40...80°C	(-40...176°F)
	EE23-xCx	-40...120°C (-40...248°F)	EE23-xHx	-40...80°C	(-40...176°F)

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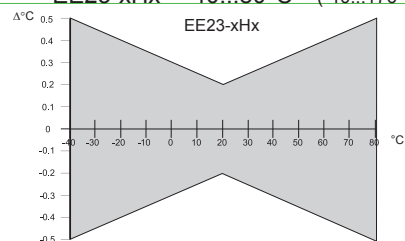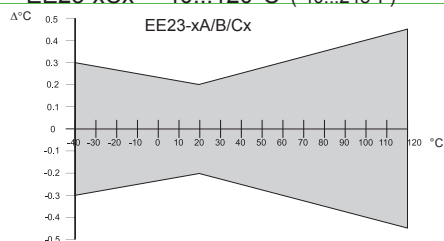
Temperature dependence of electronics	typ. 0.002°C/°C

Outputs

0...100% RH / xx...yy°C [3]	0 - 1 V	-0.5 mA < I_L < 0.5 mA
(temperature output scale adjustable by E+E or	0 - 5 V	-1 mA < I_L < 1 mA
with configuration kit)	0 - 10 V	-1 mA < I_L < 1 mA
	0 - 20mA	R_L < 470 Ohm
	4 - 20 mA	R_L < 470 Ohm

Max. adjustable output scaling [4]

		from	up to			units	
			EE23-A	*EE23-B, H*	*EE23-C*		
Humidity	RH	0	100	100	100	% RH	
Temperature	T	-40 (-40)	60 (140)	80 (176)	120 (248)	°C	(°F)
Dew-point temperature	Td	-40 (-40)	60 (140)	80 (176)	100 (212)	°C	(°F)
Frost-point temperature	Tf	-40 (-40)	0 (32)	0 (32)	0 (32)	°C	(°F)

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 and 4-20 mA outputs	15.0 - 35V DC or 15 - 28V AC	(optional 100...240V AC, 50/60Hz)

Current consumption for voltage output

for DC supply ≤ 25 mA	with alarm module:	for DC supply ≤ 35 mA
for AC supply ≤ 35 mA$_{eff}$		for AC supply ≤ 60 mA$_{eff}$

Current consumption for current output

for DC supply ≤ 50 mA	with alarm module:	for DC supply ≤ 60 mA
for AC supply ≤ 90 mA$_{eff}$		for AC supply ≤ 110 mA$_{eff}$

Housing / protection class	PC or Al Si 9 Cu 3 / IP65; Nema 4
Cable gland [5]	M16x1.5 cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection [5]	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)

1) Refer to the working range of the humidity sensor   3) Refer to ordering guide   4) Refer to accuracies of calculated values (page 152)   5) Connection plugs refer to ordering guide
2) 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).

CE compatibility according	EN61326-1	EN61326-2-3	ICES-003 ClassB
	Industrial Environment		FCC Part15 ClassB

Alarm Module - optional

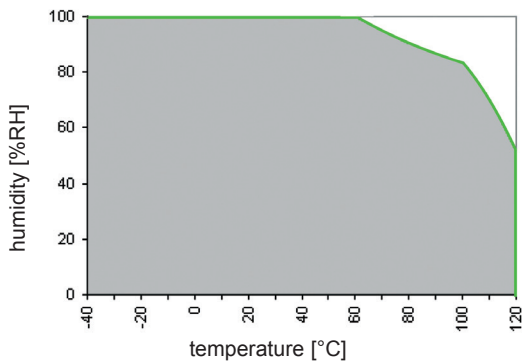| Output	SPDT-Switch up to 250V AC/8A or 28V DC/8A	
	threshold	hysteresis
Setting range	10...95% RH	3...15% RH
Setting accuracy	± 3% RH	

Humidity Sensor - Working Range

The working range of the humidity sensor element is shown in terms of humidity / temperature limits.

Although the sensors would not deteriorate beyond the limits, their performance can only be specified within the limits of the working range.

Sensor Coating

Operation in heavily polluted and/or corrosive environments is typical for many industrial processes and can lead to drift or damage of the humidity sensor and thus to false measured values. The unique protective coating developed by E+E for the sensing probe (ordering code: HC01) brings a significant improvement on the long-term stability of the transmitter in very dirty and aggressive environments.

Connecting Diagram

output and supply

with active temperature output

alarm output
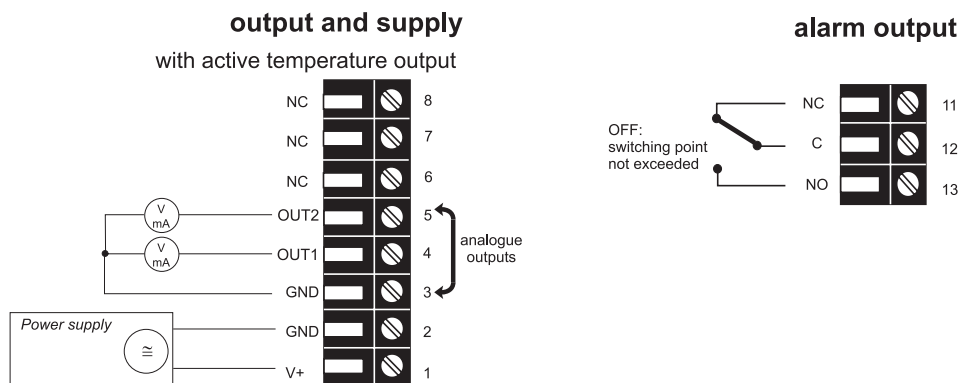
Ordering Guide

		EE23-	EE23-
Hardware Configuration			
Housing	metal housing	**M**	**M**
	polycarbonate housing	**P**	**P**
Type	humidity + temperature	**FT**	**FT**
Model	wall mounting	**A**	
	duct mounting	**B**	
	remote probe up to 120°C(248°F)	**C**	
	remote miniature probe		**H**
Filter	membrane filter 5mm		**1**
	stainless steel sintered filter	**3**	
	PTFE filter	**5**	
	metal grid filter	**6**	
	H_2O_2 filter	**8**	
Cable length(incl. probe length;	2m	**02**	**02**
models C and H only)	5m	**05**	**05**
	10m	**10**	**10**
	20m	**20**	**20**
Probe length	65mm	**2**	
(models B and C only)	200mm	**5**	
	400mm	**6**	
Display	without display		
refer to software-code)	with display	**D03**	**D03**
Alarm output[1]	no alarm output		
	with alarm output	**SW**	**SW**
Plug	standard cable 1 gland M16x1.5;cable Ø 4.5 - 10 mm (0.18 - 0.39")		
	1 plug for supply + outputs	**C03**	**C03**
Coating sensor	no		
	yes	**HC01**	
Supply voltage	15...35V DC / 15...28V AC		
	integrated power supply 100...240V AC, 50/60Hz[2]	**V01**	**V01**
Software Configuration			
Physical parameters of outputs	Relative humdity RH [%] **(A)** Output 1	Select according to Ordering Guide (A -D)	
	Temperature T [°C] **(B)**		
	Dew point temperature Td [°C] **(C)** Output 2	Select according to Ordering Guide (A -D)	
	Frost point temperature Tf [°C] **(D)**		
Type of output signals	0 - 1V **(1)**	Select according to Ordering Guide(1-6)	
	0 - 5V **(2)**		
	0 - 10V **(3)**		
	0 - 20mA **(5)**		
	4 - 20mA **(6)**		
Temperature unit	°C		
	°F	**E01**	**E01**
Scaling of T-output **Scaling of Td-output** **Scaling of Tf-output** in°C or °F	-40...60 **(T02)** -40...120 **(T12)** -40...248 **(T78)** Output T	Select according to Ordering Guide (Txx)	
	-10...50 **(T03)** 20...120 **(T15)** 0...140 **(T85)**		
	0...50 **(T04)** -30...60 **(T20)** 0...248 **(T87)** Output Td	Select according to Ordering Guide (Tdxx)	
	0...100 **(T05)** 0...80 **(T21)** 32...120 **(T90)**		
	0...60 **(T07)** -40...80 **(T22)** 32...140 **(T91)** Output Tf	Select according to Ordering Guide (Tfxx)	
	-30...70 **(T08)** -20...80 **(T24)** 32...248 **(T93)**		
	-30...120 **(T09)** -20...60 **(T25)** 32...132 **(T96)**	Other T/Td/Tf-scaling refer to data sheet „T-Scalings"	
	-20...120 **(T10)** -30...50 **(T45)**		
	-10...70 **(T11)** -20...50 **(T48)**		
Display mode	measurand output 1+2 alternating	**M12**	**M12**
	measurand output 1	**M01**	**M01**
	measurand output 2	**M02**	**M02**

1) Combination alarm output and plugs is not possible (with cable glands only) / combination alarm output and integrated power supply is not possible / alarm output for RH only
2) Integrated power supply includes 2 plugs for power supply and outputs / further plug options are not possible

Accessories (additional information see data sheet "Accessories")

- filter caps (HA0101xx)
- external power supply unit (V02)
- display + housing cover in metal (D03M)
- display + housing cover in polycarbonate (D03P)
- mounting flange (HA010201)
- mounting flange 5mm (for model H only) (HA010208)
- bracket for installation onto mounting rails* (HA010203)
- spare part sensor (FE09 or FE09-HC01)
- drip water protection (HA010503)
- calibration set (HA0104xx)
- radiation shield (HA010502)

*Note: Only for plastichousing, not for metalhousing

Order Example

EE23-MFTC6025D03/AC2-Td04-M01

housing:	metal housing
type:	humidity + temperature
model:	remote sensor probe
filter:	metal grid
cable length:	2 m (6.6ft)
probe length:	200 mm (7.9")
display:	with display
output 1:	rF
output 2:	Td
output signal:	0-5V
scaling of T-output:	0...50°C
display mode:	measurand output 1