

EE33

Humidity / Temperature Transmitter for High Humidity and Chemical Applications

The highly accurate EE33 series are designed for fast and reliable measurement of relative humidity / dew point temperature / absolute humidity / ...under the most demanding conditions.

Neither condensation nor heavy chemical pollutions will affect prompt and reliable measurements. Process pressures as high as 100 bar (1450 psi) and continuous high humidity are also no problem for the EE33 series.

The core of the EE33 series is the new monolithic measurement cell type HMC01, manufactured in thin-film technology by E+E Elektronik.

Chemical contamination and also condensation will actually evaporate due to the innovative design of the HMC01 measurement cell. The monolithic construction of the sensor allows a fast return to normal conditions and a continuation of the measurement.

Additionally, with the inimitable E+E sensor coating the HMC01 measurement cell is even better protected against corrosive and short-circuit-causing conductive soils.

Distinctive models and mounting versions allow the EE33 series to be utilized in numerous applications:

- **Measurement of relative humidity during temporary condensation:**
the measurement cell is briefly heated, but very intense
- **Measurement of dew point temperature at continuous high humidity:**
the measurement cell is controlled and heated continuously
- **Measurement of relative humidity at continuous high humidity:**
the measurement cell is controlled and heated continuously;
an additional temperature sensor is added
- **Measurement of relative humidity at high chemical exposure and average humidity:**
the measurement cell is briefly heated, but very intense
- **Measurement of relative humidity at process pressure up to 100 bar (1450 psi) and average humidity:**
the measurement cell is installed in a special high pressure probe

The configuration software included in the scope of supply allows user friendly setup of the operation / sensor heating mode as well as selection and adjustment of the electrical outputs.



Model	Environmental Conditions
C - remote sensing probe up to 120 °C (248 °F)	chemical pollution, temporary condensation
D - remote sensing probe up to 180 °C (356 °F)	chemical pollution, temporary condensation
E - remote sensing probe, pressure tight up to 20 bar (300 psi)	chemical pollution, temporary condensation
I - remote sensing probe, pressure tight up to 100 bar (1450 psi)	chemical pollution, temporary condensation
J - 2 remote sensing probes (RH-measurement), pressure tight up to 20 bar (300 psi)	continuous high humidity and condensation
K - remote sensing probe (Td-measurement) pressure tight up to 20bar (300 psi)	continuous high humidity and condensation

Typical Applications

pharmaceutical and food industry
dryers for ceramics, wood, concrete
and polyester, etc.
mushroom farms
high-humidity storage rooms
climate, test and curing chambers
meteorology

Features

heated, monolithic measurement cell
working range 0...100 % RH / -40...+180 °C (-40...356 °F)
measurement near condensation
fast recovery after condensation
chemical purge after chemical exposure
pressure tight up to 100bar (1450psi)
calculation of additional physical quantities
optional sensor coating

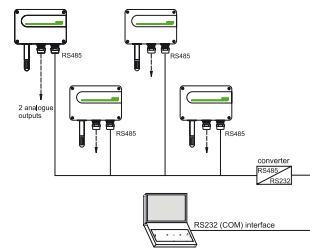
Functions

	Comment
Measurement of humidity and temperature	✓
Calculation h, r, dv, Tw, Td, Tf, e	✓
2 freely scaleable and configurable analogue outputs	✓
Remote sensing probe up to 20m (65.6ft)	✓
On-site adjustment for relative humidity and temperature	✓
LED indication of transmitter status / error diagnosis of probes	✓
RS232 for transmitter configuration via PC	✓
Configuration software	✓
Alternating display with MIN/MAX indication	optional
2 freely configurable alarm outputs	optional
Removeable sensing probe	optional
Sensor protection with coating	optional
Pluggable electrical connections	optional
Data output via RS232 interface	✓
Data output via RS485 interface	optional
Networking for up to 32 transmitters via RS485 bus	optional
ARC-Module for external triggering of sensor-heating	optional

Networkability

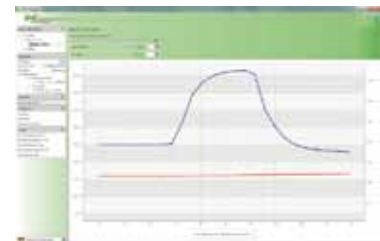
The optional RS485 interface (order code N) allows for building a network of up to 32 transmitters.

The measurement data can be collected in a shared database and made available for all kinds of further processing.



Product Configuration Software (EE-PCS)

The configuration software allows flexible and simple adjustment of the analogue and alarm outputs in accordance with the requirements. The adjustment / calibration of the humidity and temperature outputs is possible as well. Furthermore the settings of the start and duration of the heating of the measurement cell can be defined.



Integrated Display

The actual measurement data and the corresponding Min/Max values can be indicated in an optional display (order code D05). The physical quantity to be displayed is selected by the push buttons next to the display.

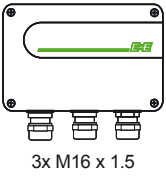


Alarm Outputs

An optional alarm module with 2 relay outputs is available for control and alarm purposes (order code SW). The selection of the physical quantity and the setting of threshold and hysteresis can be made with the configuration software included in the scope of supply.

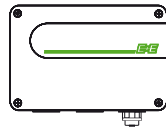
Connection Versions

standard



3x M16 x 1.5

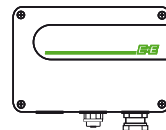
plug option C03



Lumberg RKC 5/7

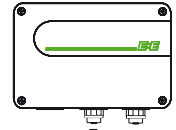
power supply+
analogue output

plug option C06



Lumberg RSC 5/7
M16x1.5
RS232

plug option C08

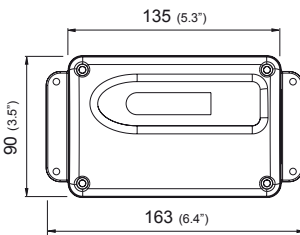


Y-splitter *
Lumberg RSC 5/7
RS485 network
Lumberg RKC 5/7
power supply+
analogue output

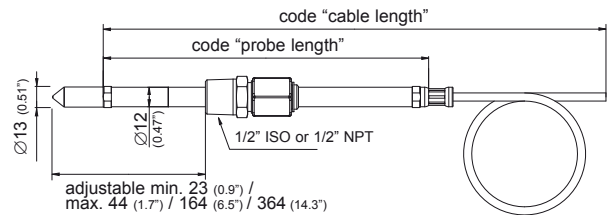
* Siemens 6ES7 194-1KA01-0XA0

Dimensions (mm)

Housing:



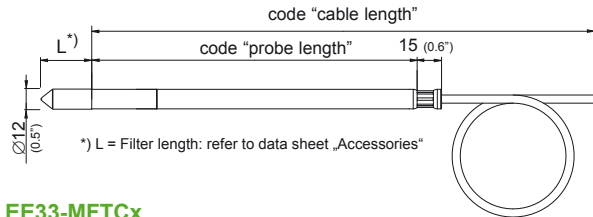
Sensing probes:



EE33-MFTEx

Pressure tight probe up to 20 bar (300 psi)
Probe material: stainless steel

Remote Probe:



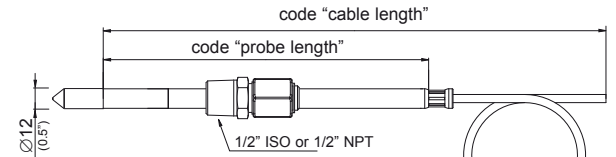
*) L = Filter length: refer to data sheet „Accessories“

EE33-MFTCx

EE33-MFTDx

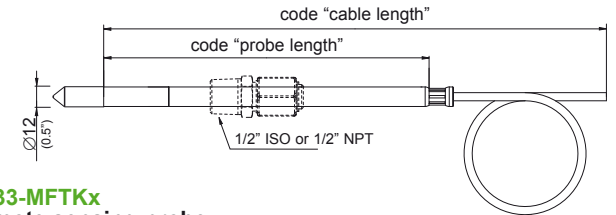
Remote sensing probe

Probe material: stainless steel



EE33-MFTIx

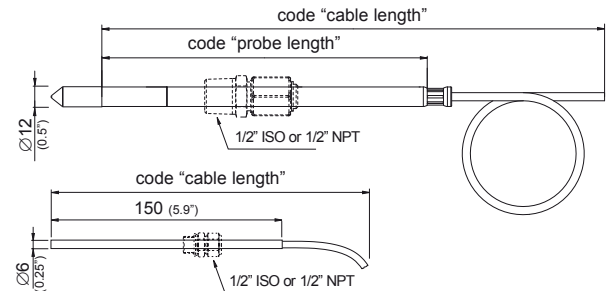
Pressure tight probe up to 100 bar (1450 psi)
Probe material: stainless steel



EE33-MFTKx

**Remote sensing probe,
pressure tight up to 20 bar (300 psi)**
(screw connection is not included in the scope of supply)
Probe material: stainless steel

screw connection:	order code:
1/2" ISO Ø12 mm	HA011102
1/2" NPT Ø12 mm	HA011103



EE33-MFTJx

**Two remote sensing probes,
pressure tight up to 20 bar (300 psi)**
(screw connections are not included in the scope of supply)
Probe material: stainless steel

screw connection:	order code:
1/2" ISO Ø12 mm	HA011102
1/2" NPT Ø12 mm	HA011103
1/2" ISO Ø6 mm	HA011104
1/2" NPT Ø6 mm	HA011105

Technical Data

Measurement values

Relative humidity

Humidity sensor ¹⁾	heated, monolithic measurement cell HMC01
Working range ¹⁾	0...100 % RH
Accuracy ^{*)} (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

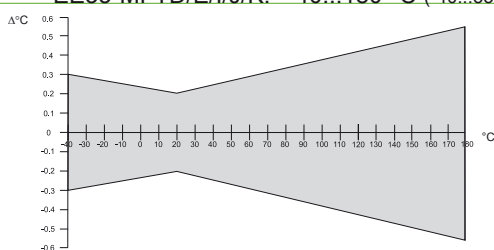
Temperature dependence of electronics typ. ± 0.01 % RH/°C (0.0055 % RH/°F)

Response time with metal grid filter at 20°C (68°F) / t₉₀ < 15 s

Temperature

Temperature sensor element	monolithic measurement cell HMC01
Working range sensing head	EE33-MFTC: -40...120 °C (-40...248 °F) EE33-MFTD/E/I/J/K: -40...180 °C (-40...356 °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 - 1 V	-1mA < I _L < 1 mA
	0 - 5 V	-1mA < I _L < 1 mA
	0 - 10 V	-1mA < 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 range²⁾³⁾

		from	EE33-C	to	EE33-D/E/I/J	EE33-K	Unit
Humidity	RH	0	100	100	/	/	% RH
Temperature	T	-40 (-40)	120 (248)	180 (356)	/	/	°C (°F)
Dew point temperature	Td	-40 (-40)	100 (212)	100 (212)	100	/	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	0 (32)	0	/	°C (°F)
Wet bulb temperature	Tw	0 (32)	100 (212)	100 (212)	/	/	°C (°F)
Water vapour partial pressure	e	0 (0)	1100 (15)	1100 (15)	/	/	mbar (psi)
Mixture ratio	r	0 (0)	999 (9999)	999 (9999)	/	/	g/kg (gr/lb)
Absolute humidity	dv	0 (0)	700 (300)	700 (300)	/	/	g/m3 (gr/ft ³)
Specific enthalpy	h	0 (0)	2800 (99999)	2800 (99999)	/	/	kJ/kg (Btu/lb)

General

Supply voltage	8...35 V DC 12...30 V AC (optional 100...240 V AC, 50/60 Hz)
Current consumption - 2x voltage output - 2x current output	for 24 V DC/AC: typ. 40 mA / 80 mA typ. 80 mA / 160 mA
Pressure range for pressure tight probe	EE33-MFTEx/Jx/Kx: 0.01...20 bar (0.15...300 psi) EE33-MFTIx: 0...100 bar (0...1450 psi)
System requirements for software	WINDOWS 2000 or later; serial interface
Housing / protection class	Al Si 9 Cu 3 / IP65; (NEMA 4)
Cable gland	M16 x 1.5 cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	screw terminals up to max. 1.5 mm ² (AWG 16)
Working and storage temperature range of electronics	-40...60 °C (-40...140 °F) -20...50 °C (-4...122 °F) - housing with display
Electromagnetic compatibility according to	EN61326-1 EN61326-2-3 ICES-003 ClassA Industrial Environment FCC Part15 ClassA 

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)

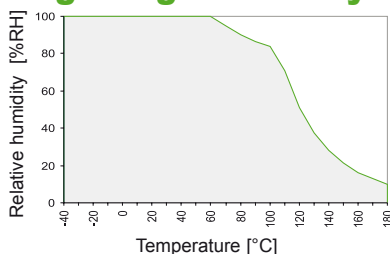
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).

The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Technical Data for Options

Display	graphical LC display (128x32 pixels), with integrated push-buttons for selecting parameters and MIN/MAX function		
Alarm outputs	2 x 1 switch contact		
	250 V AC / 6A 28 V DC / 6A		
	threshold + hysteresis: can be adjusted with configuration software		
	switching parameters:		
	freely selectable between	EE33-MFTC/D/E//J	EE33-MFTK
RH	Relative humidity	✓	
T	Temperature	✓	
Td	Dew point temperature	✓	✓
Tf	Frost point temperature	✓	✓
Tw	Wet bulb temperature	✓	
e	Water vapour partial pressure	✓	
r	Mixture ratio	✓	
dv	Absolute humidity	✓	
h	Specific enthalpy	✓	

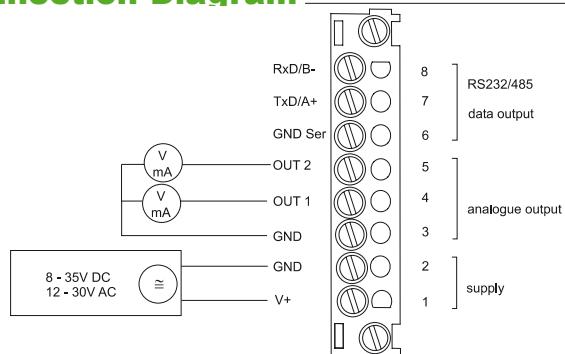
Working Range Humidity Sensor



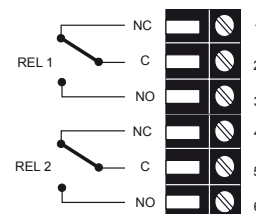
The grey area shows the allowed measurement range for the humidity sensor.

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

Connection Diagram



Terminal configuration - Alarm output
(order code SW)



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

- Filter caps	(HA0101xx)	- Calibration set	(HA0104xx)
- Display + housing cover	(D05M)	- Pressure tight screw connections	
- Interface cable for PCB	(HA010304)	1/2" ISO Ø12 mm	(HA011102)
- Interface cable for plug C06	(HA010311)	1/2" NPT Ø12 mm	(HA011103)
- Mounting flange 12 mm (RH probe)	(HA010201)	1/2" ISO Ø6 mm	(HA011104)
- Mounting flange 6 mm (T probe)	(HA010207)	1/2" NPT Ø6 mm	(HA011105)
- Adapter M16x1.5 to NPT 1/2"	(HA011101)	- Radiation shield for RH-probe	(HA010502)
- Drip water protection	(HA010503)	- Radiation shield for T-probe	(HA010506)

Scope of Supply

	Included in all versions	According to ordering guide
EE33 according to ordering guide	✓	
Manual EE33 German/English/French	✓	
Inspection certificate according to DIN EN 10204 - 3.1	✓	
Allen key 3.0		only for metal housing
Mating plug for integrated power supply		V01
Mating plug RKC 5/7		V01 / C03 / C08
Y-junction for network connection		C08 & N
Mating plug RSC 5/7		C06 / C08
M16 cable gland metal		except C03, C06, C08, V01
Cutting ring fitting		EE33-xFTI

Ordering Guide

		EE33-	EE33-	EE33-	EE33-	EE33-	EE33-
Hardware Configuration							
Housing	metal housing polycarbonate	M	M	M	M	M P	M
Type	humidity	FT	FT	FT	FT	FT	FT
Model		C	D	E	I	J	K
Filter	PTFE stainless steel filter stainless steel sintered filter PTFE filter H ₂ O ₂ filter stainless steel grid filter(up to 180°C/ 356 °F)	3 5 8 9	3 5 8 9	3 5 8 9	3 5 8 9	2	2
Cable length (incl. probe length)	2 m (6.6 ft) 5 m (16.4 ft) 10 m (32.8 ft)	02 05 10	02 05 10	02 05 10	02 05 10	02 05 10	02 05 10
Probe length	65 mm (2.6") (for model E: 80mm (3.1")) 200 mm (7.9") 400 mm (15.8")	2 5 6	2 5 6	2 5 6	5	2 5 6	2 5 6
Pressure tight feedthrough	1/2" male thread 1/2" NPT thread			HA03 HA07	HA03 HA07		
Interface	RS232 RS485	N	N	N	N	N	N
Display	without display with display	D05	D05	D05	D05	D05	D05
Alarm output ^{1) 2)}	without relay with relay	SW	SW	SW	SW	SW	SW
ARC-Module ^{1) 3) 4)}	without external triggering of sensor-heating with external triggering of sensor-heating	ARC	ARC	ARC	ARC	ARC	ARC
Plug ^{2) 3) 5)}	cable glands 1 plug for power supply and outputs 1 cable gland / plug for RS232 2 plugs for power supply / outputs and RS485 network	C03 C06 C08	C03 C06 C08	C03 C06 C08	C03 C06 C08	C03 C06 C08	C03 C06 C08
Sensing probe	fixed connectable in the housing	P03	P03	P03	P03	P03	P03
Coating sensor	no yes	HC01	HC01	HC01	HC01	HC01	HC01
Supply voltage	8...35 V DC / 12...30 V AC integrated power supply 100 ...240 V AC, 50/60 Hz ^{1) 5)}	V01	V01	V01	V01	V01	V01
Software Configuration		Select according to Ordering Guide (A - J)					C
Physical parameters of outputs	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) Mixture ratio r [g/kg] (G) Absolute humidity dv [g/m³] (H) Specific enthalpy h [kJ/kg] (J)	Select according to Orderin Guide (A-J)					D
Type of output signal	0-1 V 0-5 V 0-10 V 0-20 mA 4-20 mA	1 2 3 5 6	1 2 3 5 6	1 2 3 5 6	1 2 3 5 6	1 2 3 5 6	1 2 3 5 6
Measured value units	metric / SI non metric / US	E01	E01	E01	E01	E01	E01
T-Scaling	-40...60 (T02)	Select according to Ordering Guide (Txx)					
Td-Scaling	-10...50 (T03)	Select according to Ordering Guide (Tdx)					
Tf-Scaling	0...50 (T04)	Select according to Ordering Guide (Tfxx)					
Tw-Scaling	0...100 (T05)	Select according to Ordering Guide(Twxx)					
(in °C or °F)	0...60 (T07)	Other T/Td/Tf/Tw-scaling refer to data sheet „T-Scalings“					
	-30...70 (T08)						
	-30...120 (T09)						
	-20...120 (T10)						
	-40...120 (T12)						

1) Following combinations are not possible: alarm output / ARC-Module / integrated power supply

2) Combination alarm output and plugs is not possible (with cable glands only)

3) Plug options are not possible / If using an ARC-Module the transmitter has to be supplied with 24V AC/DC +/- 20 %

5) Integrated power supply includes 2 plugs for power supply and outputs / further plug options are not possible

4) Digital interface occupied

Order Example

EE33-MFTD5025ND05SW/BC3-T02-Td07

Hardware Configuration:

Housing:	metal	Display:	with display
Type:	humidity + temperature	Alarm output:	with relay
Model:	remote sensing probe	ARC-Module:	without
Filter:	PTFE filter	Plug:	cable glands
Cable length:	2 m (6.6 ft)	Sensing probe:	fixed
Probe length:	200 mm (7.9")	Coating sensor:	no
Interface:	RS485	Supply voltage:	8...35 V DC / 12...30 V AC

Software Configuration:

Output 1:	T
Output 2:	Td
Output signal:	0-10 V
Measurand value unit:	metric / SI
T-Scaling:	-40...60 °C
Td-Scaling:	0...60 °C