

EE33-M

Humidity and Temperature Transmitter for High-end Meteorological Applications

EE33-M is optimized for reliable measurement under demanding weather conditions. Besides accurate measurement of relative humidity (RH) and temperature (T), the device calculates all additional physical quantities like dew point temperature, absolute humidity and mixing ratio. A dual heating system prevents condensation on the RH sensor, on the sensing probe and on the filter cap, which leads to extremely short response time and fast recovery after condensing conditions. The measuring principle with separate RH and T probes enables precise continuous measurement even at permanent high humidity.

The proprietary E+E coating protects the RH sensor and its leads against corrosive and electrically conductive pollution. The probes are compatible with modern, ventilated radiation shields, like the LAM630.

With an optional connecting cable and the EE-PCS software (included in scope of supply) the user can easily perform an adjustment or a configuration of the outputs.



Typical Applications

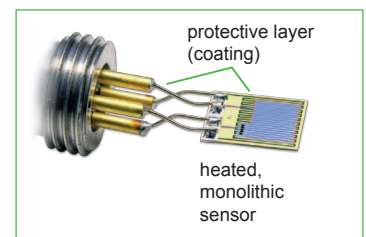
- meteorology
- wind turbine generators
- road icing warning
- off-shore measurements

Features

- monolithic RH sensor
- precise measurement close to condensation
- condensation prevention through dual heating
- protection against pollution and corrosion
- calculation of additional physical quantities

Monolithic Humidity Sensor

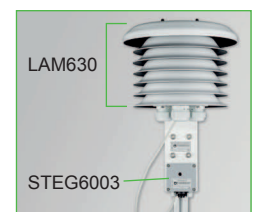
The heart of EE33-M is the monolithic HMC01 sensor, developed and manufactured in thin-film technology by E+E Elektronik. HMC01 combines the moisture and heating element on a single substrate. Condensation is prevented by controlled heating of the sensor. The proprietary E+E coating protects the sensor and its leads against pollution and corrosion.



Radiation Shield

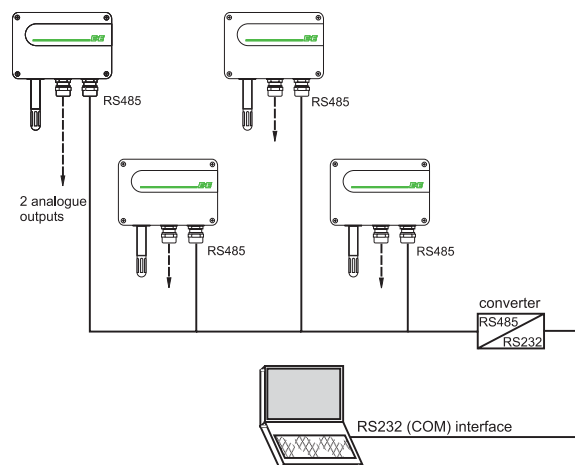
In order to minimize the impact of rain, snow, ice and solar radiation on the measurement the EE33-M must be mounted inside a radiation shield.

The radiation shield LAM630 is suitable for mounting onto a mast with 30-35mm diameter. Forced ventilation is provided by the control unit STEG6003. Up to 4 probes can be mounted using cable glands (Ø 18-25 mm).

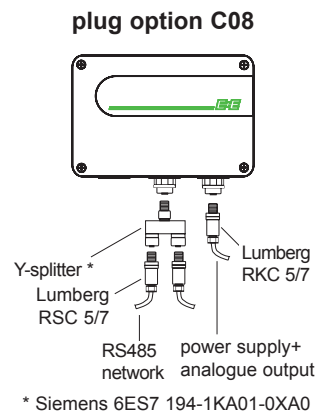
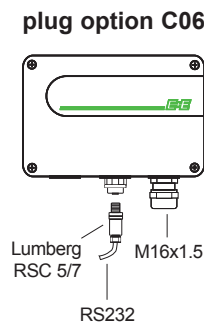
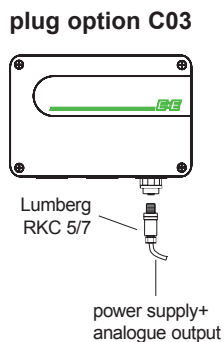
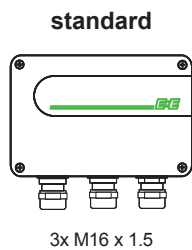


Network Compatibility / Ethernet Interface

The optional RS485 interface (order code N) allows for building a network of up to 32 transmitters. The measurement data can be collected in a shared database and made available for all kinds of further processing.

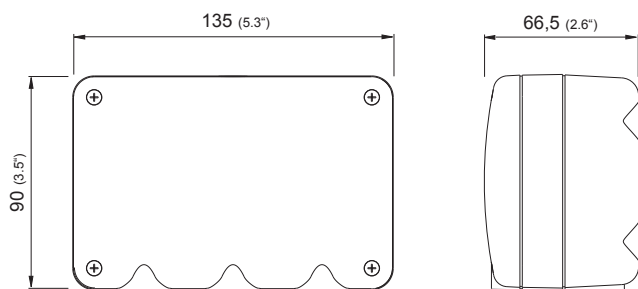


Connection Types

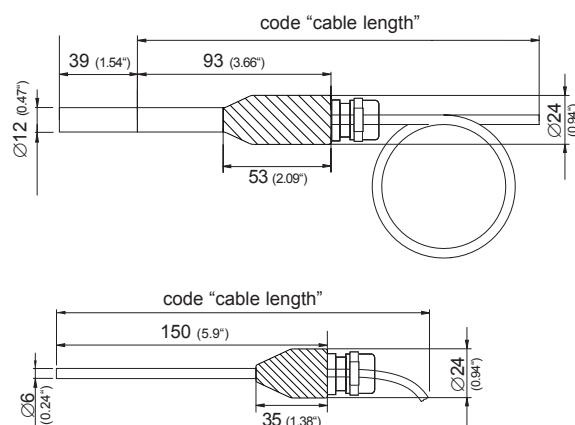


Dimensions (mm)

Housing



Humidity probe



EE33-PFTM

Probe material: stainless steel
Adapter material: polyoxymethylene
Cable gland: polycarbonate

Technical Data

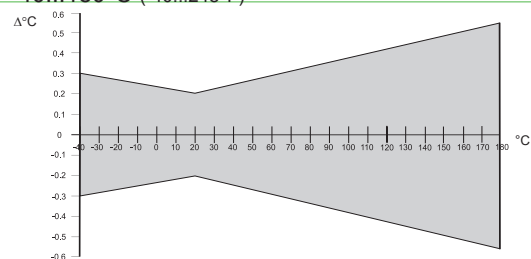
Measurement values

Relative humidity

Humidity sensor ¹⁾	heated, monolithic HMC01		
Working range ¹⁾	0...100% RH		
Accuracy ²⁾ (including hysteresis, non-linearity and repeatability)			
-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 of electronics	typ. ± 0.01% RH/°C (0.0055% RH/°F)		
Response time t_{90} at 20°C (68°F)	< 15s		

Temperature

Temperature sensor	Pt1000 DIN A
Working range sensing head	-40...180°C (-40...248°F)
Accuracy	



Temperature dependence of electronics	typ. ± 0.005°C/°C
External temperature probe	Pt1000 (DIN A)

Outputs²⁾

Two freely selectable and scaleable analogue outputs	0 - 1V	-1mA < I_L < 1mA
	0 - 5V	-1mA < I_L < 1mA
	0 - 10V	-1mA < I_L < 1mA
	4 - 20mA	R_L < 500 Ohm
	0 - 20mA	R_L < 500 Ohm

Digital interface	RS232 optional: RS485
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Max. adjustable measurement range²⁾³⁾

		min.	max.	Unit
Humidity	RH	0	100	% RH
Temperature	T	-40 (-40)	180 (248)	°C (°F)
Dew point temperature	Td	-40 (-40)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	°C (°F)
Wet bulb temperature	Tw	0 (32)	100 (212)	°C (°F)
Water vapour partial pressure	e	0	1100 (15)	mbar (psi)
Mixture ratio	r	0	999 (9999)	g/kg (gr/lb)
Absolute humidity	dv	0	700 (300)	g/m ³ (grF ³)
Specific enthalpy	h	0	2800 (99999)	kJ/kg (Btu/lb)

General

Supply voltage	8...35V DC 12...30V AC	
Current consumption - 2x voltage output - 2x current output	for 24V DC/AC: typ. 40mA / 80mA typ. 80mA / 160mA	
System requirements for software	WINDOWS 2000 or later; serial interface	
Housing / protection class	Polycarbonate / IP65	
Cable gland	M16 x 1.5	
Electrical connection	screw terminals up to max. 1.5mm ² (AWG 16)	
Working and storage temperature range of electronics	-40...60°C (-40...140°F)	
Electromagnetic compatibility according to	EN61326-1	EN61326-2-3
	Industrial Environment	



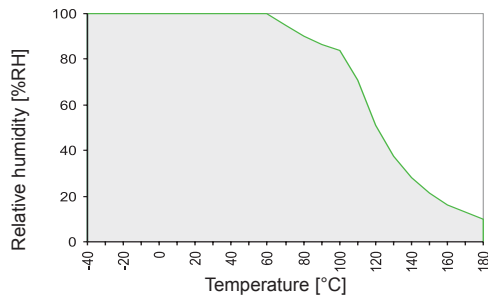
1) Refer to the working range of the humidity sensor.

2) Can be easily changed by software.

3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung).

*) 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).

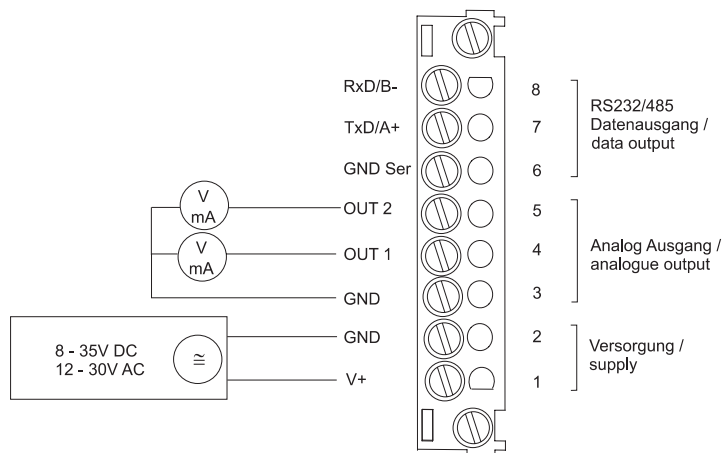
Working Range Humidity Sensor



The grey area shows the allowed measurement range for the humidity sensor.

Operating points outside of this range do not lead to destruction of the sensor, but the specified measurement accuracy cannot be guaranteed.

Connection Diagram



Scope of Supply

- EE33-M Transmitter according to Ordering Guide
- Operation Manual
- EE-PCS Product Configuration Software
- Inspection certificate according to DIN EN 10204 - 3.1
- Data logging and visualization software, only for option **N**
- Cable connector RKC 5/7 for customer assembly, only for option **C03** or **C08**
- Cable connector RSC 5/7 for customer assembly, only for option **C06** or **C08**
- Y-junction for network connection, only for option **N** or **C08**
- M16 cable gland, only for option **C03**, **C06** or **C08**

Accessories / Replacement Parts (For further information, see data sheet „Accessories“)

- | | |
|---|--|
| - PTFE stainless steel filter | HA010114 |
| - Exchange membrane for PTFE stainless steel filter | HA010114ME |
| - Stainless steel grid filter | HA010109 |
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| - Interface cable for plug option C06 | HA010311 |
| - RS485 Kit (HW + SW) for network | HA010601 |
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| - Mounting set for mast with Ø 34 - 54 mm | HA010213 |
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| - Radiation shield LAM630 with control unit | HA010508 |
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| - Calibration-Kit | see data sheet „Humidity Calibration Kit“ |
| - Configuration adapter | see data sheet „EE-PCA“ |
| - E+E Product Configuration Software | EE-PCS (download at www.epluse.com/configurator) |

Ordering Guide

		EE33-PFTM	
Hardware Configuration	Filter	PTFE stainless steel filter	2
	Cable length	1 m	01
		2 m	02
	Probe length	according to „Dimensions“	2
	Interface	RS232	no code
RS485		N	
Plug	cable glands	no code	
	1 plug for power supply and outputs	C03	
	1 cable gland / plug for RS232	C06	
	2 plugs for power supply / outputs and RS485 network	C08	
Software Configuration	Output 1	Relative humidity RH [%]	A
		Temperature T [°C]	B
		Dew point temperature Td [°C]	C
		Frost point temperature Tf [°C]	D
		Wet bulb temperature Tw [°C]	E
		Water vapour partial pres. e [mbar]	F
		Mixing ratio r [g/kg]	G
		Absolute humidity dv [g/m³]	H
		Specific enthalpy h [kJ/kg]	J
	Output 2	same choice as output 1	A - J
	Type of output signal	0-1V	1
		0-5V	2
		0-10V	3
0-20mA		5	
4-20mA		6	
Measured value units	metric / SI	no code	
	non metric / US	E01	
T-scaling (T / Td / Tf / Tw) for output 1 + 2	-40...60	002	
	-30...70	008	
	-20...80	024	

Order Example

EE33-PFTM2022N/AB3-002

Hardware Configuration:

Filter: PTFE stainless steel filter
Cable length: 2m
Probe length: 65mm
Interface: RS485
Plug: cable glands

Software Configuration:

Output 1: Relative humidity
Output 2: Temperature
Type of output signal: 0-10V
Measured value units: metric / SI
T-scaling: -40...60°C