EE33-M

Humidity and Temperature Transmitter for High-end Meteorological Applications

E33-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

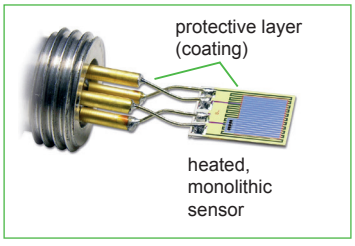
meteorology
wind turbine generators
road icing warning
off-shore measurements

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.



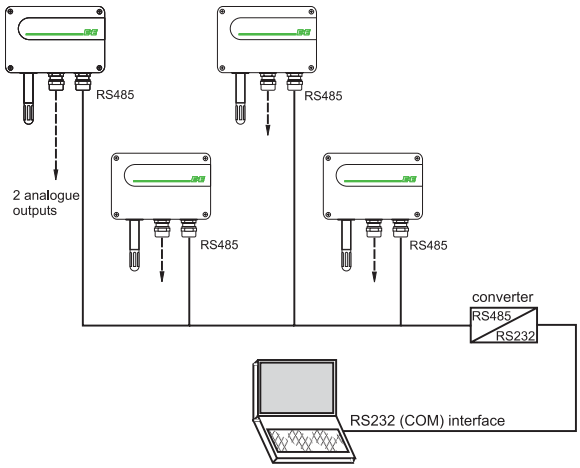
Radiation Shield

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).

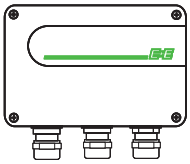
Network Compatibility / Ethernet Interface

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.



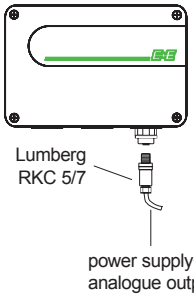
Connection Types

standard

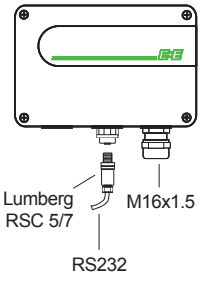


3x M16 x 1.5

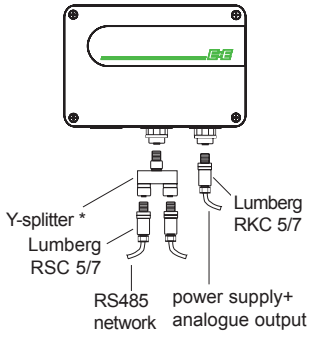
plug option C03



plug option C06



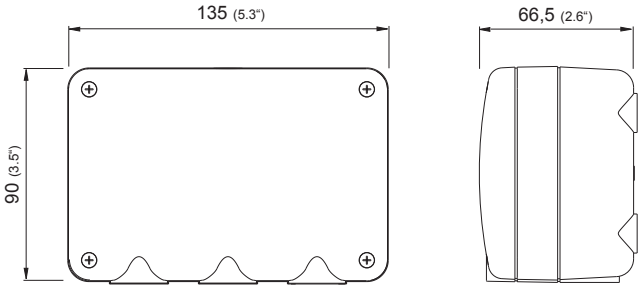
plug option C08



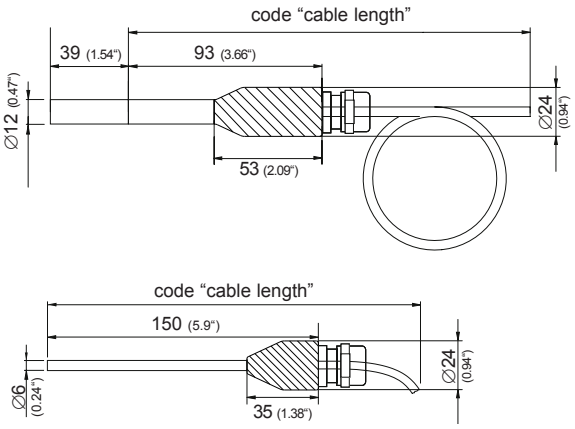
* Siemens 6ES7 194-1KA01-0XA0

Dimensions (mm)

Housing



Humidity probe



EE33-PFTM
Probe material: stainless steel
Adapter material: polyoxymethylene
Cable gland: polycarbonate

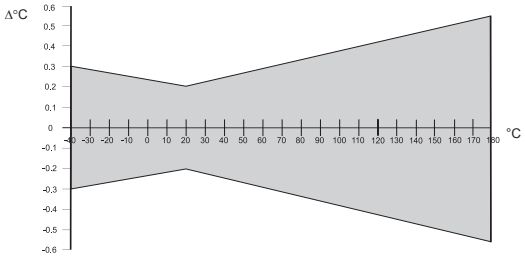
Technical Data

Measurement values

Relative humidity

Humidity sensor[1]		heated, monolithic HMC01
Working range[1]		0...100 % RH
Accuracy*) (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)		< 15 s

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)

Outputs[2]

Two freely selectable and scaleable analogue outputs	0 - 1 V	-1 mA < I_L < 1 mA
	0 - 5 V	-1 mA < I_L < 1 mA
	0 - 10 V	-1 mA < I_L < 1 mA
	4 - 20 mA	R_L < 500 Ohm
	0 - 20 mA	R_L < 500 Ohm
Digital interface	RS232 optional: RS485	

Max. adjustable measurement range[2)3)]

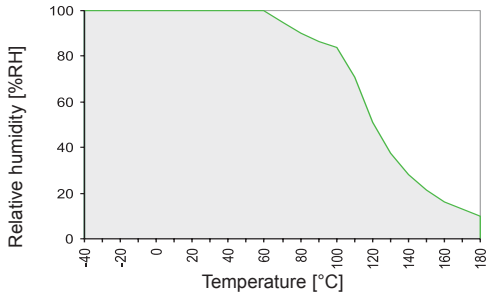
		min.	max.	Unit
Humidity	RH	0	100	% RH
Temperature	T	-40 (-40)	180 (248)	°C (°F)
Dew point temperature	Td	-40 (-40)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	°C (°F)
Wet bulb temperature	Tw	0 (32)	100 (212)	°C (°F)
Water vapour partial pressure	e	0	1100 (15)	mbar (psi)
Mixture ratio	r	0	999 (9999)	g/kg (gr/lb)
Absolute humidity	dv	0	700 (300)	g/m³ (grf³)
Specific enthalpy	h	0	2800 (99999)	kJ/kg (Btu/lb)

General

Supply voltage	8...35 V DC 12...30 V AC	
Current consumption - 2x voltage output	for 24 V DC/AC: typ. 40 mA / 80 mA	
- 2x current output	typ. 80 mA / 160 mA	
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. 1.5 mm² (AWG 16)	
Working and storage temperature range of electronics	-40...60 °C (-40...140 °F)	
Electromagnetic compatibility according to	EN61326-1 Industrial Environment	EN61326-2-3 ICES-003 ClassA FCC Part15 ClassA CE

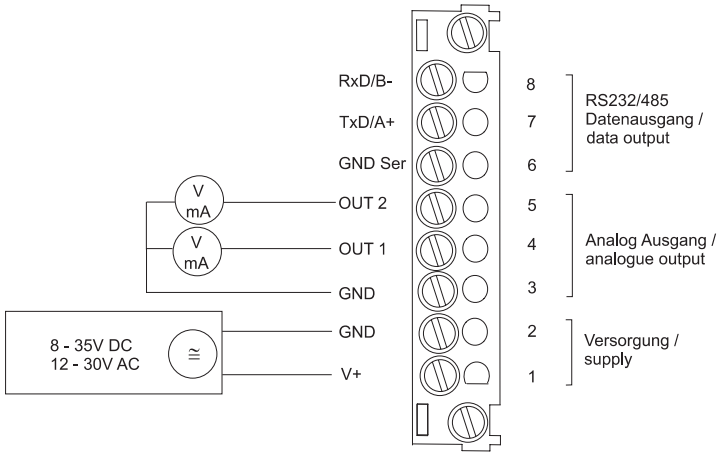
1) Refer to the working range of the humidity sensor.
2) Can be easily changed by software.
3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung).
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). 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
- Inspection certificate according to DIN EN 10204 - 3.1
- 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
- Interface cable for plug option C06	HA010311
- RS485 Kit (HW + SW) for network	HA010601
- Mounting set for mast with Ø 34 - 54 mm	HA010213
- Radiation shield LAM630 with control unit	HA010508
- 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 enthalphy	h [kJ/kg]	J
	Output 2	same choice as output 1		A - J
	Type of output signal	0-1 V		1
		0-5 V		2
		0-10 V		3
		0-20 mA		5
		4-20 mA		6
	Measured value units	metric / SI		no code
		non metric / US		E01
	T-scaling	-40...60		T002
	(T / Td / Tf / Tw)	-30...70		T008
	for output 1 + 2	-20...80		T024

Order Example

EE33-PFTM2022N/AB3-T002

Hardware Configuration:

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

Software Cofiguration:

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