PRODUCT CATALOG

По вопросам продаж и поддержки обращайтесь:

Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
Волгоград (844)278-03-48
Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06
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Казань (843)206-01-48
Калининград (4012)72-03-81
Калуга (4842)92-23-67
Кемерово (3842)65-04-62
Киров (8332)68-02-04
Краснодар (861)203-40-90
Красноярск (391)204-63-61
Курск (4712)77-13-04
Липецк (4742)52-20-81
Магнитогорск (3519)55-03-13
Москва (495)268-04-70
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Набережные Челны (8552)20-53-41
Нижний Новгород (831)429-08-12
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Омск (3812)21-46-40
Орел (4862)44-53-42
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Пермь (342)205-81-47
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Челябинск (351)202-03-61
Череповец (8202)49-02-64
Ярославль (4852)69-52-93

Единый адрес: esu@nt-rt.ru | http://epluse.nt-rt.ru

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EE33

Humidity / Temperature Transmitter for High Humidity and Chemical Applications

heated, monolithic measurement cell

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:

EE33-MFTC
EE33-MFTD
EE33-MFTK
EE33-MFTE
EE33-MFTI
EE33-MFTJ

- **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

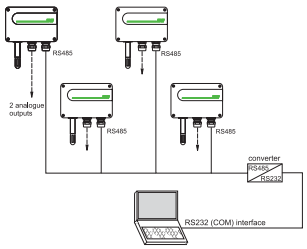
heated, monolithic measurement cell
working range 0...100 % RH / -40...+180 °C (-40...356 °F)
measurement near condensation
fast recovery after condensation
chemical purge after chemical exposure
pressure tight up to 100bar (1450psi)
calculation of additional physical quantities
optional sensor coating

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

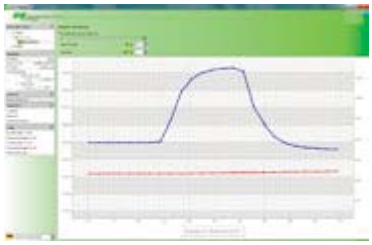
Networkability

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

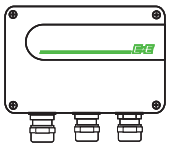
The actual measurement data and the corresponding Min/Max values can be indicated in an optional display (order code D05). The physical quantity to be displayed is selected by the push buttons next to the display.

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.

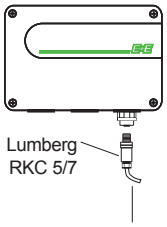
Connection Versions

standard

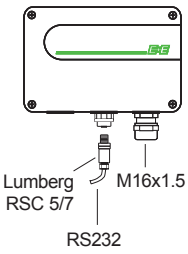


3x M16 x 1.5

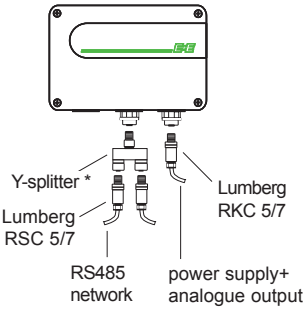
plug option C03



plug option C06



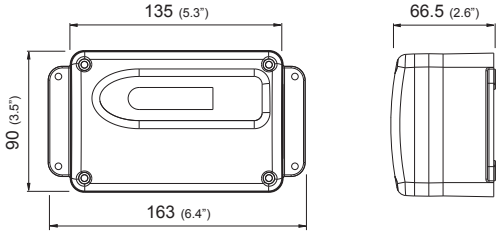
plug option C08



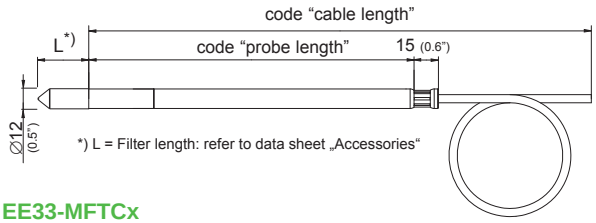
* Siemens 6ES7 194-1KA01-0XA0

Dimensions (mm)

Housing:

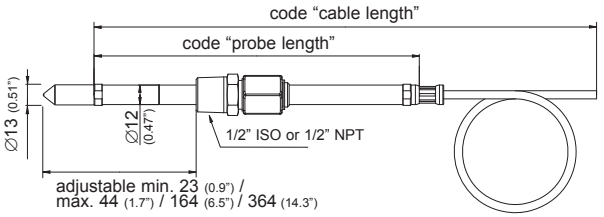


Remote Probe:

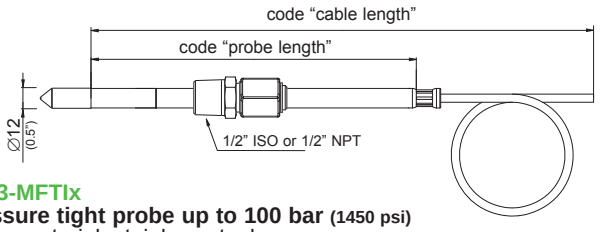


EE33-MFTCx
EE33-MFTDx
Remote sensing probe
Probe material: stainless steel

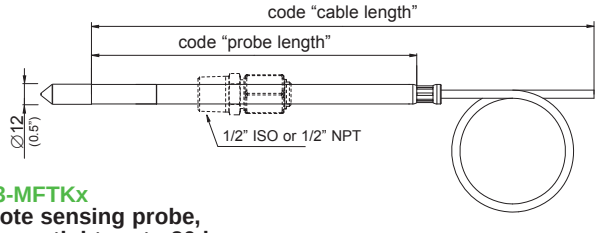
Sensing probes:



EE33-MFTEx
Pressure tight probe up to 20 bar (300 psi)
Probe material: stainless steel

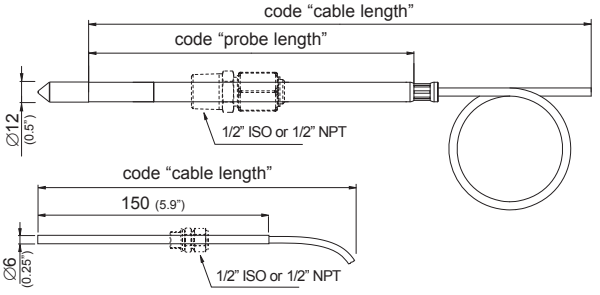


EE33-MFTIx
Pressure tight probe up to 100 bar (1450 psi)
Probe material: stainless steel



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

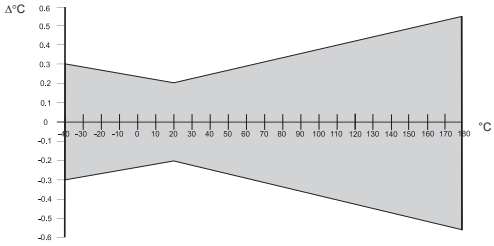
Technical Data

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) / t_{90}	< 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)

Outputs[2)]

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 range[2)3)]

		from	to			Unit
			EE33-C	EE33-D/E/I/J	EE33-K	
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/f³)
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	for 24 V DC/AC: typ. 40 mA / 80 mA
- 2x current output	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 mm² (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 CE

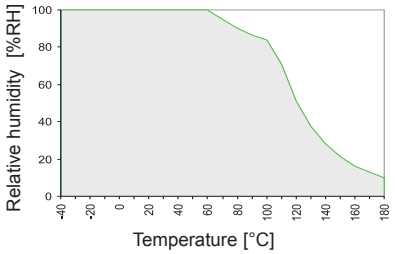
1) Refer to the working range of the humidity sensor.
2) Can be easily changed by software.
3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung)
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

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/I/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	✓	

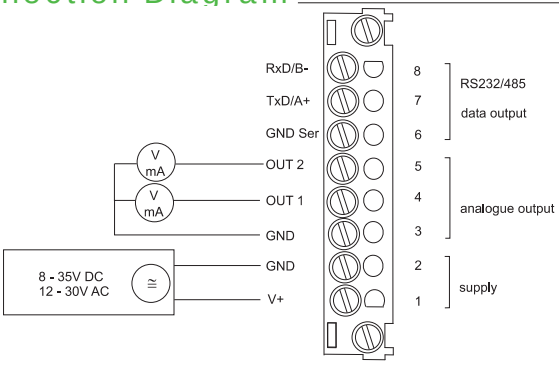
Working Range Humidity Sensor



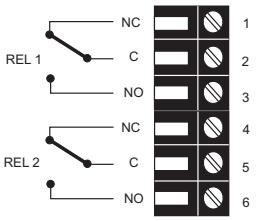
The grey area shows the allowed measurement range for the humidity sensor.

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 ∅12 mm	(HA011102)
- Interface cable for plug C06	(HA010311)	1/2" NPT ∅12 mm	(HA011103)
- Mounting flange 12 mm (RH probe)	(HA010201)	1/2" ISO ∅6 mm	(HA011104)
- Mounting flange 6 mm (T probe)	(HA010207)	1/2" NPT∅6 mm	(HA011105)
- Adapter M16x1.5 to NPT ½"	(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	M	M	M	M	M	M
	polycarbonate					P	
Type	humidity	FT	FT	FT	FT	FT	FT
Model		C	D	E	I	J	K
Filter	PTFE stainless steel filter					2	2
	stainless steel sintered filter	3	3	3	3		
	PTFE filter	5	5	5	5		
	H_2O_2 filter	8	8	8	8		
	stainless steel grid filter(up to 180°C/ 356 °F)	9	9	9	9	9	9
Cable length	2 m (6.6 ft)	02	02	02	02	02	02
(incl. probe length)	5 m (16.4 ft)	05	05	05	05	05	05
	10 m (32.8 ft)	10	10	10	10	10	10
Probe length	65 mm (2.6") (for model E: 80mm (3.1"))	2	2	2		2	2
	200 mm (7.9")	5	5	5	5	5	5
	400 mm (15.8")	6	6	6		6	6
Pressure tight	1/2" male thread			HA03	HA03		
feedthrough	1/2" NPT thread			HA07	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	C03	C03	C03	C03	C03	C03
	1 cable gland / plug for RS232	C06	C06	C06	C06	C06	C06
	2 plugs for power supply / outputs and RS485 network	C08	C08	C08	C08	C08	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)	Output 1								
	Temperature	T	[°C]	(B)									
	Dew point temperature	Td	[°C]	(C)	Output 2							Select according to Orderin Guide (A-J)	D
	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 humdity	dv	[g/m³]	(H)									
	Specific enthalphy	h	[kJ/kg]	(J)									

Type of output signal	0-1 V											1	1	1	1	1	1
	0-5 V											2	2	2	2	2	2
	0-10 V											3	3	3	3	3	3
	0-20 mA											5	5	5	5	5	5
	4-20 mA											6	6	6	6	6	6
Measured value units	metric / SI																
	non metric / US											E01	E01	E01	E01	E01	E01

T-Scaling	-40...60 (T02)	-20...100 (T14)	Output T	Select according to Ordering Guide (Txx)	
Td-Scaling	-10...50 (T03)	+20...120 (T15)			
Tf-Scaling	0...50 (T04)	0...120 (T16)	Output Td	Select according to Ordering Guide (Tdxx)	
Tw-Scaling	0...100 (T05)	0...80 (T21)			
(in °C or °F)	0...60 (T07)	-40...80 (T22)	Output Tf	Select according to Ordering Guide (Tfxx)	
	-30...70 (T08)	-20...80 (T24)			
	-30...120 (T09)	-40...160 (T33)	Output Tw	Select according to Ordering Guide(Twxx)	
	-20...120 (T10)	+20...180 (T40)		Other T/Td/Tf/Tw-scaling refer to data sheet „T-Scalings“	
	-40...120 (T12)	-40...180 (T52)			

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 %
4) Digital interface occupied
5) Integrated power supply includes 2 plugs for power supply and outputs / further plug options are not possible

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

EE310

High-End Humidity and Temperature Transmitter for Demanding Process Control

EE310 is optimized for reliable measurement in demanding industrial applications. In addition to highly accurate measurement of relative humidity (RH) and temperature (T), the transmitter also calculates parameters such as dew point, absolute humidity and mixing ratio.
Various models are available including wall, duct and remote probe. The remote probe can be used up to 180 °C (356 °F) and the pressure tight probe up to 20 bar (290 psi). The design of the rugged polycarbonate enclosure facilitates easy mounting and maintenance. The measured values are available on two analogue outputs and the Modbus RTU digital interface. The state of the art TFT colour display shows up to four measurands simultaneously and offers extensive error diagnostics. The integrated data logging function saves all measured and calculated values to the internal memory. The data can be displayed as graph directly on the device or easily downloaded via USB interface.
The E+E proprietary coating protects the sensor elements against corrosive and electrically conductive pollution.
The outputs can be freely configured and an adjustment performed directly via display or with the free EE-PCS software using the USB service interface.

EE310
with optional display

Typical applications

- industrial process monitoring and control
- dryers and humidifiers
- clean rooms
- food and pharmaceutical industry
- climate and test chambers

Features

3.5“ TFT Colour Display

» shows up to 4 measurands simultaneously
» layout and measurands freely selectable
» integrated data logger for 20.000 values per measurand
» logged values shown in graph
» error diagnostics
» intuitive device setup with push buttons

Enclosure

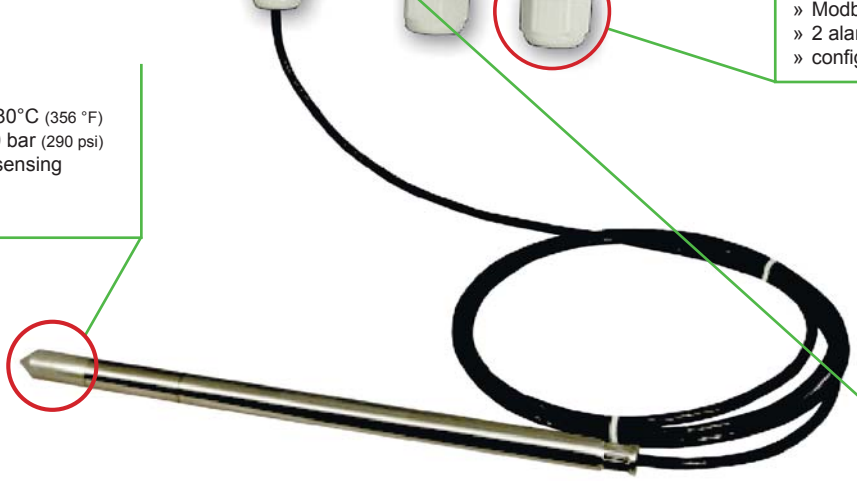
» easy mounting
» two part housing allows easy unit replacement
» IP65 protection class
» material UL94-V0 approved
» screws secured in cover

Outputs

» 2 analogue outputs current / voltage
» error indication
» Modbus RTU
» 2 alarm outputs
» configurable via display or software

Probe

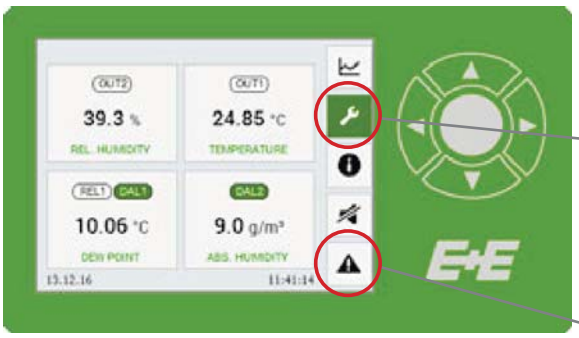
» working range up to 180°C (356 °F)
» pressure tight up to 20 bar (290 psi)
» protective coating for sensing elements
» pluggable probe



USB Service Interface

» download logged data
» perform configuration, adjustment and firmware update
» 4 status LEDs

TFT colour display with integrated data logger (option D2)



Settings

» analogue, digital and alarm outputs setup
» one and two point adjustment for RH and T
» probe replacement (for pluggable probe)
» password protection for all relevant settings

Error Diagnostics

» error self-diagnosis
» error description
» auditive and visual error warnings

Data logger

» 20.000 values saved per measurand
» selectable sampling rates
» view recorded data as graph
» download data via USB port and EE-PCS software

Protective sensor coating (option C1)

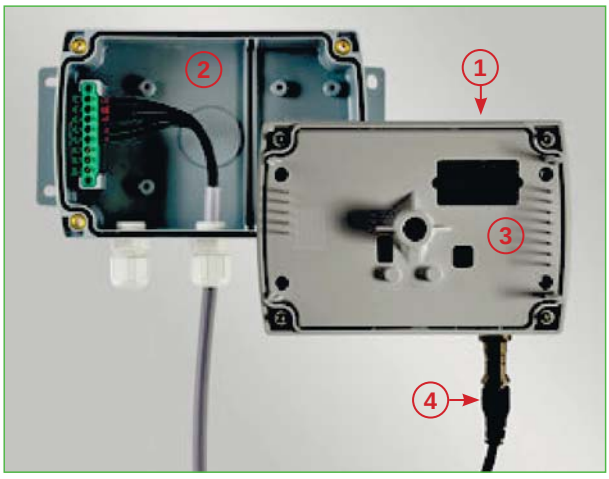
The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing elements. The coating substantially extends the lifetime and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). Additionally, it improves the sensor's long term stability in dusty, dirty or oily applications by preventing stray impedances caused by deposits on the active sensor surface.

Modular Housing / Pluggable Probe (option PC4)

The upper part of the transmitter **(1),** which accommodates the electronics and the probe, can be plugged off for service or adjustment and can be replaced within seconds. This allows for the bottom part **(2)** to remain mounted and with intact cabling.

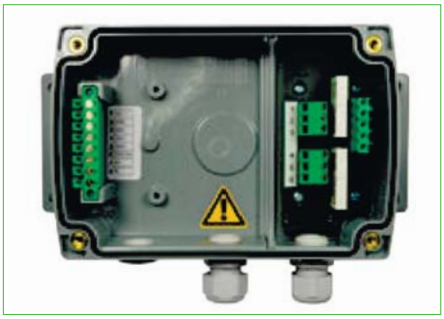
A polycarbonate cover **(3)** on the inside of the housing protects the electronics during installation or service.

The remote probe models are also available with a pluggable probe **(4)** which can be easily exchanged by a push-pull plug. It is ideal for installation of long probe cables and in applications that might require periodical probe replacements.



Alarm outputs (option AM2)

This optional module features two freely configurable relay outputs for control purposes. Various operation modes are available including hysteresis, window and error indication. When error indication is selected, a fault in the humidity or temperature measurement will trigger the alarm output. The measurands at the outputs as well as the thresholds and hysteresis can be set using the EE-PCS software or directly on the device via display and push buttons.



Integrated Power Supply Module (option AM3)

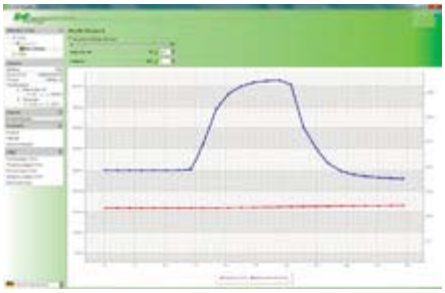
The module allows the device to be powered with 100…240 V AC (50/60 Hz).

E+E Product Configuration Software

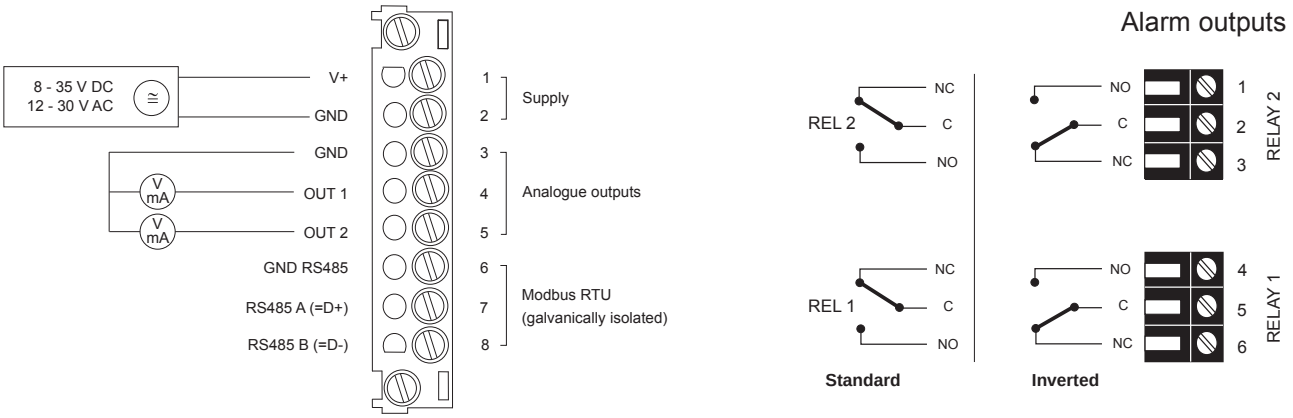
EE-PCS is an intuitive software that allows the user to perform:

- flexible, easy and fast setup of the analogue and alarm outputs
- 1 or 2 point adjustment of humidity and temperature
- replacement of the pluggable sensing probe
- Modbus RTU communication setup
- setup of the display layout
- download logged data
- view error diagnosis information

EE-PCS is available free of charge at: *http://www.epluse.com/configurator*

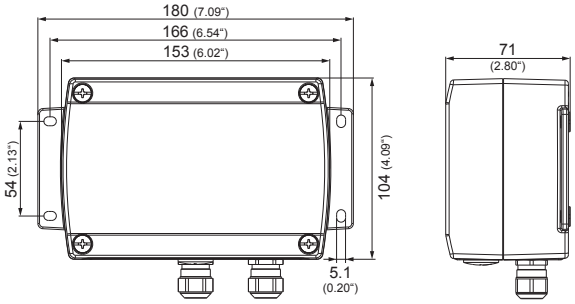


Connection diagram



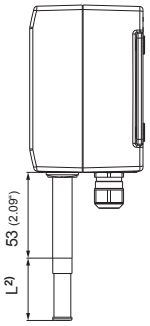
Dimensions (mm/inch)

Housing (polycarbonate):

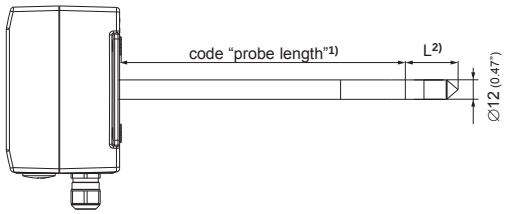


Models:

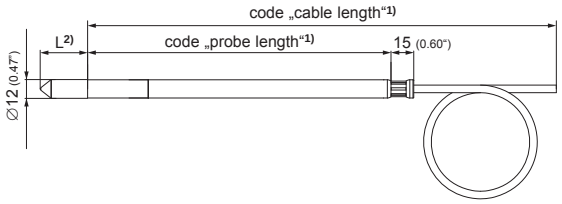
T1: Wall mounting



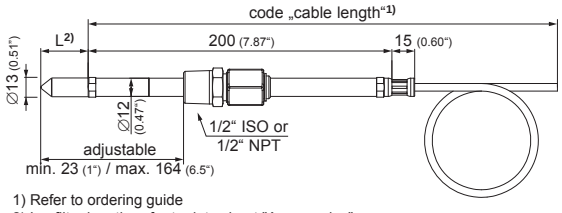
T2: Duct mounting



T5: Remote probe up to 180 °C (356 °F)



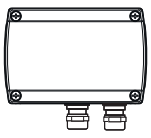
T10: Pressure tight probe up to 20 bar (300 psi)



1) Refer to ordering guide
2) L = filter length; refer to data sheet "Accessories"

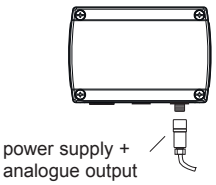
Electrical connection

standard

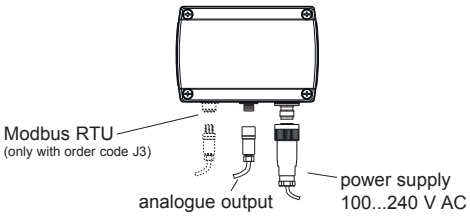


2x M16x1.5

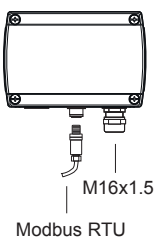
option E4



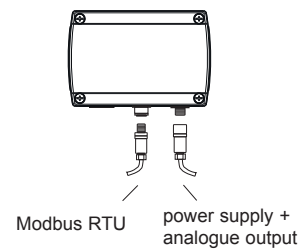
option AM3



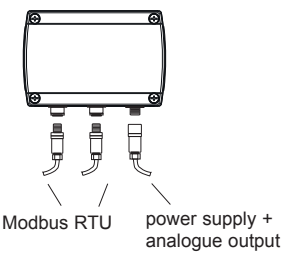
option E5



option E6



option E12



Mating plugs included in the scope of supply

Technical data

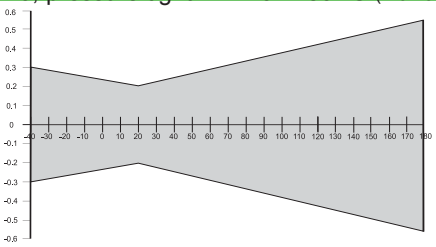
Measured values

Relative humidity (RH)

Sensor	E+E HC1000-400
Working range[1)]	0...100 % RH
Accuracy[2)] (incl. hysteresis, non-linearity and repeatability)	
-15...40 °C (5...104 °F) RH ≤90 %	± (1.3 + 0.3 % * mv) % RH
-15...40 °C (5...104 °F) RH >90 %	± 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	< 15 s with metal grid filter at 20 °C (68 °F) / t_{90}

mv = measured value

Temperature (T)

Sensor	Pt1000 (Tolerance class A, DIN EN 60751)	
Working range sensing probe	T1, wall:	-40...60 °C (-40...140 °F)
	T2, duct:	-40...80 °C (-40...176 °F)
	T5, remote:	-40...180 °C (-40...356 °F)
	T10, pressure tight:	-40...180 °C (-40...356 °F)
Accuracy		
Temperature dependence of electronics	typ. ± 0.005°C/°C	

Outputs

Two analogue outputs	0 - 1 / 5 / 10 V		-1 mA < I_L < 1 mA
freely selectable and scalable	4 - 20 mA	3-wire	R_L < 500 Ohm
	0 - 20 mA	3 wire	R_L < 500 Ohm
Digital interface	RS485 with Modbus RTU, up to 32 devices in one bus		

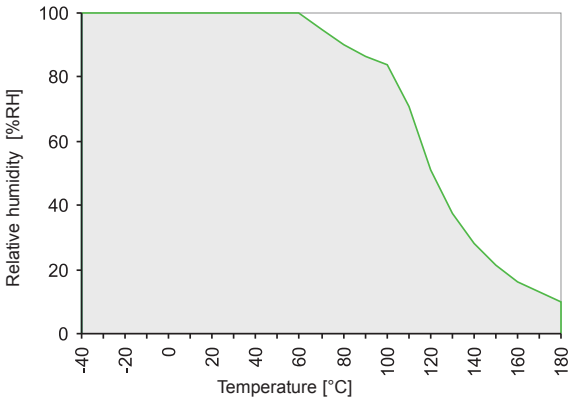
General

Power supply class III ⧫ (EU) / class 2 (NA)	8...35 V DC	12...30 V AC	
	100...240 V AC, 50/60 Hz with option AM3 [3)]		
Current consumption - 2x voltage output	for 24 V DC/AC:	typ. 40 mA	
- 2x current output		typ. 80 mA	
Pressure range for pressure tight probe	0.01...20 bar (0.15...300 psi)		
Probe material	stainless steel (1.4404 / AISI 316L)		
Enclosure material	Polycarbonate UL94-V0 approved		
Protection class	IP65		
Cable gland	M16 x 1.5, for cable Ø 4.5 - 10 mm (0.18 - 0.39")		
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)		
Working and storage temperature range	-40...60 °C (-40...140 °F) without display		
	-20...50 °C (-4...122 °F) with display		
Electromagnetic compatibility	EN61326-1	EN61326-2-3	ICES-003 ClassA
	Industrial Environment		FCC Part15 ClassA
Alarm outputs (2 relays) [3)]	250 V AC / 6 A		
	28 V DC / 6 A		
System requirements for EE-PCS software	Windows XP or higher; USB port		

CE

1) Refer to the working range humidity sensor on next page.
2) Traceable to intern. standards, administrated by NIST, PTB, BEV,...
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).
3) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

Working range humidity sensor



The graph shows the allowed measurement range for the humidity sensor.

Operating beyond this range does not damage the sensor, nevertheless the specified measurement accuracy cannot be guaranteed.

Measurement range[1)]

		from		up to						unit	
				EE310-T1		***EE310-T2***		***EE310-T5,T10***			
Humidity	RH	0		100		100		100		% RH	
Temperature	T	-40	(-40)	60	(140)	80	(176)	180	(356)	°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)
Wet bulb temperature	Tw	0	(32)	60	(140)	80	(176)	100	(212)	°C	(°F)
Water vapour partial pressure	e	0	(0)	200	(3)	500	(7.5)	1100	(15)	mbar	(psi)
Mixing ratio	r	0	(0)	425	(2900)	999	(9999)	999	(9999)	g/kg	(gr/lb)
Absolute humidity	dv	0	(0)	150	(60)	300	(120)	700	(300)	g/m³	(gr/f[3)])
Specific enthalpy	h	0	(0)	400	(50000)	1000	(375000)	2800	(999999)	kJ/kg	(Btu/lb)

1) Output scaling is freely selectable and can be easily changed via display or with the EE-PCS software.
Refer to accuracies of calculated values (www.epluse.com/humiditymeasurement).

Scope of supply

	Included in versions
EE310 according to ordering guide	all versions
Operation Manual English*	all versions
Inspection certificate according to DIN EN 10204 – 3.1	all versions
Mating plug for integrated power supply	AM3
Mating plug RKC 5/7	AM3 / E4 / E6 / E12
Mating plug RSC 5/7 (2 pcs. for option E12)	E5 / E6 / E12

*) Other languages can be downloaded at www.epluse.com/EE310

Accessories / Replacement Parts (see data sheet "Accessories")

- Filter caps	HA0101***xx***
- Mounting flange stainless steel	HA010201
- Drip water protection	HA010503
- RS485 kit	HA010605
- Bracket for installation onto mounting rails[1)]	HA010203
- Replacement probes[2)]	refer to device manual
- Replacement humidity sensor	FE09
- Replacement humidity sensor with coating	FE09-HC01
- Humidity calibration kit	see data sheet „Humidity calibration kit“

1) Note: 2 pieces necessary per housing.
2) Only for devices with pluggable probe option PC4.

Ordering Guide

			EE310			
	Type		**T1** wall mounting	**T2** duct mounting	**T5** remote probe up to 180 ° C (356 °F)	**T10** pressure tight probe up to 20 bar (300 psi)
Hardware Configuration	**Filter**	plastic - metal grid (up to 120 °C / 248 °F)	F3	F3		
		stainless steel sintered	no code	no code	no code	no code
		PTFE	F5	F5	F5	
		stainless steel - metal grid (up to 180 °C / 356 °F)	F9	F9	F9	
		H_2O_2	F12	F12	F12	
	Cable length (incl. probe length)	2 m (6.6 ft)			no code	no code
		5 m (16.4 ft)			K5	K5
		10 m (32.8 ft)			K10	K10
	Probe length	65 mm (2.55")			L65	
		200 mm (7.87")		no code	no code	no code
		400 mm (15.75")		L400	L400	
	Process connection	1/2" ISO thread				PA23
		1/2" NPT thread				PA25
	Electrical connection[1]	cable glands	no code	no code	no code	no code
		1 plug for power supply and outputs	E4	E4	E4	E4
		1 cable gland / 1 plug for Modbus RTU	E5	E5	E5	E5
		2 plugs for power supply / outputs and for Modbus RTU	E6	E6	E6	E6
		3 plugs for power supply / outputs and Modbus RTU	E12	E12	E12	E12
	Optional features	TFT colour display with integrated data logger[2]	D2	D2	D2	D2
		Modbus RTU [3]	J3	J3	J3	J3
		pluggable probe			PC4	PC4
		E+E sensor coating	C1	C1	C1	C1
		alarm outputs [4] [5]	AM2	AM2	AM2	AM2
		integrated power supply 100...240 V AC, 50/60 Hz [5]	AM3	AM3	AM3	AM3
Setup - Analogue outputs	**Output 1**	relative humidity RH [%]	no code			
		other measurand (xx see Measurand Code below)	MA*xx*			
	Output Signal 1[6]	0-1 V	GA1			
		0-5 V	GA2			
		0-10 V	GA3			
		0-20 mA	GA5			
		4-20 mA	GA6			
	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)	MB*xx*			
	Output Signal 2[6]	0-1 V	GB1			
		0-5 V	GB2			
		0-10 V	GB3			
		0-20 mA	GB5			
		4-20 mA	GB6			
	Scaling 2 low	value	SBL*value*			
	Scaling 2 high	value	SBH*value*			

Measurand Code

		Mx
relative humidity	%	10
Temperature	°C	1
	°F	2
dew point Td	°C	52
	°F	53
frost point Tf	°C	65
	°F	66
mixing ratio r	g/kg	60
	gr/lb	61

		Mx
absolute humidity dv	g/m³	56
	gr/ft³	57
wet bulb temperature Tw	°C	54
	°F	55
water vapour partial pressure e	mbar	50
	psi	51
specific enthalpy h	kJ/kg	62
	BTU/lb	64

1) Plug options E5 / E6 / E12 only in combination with Modbus RTU output, option J3.
2) Factory setup: the display shows the measurands selected for output 1 and output 2. Default language English, other languages selectable in display menu.
3) Factory settings: bau drate 9600, parity even, stop bit 1 / slave-ID 231 (16 bit integer).
4) Alarm output only available with cable glands (other plug options are not possible).
5) Combination of alarm output and integrated power supply is not possible. Integrated power supply includes 2 plugs for power supply and outputs (other plug options are not possible).
6) Both analogue outputs shall be either voltage or current.

Order Example

EE310-T5D2J3C1GA3GB3SBL-40SBH180

Type:	T5	remote probe for T up to 180 °C (356 °F)
Filter:	no code	stainless steel sintered filter
Cable length:	no code	2 m (6.6")
Probe length:	no code	200 mm (7.87")
Electrical connection:	no code	cable glands
Optional features:	D2	TFT colour display with integrated data logger
	J3	Modbus RTU
	C1	E+E sensor coating

Output 1:	no code	relative humidity %
Output Signal 1:	GA3	0-10 V
Scaling 1 low:	no code	0
Scaling 1 high:	no code	100
Output 2:	no code	temperature T [°C]
Output Signal 1:	GB3	0-10 V
Scaling 2 low:	SBL-40	-40
Scaling 2 high:	SBH180	180

EE300Ex-HT

Humidity/Temperature Transmitter for Intrinsically Safe Applications

EE300Ex - wall mounting

EE300Ex - remote sensing probe

The EE300Ex humidity / temperature transmitter has been designed specifically for measurement in explosion hazard areas. It complies with the classifications for **Europe (ATEX), International (IECEx) and USA / Canada (FM)**.
Accurate measurement over the full range of 0…100 % RH and -40…180 °C (-40...356 °F) is also possible in applications under pressure from 0.01… 300 bar (4351 psi).

The EE300Ex can be used in flammable gas and dust applications. The entire transmitter can be placed in a explosion hazardous area. With the remote sensing probe a temperature classification up to T6 can be reached.
With a stainless steel enclosure and sensing probe the EE300Ex is the ideal transmitter for challenging industrial applications. The 2-part construction facilitates simple installation and rapid replacement of the measuring section without time consuming wiring. The well proven E+E humidity sensors ensure reliable measurement performance and long term stability.

Based on 2-wire technology, the transmitter can be powered by any intrinsically safe power source or via Zener barriers. The measured values are available on two 4…20 mA analogue outputs. In addition to the measured values for humidity and temperature, the EE300Ex calculates dew point, frost point, absolute humidity, mixing ratio and other humidity related physical quantities.

When outside of the hazardous measurement area, the setup of the EE300Ex can be easily customized by using the supplied configuration software. This includes the configuration of the analogue outputs and the calibration of the humidity and temperature during service.

Measurement of moisture in oil:
Besides measurement in the air, the EE300Ex can be employed for measurement of both absolute water content (x) in ppm or relative water activity (aw) in oils.
Typical applications include oil purifiers and online monitoring of lubrication and hydraulic oils on off shore oil rigs.
The USA and Canada approval is valid for air and gas measurement only.

Typical Applications

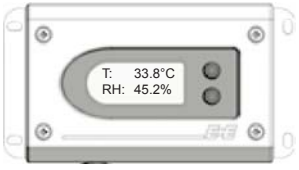
chemical process control
pharmaceutical applications
explosive / hazardous storage rooms
flour mills
moisture in oil measurement

Features

approved for gas and dust installation in zone 0 / Div. 1
calculation of related physical quantities
stainless steel housing and probe
highest accuracy up to 180 °C (356 °F)
pressure tight up to 300 bar (4351 psi)

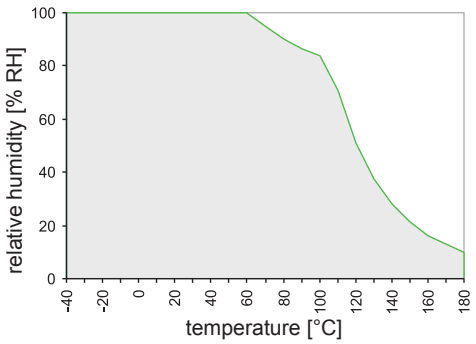
Display

Two of the measured or calculated physical quantities can be selected with push buttons on the front cover to be shown on the optional display.
EE300Ex version with display is not available for environments with combustible dust, Fibers and Flyings and gases with EPL Ga IIC (Group A&B).



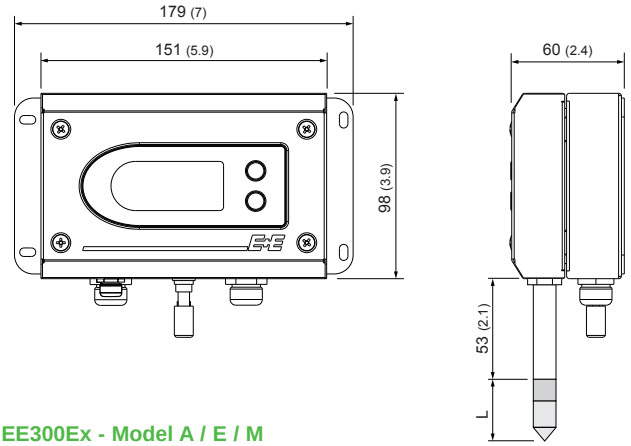
Humidity Sensor - Working Range and Coating

The gray area shows the allowed measurement range for the humidity sensor. Operating points outside of this range do not lead to destruction of the sensing element, but the specified measurement accuracy cannot be guaranteed.
Harsh industrial processes as well as heavily contaminated and/ or corrosive environments may affect the humidity
sensor and lead to measurement drift. The E+E proprietary coating significantly reduces these effects and considerably improves the long-term stability of the transmitter.



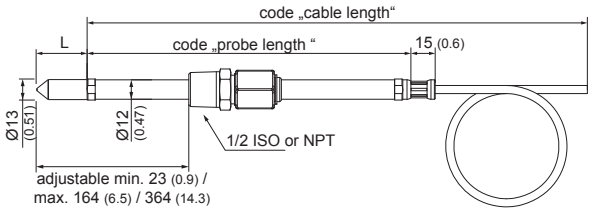
Models and Dimensions in mm (inches)

Model		pressure range	working range	Ø-probe
A -	wall mounting		-40...60 °C (-40...140°F)	12 (0.47)
E -	remote sensing probe up to 20 bar (300 psi)	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356°F)	12 (0.47)
	remote sensing probe up to 20 bar (300 psi) with sliding fitting for assembly / disassembly under pressure	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356°F)	13 (0.51)
M -	remote sensing probe up to 300 bar (4351 psi)	0.01...300 bar (0.15...4351 psi)	-40...180 °C (-40...356°F)	12 (0.47)
U -	remote sensing probe for sensor retraction tool PN250	0.01...300 bar (0.15...4351 psi)	-40...180 °C (-40...356°F)	12/15 (0.47/0.59)

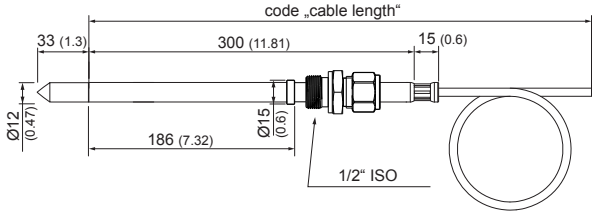


EE300Ex - Model A / E / M
wall mounting / housing remote sensing probe

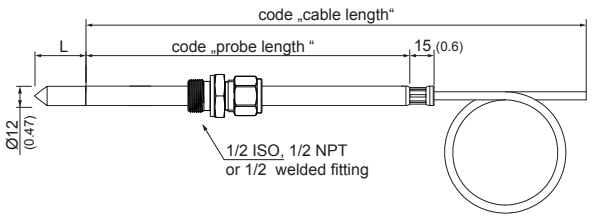
L - length of filter [mm]	
stainless steel sintered filter	33 (1.3")
PTFE-filter	33 (1.3")
stainless steel grid filter	39 (1.5")
oil filter	32 (1.26")



EE300Ex - Model E
remote sensing probe 20 bar (300 psi) with sliding fitting



EE300Ex - Model U
remote sensing probe for sensor retraction tool 250 bar (3625 psi)



EE300Ex - Model E / M
remote sensing probe 20 bar (300 psi) /
300 bar (4351 psi) with cut-in fitting

Technical Data EE300Ex

Measuring values

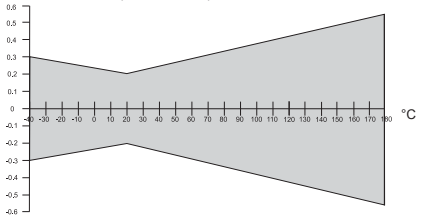
Relative humidity

Humidity sensor[1]		HC1000
Measuring range[1]		0...100 % RH
Accuracy[2] (including hysteresis, non-linearity and repeatability, traceable to international 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 electronics		typ. 0.03 % RH/°C
Response time with filter at 20 °C (68 °F) / t_{90}		< 30 sec.

Temperature

Temperature sensor		Pt1000 (Tolerance class A, DIN EN 60751)
Measuring range sensor head	wall mounting:	-40...60 °C (-40...140 °F)
	remote sensing probe:	Δ°C -40...180 °C (-40...356 °F)

Accuracy



Temperature dependence of electronics	typical 0.005 °C/°C

Calculation functions

		from		to				unit	
				wall mounting		*remote sensing probe*			
Dew/Frost point temp.	Td/Tf	-40	(-40)	60	(140)	100	(212)	°C	(°F)
Wet bulb temperature	Tw	0	(32)	60	(140)	100	(212)	°C	(°F)
Water vapour pressure	e	0	(0)	200	(3)	1100	(15)	mbar	(psi)
Mixing ratio	r	0	(0)	425	(2900)	999	(9999)	g/kg	(gr/lb)
Absolute humidity	dv	0	(0)	150	(60)	700	(300)	g/m³	(gr/ft³)
Specific enthalpy	H	0	(0)	400	(150000)	2800	(999999)	kJ/kg	(Btu/lb)
Water activity	aw	0		-		1		[ ]	
Water content	x	0		-		100000		[ppm]	

Outputs

freely selectable and scalable outputs	2 x 4 - 20 mA (2-wire) galvanically isolated Output 1 (CH1) must be connected!	R_L=(Vcc-9V)/20mA

General

Supply voltage (Class III)	$V_{cc\ min}$=(9+R_L*0.02) VDC $V_{cc\ max}$=28 V DC	
Current consumption	max 20 mA per channel	
Pressure range for pressure tight sensor probe	refer to model	
Serial interface for communication [3]	RS232	
System requirements for software	WINDOWS XP or later	
Protection class of housing	IP65 / Nema 4	
Cable gland	M16 for cable diameter 5 - 10 mm (0.2" - 0.4")	
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Temperature range	sensor head	according measuring range
	electronic	-40...60 °C (-40...140 °F)
	electronic with display	-20...60 °C (-4...140 °F)
Storage temperature range	electronic and sensor head	-20...60 °C (22...140 °F)
Electromagnetic compatibility according	EN61326-1 Industrial Environment	EN61326-2-3 ICES-003 ClassB FCC Part15 ClassB
Material Housing	Stainless Steel 1.4404	
Probe cable	PTFE	
Probe (without Filter)	Stainless Steel 1.4301	

1) Refer to the working range of the humidity sensor.
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).
3) Configuration adapter E-PCA and cable HA011061 necessary.

Ex - Classifications

Europe (ATEX)

Certificate:	TPS 13 ATEX 38892 003 X by TÜV SÜD Product Service GmbH		
Safety factors:	U_i = 28V; I_i = 100mA; P_i = 700mW; C_i = 2.2nF; $L_i \approx$ 0mH		
Ex-Designation:			
Transmitter without display	II 1 G Ex ia IIC T4 Ga	/	II 1 D Ex ia IIIC T80°C Da
Transmitter with display	II 2 G Ex ia IIC T4 Gb	/	II 1 G Ex ia IIB T4 Ga
Remote sensing probe	II 1 G Ex ia IIC T6-T1 Ga	/	II 1 D Ex ia IIIC T80°C...220°C Da

International (IECEx)

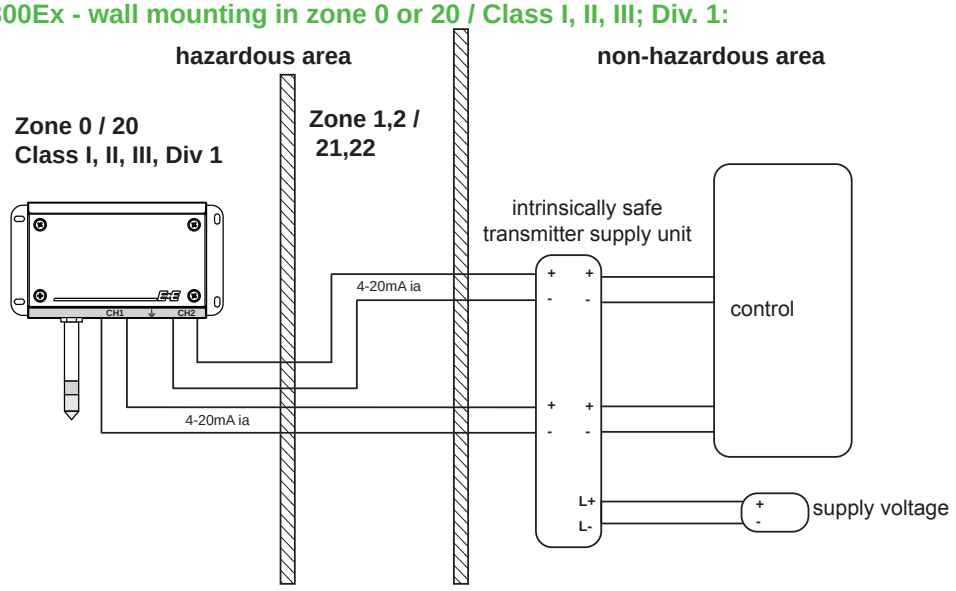
Certificate:	IECEx FMG 14.0017 X by FM Approvals		
Safety factors:	6.4 Vdc ≤ U_i ≤ 28Vdc; I_i = 100mA; P_i = 700mW; C_i = 2.2nF; L_i = 0mH		
Ex-Designation:			
Transmitter without display	Ex ia IIC T4 Ta = -40°C to 60°C Ga	/	Ex ia IIIC T131°C Da
Transmitter with display	Ex ia IIC T4 Ta = -40°C to 60°C Gb	/	Ex ia IIB T4 Ta = -40°C to 60°C Ga
Remote sensing probe	Ex ia IIC T6-T1 Ta = -70°C to 200°C Ga	/	Ex ia IIIC T80°C Da

USA and Canada (FM)

Certificate:	by FM Approvals
Safety factors:	6.4 Vdc ≤ V_{max} (or U_i) ≤ 28Vdc; I_{max} (or I_i) = 100mA; P_i = 700mW; C_i = 2.2nF; L_i = 0mH
Ex-Designation:	
Transmitter without display	IS/I,II,III/1/ABCDEFG/T4 -40°C < Ta < 60°C; Entity – M1_1309080; IP65 *USA:* NI/I,II,III/2/ABCDEFG/T4 -40°C < Ta < 60°C *Canada:* NI/I/2/ABCD/T4 -40°C < Ta < 60°C I/0/AEx ia IIC T4 -40°C < Ta < 60°C; Entity – M1_1309080; IP65 I/0/Ex ia IIC T4 -40°C < Ta < 60°C Ga; Entity – M1_1309080; IP65 20/ AEx ia IIIC T131°C -40°C < Ta < 60°C; Entity – M1_1309080; IP65
Transmitter with display	IS/I/1/CD/T4 -40°C < Ta < 60°C; Entity – M1_1309080 IS/I/2/ABCD/T4 -40°C < Ta < 60°C; Entity – M1_1309080 NI/I/2/ABCD/T4 -40°C < Ta < 60°C I/0/AEx ia IIB T4 -40°C < Ta < 60°C; Entity – M1_1309080 I/1/AEx ia IIC T4 -40°C < Ta < 60°C; Entity – M1_1309080 I/0/Ex ia IIB T4 -40°C < Ta < 60°C Ga; Entity – M1_1309080 I/1/Ex ia IIC T4 -40°C < Ta < 60°C Gb; Entity – M1_1309080
Remote sensing probe	IS/I,II,III/1/ABCDEFG/T6-T1 Entity – M1_1309080; IP65 *USA:* NI/I,II,III /2/ABCDEFG/T6-T1 *Canada:* NI/I/2/ABCD/T6-T1 I/0/AEx ia IIC T6-T1 Entity – M1_1309080; IP65 I/0/Ex ia IIC T6-T1 Ga Entity – M1_1309080; IP65 20/ AEx ia IIIC T80°C Entity – M1_1309080; IP65

Mounting Example

EE300Ex - wall mounting in zone 0 or 20 / Class I, II, III; Div. 1:



Ordering Guide EE300Ex-HT

			EE300Ex-HT6S			
Hardware Configuration	**Model**	wall mounting	A			
		remote sensing probe up to 20 bar (300 psi)		E		
		remote sensing probe up to 300 bar (4351 psi)			M	
		remote sensing probe for sensor retraction tool PN250				U
	Display	without display	x	x	x	x
		with display [1]	D	D	D	D
	Electrical Connection	2 x M16 cable gland	B	B	B	B
	Probe - Cable Length	wall mounting	x			
		1 m (3.3 ft)		C	C	C
		2 m (6.6 ft)		E	E	E
		5 m (16.4 ft)		G	G	G
		10 m (32.8 ft)		H	H	H
	Probe Length	wall mounting	x			
		65 mm (2.56) [2]		C	C	
		200 mm (7.9)		F	F	
		300 mm (11.8)				G
		400 mm (15.8)		H	H	
	Zone Feedthrough (probe fitting)	without probe fitting	x	x	x	
		1/2 ISO - cut-in fitting; 12 mm (0.47")		A	A	A
		1/2 weld cut-in fitting; 12 mm (0.47")		B	B	
		1/2 NPT - cut-in fitting; 12 mm (0.47")		C	C	
		1/2 ISO - sliding fitting; 13 mm (0.51")		F		
		1/2 NPT - sliding fitting; 13 mm (0.51")		H		
	Filter	stainless steel sintered filter	D	D	D	D
		PTFE filter [3]	E	E	E	
		stainless steel grid filter on stainless steel body	I	I	I	
		H_2O_2 filter [3]	L	L	L	
		oil filter	M	M	M	
	Sensor Protection	without coating	x	x	x	x
		with coating [4]	1	1	1	1
	Ex-Certification	Europe (ATEX)	AT	AT	AT	AT
		International (IECEx)	IC	IC	IC	
		USA / Canada (FM)	FM	FM	FM	
Software Configuration	**Measured Value Units**	metric / SI [°C]	M	M	M	M
		non metric / US [°F]	N	N	N	N
	Physical Parameters Output 1	relative humidity	UW	UW	UW	UW
		temperature	Tx	Tx	Tx	Tx
		dew point temperature	TD	TD	TD	TD
		frost point temperature	TF	TF	TF	TF
		wet bulb temperature	TW	TW	TW	TW
		water vapour partial pressure	Ex	Ex	Ex	Ex
		mixture ratio	Rx	Rx	Rx	Rx
		absolute humidity	DV	DV	DV	DV
		specific enthalpy	Hx	Hx	Hx	Hx
		water activity		AW	AW	
		water content in mineral transformer oil		Xm	Xm	
		water content customized oil		Xk	Xk	
	Scaling Range Output 1	UW, Tx,...	yyy (select according „scaling ranges“, next page)			
	Physical Parameters Output 2	relative humidity	UW	UW	UW	UW
		temperature	Tx	Tx	Tx	Tx
		dew point temperature	TD	TD	TD	TD
		frost point temperature	TF	TF	TF	TF
		wet bulb temperature	TW	TW	TW	TW
		water vapour partial pressure	Ex	Ex	Ex	Ex
		mixture ratio	Rx	Rx	Rx	Rx
		absolute humidity	DV	DV	DV	DV
		specific enthalpy	Hx	Hx	Hx	Hx
		water activity		AW	AW	
		water content in mineral transformer oil		Xm	Xm	
		water content customized oil		Xk	Xk	
	Scaling Range Output 2	UW, TD,...	yyy (select according „scaling ranges“, next page)			

[1] No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Group A&B)
[2] Not possible with sliding fitting (Code F, H)
[3] Filter cap must not be used in EPL Ga IIC (Gas Group A&B)
[4] Do not use in oil

Scaling Ranges

UW - Relative Humditiy [% RH]											
001	0...100										

Tx - Temperature / TD - Dew Point Temperature / TF- Frost Point Temperature / TW- Wet Bulb Temperature [°C or °F]											
002	-40...60	007	0...60	015	20...120	083	-40...140				
003	-10...50	008	-30...70	022	-40...80						
004	0...50	012	-40...120	024	-20...80						
005	0...100	014	-20...100	052	-40...180						

Ex - Water vapour partial pressure [mbar]											
001	0...200	002	0...1000								

Rx - Mixture ratio [g/kg]											
001	0...400	002	0...900								

DV - Absolute Humidity [g/m³]											
001	0...150	002	0...700								

Hx - Specific Enthalphy [kJ/kg]											
001	-50...400	002	-50...2800								

AW - Water Activity [ ]											
001	0...1										

Xm or Xk - Water Content [ppm]											
001	0...100	005	0...6000	009	0...20000						
002	0...500	006	0...5000	010	0...200						
003	0...1000	007	0...300	011	0...100000						
004	0...10000	008	0...30000								

Other scaling ranges on request.

Order Example

Example 1:

EE300EX-HT6SMDBHFAD1AT/MTx052UW001

Model:	remote sensing probe up to 300 bar
Display:	with display
Electrical Connection:	2 x M16 cable gland
Probe - Cable Length:	10 m (32.8 ft)
Probe Length:	200 mm (7.9)
Zone feedthrough:	1/2 ISO - cut-in fitting
Filter:	stainless steel sintered filter
Sensor Protection:	with coating
Ex-Certification:	ATEX
Measured Value Units:	metric
Physical Parameters Output 1:	temperature
Scaling Range Output 1:	-40...180 °C (-40...356 °F)
Physical Parameters Output 2:	relative humidity
Scaling Range Output 2:	0...100 % RH

Example 2:

EE300EX-HT6SAxBxxxIxFM/NTx083TD083

Model:	wall mounting
Display:	without display
Electrical Connection:	2 x M16 cable gland
Probe - Cable Length:	wall mounting
Probe Length:	wall mounting
Zone feedthrough:	without probe fitting
Filter:	stainless steel grid filter
Sensor Protection:	without coating
Ex-Certification:	USA / Canada (FM)
Measured Value Units:	non metric
Physical Parameters Output 1:	temperature
Scaling Range Output 1:	-40...140 °F (-40...284 °F)
Physical Parameters Output 2:	dew point temperature
Scaling Range Output 2:	-40...140 °F (-40...284 °F)

Accessories

Configuration adapter for PC	(EE-PCA)
ATEX Connection cable with protective circuit - EE300Ex to configuration adapter	(HA011061)
Blank cover for housing base	(HA011401)
Safety Barrier, 1-channel, STAHL 9002/13-280-093-001	(HA011410)
Intrinsically safe Transmitter Supply Unit, 1-channel, STAHL 9160/13-11-11	(HA011405)
Intrinsically safe Transmitter Supply Unit , 2-channel, STAHL 9160/23-11-11	(HA011406)
Sealing plug for unused cable glands	(HA011402)
Ball valve with 1/2 ISO female thread with Ex-Certification	(HA011403)
Sensor retraction tool PN250	(ZM-WA-025-040-EST)
Sensor retraction tool PN40	(BG-WA-103-045-EST)

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

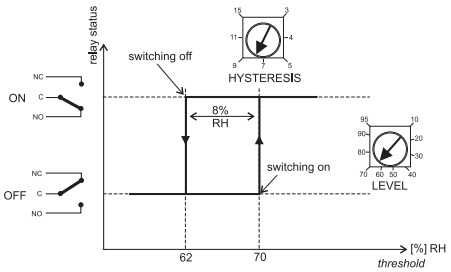
With an easy routine the user can perform a fast and accurate two point adjustment of relative humidity and temperature.

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.

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.



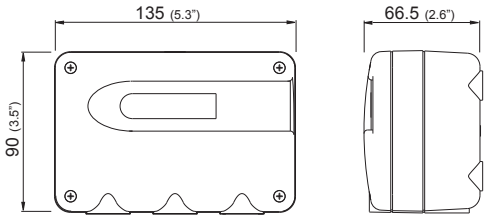
Integrated power supply

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.

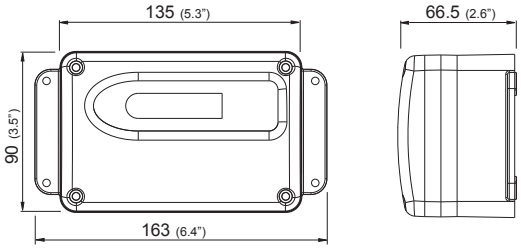
Dimensions in mm

Housing:

polycarbonate housing

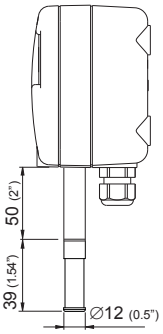


metal housing

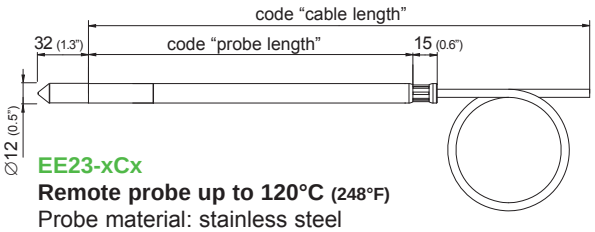


For use in harsh industrial environments all models of the EE23 are available in a robust metal housing.
The very smooth surface and the rounded outlines allow for the use in clean rooms as well.

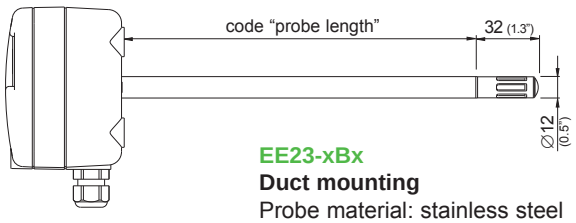
Models:



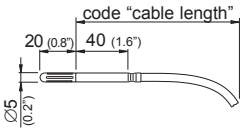
EE23-xAx
Wall mounting
Probe material: PC



EE23-xCx
Remote probe up to 120°C (248°F)
Probe material: stainless steel



EE23-xBx
Duct mounting
Probe material: stainless steel



EE23-xHx
Remote miniature probe
Probe material: stainless steel

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...)

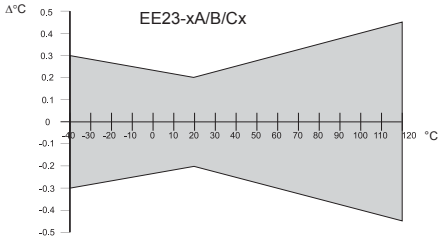
		EE23-xA/B/Cx	EE23-xHx
-15...40°C (5...104°F)	≤90% RH	± (1.3 + 0.3%*mv) % RH	± (1.8 + 0,3%*mv) % RH
-15...40°C (5...104°F)	>90% RH	± 2.3% RH	± 2.8% RH
-25...70°C (-13...158°F)		± (1.4 + 1%*mv) % RH	± (1.9 + 1%*mv) % RH
-40...120°C (-40...248°F)		± (1.5 + 1.5%*mv) % RH	-

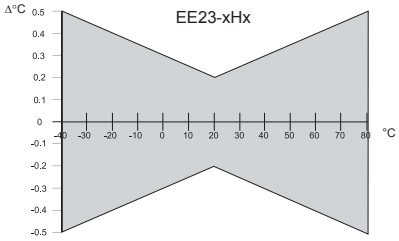
Temperature dependence electronics	typ. ± 0.015% RH/°C
Response time with metal grid filter at 20°C / t_{90}	< 15 sec.

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 *EE23-A*	*EE23-B, H*	*EE23-C*	units
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)	

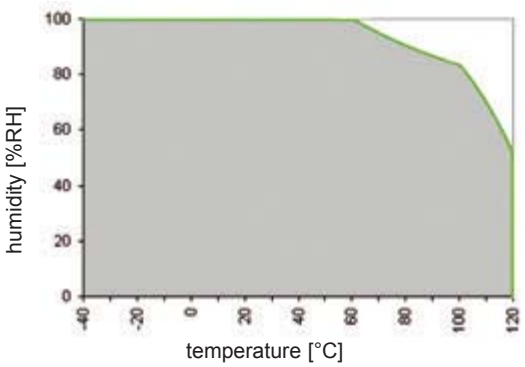
1) Refer to the working range of the humidity sensor 3) Refer to ordering guide 4) Refer to accuracies of calculated values (page 152) 5) Connection plugs refer to ordering guide
2) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard 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 Industrial Environment	EN61326-2-3	ICES-003 ClassB 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.

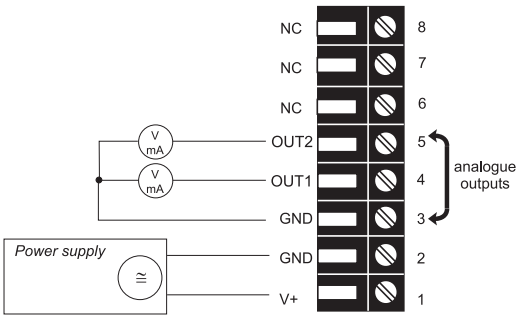
Sensor Coating

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.

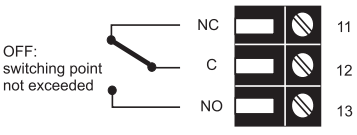
Connecting Diagram

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; models C and H only)	2m	02	02
	5m	05	05
	10m	10	10
	20m	20	20
Probe length (models B and C only)	65mm	2	
	200mm	5	
	400mm	6	
Display refer to software-code)	without display		
	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[3]	V01

								EE23-	EE23-
Software Configuration									
Physical parameters of outputs	Relative humidity		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							E01	E01
	°F								
Scaling of T-output	-40...60	(T02)	-40...120	(T12)	-40...248	(T78)	Output T	Select according to Ordering Guide (Txx)	
Scaling of Td-output	-10...50	(T03)	20...120	(T15)	0...140	(T85)			
Scaling of Tf-output	0...50	(T04)	-30...60	(T20)	0...248	(T87)	Output Td	Select according to Ordering Guide (Tdxx)	
in°C or °F	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.
3) Combination V01 and model B is 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

EE220

Humidity and Temperature Transmitter with Interchangeable Probes

The innovative, modular EE220 humidity (RH) and temperature (T) transmitter consists of a basic unit and various pluggable, interchangeable probes.

The basic unit can accommodate one combined EE07 RH and T probe or two separate EE07 probes, one for RH and one for T. The EE07 probes are available in plastic or in stainless steel enclosure and can be plugged onto the basic unit either directly or with M12 extension cables up to 10 m (32.8 ft) long. An optional kit facilitates the mounting of the probes in a duct.

The EE220 basic unit is available with polycarbonate or with metal enclosure, suitable for wall mount or for installation on rails (DIN EN 50022). For pharma and food industry the basic unit features a rear cable inlet.

The measured values are available on two analogue voltage or current (2 wire 4 – 20 mA) outputs, as well as on the optional display.

One or two point adjustment for RH and T of the transmitter can be easily performed with push buttons on the electronics board of the EE220 basic unit. Alternatively, the EE07 probes can be adjusted individually with the EE-PCA Product Configuration Adapter (see EE07 data sheet).


EE220 + 1 x EE07
Polycarbonate


EE220 + 2 x EE07
Metal

For surface moisture monitoring or for the early detection of condensation danger, EE220 can accommodate the EE03 RH & T module (see data sheet EE03).

Typical Applications

Pharma, biotech
Incubators and clean rooms
Cool chambers
Storage rooms

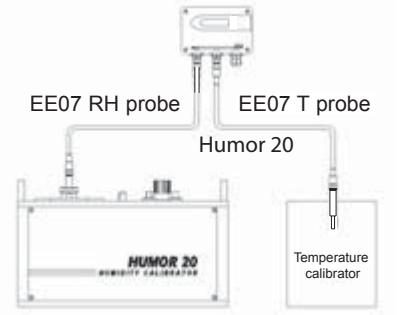
Features

Interchangeable probes
Outstanding accuracy and long term stability
Easy loop calibration
Wide temperature working range

Field Loop Calibration

A loop calibration or adjustment in the field, as required by the FDA (Food and Drugs Administration) regulated industries is easily possible for the EE220 with two separate probes. Using extension cables, the EE07 probes can be dropped into calibrators without dismounting the EE220 basic unit.

The illustration shows the EE07 RH probe placed into the Humor 20 high end portable humidity calibrator and the EE07 T probe in a dry block calibrator.



Reference Probes

A functional and accuracy check of the EE220 basic unit can be performed using reference probes instead of the regular EE07 probes. These are certified by individual test report and available for two pairs of fix RH and T values:

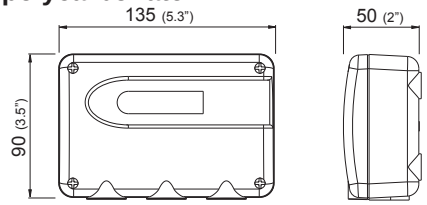
- RH = 10 % and T = 45 °C (113 °F)
- RH = 90 % and T =5 °C (41 °F)

Sensor Protection by E+E Proprietary Coating

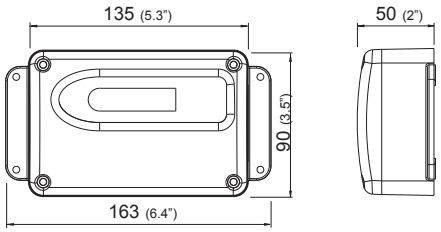
The E+E proprietary sensor coating is a hygroscopic layer applied to the active surface of the RH sensing element. The coating extends substantially the life-time and the measurement performance of the E+E sensor in corrosive environment. Additionally, it improves the sensor's long term stability in dusty, dirty or oily applications by preventing stray impedances caused by deposits on the active sensor surface.

Dimensions (mm/inch)

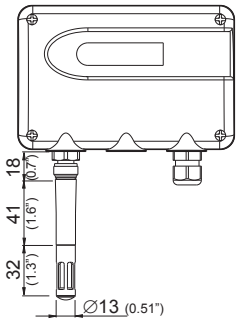
polycarbonate



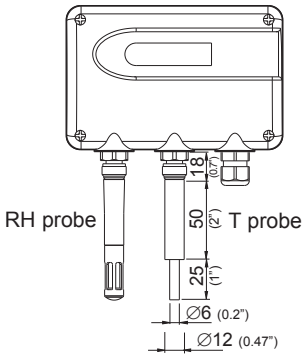
metal



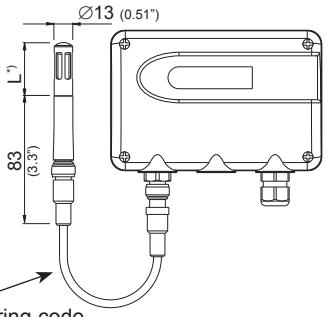
with one RH&T probe
EE220-xxx1x



with two separate probes for RH and T
EE220-xxx2x



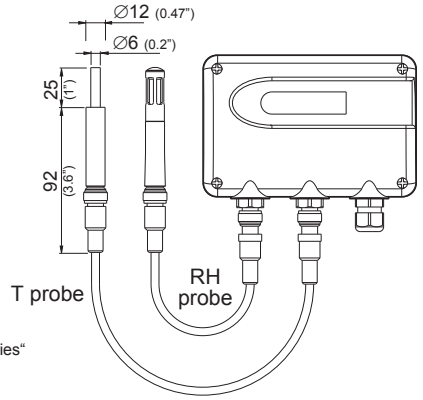
with one remote RH&T probe
EE220-xxx1x
+HAxxxx



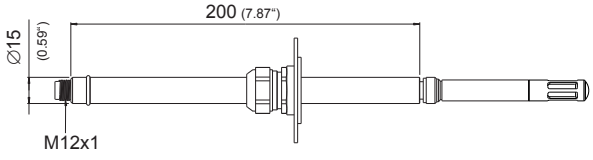
cable length	ordering code
2 m (6.6 ft)	HA010801
5 m (16.4 ft)	HA010802
10 m (32.8 ft)	HA010803

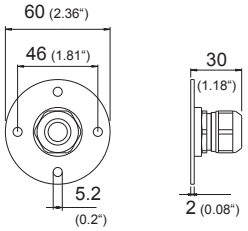
*) L = Filter length see Datasheet „Accessories"

with two remote separate probes for RH and T
EE220-xxx2x
+2x HAxxxx



duct mounting kit
HA010209





Technical Data

Outputs

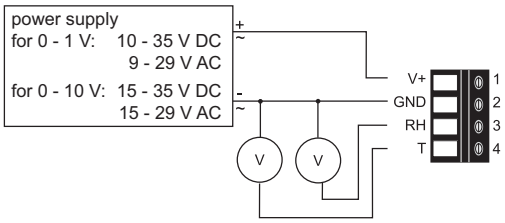
0...100 % RH	0 - 1 V	-0.5 mA < I_L < 0.5 mA
(T output scale according to ordering code)	0 - 10 V	- 1 mA < I_L < 1 mA
	4 - 20 mA (two wire)	R_L < 500 Ohm
T dependence of analogue outputs	max. 0.2 mV/°C	resp. 1 µA/°C

General

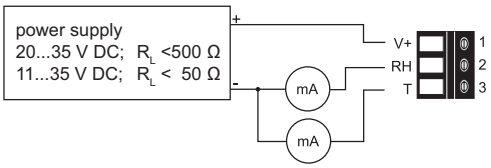
Supply voltage (Class III)			
for 0 - 1 V output	10 - 35 V DC	or	9 - 29 V AC
for 0 - 10 V output	15 - 35 V DC	or	15 - 29 V AC
for 4 - 20 mA output	10 - 35 V DC		
Load resistor for 4 - 20 mA output	$R_L < \frac{U_v - 10V}{0.02\ A}$ [Ω]		
Current consumption	typ. 10 mA for DC supply		typ. 20 mA_{eff} for AC supply
Electrical connection	screw terminals max. 2.5 mm^2		
Cable gland	M16x1.5	cable Ø 4.5 - 10 mm (0.18 - 0.39")	
	(optional connector; type: Lumberg, RSF 50/11)		
Material enclosure	PC or Al Si 9 Cu 3		
Protection class enclosure	IP65 / NEMA 4		
Electromagnetic compatibility	EN61326-1	EN61326-2-3 Industrial Environment	CE
Working temperature range basic unit	-40...60 °C (-40...140 °F)		
Storage temperature range	-40...60 °C (-40...140 °F)		

Connection Diagram

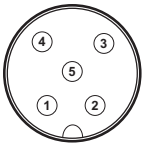
EE220- x1x - x3x



EE220- x6x



Option C03



1... brown .... T
2... white ..... RH
3... blue ..... NC
4... black ..... GND
5... grey ..... V+

Sensing Probes (for technical data and ordering guide see EE03 and EE07 data sheets)

Humidity/Temperature Probes		Measuring Range
EE07 RH/T probe, polycarbonate		0...100 % RH -40...80 °C (-40...176 °F)
EE07 RH/T probe, stainless steel for clean rooms, food and pharmaceutical industry		0...100 % RH -40...80 °C (-40...176 °F)
EE03 RH/T module for surface moisture, detection of condensation danger		0...95 % RH -40...85 °C (-40...185 °F)
Temperature Probes		**Measuring Range**
EE07 T probe, polycarbonate		-40...80 °C (-40...176 °F)
EE07 T probe, stainless steel for clean rooms, food and pharmaceutical industry		-40...80 °C (-40...176 °F)

Scope of Supply

EE220 Basic Unit
- EE220 according to ordering guide
- Cable gland M16 x 1.5
- Test report according to DIN EN10204 - 3.1
- User Guide

Probe (EE03 or EE07)
- EE03 or EE07 according to ordering guide
- Test report according according to DIN EN10204 - 3.1 (only EE07)

Probe Cable for EE03 or EE07
- Probe cable according to ordering guide

Ordering Guide

The EE220 basic unit does not include the sensing probes, which are to be ordered separately. The order shall include three positions:

- EE220 basic unit
- EE07 probes or EE03 modules
- Probe cables, optional for EE07 probes and compulsory for EE03 modules.

Position 1: EE220 Basic Unit

			EE220
Hardware Configuration	**Housing**	metal	M
		polycarbonate	P
	Output	0-1 V	1
		0-10 V	3
		4 - 20 mA	6
	Model	wall mount - cable gland M16x1.5	A
		wall mount - rear cable inlet	F
	Number of probes accommodated	one combined RH & T probe	1
		on RH probe and one T probe	2
	Display	without display	no code
		with display	D07
	Connection (only for type A)	cable gland	no code
		1 plug for power supply and ouputs	C03
Software Configuration	**T unit**	°C	no code
		°F	E01
	T output scale	-40...60 (T02) 0...120 (T16) -20...50 (T48) -10...50 (T03) -30...60 (T20) -40...176 (T80) 0...50 (T04) 0...80 (T21) 0...140 (T85) 0...60 (T07) -40...80 (T22) 0...176 (T86) -30...70 (T08) -20...80 (T24) 32...120 (T90) -10...70 (T11) -20...60 (T25) 32...140 (T91) -40...120 (T12) -30...50 (T45) 32...132 (T96) Other T scale according to data sheet „Scaling of the outputs“	Txx

Position 2 - Probes

See EE03 and EE07 ordering guide in the corresponding data sheets at www.epluse.com.

Position 3 - Probe cables

TYPE		
Cable for EE07 (optional)	2 m (6.6 ft)	HA010801
	5 m (16.4 ft)	HA010802
	10 m (32.8 ft)	HA010803
Cable for EE03 (compulsory)	2 m (6.6 ft)	HA010328
	5 m (16.4 ft)	HA010329

Order Example

Position 1 - Basic Unit:

EE220-M3A1C03/T07

Housing:	metal
Output:	0-10 V
Model:	wall mount - cable gland M16x1.5
Number of probes accommodated:	one combined RH & T probe
Display:	without display
Connection (only for type A):	1 plug for power supply and outputs
T-Unit:	°C
T-Scaling:	0...60 °C

Position 2 - Probe:

EE07-MFT9

Housing:	stainless steel
Model:	humidity and temperature
Filter:	stainless steel grid
Coating:	without

Position 3 - Probe cable:

1x HA010802

Type:	5 m (16.4 ft) cable for EE07

Accessories

- Display and metal front cover	D07M
- Display and polycarbonate front cover	D07P
- Duct mounting kit	HA010209
- Extension cable for EE07 2 m (6.6 ft) / 5 m (16.4 ft) / 10 m (32.8 ft)	HA010801/02/03
- Bracket for rail installation (polycarbonate enclosure only)	HA010203
- Power supply adapter	V03
- Reference probes set (2 probes)	HA010403

EE210

Humidity and Temperature Transmitter for Demanding Climate Control

The EE210 transmitter by E+E Elektronik meets the highest requirements in demanding climate control applications. Besides the accurate measurement of relative humidity (RH) and temperature (T), EE210 calculates various RH related parameters such as dew point, temperature, absolute humidity and mixing ratio. All measured and calculated values are available on the BACnet MS/TP or Modbus RTU interface, two of them are available on the analogue voltage or current outputs, while up to three values can be shown simultaneously on the optional display.

Excellent performance of EE210 in polluted or aggressive environment is ensured by the encapsulated measurement electronics inside the sensing probe and the long-term stable HCT01 sensor with E+E proprietary coating.

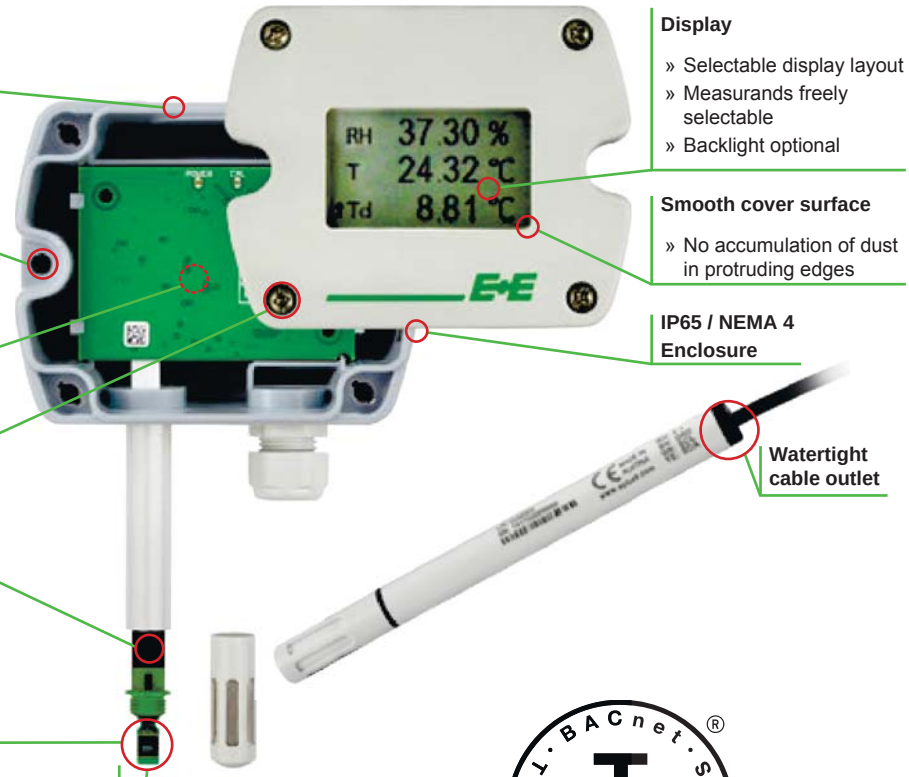
EE210 is available as wall or duct mounted version as well as with remote probe.The IP65 / NEMA 4 enclosure minimizes installation costs and provides outstanding protection against contamination and condensation.

With an optional configuration kit, the user can set the RS485 interface parameters, the output scaling and perform one or two point adjustment for RH and T.

Applications

- agriculture
- stables, incubators, hatchers
- green houses
- storage rooms, cooling chambers
- indoor pools
- demanding climate control

Features



Appropriate for US mounting requirements

» Knockout for ½" conduit fitting

External mounting holes

» Mounting with closed cover
» Electronics protected against construction site pollution
» Easy and fast mounting

Electronics on the underside of the PCB

» Optimum protection against mechanical damage during installation

Bayonet Screws

» Open/closed with a ¼ rotation

Cast Electronics

» Mechanical protection
» Condensation-resistant

E+E Humidity sensor HCT01

» Long-term stability
» Protected solder pads
» Tested according to automotive standard AEC-Q200

Protective sensor coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the HCT01 sensing element. The coating extends substantially the life-time and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). 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.

Display

» Selectable display layout
» Measurands freely selectable
» Backlight optional

Smooth cover surface

» No accumulation of dust in protruding edges

IP65 / NEMA 4 Enclosure

Watertight cable outlet

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Technical Data

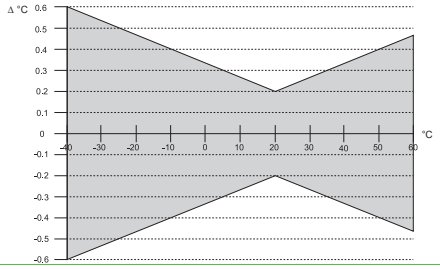
Measured Values

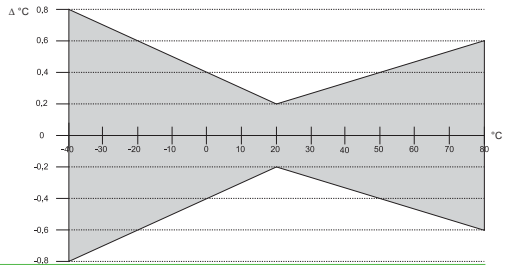
Relative Humidity (RH)

Sensor	E+E Sensor HCT01-00D	
Working range	0...100 % RH	
RH accuracy (incl. hysteresis, non-linearity and repeatability)		
Wall & duct version:		
-15...40 °C (5...104 °F)	≤90 % RH	±(1.3 + 0.003*measured value) % RH
-15...40 °C (5...104 °F)	>90 % RH	± 2.3 % RH
-40...60 °C (-40...140 °F)		±(1.5 + 0.015*measured value) % RH
Remote probe version		
at 20 °C (68 °F)		±2.5 % RH

Temperature (T)

Sensor	Pt1000 (tolerance class B, DIN EN 60751) integrated in HCT01	
T-accuracy	wall & duct	remote probe





Outputs

Analogue output	0-5 V / 0-10 V	-1 mA < I_L < 1 mA
	4-20 mA (2-wire)	R_L ≤ 500 Ohm
	0-20 mA (3-wire)	R_L ≤ 500 Ohm
Digital output	RS485 (BACnet MS/TP or Modbus RTU), max. 32 EE210 in one bus	

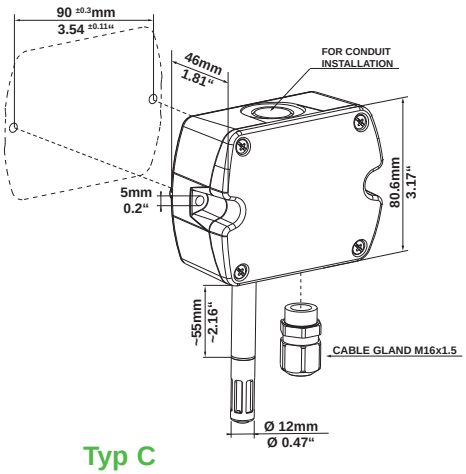
General

Power supply		
for 4-20 mA, 2-wire	10 V + R_L x 20 mA < V+ < 30 V DC	
for 0-20 mA, 3-wire for 0-5 V / 0-10 V / RS485	15-35 V DC[1)] or 24V AC ±20 %	
Current consumption at 24 V		
Voltage output	DC supply max. 12 mA; AC supply max. 34 mA_{rms};	with display max. 23 mA with display max. 49 mA_{rms}
Current output		
2-wire	DC supply max. 40 mA;	with display max. 40 mA
3-wire	DC supply typ. 33 mA; AC supply typ. 65 mA_{rms};	with display max. 44 mA with display max. 84 mA_{rms}
Digital interface	DC supply typ. 5 mA; AC supply typ. 15 mA_{rms};	with display max. 20 mA with display max. 35 mA_{rms}
Display	1, 2 or 3 lines, user configurable, optional with backlight	
Connection	Screw terminals, max. 1.5 mm^2	
Housing material	Polycarbonate, UL94V-0 (with Display UL94HB) approved	
Protection class	IP65 / NEMA 4	
Cable gland	M16 x 1.5	
Probe cable (type C)	PVC, Ø 4.3 mm, 4 x 0.25 mm^2, Length: 1.5 or 3 m (4.9 or 9.8 ft)	
Sensor protection	E+E Coating	
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial Environment	CE
Temperature ranges	Operating: -40...60 °C (-40...140 °F) (-40...80 °C for remote probe EE210P) Storage: -40...60 °C (-40...140 °F)	
Temperature ranges with display	Operating: -20...50 °C (-4...122 °F) (-40...80 °C for remote probe EE210P) Storage: -20...60 °C (-4...140 °F)	

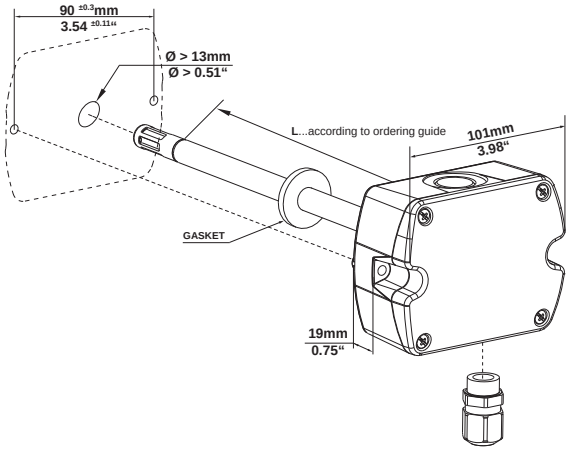
1 USA & Canada: class 2 supply required, max. supply voltage 30 V

Dimensions (mm/inch)

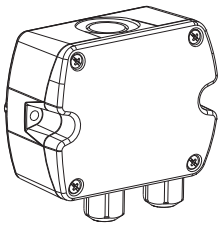
Typ A



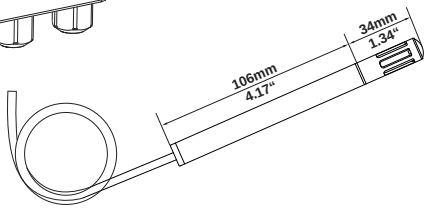
Typ B

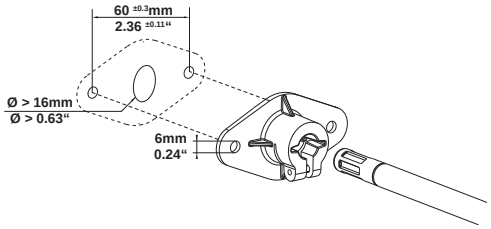


Typ C



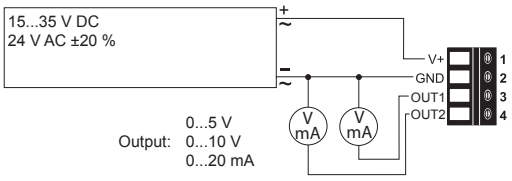
EE210P



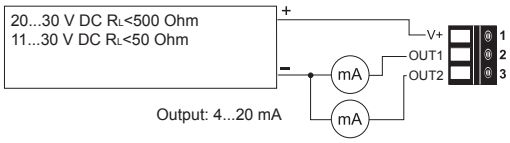


Connection Diagram

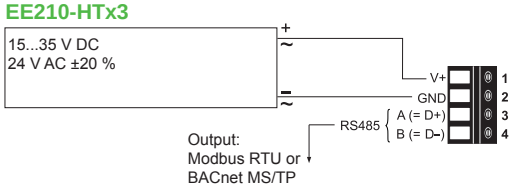
EE210-HT2/3/5



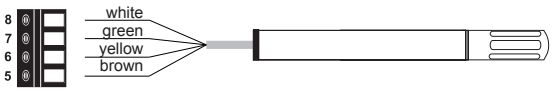
EE210-HT6



EE210-HTx3



EE210P remote probe (for HT6/HTx3)



Ordering Guide

MODEL		OUTPUT		TYPE		PROBE LENGTH[2]		DISPLAY[3]		FILTER (Type A and B)	
humidity + temperature	(HT)	0-5 V	(2x)	wall mount	(PA)	50 mm (1.97")	(B)	without backlight[4]	(D)	membrane	(B)
		0-10 V	(3x)	duct mount	(PB)	200 mm (7.87")	(F)	with backlight[5]	(E)	stainless steel sintered	(D)
		0-20 mA (3-wire)	(5x)	remote probe	(PC)[1]	Type A and C	(x)	none	(x)	for type C	(x)
		4-20 mA (2-wire)	(6x)								
		RS485	(x3)								
EE210-											

Analogue outputs (2x, 3x, 6x) setup

OUTPUT 1		SCALING 1[7]		OUTPUT 2		SCALING 2[7]		UNIT	
relative humidity[6]	(Uw)	-40...60	(002)	relative humidity[6]	(Uw)	-40...60	(002)	metric	(M)
temperature	(Tx)	-10...50	(003)	temperature	(Tx)	-10...50	(003)	non-metric	(N)
dew point temperature	(TD)	0...50	(004)	dew point temperature	(TD)	0...50	(004)		
frost point temperature	(TF)	0...100	(005)	frost point temperature	(TF)	0...100	(005)		
water vapour partial pressure[6]	(Ex)	32...122	(076)	water vapour partial pressure[6]	(Ex)	32...122	(076)		
mixing ratio[6]	(Rx)	-40...140	(083)	mixing ratio[6]	(Rx)	-40...140	(083)		
absolute humidity[6]	(DV)			absolute humidity[6]	(DV)				
specific enthalpy[6]	(Hx)			specific enthalpy[6]	(Hx)				

Digital output (x3) setup[8]

PROTOCOL		BAUDRATE		PARITY		STOPBITS		UNIT	
Modbus RTU[8]	(1)	9600	(A)	odd	(O)	1 stopbit	(1)	metric	(M)
BACnet MS/TP[9]	(3)	19200	(B)	even	(E)	2 stopbit	(2)	non-metric	(N)
		38400	(C)	no parity	(N)				
		57600[10]	(D)						
		76800[10]	(E)						
		115200[10]	(F)						

Remote probe for EE210 Type C:

MODEL		CABLE LENGTH		FILTER	
humidity + temperature	(HT)	1.5 m (4.9 ft)	(C)	membrane	(B)
		3 m (9.8 ft)	(E)	stainless steel sintered	(D)
EE210P-					

1) The EE210P probe has to be ordered as seperate position
2) Selectable probe lenght only for duct mount version available; see dimensions
3) **Factory setup:**
For analogue output versions the display shows the measurands selected for output 1 and output 2.
For digital output versions the display shows RH and T
4) Not with output 5x
5) Not with output 6x
6) Factory Scaling

relative humidity	0...100 % RH	
water vapour partial pressure	0...200 mbar	0...3 psi
mixing ratio	0...400 g/kg	0...2800 gr/lb
absolute humidity	0...150 g/m³	0...60 gr/ft³
specific enthalpy	0...400 kJ/kg	0...200 BTU/lb

7) For Tx, TD und TF; see data sheet „Scaling of the outputs" at www.epluse.com
8) Modbus Map and setup instructions:
See User Guide and Modbus Application Note at www.epluse.com/EE210
9) Product Implementation conformance Statement (PICS) availbale at www.epluse.com/EE210
10) Only for BACnet

Order Examples

Type A and B

EE210-HT3xPAxEB-UwTx005M

Model:	Humidity+Temperature
Output:	0-10 V
Type:	wall mount
Display:	with backlight
Filter:	membrane
Output scaling 1:	relative humidity
Scaling 1:	0...100 % RH
Output scaling 2:	temperature
Scaling 2:	0...100 °C
Unit:	metric

Type C

Position 1:

EE210-HT6xPCxxx-UwTx005M

Model:	Humidity+Temperature Basic Device
Output:	4-20 mA
Type:	remote probe (Pos. 2)
Display:	none
Output scaling 1:	relative humidity
Scaling 1:	0...100 % RH
Output scaling 2:	temperature
Scaling 2:	0...100 °C
Unit:	metric

Position 2:

EE210P-HTCB

Model:	Humidity+Temperature Probe
Cable length:	1.5 m
Filter:	membrane

Scope of supply

EE210	Wall mount (Type A)	Duct mount (Type B)	Remote version (Type C)*	EE210-P Remote probe* for Type C	Additionally for models with RS485 interface
EE210 according ordering guide	✓	✓	✓	✓	
Cable gland	✓	✓	✓ (2 pcs.)		✓
Mounting kit	✓	✓	✓		
Mounting flange		✓		✓	
Inspection certificate according to DIN EN10204 - 3.1	✓	✓	✓	✓	
Quick Guide - EE210 RS485 Setup					✓

** EE210-P is not included in the Scope of Supply of the EE210 Type C*

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/EE210)
Power supply adapter	V03 (see data sheet Accessories)
Protection cap for 12 mm probe	HA010783

EE211

Humidity and Temperature Transmitter for Continuous High Humidity

The EE211 is dedicated for accurate and long term stable measurement under continuous high humidity (>85 % RH) and condensing conditions in demanding climate control. It features a heated humidity probe and an interchangeable temperature probe.

Excellent performance of EE211 even in polluted, aggressive environment is ensured by the combination of completely encapsulated measurement electronics inside the humidity probe and the long-term stable HCT01 sensor with E+E proprietary coating.

The EE211 enclosure is rated IP65/NEMA 4, minimizes installation costs and provides outstanding protection against pollution and condensation. All measured and calculated values are available on the Modbus RTU interface whereas two of the values are available on the analogue voltage or current (3-wire) output. Additionally up to three values can be shown simultaneously on the optional illuminated display.

With the optional product configuration adapter EE-PCA the user can set the Modbus RTU interface parameters, the display format, the measured parameters and the output scaling. Furthermore, the user can perform an one or two point RH and T adjustment. The T probe can also be adjusted separate; for the metal version of the T probe the reference can be a high accuracy dry block calibrator.

Features

Opening appropriate for 1/2" US conduit fitting

External mounting holes

- Mounting with closed cover
- Electronics protected against construction site pollution
- Easy and fast mounting

Electronics on the bottom of the PCB

- Optimum protection against mechanical damage during installation

Cast Electronics

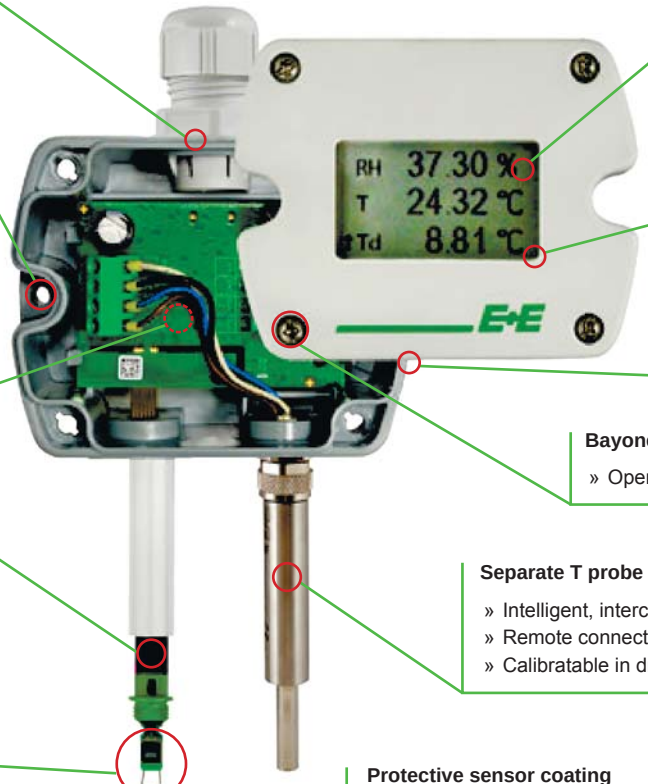
- Mechanical protection
- Condensation-resistant

Heated sensing head

- Best performance and long term stability under continious high RH and condensing conditions

E+E Humidity sensor HCT01

- Protected solder pads
- Tested according to automotive standard AEC-Q200



Display

- Shows up to 3 measurands
- Backlight

Smooth cover surface

- No accumulation of dust in protruding edges

IP65 / NEMA 4 Enclosure

Bayonet Screws

- Open/closed with a ¼ rotation

Separate T probe

- Intelligent, interchangeable T probe
- Remote connection possible
- Calibratable in dry block

Protective sensor coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the HCT01 sensing element. 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.

Applications

- Fruit and vegetable storage
- Cooling, ripening and environmental chambers
- Green houses and incubators
- Mushroom industry

Operation principle

The humidity probe is continuously heated for avoiding condensation and high humidity side effects on the sensing elements, which leads to outstanding long term stability.
Based on the measured values humidity and temperature, the EE211 calculates the dew point temperature Td whereas the separate, interchangeable T-probe measures the ambient temperature. Ultimately, out of Td and T, the device calculates the relative humidity RH as well as several other parameters like absolute humidity, mixing ratio, wet bulb temperature or enthalpy.

Outstanding long term stability under high humidity conditions

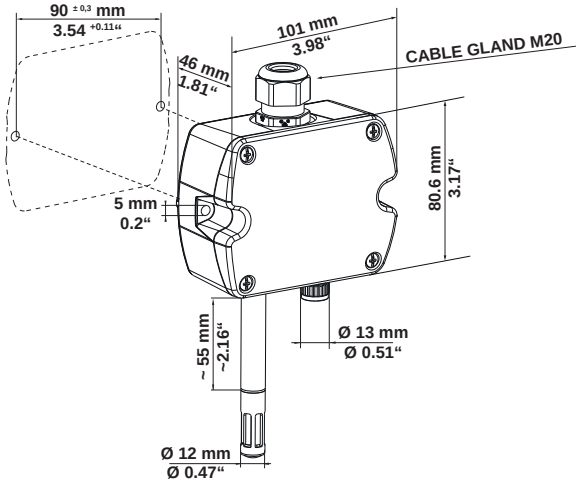
The operation principle of EE211 copes with the causes for poor long-term stability of non-heated sensors at continuously high humidity. The constant over-temperature of the EE211 sensing head (approx. 5 °C = 9 °F) means max. 76 % RH humidity at the sensors and enables following benefits:

- The sensing head of EE211 stays dry even under condensing conditions, which prevents dust and dirt from sticking to the sensor and leads to **outstanding long-term stability**.
- The combination of dry sensing head, E+E proprietary coating of the sensing element and sealed solder pads **minimize the impact of corrosive agents**.
- Maximum humidity of 76 % RH at the sensor **eliminates the drift caused by exposure to continuous high humidity**.

Important:
The humidity related parameters correspond to the location of the T probe. Consequently, the T probe shall be positioned at the place of main interest for RH measurement. In an environmental chamber for instance, the EE211 basic device can be fixed conveniently on the inside wall, while the T probe can be placed in the middle of the chamber using the optional probe cable.

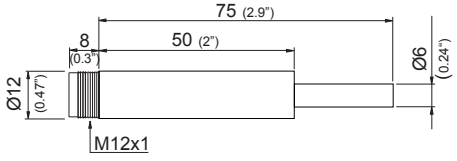
Dimensions (mm/inch)

Basic Device:

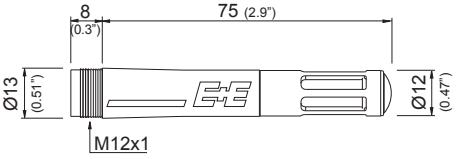


Temperature Probe:

Metal Housing EE07-MT

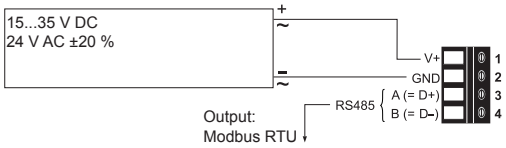


Polycarbonate Housing EE07-PT6

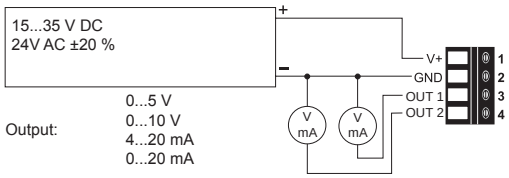


Connection Diagram

EE211-M1J3



EE211-M1A2/3/5/6



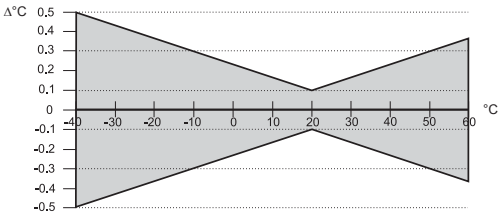
Technical Data

Relative Humidity (RH)

Sensor	E+E Sensor HCT01-00D
Working range	0...100 % RH
RH accuracy (incl. hysteresis, non-linearity and repeatability)	
-5...30 °C (23...86 °F)	±(1.3 + 0.007*measured value) % RH

Temperature (T)

Sensor	Pt1000 (tolerance class A, DIN EN 60751)
T-accuracy (at 20 °C (68 °F) : ±0,1 °C)	



Outputs

Analogue output	0-5 V / 0-10 V	-1 mA < I_L < 1 mA
(RH: 0...100 %; T: see ordering guide)	0-20 mA / 4-20 mA (3-wire)	R_L ≤ 500 Ohm
Digital output	RS485, Modbus RTU, max. 32 EE211 in one bus	

General

Power supply (Class III)	15 - 35 V DC[1] or 24 V AC ±20 %	
Current consumption at 24 V		
Voltage output	DC supply max. 13 mA	with display max. 19 mA
	AC supply max. 38 mA_{rms}	with display max. 49 mA_{rms}
Current output	DC supply max. 34 mA	with display max. 40 mA
	AC supply typ. 75 mA_{rms}	with display typ. 85 mA_{rms}
Digital interface	DC supply typ. 8 mA	with display typ. 17 mA
	AC supply typ. 23 mA_{rms}	with display typ. 40 mA_{rms}
Display	1, 2 or 3 lines, user configurable, with backlight	
Connection	Screw terminals, max. 1.5 mm^2	
Housing material	Polycarbonate, UL94V-0 (with Display UL94HB) approved	
Protection class	IP65 / NEMA 4	
Cable gland	M20 x 1.5	
Sensor protection	E+E coating	
Electromagnetic compatibility	EN61326-1 EN61326-2-3, Industrial Environment	CE
Temperature ranges	Operating / Storage: -40...60 °C (-40...140 °F)	
Temperature ranges with display	Operating: -20...50 °C (-4...122 °F)	
	Storage: -20...60 °C (-4...140 °F)	

1) USA & Canada: class 2 supply required, max. supply voltage 30V

Ordering Guide

EE211 consists of two items to be orders separately: the EE211 basic unit and EE07-xT temperature probe. A third item (T probe extension cable) is optional.

Position 1: EE211 Basic Device

				EE211
Hardware	**Model**	humidity + temperature		**M1**
	Output	0-5 V		**A2**
		0-10 V		**A3**
		0-20 mA		**A5**
		4-20 mA		**A6**
		RS485		**J3**
	Display[1]	none		**no code**
		with backlight		**D2**
Setup - Analogue outputs (not for output J3)	**Output 1**	relative humidity RH	%	**no code**
		other measurand	(**xx** see Measurand Code below)	**MA*xx***
	Scaling 1 low[2]	0		**no code**
		value		**SAL*value***
	Scaling 1 high[2]	100		**no code**
		value		**SAH*value***
	Output 2	temperature	°C	**no code**
		temperature	°F	**MB2**
		other measurand	(**xx** see Measurand Code below)	**MB*xx***
	Scaling 2 low	-40		**no code**
		value		**SBL*value***
	Scaling 2 low	60		**no code**
		value		**SBH*value***
Setup - Modbus RTU (only for output J3)	**Baudrate**	9600		**no code**
		19200		**BD6**
		38400		**BD7**
	Parity	odd		**no code**
		no parity		**PY0**
		even		**PY2**
	Stopbit	1 stopbit		**no code**
		2 stopbit		**BT2**
	Unit	metric-SI		**no code**
		non-metric		**U2**

Measurand Code

		xx
dew point Td	°C	**52**
	°F	**53**
mixing ratio r	g/kg	**60**
	gr/lb	**61**
absolute humidity dv	g/m³	**56**
	gr/ft³	**57**

		xx
wet bulb temperature Tw	°C	**54**
	°F	**55**
water vapour partial pressure e	mbar	**50**
	psi	**51**
enthalpy h	kJ/kg	**62**
	BTU/lb/kg	**64**

Position 2: EE07-xT Temperature Probe

TYPE	
Polycarbonate - with metal grid filter	**EE07-PT6**
Metal	**EE07-MT**

Position 3 (optional): Cable for EE07, M12x1 socket, M12x1 plug

CABLE LENGTH	
2 m (6.6 ft)	**HA010801**
5 m (16.4 ft)	**HA010802**
10 m (´32.8 ft)	**HA010803**

1) **Factory setup:**
For analogue output versions the display shows the measurands selected for output 1 and output 2. For digital output versions the display shows RH and T
2) Modbus Map and setup instructions: See User Guide and Modbus Application Note at www.epluse.com/EE211

Order Examples

Position 1: EE211-M1A6MB60SBL100SBH300

Model:	Humidity+Temperature
Output:	4-20 mA
Display:	none
Output scaling 1:	relative humidity RH (%)
Scaling 1 low:	0
Scaling 1 high:	100
Output scaling 2:	mixing ratio r (g/kg)
Scaling 2 low:	100
Scaling 2 high:	300

Position 2: EE07-MT

Type:	Metal

Position 3: HA010802

Type:	5 m (16.4 ft)

Position 1: EE211-M1J3D2BD6U2

Model:	Humidity+Temperature
Output:	RS485
Display:	with backlight
Baudrate:	19200
Parity:	odd
Stopbits:	1 stopbit
Unit:	non-metric

Position 2: EE07-PT6

Type:	Polycarbonate - with metal grid filter

Accessories

- Product configuration adapter	see data sheet EE-PCA
- Product configuration software	EE-PCS (free download: www.epluse.com)
- Power supply adapter	V03 (see data sheet Accessories)
- Protection cap for 12 mm probe	HA010783
- Metal grid filter cap	(HA010106) (see data sheet Accessories)

Scope of supply

EE211 Basic Device

- EE211 according ordering guide
- Cable gland M20 x 1.5
- Mounting materials
- Test report according according to DIN EN10204 - 3.1
- User Guide

EE07 Temperature Probe

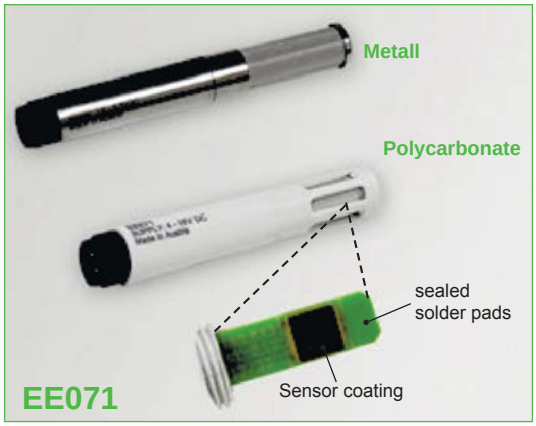
- EE07 according ordering guide
- Test report according according to DIN EN10204 - 3.1

Cable for EE07 (optional)

EE071

Humidity and Temperature Probe with Modbus Interface

EE071 is optimized for use in demanding OEM applications.
In addition to the precise measurement of humidity (RH) and temperature (T), the EE071 calculates physical quantities such as dew point temperature, mixing ratio and absolute humidity. All measured and calculated values are available on the RS-485 interface with Modbus RTU protocol.
The RH and T sensor HCT01 is perfectly protected against dust and dirt by the E+E proprietary coating. Furthermore, all solder pads are sealed against corrosion. With the appropriate filter cap the EE071 offers outstanding long term stability even in harsh environment. The compact design with M12 connector allows for easy installation and fast replacement of the probe.
With the optional Modbus configuration adapter the user can perform RH and T adjustment and set the Modbus parameters.



Typical Applications

process and climate technology
agriculture, stables
incubators, hatchers
outdoor measurement
storage rooms, cooling chambers

Key Features

highest accuracy
excellent protection against pollution
outstanding long term stability
temperature compensation
low power consumption
calculated physical quantities

Technical Data

Measured values

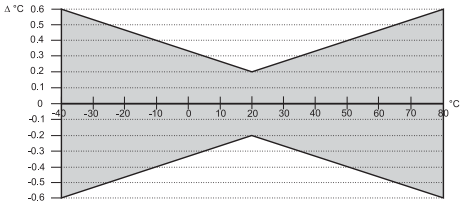
Relative Humidity

Sensor element	HCT01-00D
Modbus output range	0.00...100.00 % RH
Accuracy incl. hysteresis and nonlinearity	±2 % RH (0...90 % RH) ±3 % RH (90...100 % RH)
Temperature dependence	< (0.025 + 0.0003 x RH) [% RH/°C]

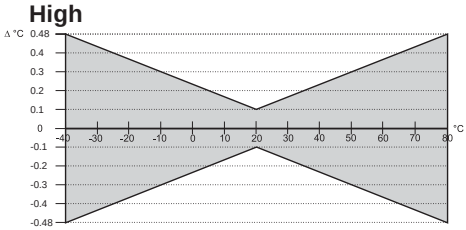
Temperature

Sensor	Pt1000
Modbus output range	-40.00...+80.00 °C (-40...176 °F)
Accuracy:	

Standard



High



General

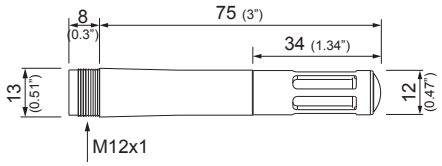
Supply voltage [1) 2)]	4 - 28 V DC	
Current consumption	typ. 0.4 mA at a measuring rate of 1 sec.	
Current pulse during power-up (with serial resistance 100 Ohm)	at UB 7 V: I_{max} 60 mA; current draw drops below 10 mA within 350 µs at UB 12 V: I_{max} 110 mA; current draw drops below 10 mA within 400 µs	
Warmup Time after Power-Up	max. 800ms	
Interface / Bus	RS485 / Modbus in slavemode	
Housing /	polycarbonate or stainless steel / IP65	
Electromagnetic compatibility [3)]	EN613226-1	EN61326-2-3
	FCC Part 15 Class B	ICES-003 Issue 5 ClassB
Working and storage temperature	-40...80°C (-40...176°F)	
Max. cable length	100m (328.1ft)	

CE

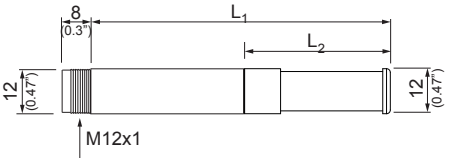
1) For bus operation with terminal resistor (120Ω) min. UB: 4,5V DC
2) No terminal, pull-up or pull-down resistor integrated in the probe
3) EE071 is not protected against voltage spikes (surge)

Dimensions in mm (inch)

polycarbonate housing - EE071-HTPx



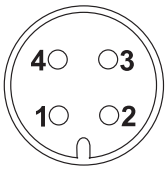
metal housing - EE071-HTMx



Filter	L_1	L_2
Stainless steel grid	79.5 mm (3.13")	38.5 mm (1.52")
H_2O_2	73.5 mm (2.89")	33 mm (1.3")

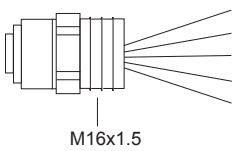
Connection Diagram

EE071:



1...+UB
2...B-RS485 (= Data-)
3...A-RS485 (= Data+)
4...GND

M12x1 flange (HA010705, Accessories)



brown...+UB
white.....B-RS485 (= Data-)
blue.....A-RS485 (= Data+)
black....GND
grey.....shielding

Modbus Map

The measured values are saved as a 32Bit *float* value from 0x19 to 0x25 and as 16Bit *signed integer* between 0x27 and 0x2D.
The factory setting for the Slave-ID is 247 as an *integer* 16Bit value. This ID can be customised in the register 0x00 (value margin 1 - 247 permitted).
The serial number as ASCII-code is located at register address 30001-30008.

FLOAT (read register):

Register address	*Protocol address*	*Parameter name*	
30026	0x19	Temperature	[°C]
30028	0x1B	Temperature	[°F]
30030	0x1D	Rel Humidity	[%]
30032	0x1F	Abs Humidity	[g/m³]
30034	0x21	Dew Point	[°C]
30036	0x23	Dew Point	[°F]
30038	0x25	Mixing ratio	[g/kg]

INTEGER (read register):[1)]

Register address	*Protocol address*	*Parameter name*	
30040	0x27	Temperature	[°C]
30041	0x28	Temperature	[°F]
30042	0x29	Rel Humidity	[%]
30043	0x2A	Abs Humidity	[g/m³]
30044	0x2B	Dew Point	[°C]
30045	0x2C	Dew Point	[°F]
30046	0x2D	Mixing ratio	[g/kg]

INTEGER (write register):

Register address	*Protocol address*	*Parameter name*
60001	0x00	Slave-ID

FLOAT (read & write register):

Register address	*Protocol address*	*Parameter name*
5001[2)]	0x1388	Air pressure[3)]

1) Values are stored with a scaling of 1:100 (e.g.: 2550 is equivalent to 25.5°C)
2) Read function code: 0x03 Write function code: 0x10
3) Ambient pressure in mbar, with 2 decimal digits (e.g. 1008.25)

For Modbus protocol setting please see Application Note (www.epluse.com/EE071).

Radiation shield

For outdoor applications EE071 must be used with the optional radiation shield HA010502, which protects the device against rain, snow, ice and solar radiation.


EE071 with radiation shield HA010502

E+E Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the HCT01 sensing element. 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.

Ordering Guide

MODEL	HOUSING	FILTER	T-ACCURACY [2]	BAUD RATE[3]	PARITY[3]	STOPBITS[3]
Humidity and Temperature (HT)	polycarbonate (P)	membrane (B)	Standard (x)	9600 (A)	odd (O)	1 stopbit (1)
	metal[1] (M)	metal grid (C)	High (C)	19200 (B)	even (E)	2 stopbits (2)
		PTFE (E)		38400 (C)	no parity (N)	
		H_2O_2[1] (L)				
		stainless steel grid[1] (I)				
EE071-						

1) The metal housing (M) is only available with stainless steel grid filter and with H_2O_2 filter (L). The stainless steel grid filter is only available with metal housing (M).
2) According to graphs in „Technical Data"
3) Factory setup: Baud rate: 9600 (A) / Parity: even (E) / Stopbit: 1 (1)

Order Example

EE071-HTPBCAE1

Model:	humidity & temperature
Housing:	polycarbonate
Filter:	membrane filter
T-Accuracy:	High
Configuration:	baud rate 9600, even parity, 1 stopbit

Scope of Supply

- EE071 probe according to ordering guide
- Inspection certificate according to DIN EN10204 - 3.1

Accessories (See data sheet "Accessories")

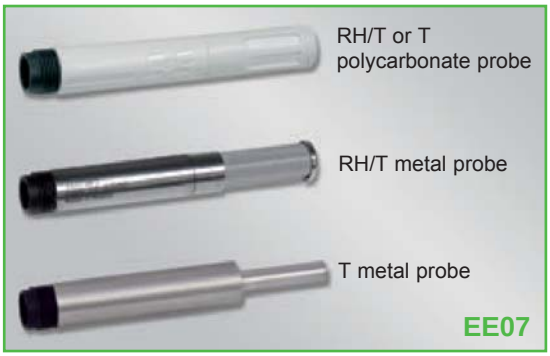
- M12x1 flange coupling with 50mm (2") flying leads	HA010705
- Cable connector for customer assembly M12x1	HA010707
- Filter caps	HA0101xx
- Connecting cable M12 - flying leads (1,5 m (59.1") / 5 m (196.9") / 10 m (393.7"))	HA0108**19/20/21**
- Connecting cable M12 - M12 (2 m (78.7") / 5 m (196.9") / 10 m (393.7"))	HA0108**16/17/18**
- T-coupler M12 - M12	HA030204
- Modbus configuration adapter	HA011012
- Radiation shield with cable gland (M20x1.5)	HA010502
- Protection cap for 12 mm (0.47") probe	HA010783
- Protection cap for M12 connecting cable female	HA010781
- Protection cap for M12 probe connector male	HA010782
- Plastic mounting flange 12 mm (0.47")	HA010202
- Stainless steel mounting flange 12 mm (0.47")	HA010201
- Duct mounting kit	HA010209
- Wall mounting clip Ø 12 mm (0.47")	HA010211
- E+E Product Configuration Software (free download at www.epluse.com/configurator)	EE-PCS

EE07

Interchangeable Humidity / Temperature Probes with Digital Output

EE07 is ideal for demanding climate control and OEM applications and features the well-proven E+E HC105 humidity (RH) sensor. It is available in polycarbonate or metal enclosure, as well as for temperature (T) measurement only.

The wide T working range, the T compensation and the choice of filter caps make EE07 appropriate for both indoor and outdoor use. Due to the excellent RH and T accuracy, the probe can be employed with the optional radiation shield even in meteorology. The E+E proprietary coating protects the humidity sensor against corrosion and dirt, which leads to best long term stability even in harsh environment.



The measured values are available on the serial E2 interface. The M12 connector allows for EE07 replacement within seconds. The user can perform the RH and T adjustment of the probe with the optional configuration kit.

Typical Applications

Demanding climate control
Outdoor and meteorology
OEM applications

Features

Outstanding RH and T Accuracy
Excellent long term stability
Digital output
Pluggable and interchangeable

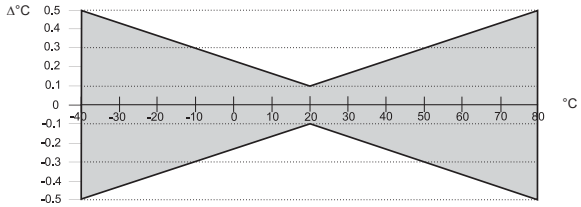
Technical Data

Measured values

Relative Humidity

Sensor element	E+E HC105
Digital output (2 wire E2 interface)[1]	output value: 0.00...100.00 % RH
Working range	0...100 % RH
Accuracy incl. hysteresis and nonlinearity	±2 % RH (0...90 % RH) ±3 % RH (90...100 % RH) Traceable to intern. standards, administrated by NIST, PTB, BEV...
Temperature dependence	< (0.025 + 0.0003 x RH) [$\frac{\%\,RH}{°C}$]

Temperature

Sensor element	Pt1000 (tolerance class A, DIN EN 60751)
Digital output (2 wire)[1]	output value: -40.00...+80.00 °C (-40...176 °F)
Accuracy (at 20 °C (68 °F): ±0.1 °C (±0.18 °F)	

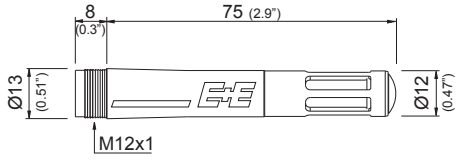
General

Supply voltage (Class III)	3.8 V DC - 5.5 V DC
Current consumption	< 1.5 mA
Voltage digital interface	max. 3.5 V
Housing	polycarbonate or stainless steel / IP65
Electromagnetic compatibility[2]	EN 61326-1 EN 61326-2-3
Temperature range	working temperature: -40...80 °C (-40...176 °F) storage temperature: -40...60 °C (-40...140 °F)
Max. cable length[3]	30 m (98.4 ft)

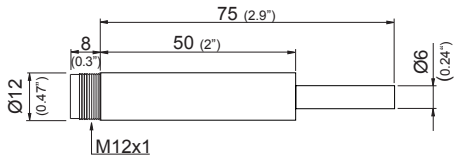
1) For details see support literature at www.epluse.com/EE07
2) No protection against surge
3) Depends on the bus frequency

Dimensions (mm/inch)

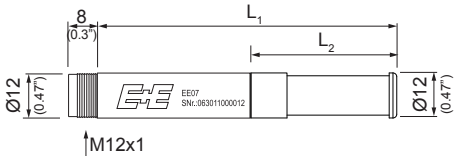
EE07-PFTx, EE07-PT1



EE07-MT



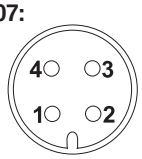
EE07-MFTx



Filter	L_1	L_2
Stainless steel grid	79.5 mm (3.13")	38.5 mm (1.52")
H_2O_2	73.5 mm (2.89")	33 mm (1.3")

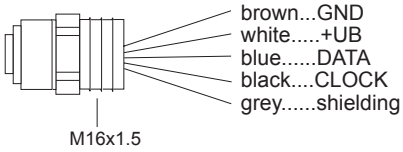
Connection Diagram

EE07:



1...GND
2...+UB
3...DATA
4...CLOCK

M12x1 flange coupling with 50 mm (2") flying leads (HA010705):



E+E Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the sensing elements. The coating extends substantially the lifetime and the measurement performance of EE07 in **corrosive environment**. Additionally, it improves relevantly the long term stability in **dusty, dirty or oily applications** by preventing stray impedances caused by deposits on the active sensor surface.

Ordering Guide

Humidity & Temperature Probes:

HOUSING		MODEL		FILTER		COATING	
metal[1]	(M)	humidity and temperature	(FT)	membrane	(1)	without	(no code)
polycarbonate	(P)			PTFE	(5)	with	(HC01)
				metal grid	(6)		
				H_2O_2[1]	(8)		
				stainless steel grid[1]	(9)		
EE07-							

1) The metal housing (M) is only available with stainless steel grid filter (9) and with H_2O_2 filter (8). The stainless steel grid filter (9) is only available with metal housing (M).

Temperature Probes:

HOUSING		MODEL		FILTER (ONLY FOR HOUSING P)	
metal	(M)	temperature	(T)	membrane	(1)
polycarbonate	(P)				
EE07-					

Order Example

EE07-PFT6
Housing: Polycarbonate
Model: Humidity and temperature
Filter: Metal grid
Coating: without

EE07-MT
Housing: Metal
Model: Temperature

Scope of Supply

- EE07 probe according to ordering guide
- Inspection certificate according to DIN EN10204 - 3.1

Accessories (See data sheet “Accessories”)

- M12x1 flange coupling with 50 mm (2“) flying leads	HA010705
- Connecting cable M12x1 - flying leads (1.5 m (59.1“) / 5 m (196.9“) / 10 m (393.7“))	HA0108**19**/**20**/**21**
- Filter caps	HA0101xx
- Radiation shield with cable gland (M20x1.5)	HA010502
- Configuration adapter	see data sheet EE-PCA

EE160

Humidity and Temperature Transmitter for HVAC Applications

Specially designed for HVAC, the EE160 sensor by E+E Elektronik is a costeffective, highly accurate and reliable solution for measuring relative air humidity and temperature. The enclosure minimizes installation costs and provides outstanding protection against contamination and condensation, thus ensuring flawless operation.

The EE160 employs the new humidity/temperature E+E sensor element HCT01 with excellent long term stability and resistance against pollutants. In combination with a long calibration experience, the EE160 provides a measurement accuracy of ±2.5 % RH and is available for wall or duct-mounted with current, voltage BACnet MS/TP or Modbus RTU output.

A configurator makes it possible to freely select the scaling of the temperature output and configure the RS485 parameters. The configurator software, which is free of charge, allows additionally for an on-site adjustment of the humidity and temperature.

Features

Appropriate for US mounting requirements
» Knockout for ½" conduit fitting

External mounting holes
» Mounting with closed cover
» Electronics protected against construction site pollution
» Easy and fast mounting

Electronics on the underside of the PCB
» Optimum protection against mechanical damage during installation

Cast Electronics
» Mechanical protection
» Condensation-resistant

E+E Humidity sensor HCT01
» Long-term stability
» Protected RH sensor surface
» Protected solder pads
» Tested according to automotive standard AEC-Q200

Protective sensor coating

The E+E proprietary sensor coating is a protective layer applied to the active surface of the HCT01 sensing element. The coating extends substantially the life-time and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). 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.

IP65 / NEMA 4 Enclosure

Bayonet Screws
» Open/closed with a ¼ rotation

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Technical data

Measured values

Relative Humidity

Sensor	E+E Sensor HCT01-00D
Working range	10...95 % RH
Accuracy at 20°C	±2.5 % RH
Temperature dependency	typ. ±0.03 % RH/°C

Temperature

Sensor	Pt1000 (tolerance class B, DIN EN 60751)
T-Accuracy at 20°C	±0.3 °C

Outputs

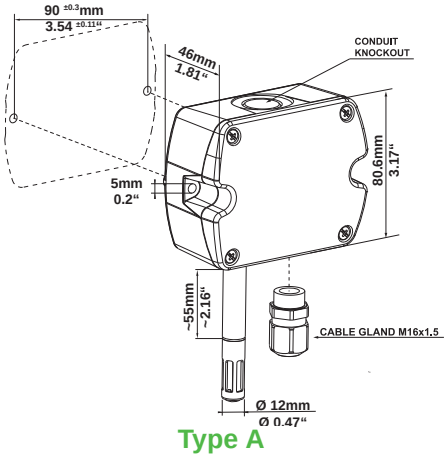
Analogue output	0-10 V	-1 mA < I_L < 1 mA or
(RH: 0...100%; T: see ordering guide)	4-20 mA (two-wire)	R_L < 500 Ohm
Digital output	RS485 (BACnet MS/TP or Modbus RTU) max. 32 EE160 in one bus	
Passive T-sensor		
4-wire	see ordering guide	

General

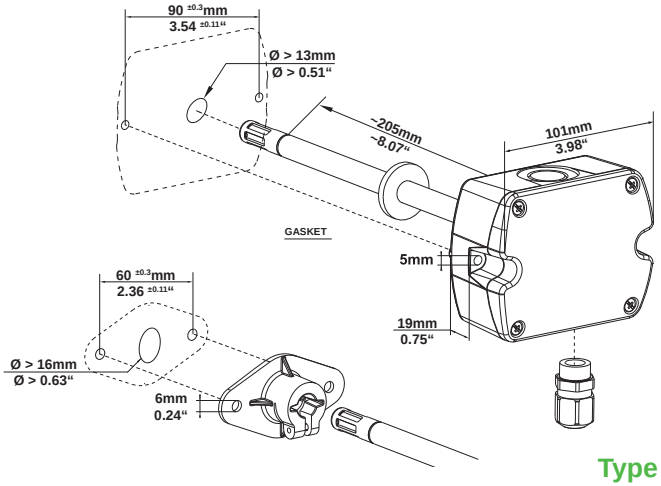
Power supply	
for 0 - 10 V / RS485	15 - 35V DC or 24V AC ±20 %
for 4 - 20 mA	10V + R_L x 20 mA < U_v < 35V DC
Current consumption	
Analogue	with DC power supplytyp. 5 mA
	with AC power supplytyp. 13 mA_{eff}
Digital	with DC power supplytyp. 15 mA
	with AC power supplytyp. 25 mA_{eff}
Connection	Screw terminals, max. 1.5 mm^2
Housing material	Polycarbonate, UL94V-0 approved
Protection class	IP65 / NEMA 4
Cable gland	M16 x 1.5
Sensor protection	membrane filter
Electromagnetic compatibility	EN61326-1
	EN61326-2-3
Temperature ranges	Operating temperature: -40...60 °C (-40...140 °F)
	Storage temperature: -20...60 °C (-4...140 °F)

CE

Dimensions (mm)

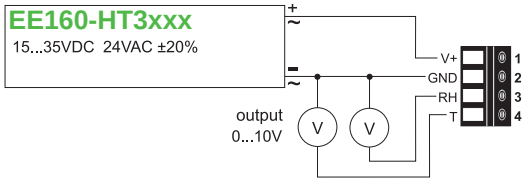


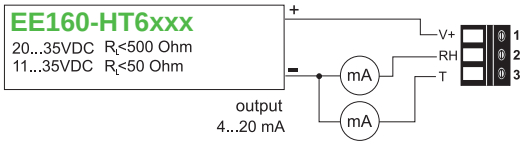
Type A

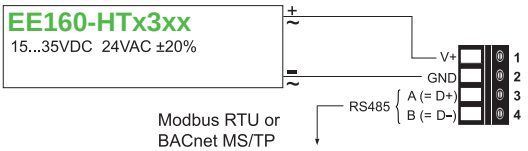


Type B

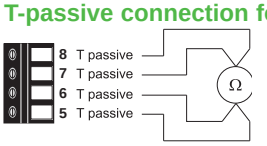
Connection diagram







T-passive connection for HT3xxx/HT6xxx



Ordering Guide

Hardware configuration

MODEL		OUTPUT		PASSIVE T-SENSOR[1]		TYPE		FILTER	
humidity + temperature	(HT)	0-10 V	(3x)	Pt 100 DIN A	(A)	wall mount	(PA)	membrane filter	(B)
		4-20 mA	(6x)	Pt 1000 DIN A	(C)	duct mount	(PB)		
		RS485	(x3)	NTC 10k	(E)				
				Ni1000, TK6180	(J)				
				none	(x)				
EE160-									

Analogue outputs setup

OUTPUT SCALING		SCALING[2]				UNIT	
temperature	(Tx)	°C		°F		metric	(M)
		-20...80	(024)	32...122	(076)	non-metric	(N)
		-40...60	(002)	-40...140	(083)		
		-10...50	(003)	0...140	(085)		
		0...50	(004)	20...120	(015)		

Digital output setup

PROTOCOL		BAUDRATE		PARITY		STOPBITS		UNIT	
Modbus RTU[3]	(1)	9600	(A)	odd	(O)	1 stopbit	(1)	metric	(M)
BACnet MS/TP[4]	(3)	19200	(B)	even	(E)	2 stopbit	(2)	non-metric	(N)
		38400	(C)	no parity	(N)				
		57600[5]	(D)						
		76800[5]	(E)						
		115200[5]	(F)						

1) Only with output 3x, 6x / T-Sensor details see www.epluse.com/R-T_Characteristics
2) Other scaling upon request
3) Modbus Map and setup instructions: See User Guide and Modbus Application Note at www.epluse.com/EE160
4) Product Implementation conformance Statement (PICS) availbale at www.epluse.com/EE160
5) Only for BACnet

Order example

Analogue output

EE160-HT6xAPAB-Tx003M

Model:	humidity + temperature transmitter
Output:	4-20 mA
Passive T-Sensor:	Pt 100 DIN A
Type:	wall mount
Filter:	membrane filter
Output scaling:	temperature
Scaling:	-10...50 °C
Unit:	metric

Digital output

EE160-HTx3xPBB-1AE1N

Model:	humidity + temperature transmitter
Output:	RS485
Type:	duct mount
Filter:	membrane filter
Protocol:	Modbus
Baudrate:	9600
Parity:	even
Stopbits:	1
Unit:	non-metric

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/EE160)
Power supply adapter	V03 (see data sheet Accessories)
Protection cap for 12 mm probe	HA010783

Scope of supply

Model	EE160 Wall mount (Type A)	EE160 Duct mount (Type B)	Additionally for all EE160 with RS485 interface
EE160 Transmitter according ordering guide	✓	✓	
Cable gland	✓	✓	✓
Mounting kit	✓	✓	
Mounting flange		✓	
Inspection certificate according to DIN EN10204 - 3.1	✓	✓	
Quick Guide - EE160 RS485 Setup			✓

EE150

Humidity and Temperature Transmitter for HVAC Applications

The EE150 is a compact, accurate and reliable transmitter for HVAC applications, available with analog current or voltage outputs for relative humidity (RH) and temperature (T), as well as an optional passive T-Sensor output. It employs an E+E capacitive humidity sensor element with excellent long term stability and resistance against pollutants.
The compact IP65/NEMA 4 enclosure and the Ø 6 mm stainless steel probe minimize installation costs, while the PTFE filter cap provides outstanding protection against contamination. External mounting holes allow installation with closed cover, the electronics are protected against construction site pollution.
With an optional configuration kit and free software the user can set the output scaling and perform one or two point adjustment for humidity and temperature.

Typical Applications

Heating, ventilation, air conditioning
Building management

Features

IP65/NEMA 4 compact enclosure
Ø 6 mm stainless steel probe
Free scaleable outputs
Resistance against pollutants
Free configuration software

Technical data

Measured values

Relative Humidity		
Working range	10...90 % RH	
Accuracy at 20 °C	±3 % RH (30...70 % RH), otherwise ±5 % RH	
Temperature dependency	typ. ±0.05 % RH/°C	
Temperature		
Working range	-5...55 °C (23...131 °F)	
T-Accuracy at 20 °C	±0.3 °C	

Outputs

Analog output	0-10 V	R_L ≥ 10 kOhm
(0...100 % RH; T: see ordering guide)	4-20 mA (two-wire)	R_L ≤ 500 Ohm
Passive T-sensor		
2-wire	see ordering guide	
Wires resistance (terminal - sensor)	typ. 0.5 Ohm	

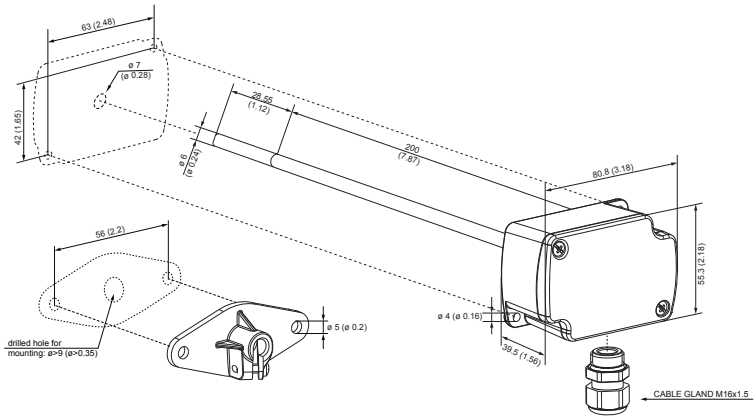
General

Power supply (Class III) ⧫		
for 0 - 10 V	15 - 35 V DC or 24 V AC ±20 %	
for 4 - 20 mA	10 V + R_L x 20 mA < U_V < 35 V DC	
Current consumption	with DC power supply	typ. 5 mA
	with AC power supply	typ. 13 mA_{eff}
Connection	Screw terminals, max. 1.5 mm^2	
Housing material	Polycarbonate, UL94V-0 approved	
Protection class	IP65 / NEMA 4	
Cable gland	M16 x 1.5 / UL94-V2	
Sensor protection	PTFE filter, non-removable	
Electromagnetic compatibility	EN61326-1 EN61326-2-3	Industrial environment
	FCC Part 15 Class B	ICES-003 Issue 5 Class B
Working conditions	-5...55 °C (23...131 °F)	0...95 % RH (non-condensing)
Storage conditions	-25...60 °C (-13...140 °F)	20...80% RH

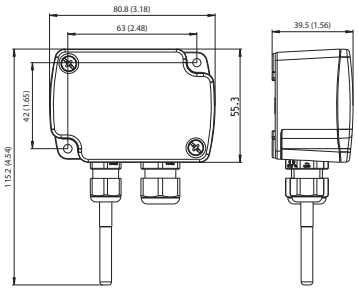
CE

Dimensions (mm/inch)

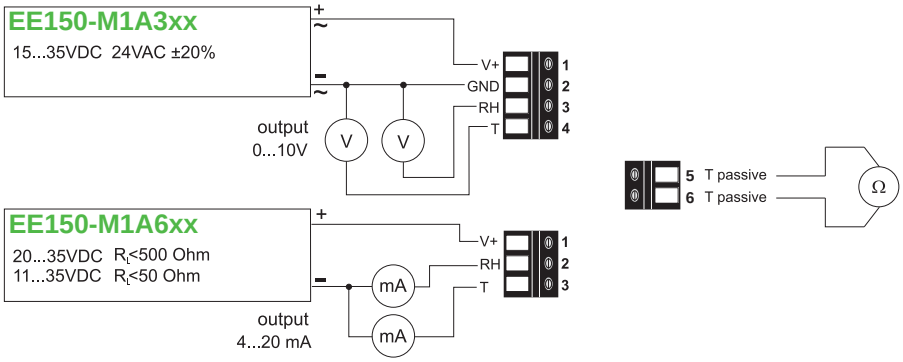
Duct mount



Wall mount



Connection diagram



Ordering Guide

		EE150-
Model	Humidity + Temperature	**M1**
Output RH / T	0-10 V	**A3**
	4-20 mA	**A6**
Additional T-Sensor passive[1)]	none	**no code**
	Pt100 DIN A	**TP1**
	Pt1000 DIN A	**TP3**
	NTC10k	**TP5**
	Ni1000 TK6180	**TP9**
Type	Duct mount	**no code**
	Wall mount	**T1**
T-Unit	°C	**no code**
	°F	**MB2**
T-Scale low	0	**no code**
	Value[2)]	**SBL *value***
T-Scale high	50	**no code**
	Value[2)]	**SBH *value***

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) Within working range. For scaling beyond working range limits please contact the E+E sales representative.

Order example

EE150-M1A6TP1

Model:	Humidity + Temperature
Output RH / T:	4-20 mA
Additional T-Sensor passive:	Pt100 DIN A
Type:	Duct mount
T-Unit:	°C
T-Scale low:	0
T-Scale high:	50

EE150-M1A6TP1T1MB2SBL-5SBH55

Model:	Humidity + Temperature
Output RH / T:	4-20 mA
Additional T-Sensor passive:	Pt100 DIN A
Type:	Wall mount
T-Unit:	°F
T-Scale low:	-5
T-Scale high:	55

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/EE150)
Power supply adapter	V03 (see data sheet Accessories)
Conduit adapter, M16x1.5 to 1/2“	HA011110

Scope of Supply

- EE150 Humidity and Temperature Transmitter
- Cable gland
- Mounting flange (only at duct mount version)
- Test report according to DIN EN10204 - 2.2

EE10

HVAC Humidity / Temperature Transmitter for Indoor Applications

EE10 room transmitters are the ideal solution for indoor applications such as HVAC in residential and official buildings. The very stylish, functional housing makes easy installation and fast exchange of the sensing unit for service purposes possible. The high quality E+E humidity sensor and state-of-the-art microprocessor controlled electronics are the guarantee for best accuracy and a wide range of options.
The standard humidity output of EE10 transmitters is 4 - 20 mA or 0 - 10 V. The temperature output signal can be active or passive.
All EE10 versions can be equipped with a good legible LC display. For EE10-FT versions the displayed values for humidity and temperature will alternate. Two different housing designs ensure professional appearance according to regional standards.

Typical Applications

building management for residential and office areas
air conditioning in switching cabinets
climate control in hotels and museums

Features

excellent price / performance ratio
easiest installation
modern design
long term stable
optional display

Technical Data

Measuring Quantities

Relative Humidity

Humidity sensor	HC103	
Analogue output 0...100% RH	0-10 V	-1 mA < I_L < 1mA
	4-20 mA (two wires)	$R_L < (U_v-10)/0.02 < 500$ Ohm
Working range[1)]	0...95 % RH	
Accuracy at 20°C (68°F) and U_v=24VDC	±2% RH (40...60% RH)	±3% RH (10...90% RH)
	Traceable to intern. standards, administrated by NIST, PTB, BEV...	
Temperature dependence at 60% RH	typical 0.06% RH /°C (0.03% RH / °F)	
Temperature (active output)	0-10 V	-1 mA < I_L < 1mA
	4-20 mA (two wires)	$R_L < (U_v-10)/0.02 < 500$ Ohm
Accuracy at 20°C (68°F) and U_v=24VDC	FT3: ±0.25°C (±0.45°F)	FT6: ±0.4°C (±0.72°F)
Temperature (passive output)		
Type of T-Sensor	please see ordering guide	

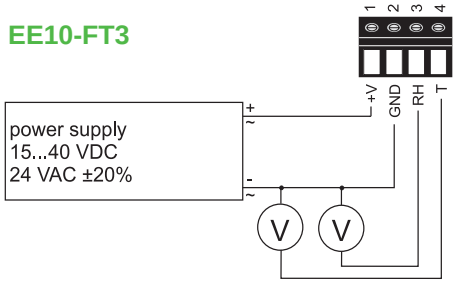
General Data

Voltage supply (U_v)		
for 0 - 10 V	15 - 40 VDC or 24 VAC ±20%	
for 4 - 20 mA	28V DC > U_v > 10 + 0.02 x R_L (R_L < 500 Ohm)	
Current consumption	for DC supply: typical 4 mA	
	for AC supply: typical 15 mA_{eff}	
Electrical connection	screw terminals max. 1.5 mm^2 (AWG 16)	
Housing material	Polycarbonat	
	US Version: UL94V-0 approved / EU Version: UL94HB approved	
Protection class	IP30	
Display	for EE10-FTx version	Humidity / Temperature alternating
	for EE10-Fx and EE10-FPx version	Humidity
CE compatibility according	EN61326-1	CE
	EN61326-2-3	
Temperature ranges	working temperature range:	-5...55°C (23...131°F)
	storage temperature range:	-25...60°C (-13...140°F)

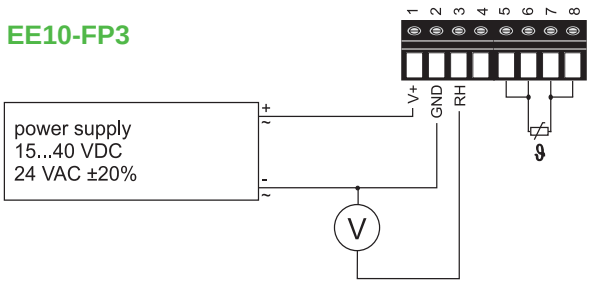
1) Please refer to the working range of the HC103

Connection Diagram

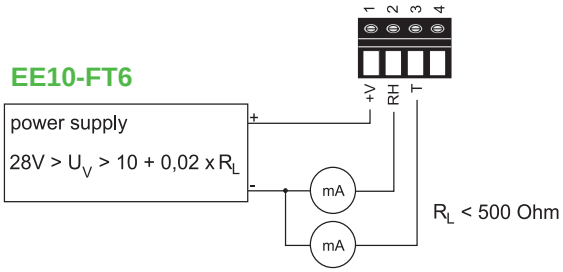
EE10-FT3



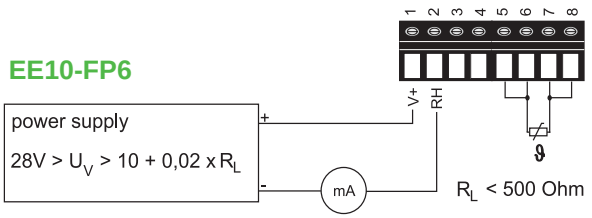
EE10-FP3



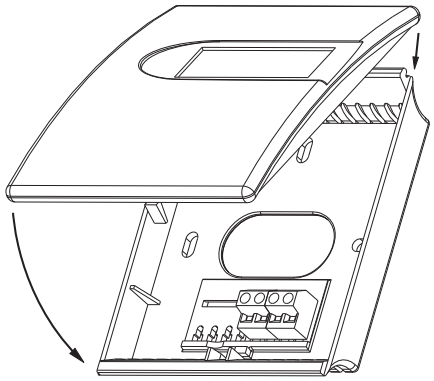
EE10-FT6



EE10-FP6



Dimensions (mm)



Housing colour:

Standard (EU & US):

Front cover:	Signal white	RAL 9003
Back cover:	Light grey	RAL 7035

Optional (only EU):

Front and back cover	Grey	(Anthracite grey RAL 7016)
	Silver	(White aluminum RAL 9006)

EU:	W x H x D = 85 x 100 x 26 mm	(3.3 x 3.9 x 1")
US:	W x H x D = 85 x 136 x 26 mm	(3.3 x 5.4 x 1")

Ordering Guide

MODEL	OUTPUT	T-SENSOR[1] (only passive)	DISPLAY	HOUSING DESIGN & COLOUR	T-UNIT	T-SCALE[2] (only for FT)
humidity + temperature (FT)	0 - 10 V (3)	Pt 100 DIN A (A)	without display (--)	EU-Standard (RAL9003 / RAL7035) (--)	°C (--)	0...50 (T04)
	4 - 20 mA (6)	Pt 1000 DIN A (C)	with display (D04)	EU-Grey (RAL7016) (G)	°F (E01)	-5...55 (T31)
humidity + temperature passive (FP)		Ni1000, TK6180 (J)		EU-Silver (RAL9006) (S)		0...40 (T55)
		NTC10k (E)		US (RAL9003 / RAL7035) (US)		20...120 (T15)
		NTC1.8 (G)				32...122 (T76)
						32...132 (T96)
EE10-						

1) T-Sensor details see www.epluse.com/R-T_Characteristics

2) other scaling upon request

Order Example

EE10-FT3-D04-T04

Model:	humidity + temperature
Output:	0-10 V
Display:	with display
Housing design & colour	EU-Standard (RAL9003 / RAL7035)
T-Unit:	°C
T-Scale:	0...50

Scope of supply

- EE10 Transmitter according to ordering guide
- Mounting materials
- Test report according to DIN EN10204 - 2.2

EE046

Condensation Monitor

EE046 condensation monitor helps prevent condensation on chilled beams and other critical cold spots and is appropriate for mounting onto plane surfaces and on pipes with max. 50 mm (2”) diameter. It features the well-proven E+E HC105 SMD humidity sensor.

Condensation on a surface occurs when the relative humidity (RH) of the air close to the surface reaches 100 % RH. Because of very good thermal coupling with the surface, EE046 measures directly the RH of the air at surface temperature.

The relay output gives an early warning when approaching condensing conditions, before condensation actually happens. It indicates also a power supply failure or a broken cable.
A status LED indicates normal operation, alarm or power supply failure.
The E+E proprietary coating protects the humidity sensor against dust and dirt.

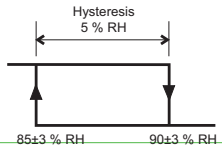
Typical Applications

early detection of condensation danger
chilled beams
switching cabinets
climate control

Features

fast response time
dust protection
compact design and easy mounting
LED status indication

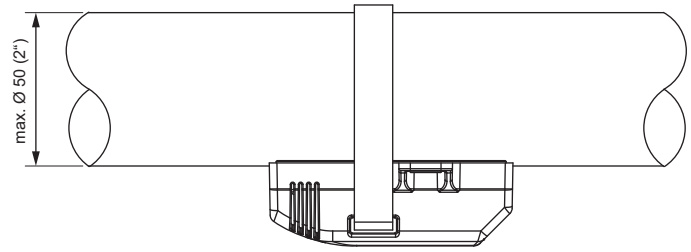
Technical Data

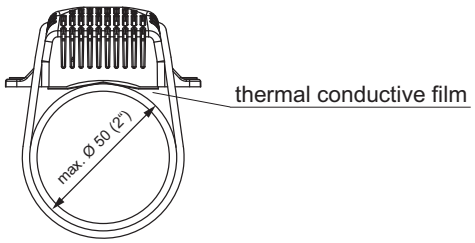
Humidity sensor	E+E HC105
Working range	10...100 % RH
Threshold at 20 °C (68°F), 24 V AC/DC	90±3 % RH
Hysteresis	
Response time at change of the surface temperature	t_{90} < 3 min.
Response time at change of the relative humidity	t_{90} < 25 sec.
Electrical output	potential free relay with changeover contact
Switching capability	max. 24 V AC/DC, 1A
Supply voltage (Class III)	24 V AC/DC ±20 %
Current consumption	< 6 mA for 24 V DC supply < 10 mA for 24 V AC supply
Relay status indication	LED, red
Electrical connection	5-pole push-in terminal, max. 1.5 mm² (AWG 16)
Protection sensor / electronics	E+E proprietary coating / varnish
Housing protection class	IP40
Housing material	Polycarbonate, UL94-V2 approved
Electromagnetic compatibility	EN 61326-1 industrial environment EN 61326-2-3 CE
Temperature range operation	0...50 °C (32...122 °F)
storage	-20...70 °C (-4...158 °F)
Weight	approx. 60 g

Dimensions (mm/inch)

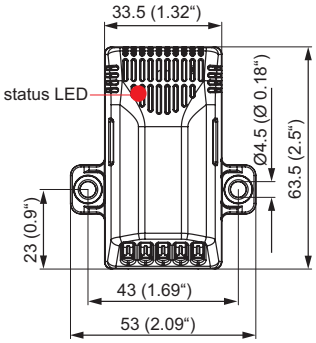
Installation

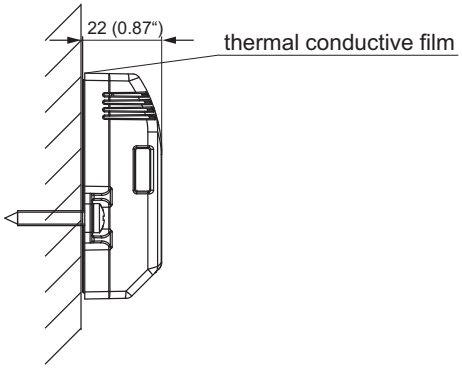
Pipe mount



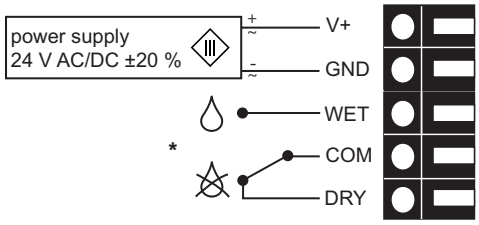


Wall mount





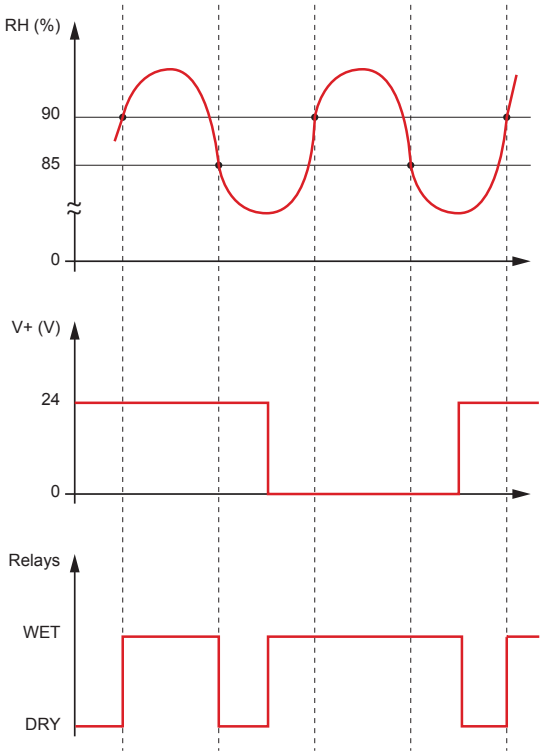
Connection Diagram / Status Indication



* Relay status for power on and RH < 90%.
The relay falls to "WET" for RH > 90% or power off.

LED ON:	no condensation danger
LED flashes:	condensation danger
LED OFF:	power supply off / failure

Relay Function



Ordering Guide

Condensation Monitor EE046 **EE046**

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

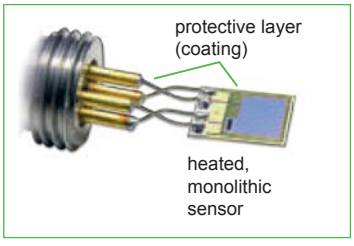
meteorology
wind turbine generators
road icing warning
off-shore measurements

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.



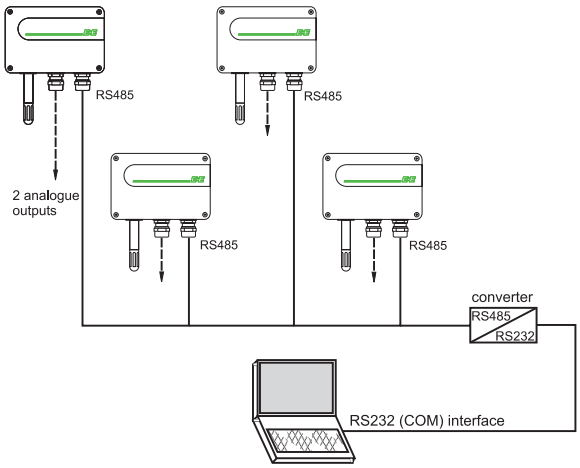
Radiation Shield

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).

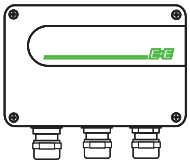
Network Compatibility / Ethernet Interface

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.

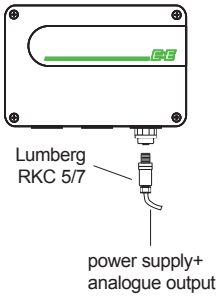


Connection Types

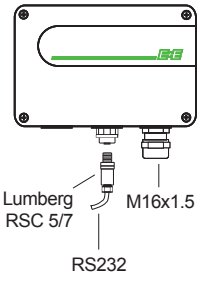
standard



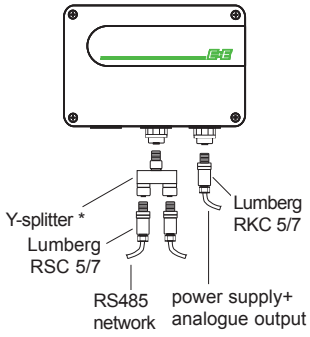
plug option C03



plug option C06



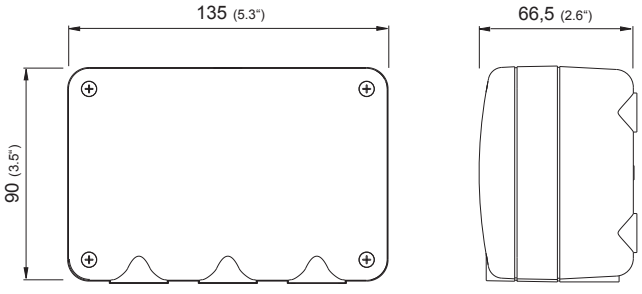
plug option C08



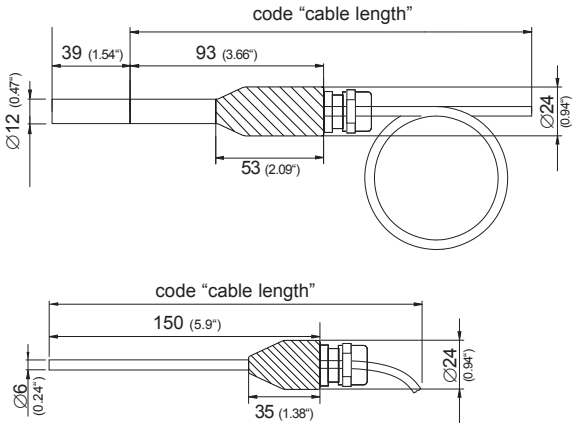
* Siemens 6ES7 194-1KA01-0XA0

Dimensions (mm)

Housing



Humidity probe



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

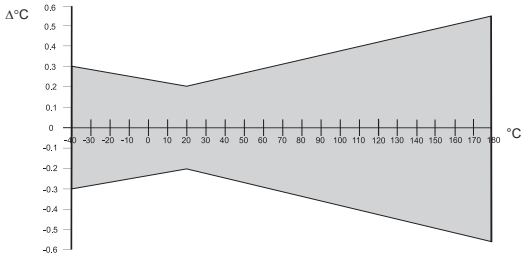
Technical Data

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)]

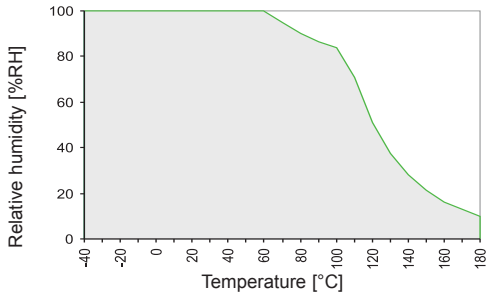
		min.	max.	Unit
Humidity	RH	0	100	% RH
Temperature	T	-40 (-40)	180 (248)	°C (°F)
Dew point temperature	Td	-40 (-40)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	°C (°F)
Wet bulb temperature	Tw	0 (32)	100 (212)	°C (°F)
Water vapour partial pressure	e	0	1100 (15)	mbar (psi)
Mixture ratio	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

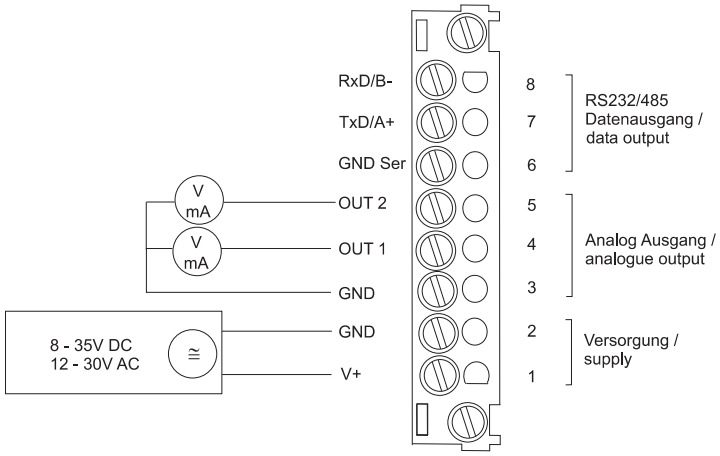
1) Refer to the working range of the humidity sensor.
2) Can be easily changed by software.
3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung).
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). 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

EE210 Outdoor

Humidity and Temperature Transmitter for Outdoor and Meteorological Applications

The EE210 Outdoor transmitter meets the highest requirements in demanding outdoor applications. It measures accurately the relative humidity and temperature, and calculates other parameters such as dew point, frost point or specific enthalpy.

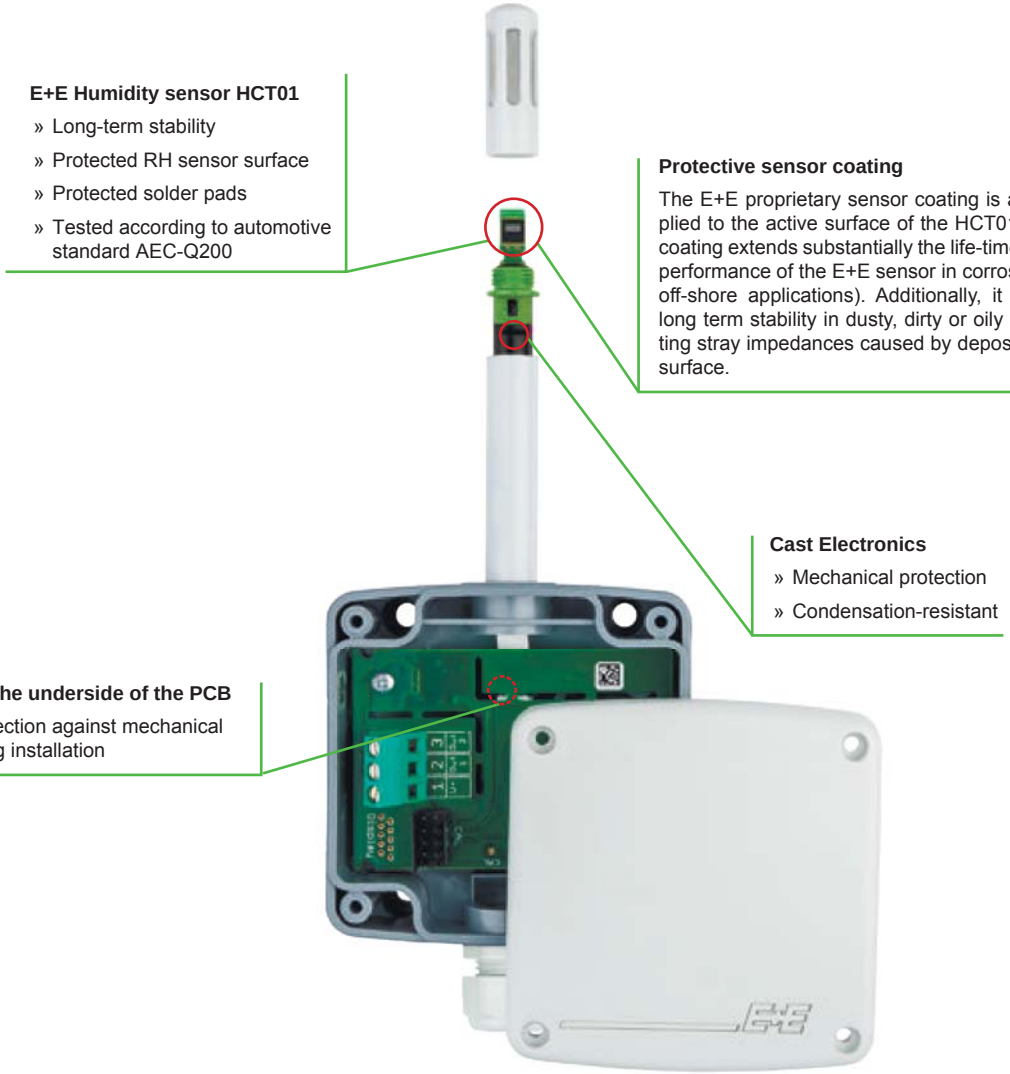
Excellent performance of EE210 Outdoor in polluted environment is ensured by the combination of completely encapsulated measurement electronics inside the sensing probe and long-term stable HCT01 sensor with the E+E proprietary protective coating.

Two of the measured and calculated values are available on the analogue voltage or current outputs. With an optional configuration kit the user can set the output scaling and perform one or two point adjustment for humidity and temperature.

The HA010501 radiation shield can be mounted onto a wall or a mast. It protects the sensing probe from solar radiation and precipitations while providing natural ventilation for short response time.

EE210 Outdoor with radiation shield

Features



E+E Humidity sensor HCT01

» Long-term stability
» Protected RH sensor surface
» Protected solder pads
» Tested according to automotive standard AEC-Q200

Protective sensor coating

The E+E proprietary sensor coating is a hygroscopic layer applied to the active surface of the HCT01 sensing element. The coating extends substantially the life-time and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). 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.

Cast Electronics

» Mechanical protection
» Condensation-resistant

Electronics on the underside of the PCB

» Optimum protection against mechanical damage during installation

Technical Data

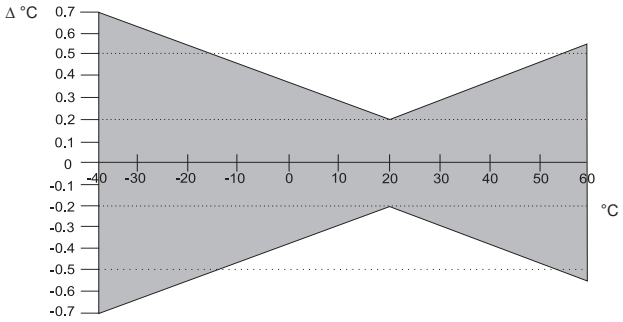
Measured Values

Relative Humidity

Sensor		E+E Sensor HCT01-00D
Working range		0...100% RH
RH accuracy [1]		
-15...40°C (5...104°F)	≤ 90% RH	± (1.6 + 0.005*measured value) % RH
-15...40°C (5...104°F)	≥ 90% RH	± 3 % RH
-40...60°C (0...140°F)		± (2.3 + 0.008*measured value) % RH
Temperature dependence electronics		0.06% RH/°C

Temperature

Sensor	Pt1000 (tolerance class B, DIN EN 60751) integrated in HCT01
T-accuracy [1]	



Outputs

Analog output	0-10 V	-1 mA < I_L < 1 mA
(RH: 0...100%; T: see ordering guide)	4-20 mA (two-wire)	250 ≤ R_L ≤ 500 Ohm

General

Power supply	
for 0-10 V	15 - 35V DC[2] or 24V AC ±20%
for 4-20 mA	24V DC ±10%
Current consumption	
Voltage output	DC supply typ. 3.3mA AC supply typ. 34mA
Current output	DC supply max. 40mA
Connection	Screw terminals, max. 1.5 mm²
Housing material	Polycarbonate
Protection class	IP65
Cable gland	M16 x 1.5
Sensor protection	E+E Coating
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial Environment FCC Part 15 Class B ICES-003 Issue 5 Class B
Temperature ranges	Operating temperature: -40...60°C (-40...140°F) Storage temperature: -40...60°C (-40...140°F)

CE

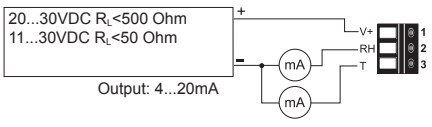
Radiation Shield

Material	Polystyrene

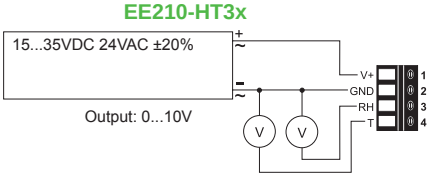
1) At 24V and 250 Ohm incl. hysteresis, non-linearity and repeatability
2) USA & Canada: class 2 supply required, max. supply voltage 30V

Connection Diagram

EE210-HT6x

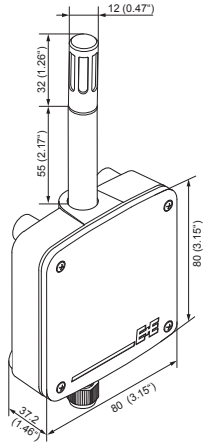


EE210-HT3x

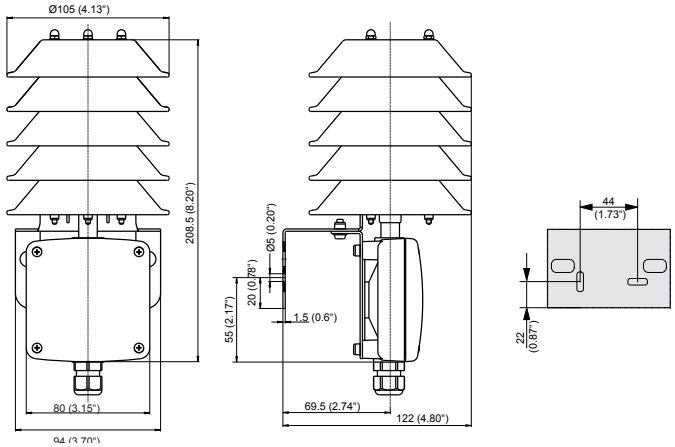


Dimensions (mm/inch)

EE210 Outdoor



Radiation shield HA010501 (ordered separately)



Ordering Guide

MODEL		ANALOGUE[1]		TYPE		FILTER	
humidity + temperature	(HT)	0-10V	(3x)	Outdoor	(Q)	metal grid	(C)
		4-20mA	(6x)				
EE210-							

Analogue outputs setup

OUTPUT 1		SCALING 1[2]		OUTPUT 2		SCALING 2[2]		UNIT	
relative humidity[1]	(Uw)	-40...60	(002)	relative humidity[1]	(Uw)	-40...60	(002)	metric	(M)
temperature	(Tx)	-10...50	(003)	temperature	(Tx)	-10...50	(003)	non-metric	(N)
dew point temperature	(TD)	0...50	(004)	dew point temperature	(TD)	0...50	(004)		
frost point temperature	(TF)	32...122	(076)	frost point temperature	(TF)	32...122	(076)		
specific enthalpy[1]	(Hx)	-40...140	(083)	specific enthalpy[1]	(Hx)	-40...140	(083)		
water vapour partial pressure[1]	(Ex)			water vapour partial pressure[1]	(Ex)				
mixing ratio[1]	(Rx)			mixing ratio[1]	(Rx)				
absolute humidity[1]	(DV)			absolute humidity[1]	(DV)				

1) Factory Scaling

relative humidity	0...100% RH	
water vapour partial pressure	0...200mbar	0...3psi
mixing ratio	0...425g/kg	0...2900gr/lb
absolute humidity	0...150g/m³	0...60gr/ft³
specific enthalpy	0...400kJ/kg	0...200BTU/lb

2) For Tx, TD und TF;
other scaling upon request

Order Examples

Position 1:

EE210-HT6xQC/UwTx002M

Model:	Humidity+Temperature Basic Device
Analog output:	4-20mA
Housing:	Outdoor
Filter:	metal grid
Output scaling 1:	relative humidity
Scaling 1:	0...100% RH
Output scaling 2:	temperature
Scaling 2:	-40...60°C
Unit:	metric

Position 2:

HA010501

Radiation shield for EE210 Outdoor

Scope of Supply

- EE210 Transmitter according ordering guide
- Cable gland
- Mounting screws
- Inspection certificate according to DIN EN10204 - 3.1

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/configurator)
Power supply adapter	V03 (see data sheet Accessories)

EE08

High-Precision Miniature Humidity / Temperature Transmitter

Accurate humidity / temperature measurement over a wide working range, fitted in a small-sized housing and high flexibility have been the main goals for the development of the EE08 series.
Low power consumption and short start-up time support efficient energy management for battery operated systems.
For this application an additional version (V10) with supply voltage 4.5-15 V DC has been developed.
Calibration data and other relevant functions like linearization or temperature compensation are stored in the probe. This feature, together with the optional connector, allows for easy replacement of the probe without a need for re-adjustment of the reading device (interchangeability).
The humidity and temperature measurement are available as analogue outputs (0-1/2.5/5 V) and as a digital interface (E2-interface). Easy implementation and data processing is warranted. Humidity and temperature reading can be re-adjusted using the calibration software; available as an accessory. The configuration equipment allows humidity and temperature adjustment of the sensor.

Typical Applications

meteorology / weather stations
humidity / temperature data logging
incubators
fermentation chambers
green houses
snow machines
dry storage facilities

Features

small dimensions
wide working range, high accuracy
traceable calibration
customer adjustment possible
interchangeable in seconds
low power consumption / short start-up time
analogue outputs / digital interface

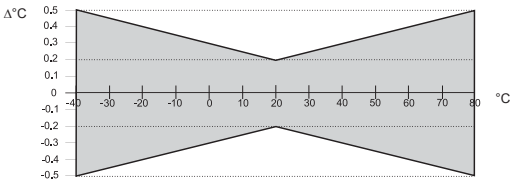
Technical Data

Measuring values

Relative Humidity

Sensor	HC101
Working range[1)]	0...100 % RH
Digital output (2 wire)[2)]	output value: 0.00...100.00 % RH
Analogue output 0...100 % RH	0-1/2.5/5/10 V -0.2 mA < I_L < 0.2 mA
Accuracy at 20 °C (68 °F) and 12 V DC[*)]	±2 % RH (0...90 % RH) ±3 % RH (90...100 % RH)
Temperature dependence	typ. 0.03 % RH/°C (typ. 0.02 % RH/°F)

Temperature

Sensor	Pt 1000 (DIN A)
Digital output (2 wire)[2)]	output value: -40.00...+80.00 °C (-40...176 °F)
Analogue output	0-1/2.5/5/10 V -0.2mA < I_L < 0.2 mA
Accuracy at 12/24V DC	

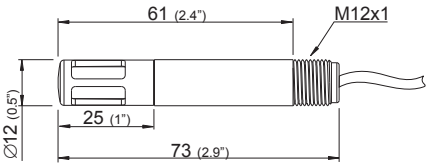
General

Supply voltage	output 0-1 V / 0-2.5 V	4.5-15 V DC or 7-30 V DC
	output 0-5 V	7-30 V DC
	output 0-10 V	12-30 V DC
Current consumption	typ. < 1.3 mA	
Digital interface	E2-interface	level = 3.3 V / ±0.1 V
Housing	polycarbonate / IP65	
Sensor protection	metal grid filter	
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial Environment	CE
Temperature ranges	working temperature: -40...80 °C (-40...176 °F)	
	storage temperature: -40...80 °C (-40...176 °F)	

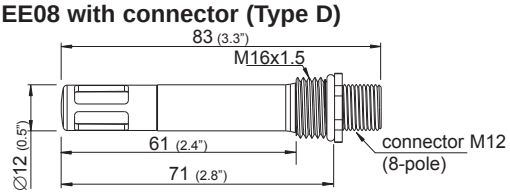
1) refer to the working range of the humidtiy sensor HC101
2) serial protocol refer to www.epluse.com
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Dimensions (mm)

EE08 with cable (Type E)



EE08 with connector (Type D)



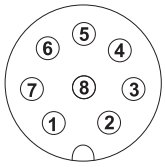
Connection Diagram

Type E:

	Temp. active	Temp. passive, 4-wire
T-passive	white (not connected)	white, black
T-passive	blue (not connected)	blue, violet
GND	pink	pink
T-out	grey	grey (not connected)
RH-out	yellow	yellow
SCL } E2-inferface	green	green
SDA } E2-inferface	brown	brown
+UB	red	red

Type D:

1	T-passive	
2	SDA }	E2-interface
3	SCL }	E2-interface
4	RH-out	
5	T-out	
6	GND	
7	T-passive	
8	+UB	



Ordering Guide

HOUSING	MODEL	OUTPUT	SUPPLY	T-SENSOR[3] (passive, 4-wire)	TYPE
polycarbonate (P)	humidity active / temperature active (FT)	0 - 1 V[1] (1)	4.5 - 15 V DC (V10)	Pt 100 DIN A (A)	with connector (D)
	humidity active / temperature passive (FP)	0 - 2.5 V[1] (7)	7 - 30 V DC (V11)	Pt 1000 DIN A (C)	with cable (E)
		0 - 5 V[2] (2)			
		0 - 10 V[2] (3)			
EE08-					

FILTER	COATING	CABLE LENGTH (Type E only)	T-UNIT	T-SCALING
metal grid filter (6)	without coating (no code)	1 m (3.3ft) (01)	metric (no code)	-40...80 (T22)
	with coating (HC01)	2 m (6.6ft) (02)	non metric (E01)	-40...60 (T02)
		5 m (16.4ft) (05)		-30...70 (T08)
				-20...80 (T24)
				-20...50 (T48)
				other (Txx)

1) possible with supply 4.5 - 15 V DC (V10) or 7 - 30 V DC (V11)
2) possible with supply 7 - 30 V DC (V11) only
3) T-Sensor details see www.epluse.com/R-T_Characteristics

Order Example

EE08-PFT2V11E602T22

housing:	polycarbonate	filter:	metal grid filter
model:	humidity active / temp. active	coating:	without
output:	0 - 5V	cable length:	2m (6.6ft)
supply:	7 - 30V DC	T-unit:	metric
type:	with cable	T-scaling:	-40...80°C

Scope of Supply

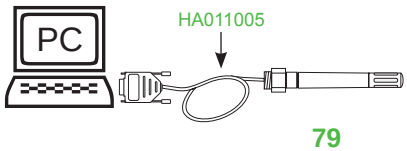
- EE08 Transmitter according to ordering guide
- Inspection certificate according to DIN EN10204 - 3.1

Accessories / Replacement Parts

- M12 connection cable for type D, length 1.5 m (5 ft) (HA010322)
- M12 connection cable for type D, length 3 m (10 ft) (HA010323)
- M12 connection cable for type D, length 5 m (16.4 ft) (HA010324)
- M12 connection cable for type D, length 10 m (32.8 ft) (HA010325)
- Radiation shield for Type E (HA010502)
- Radiation shield for Type D (HA010506)
- Protection cap for 12 mm probe (HA010783)
- M12 female socket with wires (HA010703)
- M12 female cable connector assembly possible (HA010704)
- metal grid filter (HA010113)

Configuration equipment: The configuration equipment allows humidity and temperature adjustment of the sensor.

- configuration cable (HA011005)
- configuration software: free download under www.epluse.com/EE08



EE99-1

OEM - Humidity / Temperature Modules

The EE99-1 OEM - RH/T modules are designed to meet the specific requirements of RH/T monitoring in climate chambers.
High-end E+E humidity sensor elements of the HC series and accurate temperature compensation of the humidity reading result in an excellent accuracy over a broad measurement range.
The analogue output for relative humidity is 4 - 20mA / 3-wire. The passive temperature output can be connected via 3-wire to an external readout.
Easy mounting and service is possible with a plug-in screw terminals block and by push buttons for field calibration.

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 therefore to incorrect measurements. The unique protective coating developed by E+E for the sensing probe means a significant improvement of the long-term stability of the transmitter in very dirty and aggressive environments.

Typical Applications

climate chambers
drying chambers

Features

remote sensing probe up to 10m (32.8ft)
accuracy ±2% RH
traceable calibration
working range humidity 0...100% RH
working range temperature -50...180°C (-58...356°F) / up to 200°C (392°F)
short term passive 3-wire temperature output
easy field calibration

Technical Data

Measured quantities

Relative humidity

Humidity sensor [1]		HC1000-400
Working range		0…100% RH
Accuracy [2] (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
-50...180°C (-40...356°F)		± (1.5 + 1.5%*mv) % RH
Output signal		4 - 20mA (3-wire)
Response time with filter at 20°C (68°F) / t_{90}		< 15 sec.

Temperature

Temperature sensor element [3]	Pt100 resp. Pt1000 (class A, DIN EN 60751) see Ordering Guide
Working range	-50...180°C (-58...356°F) / up to 200°C (392°F) short term

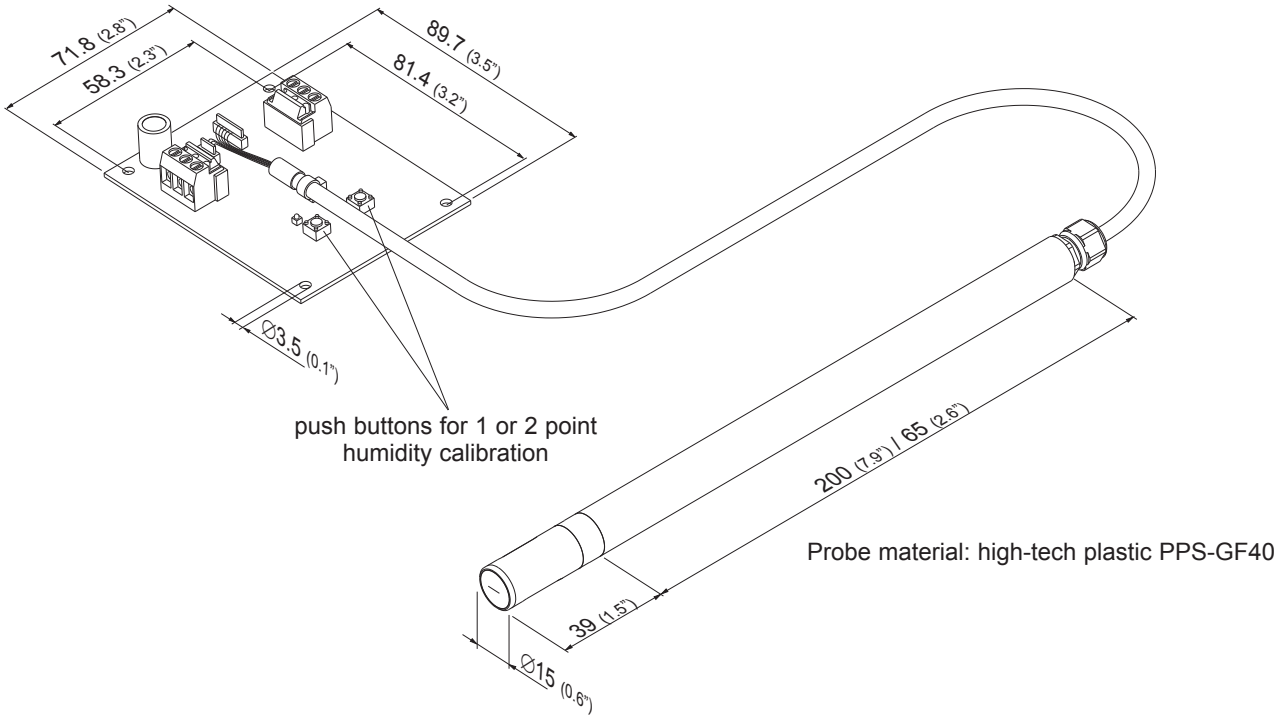
General Data

Supply voltage	10 - 35V DC or 10 - 28V AC	
Load resistor for 4 - 20 mA output	10 - 35V DC	$R_L < \frac{U_v - 5V}{0.02\ A}$ [Ω] (max. 350 Ω)
	10 - 28V AC	$R_L < 350\ \Omega$
Current consumption	for DC supply < 32mA	for AC supply < 60mA$_{eff}$
Working temperature range electronics	-40…60°C (-40...140°F)	
Storage temperature range	-40…60°C (-40...140°F)	
Electrical connection	pluggable screw terminals up to max. 1.5mm² (AWG 16)	
Sensor protection	stainless steel grid filter	
Electromagnetic compatibility	Designed for installment in and with other equipment (OEM) Measurements according to EN61000-4-3 and EN61000-4-6 FCC Part15 ClassB ICES-003 ClassB	

1) Refer to the working range of the humidity sensor
3) max. power dissipation 1mW

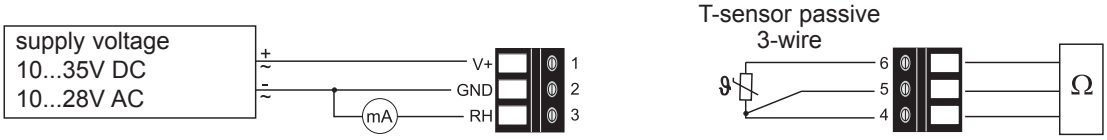
2) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Mounting Dimensions (mm)



Probe material: high-tech plastic PPS-GF40

Connection Diagram



Ordering Guide

MODEL	OUTPUT	T-SENSOR	VERSION	FILTER	CABLE LENGTH
Humidity + Temperature passive (FP)	4 - 20 mA (6)	Pt100 DIN A (A) Pt1000 DIN A (C)	remote sensing probe (D)	stainless steel grid filter (8)	2m (6.6ft) (02) 5m (16.4ft) (05) 10m (32.8ft) (10)
EE99-1-					

PROBE LENGTH
200mm (7.9") (5)
65mm (2.6") (2)

Order Example

EE99-1-FP6AD8025

Model:	Humidity + Temperature passive
Output:	4 - 20mA
T-Sensor:	Pt100 DIN A
Version:	remote sensing probe
Filter:	stainless steel grid filter
Cable length:	2m (6.6ft)
Probe length:	200mm (7.9")

Accessories

Metal grid filter **(HA010108)**

EE060

OEM Humidity / Temperature Transmitter with Voltage Output

EE060 probes are the ideal solution for cost-effective, highly accurate and reliable measurement of relative humidity and temperature.

Excellent protection against external influences is ensured by the combination of completely encapsulated electronics and the long-term stable HCT01 sensor with E+E proprietary protective coating. EE060 is available with an integrated cable or a threaded connector, with wide temperature and supply voltage ranges and dual 0-1 V, 0-5 V or 0-10 V analogue outputs, for humidity and temperature.

The result of the wide temperature range and the flexible supply voltage in combination with the excellent long-term stability is a versatile applicable probe.

The E+E proprietary sensor coating is a protective layer applied to the active surface of the HCT01 sensing element. The coating extends substantially the life-time 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.

Typical Applications

stables, incubators, hatchers
green houses
humidifiers and dehumidifiers
monitoring of storage rooms
HVAC applications

Features

excellent price/performance ratio
very good long term stability
easy installation
well protected against dust and dirt

Technical Data

Measuring values

Relative humidity

Sensor	HCT01-00D
Working range	0...100 % RH
Analogue output 0...100 % RH	0-10 V -1.0 mA < I_L < 1.0 mA
	0-5 V -0.2 mA < I_L < 0.2 mA
	0-1 V -0.1 mA < I_L < 0.1 mA
Accuracy at 24V DC, 20 °C (68 °F)	±2.5 % RH

Temperature active

Sensor	Pt1000 DIN B
Analogue output -40...60 °C (-40...140 °F)	0-10 V -1.0 mA < I_L < 1.0 mA
	0-5 V -0.5 mA < I_L < 0.5 mA
	0-1 V -0.1 mA < I_L < 0.1 mA
Accuracy at 24V DC, 20°C (68°F)	±0.3 °C (±0.5 °F)

Temperature passive (with 0-1 V output and 8-pole connector only)

Output	resistive, 2-wire
Type of T-Sensor	refer to ordering guide

General

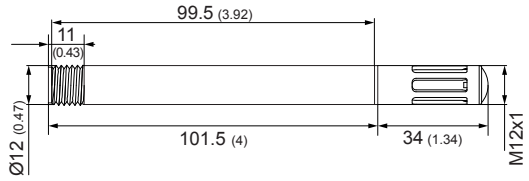
Supply voltage	HT1: 3.6...30 V DC / HT2: 10...30 V DC / HT3: 15...30 V DC
Current consumption	typ. 1.5 mA
Electrical connection	M12 connector or cable (PVC, Ø 4.3 mm, 4 x 25 mm²)
Housing	polycarbonate / IP65
Electromagnetic compatibility [2]	EN61326-1
(industrial environment)	EN61326-2-3
Working and storage temperature	-40...+60 °C (-40...140 °F)

CE

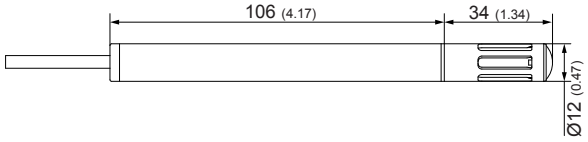
1) Analogue output 0-1 V is not protected against surge!

Dimensions in mm (inch)

connector version



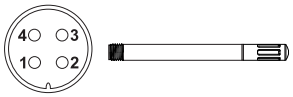
cable version



Connection Diagram

connector version

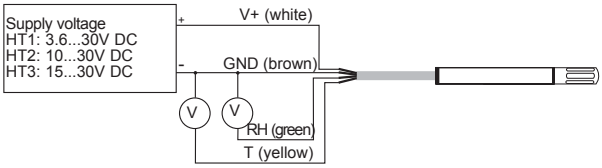
Connector 4-pole (M)
1...V+
2...RH-out
3...GND
4...T-out



Connector 8-pole (M)
1...T-passive
2...not connected
3...not connected
4...RH-out
5...T-out
6...GND
7...T-passive
8...V+

Supply voltage
HT1: 3.6...30V DC
HT2: 10...30V DC
HT3: 15...30V DC

cable version



Ordering Guide

ANALOG OUTPUT		T-SENSOR PASSIVE[1] (with 0-1 V output and 8-pole connector only)		ELECTRICAL CONNECTION		CABLE LENGTH		FILTER	
0 - 1 V	(1)	none	(x)	connector 4-pole	(PM)	0.5 m (1.6 ft)	(A)	membrane filter	(B)
0 - 5 V	(2)	Pt1000 DIN A	(C)	connector 8-pole (forT-Sensor passive)	(PV)	1.5 m (4.9 ft)	(C)		
0 - 10 V	(3)	NTC10k at 25 °C	(E)	cable	(PN)	3 m (9.8 ft)	(E)		
						with connector	(x)		
EE060-HT									

1) T-Sensor details see www.epluse.com/R-T_Characteristics

Order Example

EE060-HT2xPMxB

Output:	0-5 V
T-Sensor passive:	none
El. Connection:	connector 4-pole
Cable length:	with connector
Filter:	membrane filter

EE060-HT1CPVxB

Output:	0-1 V
T-Sensor passive:	Pt1000 DIN A
El. Connection:	connector 8-pole
Cable length:	with connector
Filter:	membrane filter

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

Female connector 4pol. self assembly M12x1	HA010707
Female connector 8pol. self assembly M12x1	HA010704
Connecting cable 5 pins, M12x1 plug-socket 2 m (6.6 ft) / 5 m (16.4 ft) /10 m (32.8 ft)	HA010**16**/HA010**17**/HA010**18**
Connecting cable 8 pins, M12x1 socket - flying leads 3 m (9.8 ft) / 5 m (16.4 ft) / 10 m (32.8 ft)	HA010**23**/HA010**24**/HA010**25**
Connecting cable 5 pins, M12x1 socket - flying leads 1.5 m (4.9 ft) / 5 m (16.4 ft) / 10 m (32.8 ft)	HA010**19**/HA010**20**/HA010**21**
Plastic mounting flange for duct mounting light grey / black	HA010**02**/HA010**14**
Radiation shield	HA010502

Support literature

www.epluse.com/EE060

EE061

OEM Humidity / Temperature Transmitter with Current Output

EE061 probes are the ideal solution for cost-effective, highly accurate and reliable measurement of relative humidity and temperature.
The analogue humidity output provides a current signal with 4-20 mA.
A passive temperature output signal is available.

Wide temperature and supply voltage ranges, excellent long term stability and the optional sensor coating allow the use in many applications.

Typical Applications

stables
green houses
humidifiers and dehumidifiers
monitoring of storage rooms

Features

excellent price/performance ratio
very good long term stability
easy installation
compact design

Technical Data

Measuring values

Relative humidity

Sensor	HC105
Working range[1)]	0...100 % RH
Analogue output 0...100 % RH	4...20 mA (two wire) R_L<500 Ohm
Accuracy at 20 °C (68 °F), 12 V DC	±3 % RH (10...90 % RH) ±5 % RH (<10 % RH and >90 % RH)
Temperature dependence [% RH/°C]	typ. ±0.03

Temperature passive

Output	resistive, 4 wire
Type of T-Sensor	refer to ordering guide

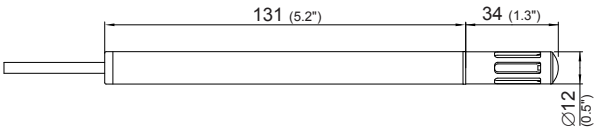
General

Supply voltage	9 V DC - 28 V DC
Current consumption	typ. 1.5 mA
Electrical connection	cable with 0.5 m (1.6 ft) / 3 m (9.8 ft) / 10 m (32.8 ft)
Housing	polycarbonate IP65
Sensor protection	membrane filter, metal grid filter
Electromagnetic compatibility	EN61326-1 EN61326-2-3
Temperature ranges	working temperature: -40...+60 °C (-40...140 °F) storage temperature: -40...+60 °C (-40...140 °F)

CE

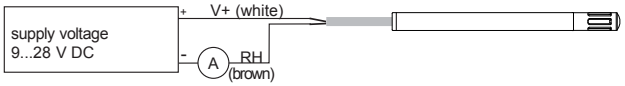
1) Refer to the working range of the humidity sensor

Dimensions (mm)

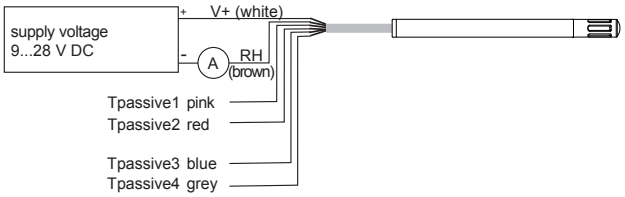


Connection Diagram

with active humidity output:



with active humidity output and passive T-sensor:



Ordering Guide

MODEL	OUTPUT	T-SENSOR[1] (passive only)	FILTER	COATING	CABLE LENGTH
humidity (F)	4 - 20 mA (6)	Pt100 DIN A (A)	membrane filter (1)	without coating (no code)	0.5 m (1.6 ft) (co code)
humidity+temperature passive (FP)		Pt1000 DIN A (C)	metal grid filter (6)	with coating (HC01)	3 m (9.8 ft) (K300)
		NTC 10K at 25°C (E)			10 m (32.8 ft) (K1000)
EE061-					

1) T-Sensor details see www.epluse.com/R-T_Characteristics

Order Example

EE061-FP6A6HC01K300

model:	humidity+temperature passive	filter:	metal grid filter
output:	4 - 20 mA	coating:	with coating
T-sensor:	Pt 100 DIN A	cable length:	3 m

Accessories

For more information please refer to data sheet "Accessories"

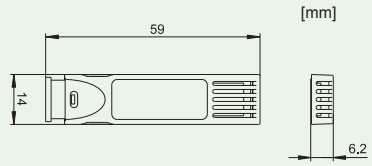
Scope of Supply

- EE061 Transmitter according to ordering guide

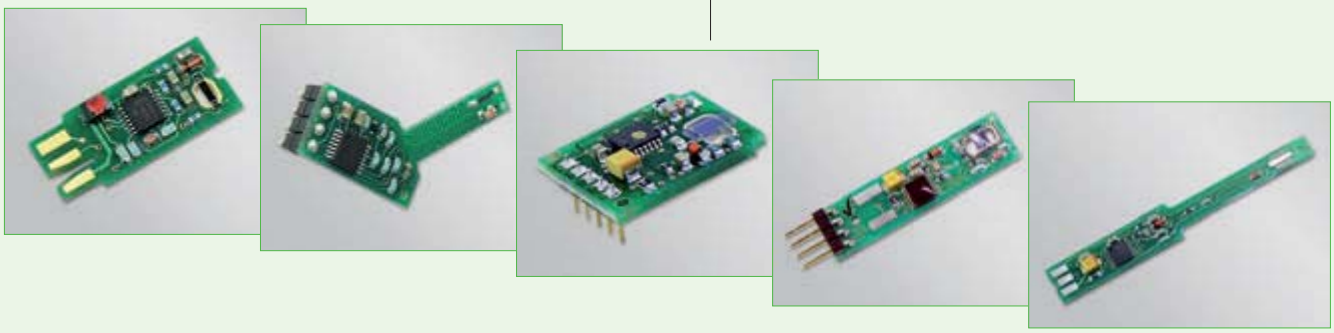
OEM Products

E+E Elektronik is your reliable partner for customised OEM products in sensor technology for measurement of humidity, dew point, air velocity, CO_2 and temperature. We develop and produce your customer-specific solutions - from simple sensor elements to complete transmitters.
You can save time if you come to us with your requirements. Our team of experts can fall back on a host of existing solutions and therefore developement time can be kept to a minimum.
Our knowhow in product design and calibration helps you to avoid expensive investments and brings your product to the market faster. Our longtime experience as an automotive supplier guarantees the best product quality and reliability.

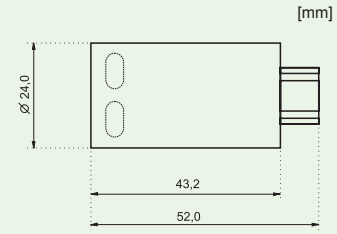
EE03 Series



Measuring range:	0...100% RH / -40...85°C (-40...185°F)
Accuracy at 20°C (70°F):	±3% RH (10...100% RH) / ±0.3°C (±0.54°F)
Output:	digital (2-wires)
Supply:	2.5...5.5V DC

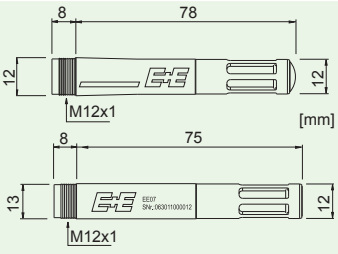


EE04 Series



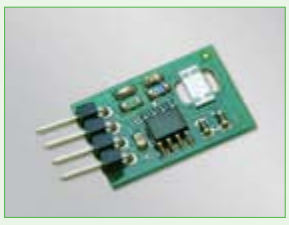
Measuring range:	0...100% RH / -40...85°C (-40...185°F)
Accuracy at 20°C (70°F):	±3% RH (40...60% RH) / ±0.3°C (±0.54°F)
Humidity output:	linear analogue output: 0...100% RH ≙ 0.1xU_V...0.9x U_V
Temperature output:	voltage divider: NTC with pull down resistor
Supply:	5.5V DC ±10%

EE07 Series



Measuring range:	0...100% RH / -40...80°C (-40...176°F)
Accuracy at 20°C (70°F):	±2% RH (0...90% RH) / ±0.3°C (±0.54°F)
Output:	digital (2-wires)
Supply:	3.8...5.5V DC
Housing:	polycarbonate or stainless steel

Example pictures of customised products



OMNIPORT 30

Multifunctional Hand-Held

The robust multifunctional hand-held meets the highest requirements and comes with a wide range of accurate probes that fit various applications.
Use touch-screen navigation to show, up to three measurement values simultaneously on the capacitive TFT display.

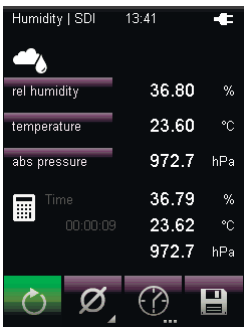
A total of 23 measurands (vary according to probe) is available, including:

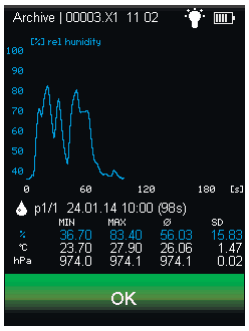
- relative humidity RH
- temperature T
- dew point temperature Td
- absolute humidity dv
- mixing ratio r
- air velocity v
- volumetric flow $\dot{v}$
- air pressure p
- CO_2 ppm

Store measurement values in the internal memory of the device and use the free SmartGraph3 software to manage data on your PC. The optional carrying case accommodates the hand-held and probes, as well as accessories.

Data-Logging & Data-Management

The Omniport 30 offers both continuous and single-point data-logging. The measurement values of up to three channels are stored simultaneously, together with a time and date stamp, in the internal memory of the device.





Stored measurement data, as well as the minimum, maximum, average and standard deviation values can be shown directly on the display. Scroll through a recorded measurement and switch between graphs by using the control cross.

Data management is easy and intuitive by using the free SmartGraph3 software to create graphs that contain measurement channels of interest for better data analysis. Data can be exported in .csv format and then imported into EXCEL for further processing.

Features

Data logging
Internal memory for 2 million measured values
23 physical quantities
Capacitive TFT touch screen
Displays measurands simultaneously
Real-time HOLD / MIN / MAX / AVG readout
Integrated air pressure sensor
User friendly operation
Free data management software

Technical Data

General

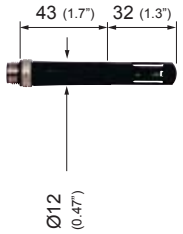
Power supply	4 x Alkaline LR6 AA batteries, 1.5 V **(not in the scope of supply)**
Optional power supply	5V DC via USB (cable included)
Temperature range	operating: handheld and handle of sensing probe: 0...50°C (32...122°F) storage: -20...60°C (-4...140°F)
Internal memory	for approx. 2 million measured values
Housing / protection class	ABS / IP40
Dimensions (HxWxD)	170 x 62 x 34 mm (6.69 x 2.44 x 1.34")
Weight	ca. 205g (0.45 lbs)
Display	TFT display, 54 x 41 mm (2.13 x 1.61"), illuminated
CE compatibility	Hand-held: EN61000-6-2:2005 EN61000-6-3:2007 Logprobe: EN61326-1:2013 EN61326-2-3:2013

Integrated air pressure sensor

Measuring range	800 to 1100 mbar (complete accuracy)
Accuracy	max. ± 0.5 mbar (at 25 °C, 1013.25 mbar)
Long term stability	typ. -1 mbar/year

HUMIDITY / TEMPERATURE PROBES

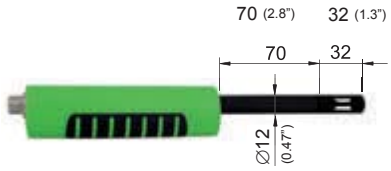
LOGPROBE 20 - compact, pluggable HVAC probe



Working range: 0...100% RH / -40...80°C (-40...176°F)
Accuracy: ±2% RH (0...90% RH), ±3% RH (90...100% RH) @20°C / 68°F
±0.2°C / ±0.36°F @20°C / 68°F
max. ±0.6°C / ±1.08°F (-40...80°C / -40...176°F)
Order code: **LOGPROBE20-HTPC**
Response time τ_{90}: ≤ 30 sec.
Filter: Membrane filter

Order code: **LOGPROBE20-HTPA**
Response time τ_{90} ≤ 10 sec.
Filter: Plastic grid filter

LOGPROBE 16 - HVAC probe

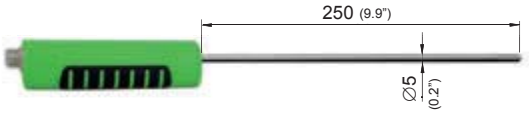


Working range: 0...100% RH / -20...70°C (-4...158°F)
Accuracy: ±2% RH (0...90% RH), ±3% RH (90...100% RH) @20°C / 68°F
±0.2°C / ±0.36°F @20°C / 68°F
max. ±0.5°C / ±0.9°F (-20...70°C / -4...158°F)
Response time τ_{90}: ≤ 7 sec.
Order code: **LOGPROBE16**

LOGPROBE 31 - high temperature probe

Working range: 0...100% RH / -40...180°C (-40...356°F)
(grip of sensing probe up to 50°C/122°F)
Accuracy: ±2% RH (0...90% RH), ±3% RH (90...100% RH) @20°C / 68°F
±0.2°C / ±0.36°F @20°C / 68°F
max. ±0.6°C / ±1.08°F (-40...180°C / -40...356°F)
Response time τ_{90}: ≤ 30 sec.
Temperature dependency: RH: ±0.03% RH/°C (% RH/1.8°F)
Order code: **LOGPROBE31**

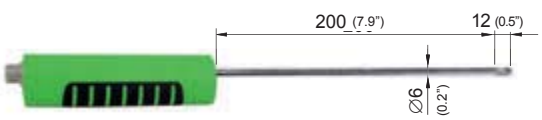
LOGPROBE 30 - confined space probe



Working range: 0...100% RH / -40...100°C (-40...212°F)
Accuracy: ±2% RH (0...90% RH), ±3% RH (90...100% RH) @20°C / 68°F
±0.2°C / ±0.36°F @20°C / 68°F
max. ±0.6°C / ±1.08°F (-40...100°C / -40...212°F)
Response time τ_{90}: ≤ 15 sec.
Temperature dependency: RH: ±0.03% RH/°C (% RH/1.8°F)
Order code: **LOGPROBE30**

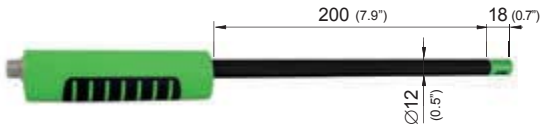
AIR VELOCITY PROBES

LOGPROBE 61/60 - stainless steel probe



Working range:	0.08...2m/s (15...400ft/min)	0.2...20m/s (40...4000ft/min)
	-20...70°C (-4...158°F)	-20...70°C (-4...158°F)
Accuracy:	± (0.04m/s / 8ft/min+ 1% of m. v.)	± (0.2m/s / 39ft/min + 2% of m. v.)
	± 0.7°C / ±1.26°F (0...50°C / 32...122°F)	± 0.7°C / ±1.26°F (0...50°C / 32...122°F)
Response time τ_{90}:	≤ 1.5 sec.	≤ 1.5 sec.
Order code:	**LOGPROBE61**	**LOGPROBE60**

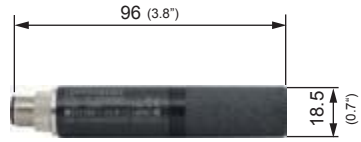
LOGPROBE 65 - polycarbonate probe



Working range:	0.2...20m/s (40...4000ft/min) / 0...50°C (32...122°F)
Accuracy:	± (0.2m/s / 39ft/min + 3% of m.v.)
	± 1°C / ±1.8°F (0...50°C / 32...122°F)
Response time τ_{90}:	≤ 1.5 sec.
Order code:	**LOGPROBE65**

CO_2 PROBE

LOGPROBE 802/805/810 - CO_2 probe



Working range:	0...2000 / 5000 / 10000ppm	
Technology:	dual wave NDIR with autocalibration	
Accuracy at 25°C	0...2000ppm: < ± (50ppm +2% of measured value)	
and 1013mbar	0...5000ppm: < ± (50ppm +3% of measured value)	
(77°F and 14.69psi)	0...10000ppm: < ± (100ppm +5% of measured value)	
Warm-up time:	3 min.	
Temperature dependency: typ. 1ppm CO_2/°C (-20...45°C) (-4...113°F)		
Order code:	0...2000ppm	**LOGPROBE802**
	0...5000ppm	**LOGPROBE805**
	0...10000ppm	**LOGPROBE810**

Carrying Case

The optional carrying case protects the handheld, probes and accessories during transport and storage. It helps to avoid mechanical damage, as well as the contamination of the sensors, which is essential for the optimal long term performance of the instrument.


HA040906

Protective Cover

The optional cover protects the handheld device during usage in dirty or oily environments. The integrated magnetic plate allows an easy temporary fixing of the handheld onto a metallic surface on site, while the hang-on straps helps keep your hands free while taking measurements.


HA040907

Ordering Guide

			Pluggable Probes [1]	Remote Probes [2]
POSITION 1	**BASIC DEVICE**		OMNIPORT30	OMNIPORT30
POSITION 2	**CABLE**	2m (6.6ft)		HA010813
POSITION 3	**PROBES**			
	Humidity / Temperature			
	LOGPROBE 20 - Response time ≤ 30 sec.		LOGPROBE20-HTPC	
	LOGPROBE 20 - Response time ≤ 10 sec.		LOGPROBE20-HTPA	
	LOGPROBE 16 - HVAC probe			LOGPROBE16
	LOGPROBE 31 - high temperature probe			LOGPROBE31
	LOGPROBE 30 - confined space probe			LOGPROBE30
	Air Velocity			
	LOGPROBE 61 - stainless steel probe / 0.08...2m/s (15...400ft/min)			LOGPROBE61
	LOGPROBE 60 - stainless steel probe / 0.2...20m/s (40...4000ft/min)			LOGPROBE60
	LOGPROBE 65 - polycarbonate probe / 0.2...20m/s (40...4000ft/min)			LOGPROBE65
	CO_2			
	LOGPROBE 802 - 0...2000ppm		LOGPROBE802	
	LOGPROBE 805 - 0...5000ppm		LOGPROBE805	
	LOGPROBE 810 - 0...10000ppm		LOGPROBE810	
POSITION 4	**CARRYING CASE**	For basic device and up to 4 probes	HA040906	HA040906

1) Directly connected to device, cable is optional
2) Cable is necessary

Order Example

Pluggable Probes:

Position 1 - Basic Device	OMNIPORT30
Position 2 - Probe	LOGPROBE805
Position 3 - Carrying Case	HA040906

Remote Probes:

Position 1 - Basic Device	OMNIPORT30
Position 2 - Cable	HA010813
Position 3 - Probes	LOGPROBE16 LOGPROBE61
Position 4 - Carrying Case	HA040906

Accessories

Carrying case for basic device, 2 pluggable and 2 remote probes	HA040906
Protective cover	HA040907
Membrane filter PC (for ∅12mm RH/T probes)	HA010118
Metal grid filter PC (for ∅12mm RH/T probes)	HA010119
Stainless steel sintered filter (for ∅12mm RH/T probe)	HA010103
Plastic grid filter PC (for Logprobe 20-HTPA)	HA010121
Cable for remote probes 2m (6.6ft)	HA010813
Humidity standards / Calibration device	refer to data sheet Humidity Calibration Set
SmartGraph 3 - data management software	free download at www.epluse.com/smartgraph3

HUMLOG20

Data logger for Humidity, Temperature, Air Pressure and CO_2

The HUMLOG20 facilitates exact and professional recordings for climatic measurements of humidity, temperature, air pressure and CO_2 concentration.
The long battery life and large memory allow for continuous data recording over long periods of time. The configuration of the data logger and the evaluation of the measurement data are simple and straightforward using SmartGraph3 software, which is included in the scope of supply. The built-in Ethernet interface makes the HUMLOG20 Network capable, and ensures maximum reliability in data transmission. For various requirements in the application, the four models **THI**, **THIP, TCO** and **E** are available. The Model **E** offers the highest flexibility with analog and digital interface for external sensors.

HUMLOG20 THI

Measurement Categories	Model THI	THIP	TCO	E
Temperature (air)	✓	✓	✓	
Relative humidity	✓	✓	✓	
Absolute humidity	✓	✓	✓	
Dew point temperature	✓	✓	✓	
Barometric air pressure		✓		
Relative air pressure		✓		
CO_2 Concentration			✓	
External input - digital RH/T-Sensor				✓
External input - Pt100, Thermocouple				✓
Analog input voltage 0-1V				✓
Analog input current 0/4-20mA				✓
Functions				
Power supply battery	✓	✓	✓	✓
Power supply USB	✓	✓	✓	✓
Power supply LAN (PoE)	optional	optional	optional	optional
Measured data storage	3,200,000	3,200,000	3,200,000	3,200,000
Typical battery life	> 1 year	> 1 year	> 4 months	> 4 months
LC-display	✓	✓	✓	✓
One-button operation	✓	✓	✓	✓
1-point calibration by operator	✓	✓	✓	✓
°C/°F switchable	✓	✓	✓	✓
Optical / acoustical alarm	✓	✓	✓	✓
Date / time	✓	✓	✓	✓
Records MIN/MAX/AVG	✓	✓	✓	✓
SmartGraph3 evaluation software	✓	✓	✓	✓
Functions Software				
Graphical representation	✓	✓	✓	✓
Numerical data display	✓	✓	✓	✓
Print function	✓	✓	✓	✓
Export function (e.g. Excel)	✓	✓	✓	✓
Gathered printouts of all measurement sites	✓	✓	✓	✓
User administration	✓	✓	✓	✓
Administration of up to 255 data logger	✓	✓	✓	✓

HUMLOG20 THIP

HUMLOG20 TCO

HUMLOG20 E

Typical Applications

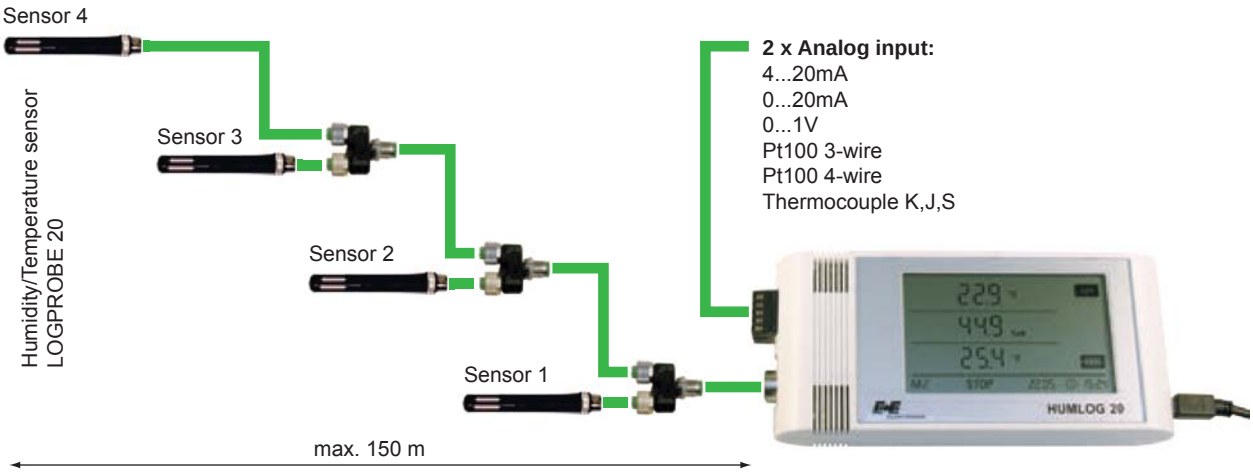
museums and exhibition spaces
clean rooms
warehouses
electronic-data-processing centres
calibration laboratories

Features

large data memory
large format display
USB and Ethernet interface
network-capable
powerful software for data analysis

HUMLOG20 E Configurations Examples

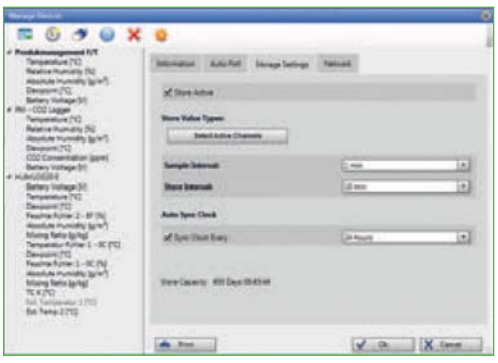
The HUMLOG20 E is equipped with an digital input, which allows the connection of up to four external humidity/temperature sensors.
Two additional analog inputs for sensors with voltage or current output, Pt100 temperature sensors in 3 and 4 wire technology or Thermocouple J, K and S offers highest flexibility in the application.
Each fully equipped HUMLOG20 E is a 10 channel data logger that can record various data.



Software SmartGraph3

With SmartGraph3 the gathering of measured data is simple and as intuitive as possible:

- An HUMLOG20 data logger is automatically recognized and added as a “network device”.
- In addition to its data-readout function, the software possesses a recording mode that enables parallel recording to be displayed on the computer.
- The data from any desired number of HUMLOG20 devices can be read out simultaneously.
- The zoom function allows for quick analyses of critical time periods.
- The exporting of measured data in csv format enables it to be imported into EXCEL.
- The device configuration can be printed out in order to check installation parameters.
- Alarm limits - like the measured data - are chronologically managed at various times so that when changes in alarm limits occur, they can be retracted.
- Automatic data readout of all measured data is supported.



Technical Data

General

Dimensions		length 166 mm, width 78 mm, depth 32 mm
Housing / protection class		plastic ABS / IP40
Battery lifetime	THI, THIP:	> 1 year
	TCO, E:	> 4 months
Data storage		16 MB, 3,200,000 measured values
LC-Display		size 90x64 mm
Weight		approx. 250g
Interface		USB, LAN (Ethernet)
Measurement rate		10/30s, 1/10/12/15/30min, 1/3/6/12/24h
Storage rate		1/1012/15/30min, 1/3/6/12/24h
Power supply		Battery 4 x LRG AA Mignon (not in the scope of supply) or USB optionally the power supply via PoE (Power over Ethernet) is possible
Working range	Temperature:	-20...50°C (-4...120°F)
	Humidity:	0...95%RH (non condensing)
CE compatibility according		EN61000-6-2 EN55022 EN6100-4-2 to EN6100-4-6

Measurements

Relative Humidity

Sensor	capacitive
Measurement range	10...95%RH
Accuracy at 20°C	±2%RH
Resolution	0.1%RH

Temperature

Sensor	NTC
Measurement range	-20...50°C (-4...120°F)
Accuracy	±0.3°C (0...40°C; 32...102°F), otherwise ±0.5°C
Resolution	0.1°C

Air pressure (only Model THIP)

Measurement range	300...1300 hPa absolute
Accuracy at 25°C	±0.5 hPa in the range of 700...1100 hPa
Resolution	0.1 hPa

CO_2 (only Model TCO)

Sensor	NDIR 2-Beam Principle
Measurement range	0...5000 ppm
Accuracy	± (50ppm +3% of measured value)
Resolution	1 ppm
Long-term stability	20 ppm/year
Response time t_{90}	< 195s for measurement rate 10s
Temperature dependence	typ. 2ppm CO_2/°C (0...50°C / 32...122°F) different from 25°C (77°F)

Voltage input 0-1V (only Model E)

Measurement range	0...1V
Accuracy	±(200µV +0,1% of measured value)
Resolution	500µV

Current input (only Model E)

Measurement range	2-wires: 4...20mA 3-wires: 0...20mA
Accuracy	±(4µA +0,1% of measured value)
Resolution	5µA
Resistance	max. 50 Ohm

Thermocouple K, J, S (only Model E)

Measurement range	for K, J:	-200...1200°C
	for S:	-50...1700°C
Accuracy	for -200...0°C:	±(1°C +0,5% of measured value)
	for 0...1700°C:	±(1°C +0,2% of measured value)
Resolution		0,2°C

Pt100 (only Model E)

Measurement range	-200...500°C
Accuracy	±(0,2°C +0,1% of measured value)
Resolution	0,02°C

Technical Data LOGPROBE20

General

Housing / protection class		plastic PC / IP65
Working range	Temperature:	-40...80°C (-40...176°F)
	Humidity:	0...100%RH
CE compatibility according [1]		EN61326-2-3 EN61326-1
Maximum cable length		150m

Measurements

Relative Humidity

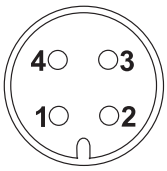
Sensor	capacitive	
Measurement range	relative humidity	0...100%RH
	absolute humidity	0...290 g/m³
	mixing ratio	0...550 g/kg
	dew point temperature	-40...80°C (-40...176°F)
Accuracy at 20°C	±2%RH (0...90%RH) ±3%RH (90...100%RH)	

Temperature

Sensor	Pt1000 DIN B
Measurement range	-40...80°C (-40...176°F)
Accuracy	±0.2°C at 20°C (68°F); ±0.4°C (-10...50°C 14...122°F); ±0.6 (-40...80°C -40...176°F)

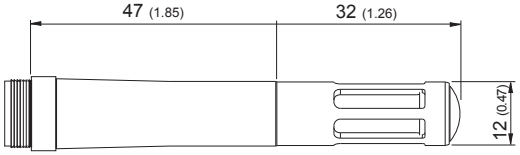
1) is not protected against surge

Connection Diagram



1...+UB
2...RS485 B
3...RS485 A
4...GND

Dimensions mm (inch)



Ordering Guide

DATA LOGGER		Accessories - Data logger	
Temperature and relative humidity	**HUMLOG20 THI**	Power supply for HUMLOG20	**HA030106**
Temperature, rel. humidity, air pressure	**HUMLOG20 THIP**	theft-proof installation kit	**HA030104**
Temperature, rel. humidity, CO_2	**HUMLOG20 TCO**		
external inputs	**HUMLOG20 E**		
optional PoE (Power over Ethernet)	**-POE** (add to the end)		
HUMIDITY/TEMPERATURE SENSOR for HUMLOG20 E		**Accessories - HUMLOG20 E**	
RH/T-Sensor with metal grid filter	**LOGPROBE20-HTPC**	T-coupler M12 - M12	**HA030204**
RH/T-Sensor with stainless steel sintered filter	**LOGPROBE20-HTPD**	cable 2m (6.6ft)	**HA010816**
		cable 5m (16.4ft)	**HA010817**
		cable 10m (32.8ft)	**HA010818**
		male connector M12x1 self-assembled	**HA010706**
		female connector M12x1 self-assembled	**HA010708**

Order Example

HUMLOG20 THI
Data logger for Temperature and relative Humidity

HUMLOG20 TCO-POE
Data logger for Temperature, relative Humidity and CO_2 with PoE (Power over Ethernet)

EE02

High-Precision Thermo - Hygrometer

The new hygrometer EE02 is the combination of high accuracy measurement technology with modern design. The relative humidity and temperature values with trend indication are alternating on the large display.

High quality E+E sensor technology and state of the art microprocessor based electronics result in highest accuracy and long term stability. The very low power consumption allows battery operation and independence from external power supply.
The standard batteries, replaceable by the user, have a life time about 5 years.

The modern housing concept makes the wall mounting very easy. EE02 can be used as bench mount as well, the free standing kit is included in the scope of supply.

EE02 is available upon request as OEM thermo - hygrometer with your company logo.

Typical Applications

climate monitoring for:
- **office spaces**
- **private areas**
- **laboratories**
- **food stores**

gift article

Features

easiest mounting
modern design
highest accuracy
traceable calibration
long battery life time
available as OEM meter

Technical Data

Measuring Quantities

Relative Humidity

Humidity sensor type	HC103	
Working range[1)]	10...95% RH	
Resolution	0.1% RH	
Accuracy at 20°C (68°F)	±2% RH (40...60% RH)	±3% RH (10...95% RH)
	Traceable to intern. standards, administrated by NIST, PTB, BEV...	
Trend indication	yes	

Temperature active

Working range	-5...55°C (23...131°F)
Resolution	0.1°C
Accuracy at 20°C (68°F)	±0.3°C (±0.54°F)
Trend indication	yes

General Data

Sampling rate	10s	
Current supply	2x 1.5V AAA Alkali battery (not in the scope of supply)	
Battery life time	typ. 5 years	
Display	°C or °F (selectable by jumper)	
CE compatibility according	EN61326-1 EN61326-2-3	CE
Temperature ranges	Working temperature range:	-5...55°C (23...131°F)
	Storage temperature range:	-20...60°C (-4...140°F)
Dimensions	85 x 100 x 26 mm (3.3 x 3.9 x 1")	
Housing / protection class	PC, IP20	

1) Please refer to the working range of the HC103

Ordering Guide

MODEL	
EE02 with E+E logo	**(EE02-FT01)**
EE02 without E+E logo	**(EE02-FT01-L01)**

Humidity Sensor Elements

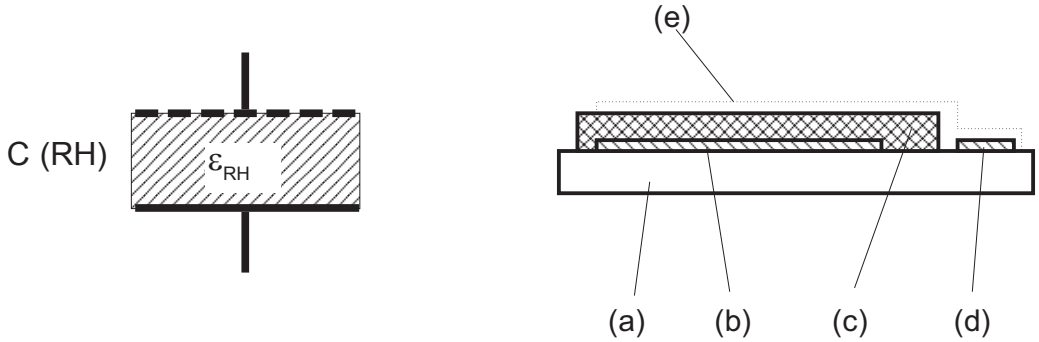
HCT01
HC109
HC103M2
HC201

The HC Series of E+E Elektronik are capacitive humidity sensors produced in thin film technology.
Due to careful selection of materials, to state-of-the-art production technology and to long experience of E+E in thin film technology, all HC humidity sensors show an excellent long term stability, highest reproducibility of the sensor characteristic, are wettable and very resistant to pollutants.
They are used in all E+E standard transmitter series, as well as in a large number of customised and OEM products from mass- to high-end applications.
The excellent linearity enables the use of a simple, cost-effective oscillator circuitry with an easy and accurate calibration procedure.
Extensive evaluation results such as from various long term tests or resistance to most chemicals of practical importance are available.

Construction

A capacitive humidity sensor is in fact a plate capacitor.
A polymer layer is placed between a metal electrode and a coated glass substrate. The dielectric permittivity ε of the polymer depends on its water content.

schematic construction of an E+E humidity sensor



(a) glass substrate
(b) main electrode
(c) humidity sensing polymer layer
(d) connection electrode
(e) porous metal electrode

For an optimal humidity exchange between the polymer layer and the surrounding air, the metal electrode is a porous layer of 0.1 to 1 µm produced by a special production process. The absence of additional insolation layers leads to a high sensitivity. (refer to characteristics of E+E humidity sensors)

The capacity of the sensor:

C sensor capacity at relative humidity RH
ε_{RH} relative dielectric permittivity, depending on humidity
ε_{RH} = 3 (at 0%RH)...3.9 (at 100%RH)
ε_o permittivity of vacuum
A area of the electrodes
d distance between the electrodes
RH relative humidity

$$C(RH) = \frac{\varepsilon_{RH} \cdot \varepsilon_O \cdot A}{d}$$

Definitions

Working Range

The working range is the maximum range for humidity and temperature wherein specified data and tolerances are valid. The interdependence of humidity and temperature is of importance. (refer to data for working range).

Nominal Capacitance

The nominal capacitance is the capacity of the sensor at a certain relative humidity, at temperatures of 20°C (68°F) or 30°C (86°F) and operating frequency of 20kHz.

Sensitivity

The sensitivity is the variation of the capacitance per % RH. It is measured at 33% RH and 76% RH.

Linearity Error

The linearity error is the maximum deviation of the sensor characteristic from the best linear approximation.

Hysteresis

The hysteresis is the maximum difference between two cycles 15 - 95% RH and 95 - 15% RH. The cycles are performed in steps of 20% RH with a stabilisation time of 2 hours after each step.

Temperature Dependence

The temperature dependence is the deviation in % RH per°C (°F) at different humidity and temperature values.

Response Time t_{90}

The response time t_{90} is the time the sensor needs to reach 90 % of the final value for a 0 - 80 % step of relative humidity.

Loss Tangent

The loss tangent quantifies the resistive value of the impedance. It is measured at 25°C (77°F), 76%RH and at operating frequency 20 kHz.

Maximum Supply Voltage

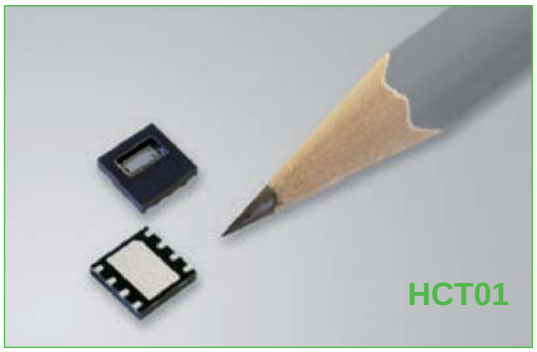
It is given as peak to peak voltage. DC voltage components on the sensing element are not allowed.

Operating Frequency

The HC sensors can operate within the specified frequency limits. For best results we recommend an operating frequency of 20 kHz.
All specified technical data are measured at an operating frequency 20kHz.

HCT01

The preadjusted, capacitive E+E humidity sensor renders elaborate humidity adjustment unnecessary. Temperature is measured by means of a high precision thin-film element – a prerequisite for precisely determining dew point.
The SMD housing provides maximum mechanical sensor protection while permitting a standard reflow process. A protective film applied to the active surface of the humidity sensor provides effective protection against soiling such as dust, mineral salts or other deposits.
Depending on accuracy requirements and existing electronics, various cost-effective evaluation circuits are available

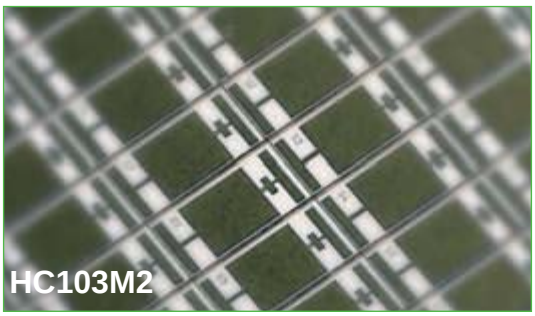


HC109 - SMD Version

Based on the high-end HC1000 and HC101, HC109 was developed to meet the demands of automatic assembly lines for mass production at a competitive price. Typical applications are automotive or home appliances.
HC109 sensors are positioned on the PCB at the same time as other SMD components and soldered using the reflow soldering method. Their small dimensions allow an easy and space saving design.
They show the same advantages as HC1000 and HC101, such as high reproducibility of the sensor data and outstanding linearity over the whole humidity range.
The temperature dependence is also highly reproducible and allows software temperature compensation. This means high accuracy over a wide temperature range, which is essential for instance to calculate dew point temperature.

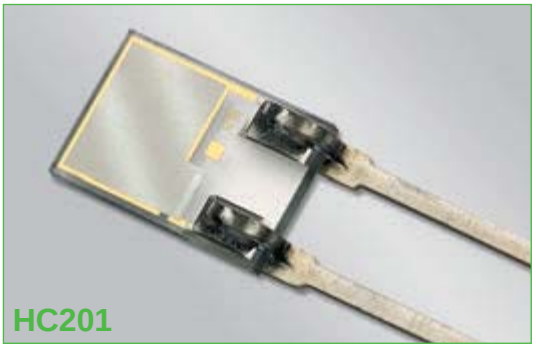
HC103M2

HC103M2 is based on the design of the HC103 series, nevertheless with relevantly shorter response time (t_{90}). This has been reduced to less than 3 seconds, which is twice faster than HC103.
The very short response time together with outstanding linearity over the entire working range and the highly reproducible temperature dependence are ideal for the use of HC103M2 in high end meteorological applications such as weather balloons.



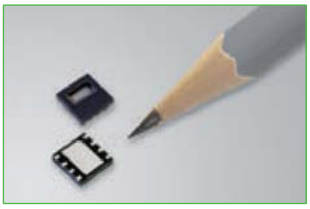
HC201 - For Cost-Effective Applications

With the HC201 offers E+E Elektronik a high-quality and cost-effective humidity sensor in thin layer technology. Mass applications in indoor climate controls are only one of many possible applications of the HC201 series.
HC201/H is a version with a plastic housing which offers easy mounting on PCBs.



HCT01

Humidity / Temperature Sensor



HCT01 humidity/temperature sensors combine high quality, long time approved thin-film sensor technology simple processability and the possibility of a cost-efficient integration into customer application.

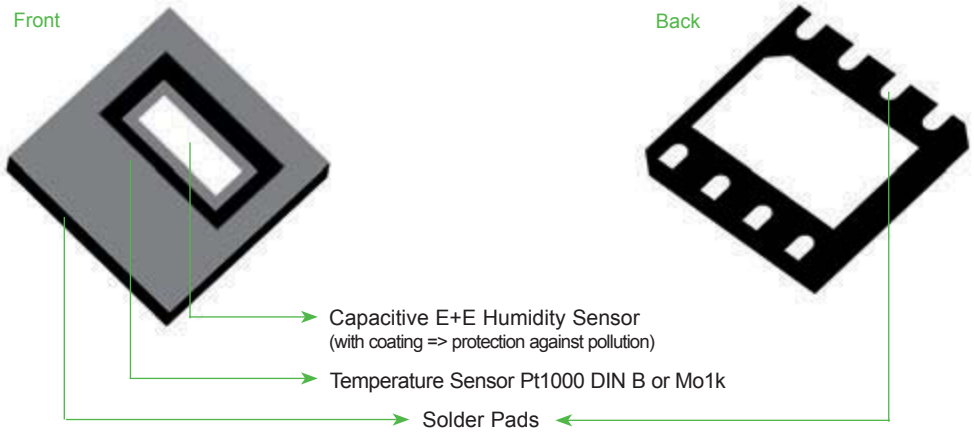
The pre-adjusted capacitive E+E humidity sensorelement saves complicated and time-consuming humidity adjustment. Highly accurate thin-film elements are used for the temperature measurement – a must for precise dew point determination. The DFN packaging guarantees maximum mechanical sensor protection and enables reflow soldering. A protective film on the surface of the humidity sensor ensures extensive protection against contamination like dust, salt or chemical deposit.

Depending on the individual application, accuracy requirements and existing interface electronics, different cost-saving evaluation circuitries are available. Do not hesitate to contact our specialists for further information and design-in support.

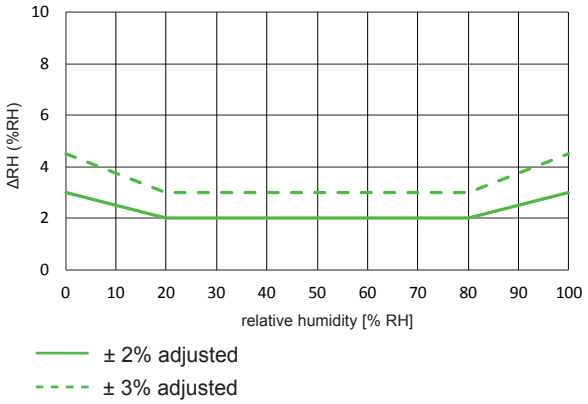
Features

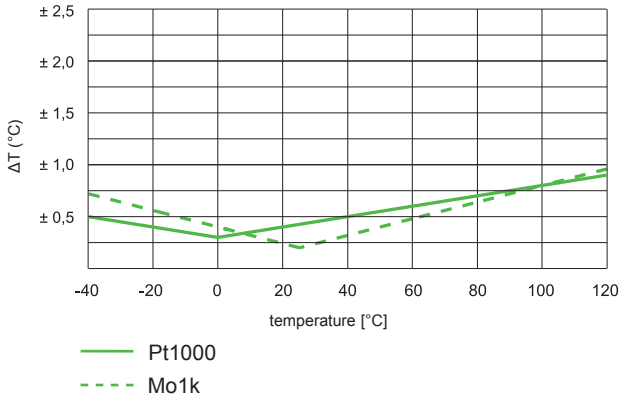
RH and T sensor in one package
RH adjusted
mature humidity sensor technology
high temperature accuracy
reflow solderable
integrated dust filter
standardized DFN package

Basic Design



Accuracy for rH and T

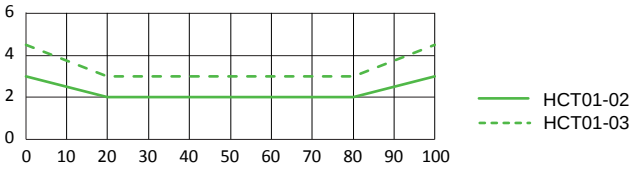




Technical Data

Humidity Element

Working range	humidity:	0...100% RH	
	temperature:	-40...140°C (-40...284°F)	
Nominal capacitance	C_0	70 pF	
Accuracy RH at 30°C	HCT01-00:	non adjusted (C_0: 70±7 pF)	
	HCT01-02:	±2% RH (20...80% RH)	±3% RH (0...90% RH)
	HCT01-03:	±3% RH (20...80% RH)	±4.5% RH (0...90% RH)



Sensitivity	0.25 pF /% RH
Temperature dependence[1)]	dC = -0,00083*RH*(T-30°C) [pF]
Hysteresis	< 1.85%
Long term stability	drift < 0.5% / year[2)]
Maximum supply voltage (no DC voltage)	5V max (Upp)
Maximum DC voltage	< 0.3V
Parallel Resistance	$R_p \geq 100$ MΩ
Serial Resistance	$R_s \leq 1200$ Ω
Respons time	$t_{63} \leq 6$s
Material housing	plated Cu lead-frame and green epoxy-based compound fully RoHS and WEEE compliant
Lead finish	NiPdAu
Sensor protection	E+E coating
Storage temperature	-40..55°C (-40...131°F)
Dimensions	5x5x0.95 mm
Packaging	tape and reel

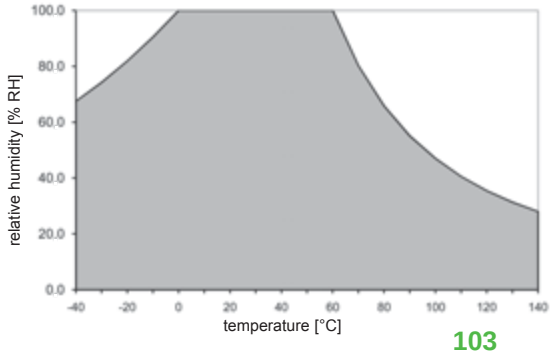
Temperature Element	Mo1k	Pt1000
Nominal resistance (at 25°C / 77°F)	R_{25} = 1000 Ohm	R_0 = 1000 Ohm
Accuracy	dt = ±[0.2+0.008 * (t-25)] K	DINB
Respons time	$t_{63} \leq 6$s	
Characteristics	$R = R_0 * (1+A*t+B*t^2)$ R_0 = 928.73 Ohm A = 0.0030659 $B = 3.41*10^{-7}$	acc. EN60751
Maximum continuous current ($t_{LL}<t_A<t_{UL}$)	0.1mA (I_{cont})	
Maximum current	1mA (I_{max})	
Self heating	0.35 K/mW	

1) Detailed calculation on request.
2) In environments with high concentrations of volatile organic compounds, the value may be higher.

Working Range

The working range is shown with regard to the humidity / temperature limits.

Although the sensors would not fail beyond the limits, the specification is guaranteed only within the working range.
In applications with high humidity at high temperatures the time factor shall be considered.

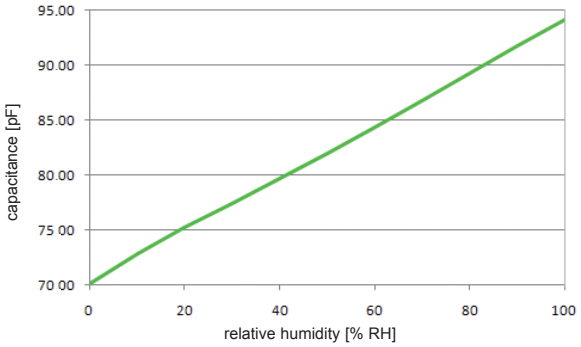


Characteristic Humidity Element

The average increase of capacitance over the working range is app. 25 pF. For the range of 0–98% RH linear approximation is possible, errors will be lower than < ± 1.5% RH.

The sensor characteristic is determined by the following linear formula:

$C(U_w) = C_0 * [1+HC_0 * U_w]$ $\quad C_0 = 70$ pF
with $HC_0 = 3420 \pm 191$ ppm /% RH



For high accuracy requirements, the sensitivity is determined by the following polynomial:

$$C(U_w) = C_0 * [1 + HC_0 * U_w + k(U_w)]$$

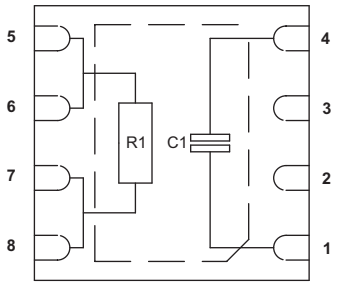
whereby: $k(U_w) = A_1*U_w+A_2*U_w^{1.5}+A_3*U_w^{2}+A_4*U_w^{2.5}$

$A_1 = 2.6657E^{-3}$ $\quad A_2 = -9.6134E^{-4}$

$A_3 = 1.1272E^{-4}$ $\quad A_4 = -4.3E^{-6}$

Connection Diagram

Top View:

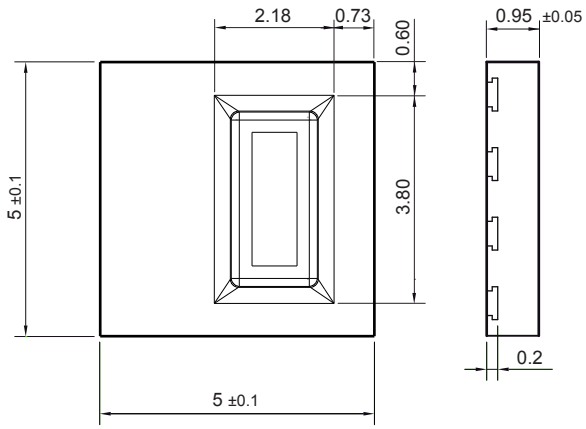


1	H1	Humidity +
2	NC	not connected
3	NC	not connected
4	H2	Humidity -
5	T1	Temperature
6	T1	Temperature
7	T2	Temperature
8	T2	Temperature

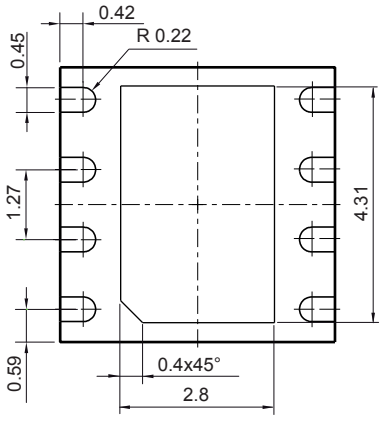
Dimensions in mm

DFN-8 package

Top View:



Bottom View:



Possible circuitries using HCT01

Depending on accuracy requirements and existing electronics, various cost-effective evaluation circuits are available – our specialists can provide expert advice for your specific application.

Ordering Guide

TYPE		ACCURACY RH		TEMPERATURE ELEMENT		PACKAGING	
HCT01	(HCT01)	non adjusted	(00)	no temperature element	(no code)	1000 sensors per reel	(TR1)
		±2%	(02)	Pt1000 DINB	(D)	2500 sensors per reel	(TR2,5)
		±3%	(03)	Mo1k	(S)		

Order Example

HCT01-02STR1

Type:	HCT01
Accuracy RH:	±2%
Temp. Element:	Mo1k
Packaging:	1000 sensors per reel

HC109

SMD Humidity Sensors for Mass Applications

Typical Applications

automotive - air conditioning
home appliances
photocopy machines

Features

SMD mounting
high reproducibility
wettable
very good long term stability
small size construction

Technical Data

Sensor		**HC109**
Nominal capacitance C_0 (at 30 °C / 86 °F)		80 ± 12 pF
	C_{76} (at 30 °C / 86 °F)	100.8 ± 15.1 pF
Response time t_{90}		< 6 sec.
Sensitivity		0.27 pF /% RH
Temperature dependence		dC = -0.00095*RH*(T-30 °C) [pF]
Working range	humidity	0...100 % RH
	temperature	-40...120 °C (-40...248 °F)
Linearity error	(0...98 % RH)	< ± 1.5 % RH
Hysteresis		1.7 ± 0.15 % RH
Long term stability at 20-30 °C (68-86 °F) / 20-80 % RH		drift < 0.5 % / year[1)]
Loss tangent		< 0.05 typical
Maximum supply voltage (no DC voltage)		5 V max (Upp)
Maximum DC voltage		< 5 mV
Operating frequency		10...100 kHz, recommended 20 kHz
Packaging		(tape and reel) refer to ordering guide

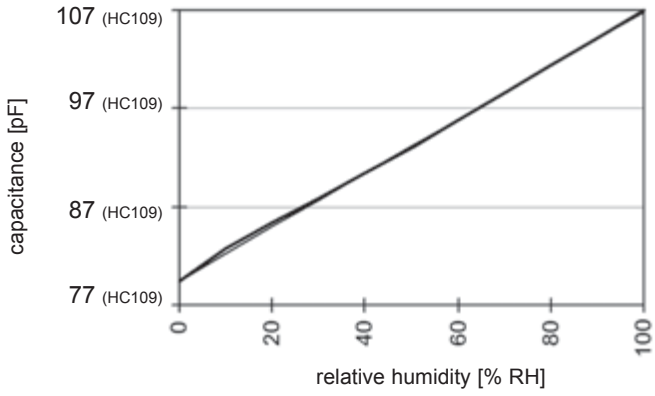
1) In environments with high concentrations of volatile organic compounds, the value may be higher.

Characteristics

The average increase of capacitance over the working range is 27.5 pF (HC109). For the range of 0–98% RH linear approximation is possible, errors will be lower than < ± 1.5% RH.

The sensor characteristic is determined by the following linear formula:

$C(RH) = C_0 * [1+HC_0 * RH]$
with HC_0 = 3420 ± 191 ppm /% RH



For high accuracy requirements, the sensitivity is determined by the following polynomial:

$$C(RH) = C_0 * [1 + HC_0 * RH + K(RH)]$$

whereby:

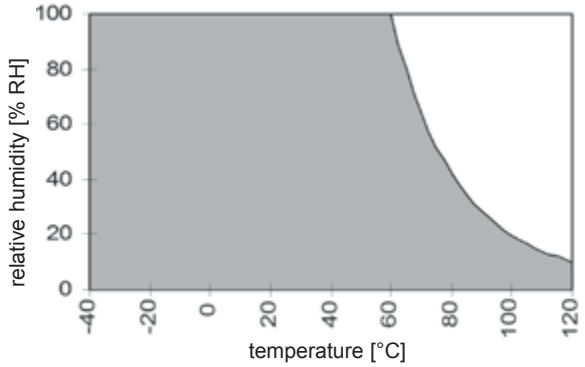
$$K(RH) = A_1*RH+A_2*RH^{1.5}+A_3*RH^2+A_4*RH^{2.5}$$

$A_1 = 2.6657E^{-3}$ $A_2 = -9.6134E^{-4}$
$A_3 = 1.1272E^{-4}$ $A_4 = -4.3E^{-6}$

Working Range

The working range of the humidity sensors HC109 is shown with regard to the humidity / temperature limits.

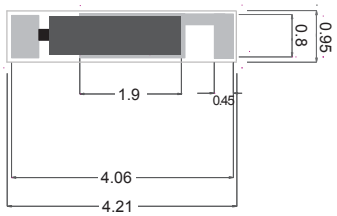
Although the sensors would not fail beyond the limits, the specification is guaranteed only within the working range.
In applications with high humidity at high temperatures the time factor shall be considered.

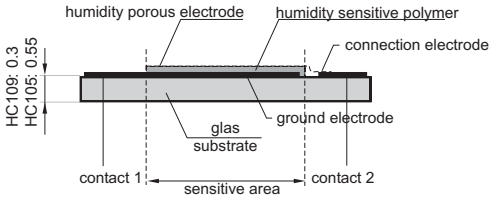


Dimensions (mm)

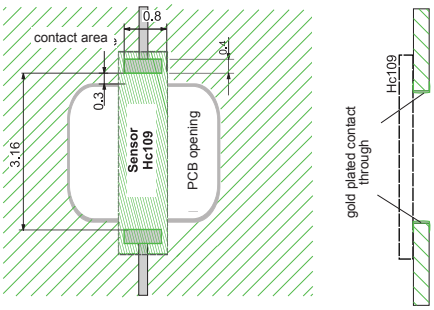
1 mm = 0.03937" / 1" = 25.4 mm

HC109





Mounting Instructions



To allow full access of the air, the humidity sensor should be positioned over an opening in the printed circuit board (PCB).
False readings because of humidity assimilation at the front side of the PCB should be avoided as much as possible by using gold-plated-through holes.

Assembling and Soldering

HC109 sensor series are designed for SMD automatic assembling with subsequent reflow-soldering.

Recommended SMD equipment:
- Automatic tooling machine with suction pipette
- Optical control for sensor identification

Ordering Guide

TYPE		PACKAGING	
capacitive humidity sensor 80 pF	(109)	500 sensors per reel	(TR0,5)
		1000 sensors per reel	(TR1)
		2500 sensors per reel	(TR2,5)
		10000 sensors per reel	(TR10)
HC			

Order Example

HC109TR1
SMD humidity sensor

Type: HC109
Packaging: 1000 sensors per reel

HC201

Humidity Sensors for HVAC Applications

Typical Applications

HVAC
hand helds
humidifiers
dehumidifiers

Features

high repeatability
high sensitivity
wettable
very good long term stability
good resistance to pollutants
small size construction

Technical Data

Nominal capacitance C_{76} (at 20°C / 68°F)	200 ± 30 pF	
Sensitivity	0.6 pF / % RH	
Working range	Humidity	10...95% RH
	Temperature	-40...110°C (-40...230°F)
Linearity error (20...90% RH)	< ± 2% RH	
Hysteresis	2.0 ± 0.3% RH	
Response time t_{90}	< 15 sec	
Temperature dependence [%RH /°C]	ΔRH = g * RH * (T - 20)	g = -0.004 ± 10 %
Long term stability at 20-30°C (68-86°F) / 20-80% RH	drift < 1.5 % / year	
Loss tangent	< 0.1 typical	
Maximum supply voltage (no DC voltage)	5 V max (Upp)	
Maximum DC voltage	< 5 mV	
Operating frequency	10...100 kHz, recommended 20 kHz	
Material connection	phosphor bronze with tin coating	

Packaging

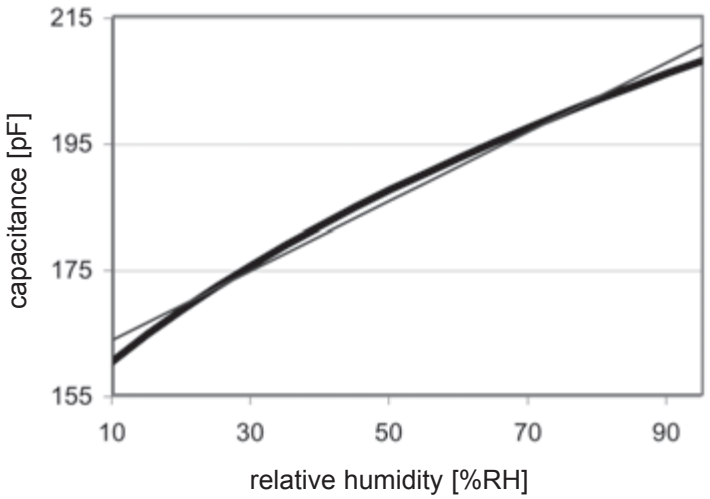
HC201	taped
HC201/H	in tube (80 pcs packing unit)
HC201/G	taped

Characteristics

The average increase of capacitance over the working range is 50pF. For the range of 20–90% RH, linear approximation is possible, errors will be lower than ± 2% RH.

The sensor characteristic is described by the following linear formula:

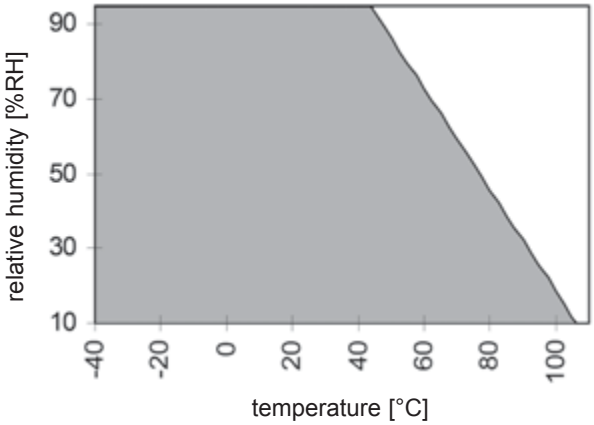
$C(RH) = C_{76} * [1 + HK * (RH – 76)]$
with HK = 2700 ± 250 ppm /% RH



Working Range

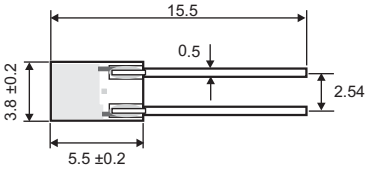
The working range for the humidity sensor HC201 is shown with regard to the humidity / temperature limits.

Although the sensors would not fail beyond the limits, the specification is guaranteed only within the working range.
In applications with high humidity at high temperature the time factor shall be considered.

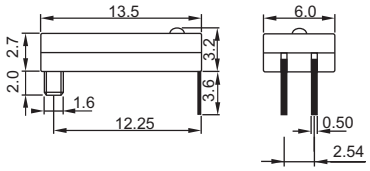


Dimensions (mm)

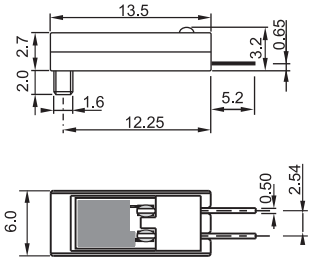
1 mm = 0.03937” / 1” = 25.4 mm



HC201



HC201/H



HC201/G

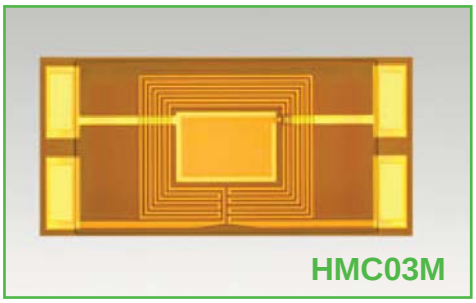
Ordering Guide

MODE	TYPE	
HC	capacitive humidity sensor 200 pF	(201)
	capacitive humidity sensor 200 pF with PC housing for mounting on the printed ciruit board	(201/H)
	capacitive humidity sensor 200 pF with PC housing	(201/G)
HC		

HMC03M

Heated Humidity Sensor for Radiosondes and Weather Balloons

HMC03M is optimized for short response time even at very low temperature (T) in the upper atmosphere. It combines on a silicon substrate a capacitive relative humidity (RH) sensor and a heating resistor (heater).
The heater is dedicated for fast recovery of the humidity sensor after condensation or icing. The construction with the heater positioned all around the RH sensor grants uniform temperature throughout the HMC03M structure, which leads to outstanding measuring performance in high-end weather observation.

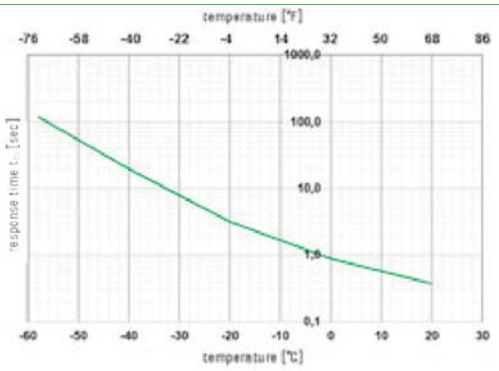


Features

Very short RH response time at low T
Fast recovery after condensation or icing due to sensor heating
High sensitivity

Technical Data

Humidity sensor

Nominal capacitance C_0 (at 30 °C / 86 °F)		120 ± 40 pF
Sensitivity (for C_0 = 120 pF, in average)		0.41 pF / % RH[1)]
Working range	humidity	0...100 % RH
	temperature	-80...60 °C (-112...140 °F)
Linearity error (0...98 % RH)		< ± 2 % RH
Hysteresis		1.9 ± 0.25 % RH
Response time RH t_{63}		

Temperature dependence[2)]	dC = -0.0014*RH*(T-30 °C) [pF]
Loss tangent	< 0.05
Supply voltage	5 V max (UPP)
DC voltage	< 5 mV
Operating frequency	10...100 kHz, recommended 20 kHz

Heater (Molybdenum)

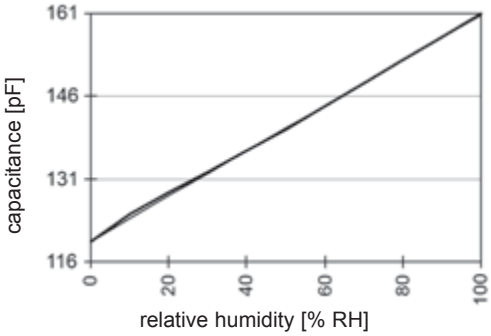
Nominal resistance R_0	100 ± 20 Ohm
Temperature coefficient	3500 ± 150 ppm/K
Self heating coefficient (SHC), typical (at 980 hPa)	
5 m/s	0.09 K/mW
1 m/s	0.17 K/mW
0.1 m/s	0.31 K/mW
Max. power	100 mW

1) More details see „Characteristics
2) Basic formula. Details for t < -20 °C on request

Characteristics

Humidity sensor

$C(RH) = C_0 * [1 + HC_0 * RH]$, where HC_0 = 3420 ± 250 ppm / % RH



Alternatively, a polynomial approximation of the characteristic can be used for high accuracy requirements:

$C(RH) = C_0 * [1 + HC_0 * RH + K(RH)]$, where

$K(RH) = A_1 * RH + A_2 * RH^{1.5} + A_3 * RH^2 + A_4 * RH^{2.5}$

$A_1 = 2.6657e^{-3}$ $A_2 = -9.6134e^{-4}$

$A_3 = 1.1272e^{-4}$ $A_4 = -4.3e^{-6}$

Heater

$R(t) = R_0 * \{1 + \alpha * t * [1 + (\beta + \gamma * t^2) * (\frac{t}{100} - 1)]\}$, where

$\alpha = 0.0031 \pm 0.00015$ $\beta = 0.0086$ $\gamma = -5.6e^{-7}$ for t < 0 °C (32 °F) $\gamma = 0$ for t ≥ 0 °C (32 °F)

Alternative formula according IEC60751:

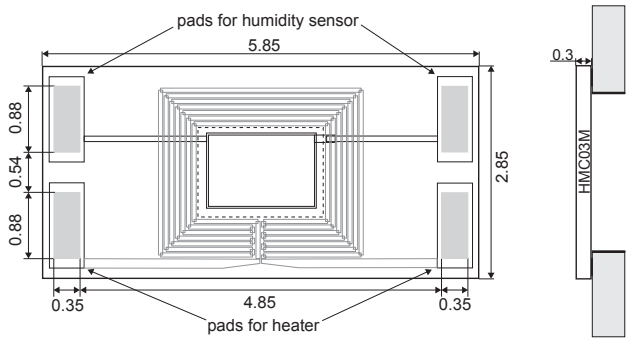
$R(t) = R_0 * (1 + A * t + B * t^2 + C * (t - 100) * t^3)$, where

$A = \alpha * (1 - \beta)$ $B = \frac{\alpha * \beta}{100}$ $C = \frac{\alpha * \gamma}{100}$

Example for TK = 3100 ppm/°C

A = 0.0030733 $B = 2.666e^{-7}$ $C = -1.736e^{-11}$ for t < 0 °C (32 °F) C = 0 for t ≥ 0 °C (32 °F)

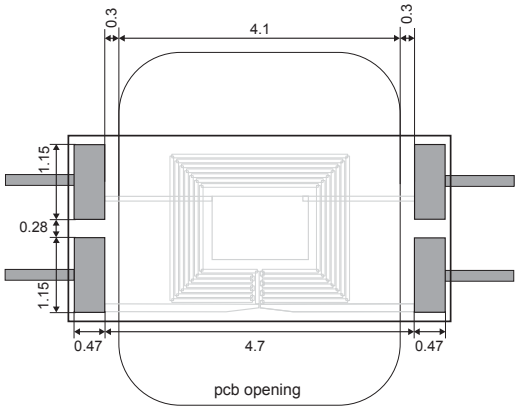
Dimensions (mm)



1 mm = 0.03937”

1” = 25.4 mm

Mounting Instructions



For shortest response time, in case of mounting onto a printed circuit board (PCB), HMC03M shall be positioned over an opening to allow enough air circulation around the sensor.
For best accuracy it is important to avoid moisture accumulation such as at the edge of the PCB by selecting appropriate board material or gold-plating the edge of the opening.

Assembling and Soldering

HMC03M is an SMD (surface mounted device) sensor, appropriate for automatic assembling with subsequent reflow soldering. Please refer to the handling guidelines at www.epluse.com.

Ordering Guide

TYPE	PACKAGING (tape and reel)	
HMC03M	500 sensors	(TR0,5)
	1000 sensors	(TR1)
	2500 sensors	(TR2,5)

Order Example

HMC03MTR1

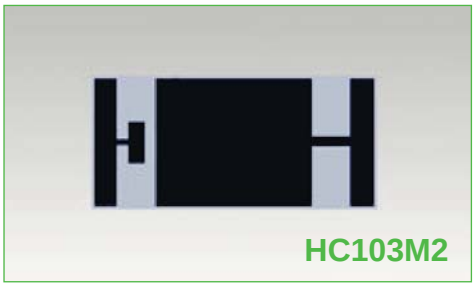
Type: HMC03M
Packaging: 1000 sensors per reel

HC103M2

Very Fast Humidity Sensor for Radiosondes

HC103M2 is a capacitive humidity sensor with very short response time even at very low temperature. By this, the sensor is ideal for accurate measurement in the upper atmosphere with radiosondes and weather balloons.

The sensor is manufactured in state of the art thin film technology and is appropriate for SMD assembly. The design and the choice of materials lead to excellent linearity, high sensitivity and reproducible temperature dependence, which facilitate considerably the design in.



HC103M2 is supplied on tape and reel appropriate for standard SMD assembly machines.

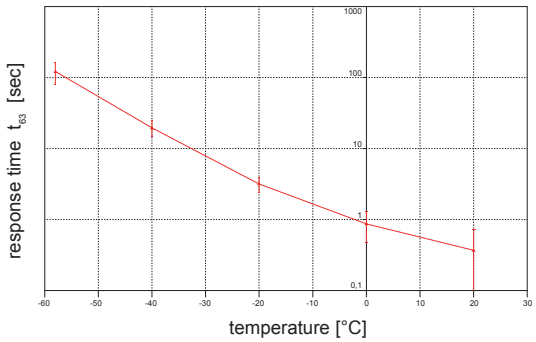
Typical Applications

Radiosondes
Weather observation

Features

Very short response time
High sensitivity and outstanding linearity
Reproducible temperature dependence

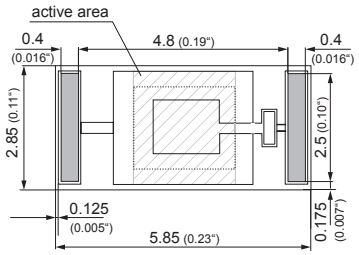
Technical Data

Nominal capacitance C_0 (at 30 °C / 86°F)		160 ± 40 pF
Sensitivity		0.55 pF / % RH
Working range	humidity	0...100 % RH
	temperature	-80...60 °C (-112...140 °F)
Linearity error (0...98 % RH)		< ± 2 % RH
Hysteresis		1.9 ± 0.25 % RH
Response time RH t_{63}		

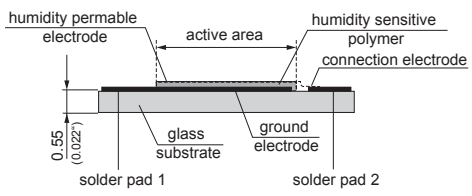
Temperature dependence[1)]	dC = -0.0019*RH*(T-30 °C) [pF]
Loss tangent	< 0.05
Maximum supply voltage	5 V max (UPP)
Maximum DC voltage	< 5 mV
Operating frequency	10...100 kHz, recommended 20 kHz

1) more details for t < -20 °C (68 °F) on request

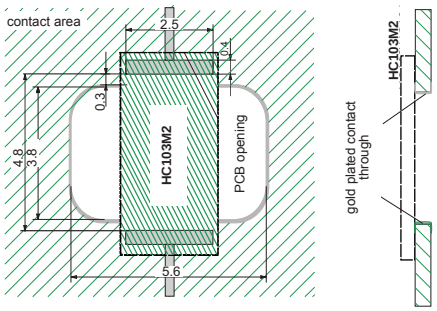
Dimensions (mm/inch)



Construction



Mounting instructions



For shortest response time, in case of mounting onto a printed circuit board (PCB), HC103M2 shall be positioned over an opening to allow enough air circulation around the sensor.
For best accuracy it is important to avoid moisture accumulation such as at the edge of the PCB by selecting appropriate board material or gold-plating the edge of the opening.

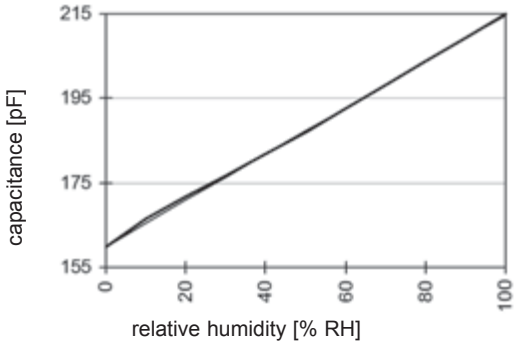
Please refer to the HC103M2 Handling Instructions at www.epluse.com.

Sensor Characteristic

The average capacitance increases over the working range is around 55 pF.

The following linear approximation of the caracteristic over the range 0–98 % RH leads to errors lower than < ± 2 % RH.

$C(RH) = C_0 * [1+HC_0 * RH]$
with HC_0 = 3420 ± 250 ppm /% RH



For high accuracy requirements, the characteristic is described by the following polynomial:

$$C(RH) = C_0 * [1 + HC_0 * RH + K(RH)]$$

whereby:

$$K(RH) = A_1*RH+A_2*RH^{1.5}+A_3*RH^2+A_4*RH^{2.5}$$

$A_1 = 2.6657E^{-3}$ $A_2 = -9.6134E^{-4}$
$A_3 = 1.1272E^{-4}$ $A_4 = -4.3E^{-6}$

Ordering Guide

TYPE		TAPE AND REEL PACKAGING	
HC103M2	(HC103M2)	500 sensors	(TR0,5)
		1000 sensors	(TR1)
		2500 sensors	(TR2,5)
		10000 sensors	(TR10)

Order Example

HC103M2TR1

Type: HC103M2
Packaging: 1000 sensors

Handling Instructions

Cleaning

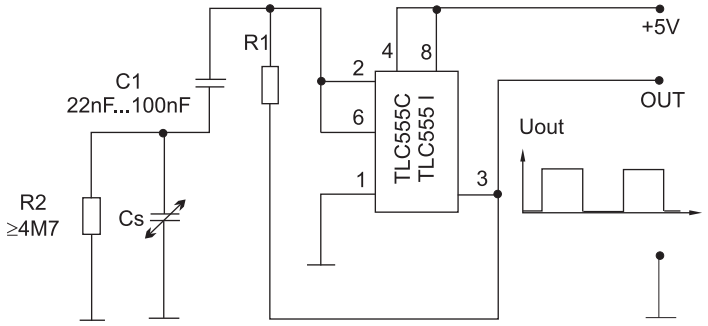
If necessary, the HC sensors can be cleaned by shaking them in pure isopropylalcohol, industrial grade. Do not touch or rub the sensor surface. After cleaning with isopropylalcohol, immerse them in water and let them dry.

Test Circuitry

This test circuitry is in fact an oscillator. Changes of the sensor capacitance modify the frequency of the output signal. The operating frequency can be selected by the R1[1)] resistor (trimmer).

For example, an operating frequency of appr. 50kHz at 76% RH can be set with the following values of R1:

HC105/HC109	R1=appr. 56kΩ...68kΩ
HC104	R1=appr. 68kΩ
HC201	R1=appr. 51kΩ...75kΩ



[1)] Please note that the exact value of R1 depends on the tolerances of Humidity Sensors, the PCB Layout, and the TLC555 tolerances.

Calibration

Each sensor is tested at reference conditions for humidity. The calibration point for the humidity circuitry should be chosen according to the application and typical operation range. If the circuitry has no linearisation we recommend calibration at 33 and 76%. High humidity levels should not be chosen, as wetting of the element can cause misreadings during the calibration procedure.

For reliable check the E+E special calibration set is available.
(refer to data for „Humidity Calibration Set“)

As a professional alternative for check and calibration we recommend the use of the E+E high accuracy humidity calibrator HUMOR 20.
(refer to data for „HUMOR 20“)

EE35

Industrial Transmitter for Dew Point Measurement

Exact dew point monitoring is increasingly playing a more important role in many industrial applications, such as drying processes, air pressure pipelines, etc. For these purposes the multifunctional EE35 Series offers the ideal features.

The EE35 Series is based on a functional, user-friendly housing concept and on the proven polymer humidity sensors of the HC Series.
A specially developed autocalibration process enables measurements in a measurement range of -60...60°C Td (-76...140°F Td), with a Td measurement accuracy of ±2°C (±3.6°F).
Two freely configurable and scalable analogue outputs are available for the two measurement values (Td, T).
An optional hygrostat output, which can be set by means of a potentiometer, provides an alarm signal in a simple way when a threshold of the permitted dew point is exceeded.
An optional display for the measurement values and the associated MIN/MAX values allows a quick overview of the current situation.

Autocalibration

Dew points in the range of -60...-20°C (-76...-4°F) at room temperatures correspond to relative humidity values of 0.08...5.37% RH. The measurement of such low humidity values is not possible with conventional capacitive measurement methods. For the EE35 Series, a special autocalibration process is used to compensate for the usual drift effects and thus to achieve high accuracy measurements also at -60°C Td (-76°F Td).

Installation

In addition to the direct mounting of the dew point probe, a ball valve installation enables the mounting and removal of the probe without having to interrupt the running process.

Alarm Output

An optional alarm module with one relay output is available for control and alarm purposes. The setting of the Td threshold can be easily done with the potentiometer on the printed circuit board.

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.

Typical Applications

industrial processes
monitoring of air pressure pipelines
warehouses
drying processes
paper industries
chemical industries

Features

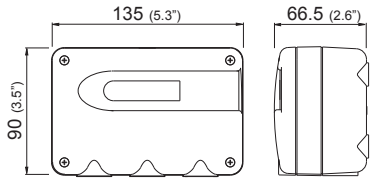
measuring range -60...60°C Td (-76...140°F Td)
accuracy of measurement ±2°C Td (±3.6°F Td)
traceable calibration
alarm output for dew point
autocalibration

Housing Dimensions (mm)

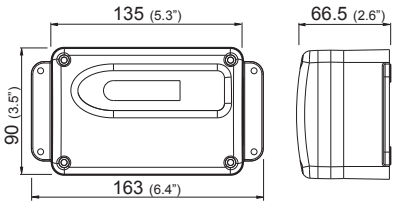
Installation Example

Housing:

polycarbonate housing

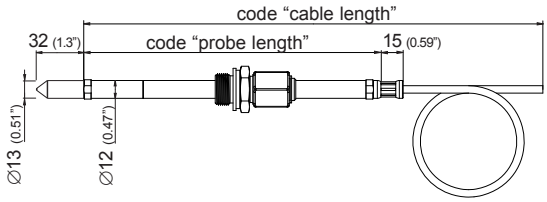


metal housing

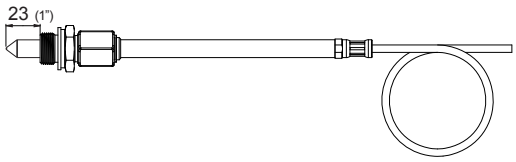


For use in harsh industrial environments the EE35 series is available in a robust metal housing.

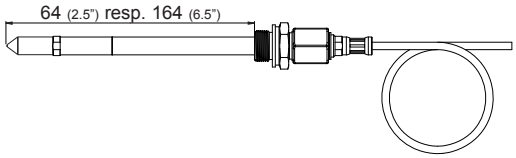
Model:



EE35-xEx
Remote probe for T up to 60°C (140°F) and pressure-tight up to 20bar (290psi)
Probe material: stainless steel

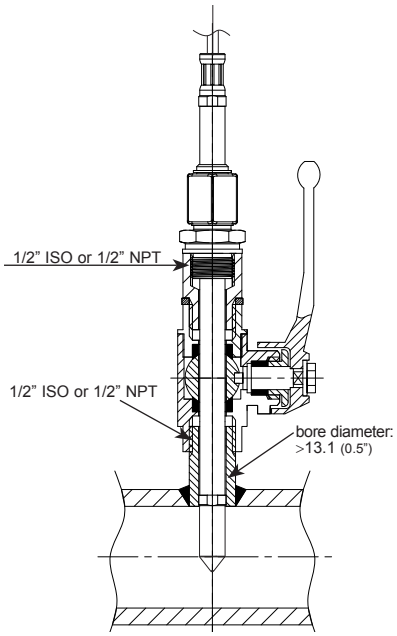


minimum installation depth

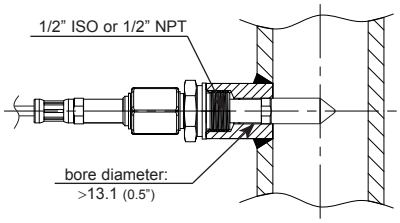


maximum installation depth

ball valve installation
(pressure-tight up to 20bar/290psi)

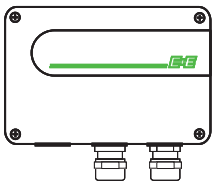


fixed installation
(pressure-tight up to 20bar/290psi)



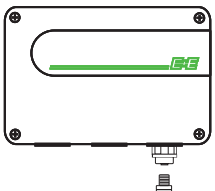
Connection Versions

Standard



2x M16x1.5

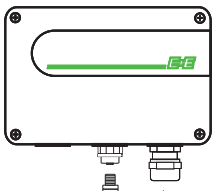
Plug Option C03



Lumberg RKC 5/7

Power supply + Analogue output

Plug Option C06



Lumberg RSC 5/7

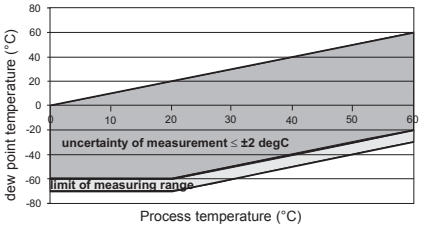
M16x1.5

Technical Data

Measuring Quantities

Dew point

Humidity sensor	HC1000-400
Measuring range (below 0°C / 32°F the transmitter outputs frostpoint)	standard calibration: -40...60°C (-40...140°F) special calibration: -60...60°C (-76...140°F)
Accuracy	≤ ±2°C (≤ ± 3.6°F)
Traceable to intern. standards, administrated by NIST, PTB, BEV...	



Response time t_{90}	80 sec.	-20°C → -40°C	(-4°F → -40°F)
	10 sec.	-40°C → -20°C	(-40°F → -4°F)

Temperature

Sensor	Pt1000 DIN A
Measuring range	0...60°C (32...140°F)
Accuracy of temperature measurement at 20°C (68°F)	±0.2°C (±0.36°F)
Sensitivity error at full scale	±0.1°C (±0.18°F)
Temperature dependence of electronics	< 0.005°C/°C

Outputs

Two freely selectable and scaleable analogue outputs xx...yy°C T, Td/Tf / xx...yy°C respectively	0 - 5V	-1mA < I_L < 1mA
	0 - 10V	-1mA < I_L < 1mA
	4 - 20mA	R_L < 500 Ohm
	0 - 20mA	R_L < 500 Ohm

General

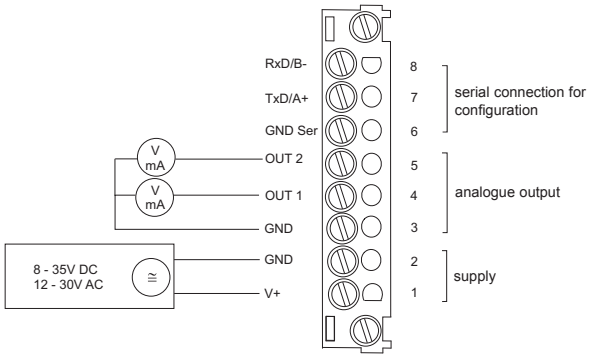
Supply voltage	8...35V DC 12...30V AC	(optional 100...240V AC, 50/60Hz)
Current consumption - voltage output	typ. 40mA, with autocalibration: 100mA	
- current output	typ. 80mA, with autocalibration: 140mA	
Pressure range	0...20bar (0...300psi)	
Housing / protection class	PC or Al Si 9 Cu 3 / IP65; Nema 4	
Cable gland	M16 x 1.5 (option: plug)	cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	screw terminals up to max. 1.5mm² (AWG 16)	
Sensor protection	stainless steel sintered filter	
Working temperature range	probe:	-40...60°C (-40...140°F)
	electronic:	-40...60°C (-40...140°F)
	with LC display:	-20...50°C (-4...122°F)
	with alarm module:	-40...60°C (-40...140°F)
Storage temperature range	-40...60°C (-40...140°F)	
Electromagnetic compatibility according to	EN 61326-1 Industrial Environment	EN61326-2-3 ICES-003 ClassB FCC Part15 ClassB

CE

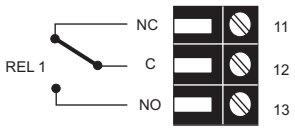
Technical Data for Options

Display	graphical LC display (128x32 pixels), with integrated push-buttons for selecting parameters Td or T and MIN/MAX functions
Alarm output for Td/Tf	- range: -60...40°C Td (-60...40°F Td) adjustable with the potentiometer on the printed circuit board - 1 switch contact - 250V AC/6A or 28V DC/6A

Connection Diagram



Terminal configuration - Alarm output



Ordering Guide EE35

		EE35-
Hardware Configuration		
Housing	metal housing	M
	polycarbonate housing	P
Type	pressure tight	E
Cable length	1m (3.3ft)	01
(incl. probe length)	2m (6.6ft)	02
	5m (16.4ft)	05
Probe length	100mm (3.9")	3
	200mm (7.9")	5
Pressure tight	1/2" male thread	HA03
feedthrough	1/2" NPT thread	HA07
Display	without display	
	with display	D05
Alarm output[1]	without relay	
	with relay	SW
Plug	cable glands	
	1 plug for power supply and outputs	C03
	1 cable thread / 1 plug for RS232	C06
Probe	fixed	
	pluggable	P01
Td-Calibration	standard -40...60°C (-40...140°F)	
	special calibration -60...60°C (-76...140°F)	CA02
Supply voltage	8...35V DC / 12...30V AC	
	integrated power supply 100...240V AC, 50/60Hz[2]	V01

Software Configuration								
Physical parametres of the outputs	temperature		T	[°C/°F]			output 1	B
	dew point temperature		Td	[°C/°F]			output 2	C
	frost point temperature		Tf	[°C/°F]				D
Type of output signals	0-5V							2
	0-10V							3
	0-20mA							5
	4-20mA							6
Measured value unit	metric [°C]							
	non metric [°F]							E01
Scaling of T-output	-40...60	(T02)	-60...20	(T65)	-40...100	(T79)	output T	Select accorcding to ordering guide (Txx)
	-50...50	(T27)	-50...100	(T66)	-40...140	(T83)		
	-80...20	(T63)	-20...70	(T73)	-60...120	(T97)		Other T-scaling refer to data sheet „„T-Scalings““
	-60...60	(T64)	20...140	(T77)				
Scaling of Td/Tf-output	-40...60	(T02)	0...60	(T07)	-60...60	(T64)	output Td resp.Tf	Select accorcding to ordering guide (Tdxx resp. Tfxx)
	-10...50	(T03)	0...80	(T21)	32...120	(T90)		
	0...50	(T04)	-40...80	(T22)	32...140	(T91)		Other Td/Tf-scaling refer to data sheet „„T-Scalings““
	0...100	(T05)	-20...80	(T24)	32...132	(T96)		

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

Accessories

- Ball valve set 1/2" ISO (HA050101)
- Ball valve set 1/2" NPT (HA050104)
- Display + housing cover in metal („D05M“)
- Display + housing cover in polycarbonate („D05P“)
- Stainless steel sintered filter („HA010103“)
- Interface cable for PCB („HA010304“)
- Interface cable for plug C06 („HA010311“)
- Bracket for installation onto mounting rails* („HA010203“)
- Sealing element (HA050308)

*Note: Only for plastichousing, not for metalhousing

Order Example

EE35-ME025HA03D05P01/BC5-T02-Td02

Housing:	metal housing
Type:	pressure tight
Cable length:	2m (6.6ft)
Probe length:	200mm (7.9")
Pressure tight feedthrough:	1/2" male thread
Display:	with display
Alarm output:	without relay
Plug:	cable glands
Sensing probe:	pluggable
Td Calibration:	standard
Supply voltage:	8...35V DC / 12...30V AC

Output 1:	T
Output 2:	Td
Output signal:	0-20mA
Measured value unit:	metric
Scaling of T-output:	-40...60°C
Scaling of Td-output:	-40...60°C

EE355

OEM Dew Point Transmitter down to -60 °C Td

The compact EE355 Dew Point Transmitter with a measuring range down to -60 °C Td is ideal for applications in compressed air systems, plastic dryers and industrial drying processes. An integrated auto-calibration procedure permits a measurement accuracy of <2 °C Td.

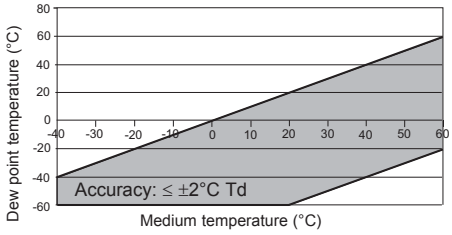
The measured values for dew point, frost point or ppm volume concentration are available on an analog 4-20 mA and a digital Modbus RTU output. Integration into the measurement task is simplified by the compact design and the exceptionally robust stainless steel housing.

With an optional Modbus to USB converter and the free EE-PCS configuration software the user can adjust the transmitter, set the Modbus parameters, and change the scaling of the analog output.

Technical Data

Measuring values

Dew point (Td)

Measurement range	-60...60 °C Td (-76...140 °F Td)
Accuracy [1]	

Response time t_{90}	< 5 min -20 °C Td (-4 °F Td) → -60 °C Td (-76 °F Td) <15 sec -60 °C Td (-76 °F Td) → -20 °C Td (-4 °F Td)

Volume concentration (ppm)

Measurement range	20...200,000 ppm
Accuracy at 20 °C (68 °F) and 1013mbar	±(5 ppm + 9 % from measured value)

Output

Analog output (scalable)	4 - 20 mA (3-wire technology) RL < 500 Ohm
Maximum adjustable scaling	-100...80 °C Td (-148...176 °F Td)
Resolution of analog output	2 µA
Digital interface	MODBUS RTU (max. 32 units in one bus)
Temperature dependence	±5ppm of the measuring span / °C (Deviating from 20 °C)

General

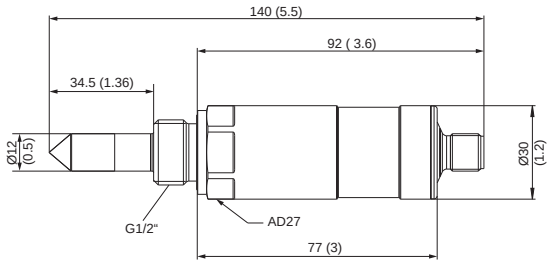
Supply voltage	18...28 V DC
Current consumption at 24V DC	<20 mA + load current / with autocalibration: 100 mA + load current
Pressure range of use	0...80 bar
Housing / protection class	Stainless steel 1.4404 (AISI 316L) / IP65
Electrical connection [2]	M12x1 5-pin plug
Sensor protection	Stainless steel sintered filter
Temperature / humidity operating range	-40...70 °C (-40...158 °F) / 0...100 % RH
Storage temperature range	-40...60 °C (-40...140 °F)
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial environment FCC Part 15 ICES-003 ClassB

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).

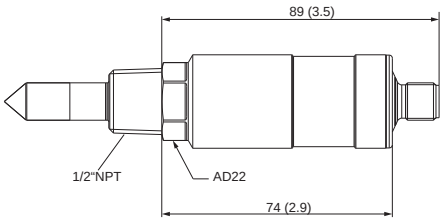
2) Field-attachable mating connector is included in the scope of supply.

Dimensions in mm (inch)

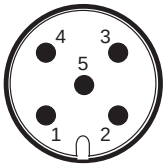
ISO



NPT



Connection Diagram

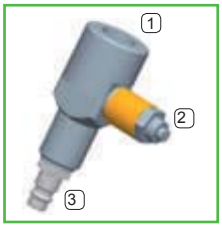


Plug

1...V+
2...Analog output 4-20mA
3...GND
4...RS485 A (=D+)
5...RS485 B (=D-)

Sampling Cell with Quick Connector

The sampling cell is specially developed for use in compressed air lines and has a quick-connector suitable for standard compressed air connections (DN7.2). It allows for the cell to be fitted and removed without interrupting the process. The flow of gas can be adjusted using a bleed screw. Pressure range: 0...10 bar (0...145 psi).



1 = G 1/2“ ISO
2 = Bleed screw
3 = Quick connector

Ordering Information

					EE355-T63G
Pressure-tight screw connection	G1/2" thread 1/2“ NPT thread				**A** **C**
Software configuration					
Physical parameter for analog output	Dew point temperature Frost point temperature volume fraction of water vapor	Td Tf Wv	[°C/°F] [°C/°F] [ppm]	 output for Td < 0	**TD** **TF** **WV**
Scaling of analog output	see chart Scaling Range (e.g. TD002 for -40...60 °C Td)				**xxx**
Measured value unit	metric [°C] non metric [°F]				**M** **N**

Scaling Range

Dew point TD or Frost point TF (in °C or °F)								**volume fraction of water vapor WV**			
002	-40...60	063	-80...20	083	-40...140			001	0...100	004	0...10000
003	-10...50	064	-60...60	141	-100...20			002	0...500	011	0...100000
010	-20...120	065	-60...20					003	0...1000		

Scope of Supply

- EE355 Transmitter according to Ordering Guide
- Mating plug M12x1 for customer assembly
- Operation Manual - Quick guide
- Inspection certificate according to DIN EN10204 - 3.1

Order example

EE355-T63GA/TD065M

Pressure-tight screw connection:	G1/2” thread
Output:	Dew point Td
Output scaling:	4-20 mA = -60...20 °C Td
Measured value unit:	metric [°C]

Accessories

M12x1 5pin connection cable socket/flying leads 1.5m	HA010819	sampling cell with quick connector	HA050102
M12x1 5pin connection cable socket/flying leads 5m	HA010820	sampling cell NPT with bleed screw	HA050107
M12x1 5pin connection cable socket/flying leads 10m	HA010821	basic sampling cell	HA050103
Modbus - USB converter for EE35x	HA011013	stainless steel sintered filter	HA010103

EE354

Miniature Dew Point Transmitter down to -20 °C Td (-4 °F Td)

The EE354 was developed for monitoring dew point down to -20 °C Td (-4 °F Td). The high measurement accuracy of ±1 °C Td (±1.8 °F Td) in the typical working range of a refrigeration dryer makes the EE354 the ideal solution for OEM manufacturers.
Integration into the measurement task is considerably simplified thanks to its highly compact design and exceptional robust stainless steel housing. The measurement values are issued on an analog 4-20 mA and a digital Modbus RTU output. Furthermore, excellent long-term stability and temperature compensation across the entire measurement range are important features of the EE354.
Using the free EE-PCS configuration software and the Modbus USB converter (available as an accessory), the scaling of the analog output can be modified. This also permits one and two-point adjustments by the user.

Typical Applications

Compressed air monitoring
Refrigeration dryer

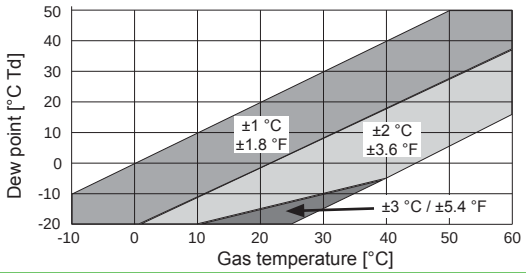
Features

Measurement range -20...50 °C Td (-4...122 °F Td)
Accuracy ±1 °C (±1.8 °F) for refrigerant dryers
Output 4...20 mA
MODBUS RTU digital interface
Pressure-tight up to 80 bar (1160 psi)

Technical Data

Measured Values

Dew point (Td)

Sensor	HC1000
Measurement range	-20...50 °C Td (-4...122 °F Td)
Accuracy at 20 °C[1]	
Response time t_{90} at 20 °C	< 30 sec.

Output

Analog output (scalable)	4 - 20 mA (3-wire technology)	R_L < 500 Ohm
Maximum adjustable scaling	-40...80 °C Td (-40...176 °F Td)	
Digital interface	MODBUS RTU	
Temperature dependence	±0.005 % of the measuring span / °C	

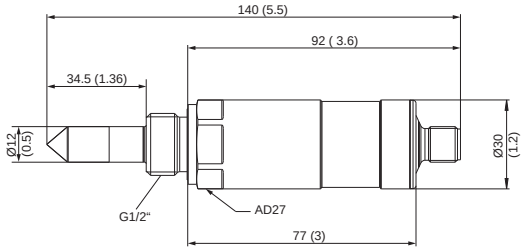
General

Supply voltage	10*)...28 V DC	*) 10V+0.02*R_L
Power consumption at 24 V DC	<40 mA	
Pressure range of use	0...80 bar (0...1160 psi)	
Housing / protection rating	Stainless steel 1.4404 (AISI 316L) / IP65	
Electrical connection[2]	M12x1 5-pin plug	
Sensor protection	Stainless steel sinter filter	
Temperature / humidity operating range	-40...60 °C (-40...140 °F) / 0...100 % RH	
Storage temperature range	-40...60 °C (-40...140 °F)	
Electromagnetic compatibility in accordance with	EN61326-1 EN61326-2-3 Industrial environment	CE

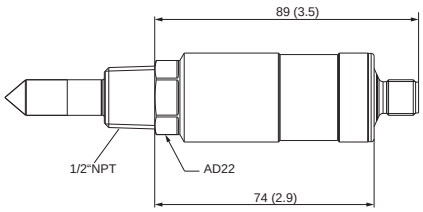
1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2 x standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
2) Flange receptacle for self assembly included in scope of supply.

Dimensions in mm (inch)

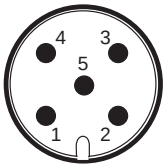
ISO



NPT



Connection Diagram



Plug

1...V+
2...Analog output 4-20 mA
3...GND
4...RS485 A (=D+)
5...RS485 B (=D-)

Modbus Map

The measured values are 32Bit *float* values. The factory-set slave ID is 243 as *integer* 16Bit value. This ID can be customised in the register 0x00 (value range 1 - 247 permitted). For Modbus setting please see Application Note AN0103. The factory setting of the transmission rate is: baud rate 9600, parity even, and stop bit 1.

FLOAT:

Register address	*Protocol address*	*Parameter name*
30032	0x1F	dew point Td
30042	0x29	frost point Tf

INTEGER:

Register address	*Protocol address*	*Parameter name*
60001	0x00	Slave-ID
60002	0x01	RS485 setting

Ordering Information

				EE354-T63G
Pressure-tight screw connection	G1/2" thread 1/2" NPT thread			A C
Software configuration				
Physical parameters **Analog output**	Dew point temperature Td Frost point temperature Tf	[°C/°F] [°C/°F]	 at dew point <0°C, the frost point is issued	TD TF
Td/Tf output scaling (in °C or °F)				xxx (acc. to table scaling ranges)
Measured value unit	metric [°C] non metric [°F]			M N

Scaling Range

TD or TF											
002	-40...60	007	0...60	024	-20...80	048	-20...50	090	32...120		
003	-10...50	008	-30...70	025	-20...60	060	-20...40	091	32...140		
004	0...50	022	-40...80	047	-20...150	083	-40...140				

Accessories

M12x1 5pin mating plug suitable for customer-specific assembly	HA010708	sampling cell with quick connector	HA050102
M12x1 5pin connection cable socket/flying leads 1.5 m	HA010819	sampling cell NPT with bleed screw	HA050107
M12x1 5pin connection cable socket/flying leads 5 m	HA010820	basic sampling cell	HA050103
M12x1 5pin connection cable socket/flying leads 10 m	HA010821	stainless steel sinter filter	HA010103
		Modbus - USB converter for EE35x	HA011013

Order example

EE354-T63GA/TD060M

Pressure-tight screw connection:	G1/2" thread
Output:	Dew point Td
Scaling of output:	4-20 mA = -20...40 °C Td
Measured value unit:	metric [°C]

EE371

Compact Dew Point Temperature Transmitter / Switch

The exact monitoring of dew point temperature in compressed air systems, dryers for plastic and other industrial processes is becoming increasingly more important.
EE371 series with a measuring range -60...60°C Td (-112...140°F Td) is the ideal solution for such applications.
The core of the transmitter is the monolithic measurement cell type HMC01, developed by E+E Elektronik in thin-film technology.
An autocalibration procedure which is integrated in the device and years of experience in low humidity adjustment make an accuracy of <2°C Td (±3.6°F Td) possible.
The compact construction in a robust aluminium housing and the numerous options allow easy mounting and many application possibilities.

Autocalibration

Dew point temperatures in the range of -60...-20°C (-76...-4°F) at room temperature correspond to relative humidity values of 0.08...5.37% RH. The measurement of these low humidity values is not possible with conventional capacitive measurement methods. For the EE371 series a special autocalibration procedure is utilized to achieve high accuracy measurements at lowest dew points too.

Outputs

Model T: The transmitter has two freely selectable and scaleable outputs for dew point, frost point or ppm volume concentration.

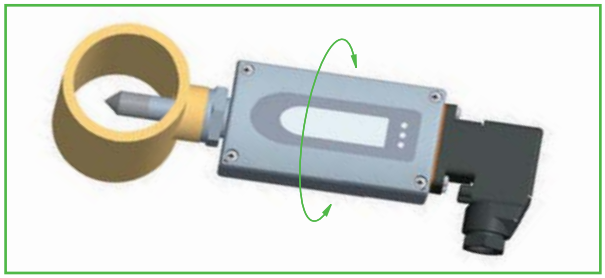
Model S: The switch with two relay outputs is designed for control and alarm purposes. The status for early warning and main alarm is indicated by LED's. Adjustment of the Td/Tf set point and hysteresis can be achieved with the optional configuration software.

Configuration Software

The optional configuration software allows flexible and easy adjustment of the analogue resp. relay outputs to the respective requirements.
The adjustment / calibration of the transmitters can easily be performed.

Screw Connection for Mounting - 360° positionable

The construction of this screw connection enables any position / rotation of the mounted transmitter.
So an optimal position of the display resp. the cable outlet is guaranteed.



Typical Applications

monitoring of compressed air systems
refrigerant type dryer
absorption dryer
plastics dryer

Features

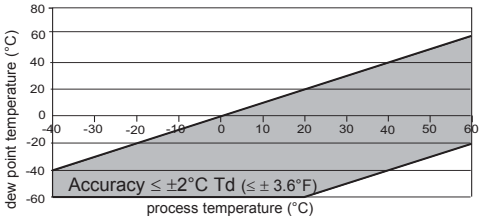
measuring range -60...60°C Td (-76...140°F Td)
accuracy of measurement ±2°C Td (±3.6°F Td)
two Td/Tf alarm outputs
autocalibration
pressure tight up to 100 bar (1450psi)

Technical Data

Measuring Quantities

Dew point (Td)

Dew point sensor	HMC01
Measuring range	-60...60°C Td (-76...140°F Td)
Accuracy	Traceable to intern. standards, administrated by NIST, PTB, BEV...



Response time t_{90}	80 sec.	-20°C Td → -40°C Td	(-4°F Td → -40°F Td)
	10 sec.	-40°C Td → -20°C Td	(-40°F Td → -4°F Td)

Volume concentration

Measuring range	20...200,000ppm
Accuracy at 20°C (68°F) and 1013mbar	±(5 ppm + 9 % from measured value)

Outputs

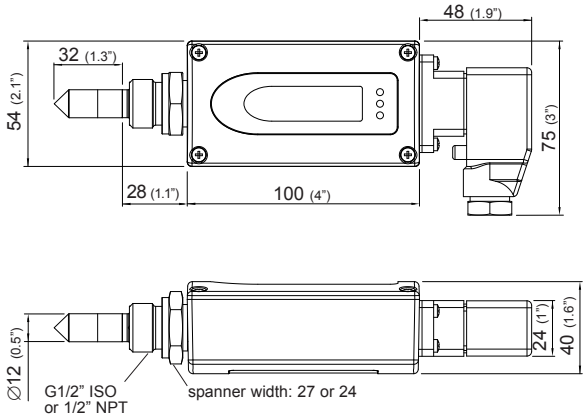
EE371-Tx two freely selectable and scaleable analogue outputs for Td, Tf, Wv	0 - 1V / 0 - 5V / 0 - 10V[1)]	-1mA < I_L < 1mA
	4 - 20mA / 0 - 20mA	R_L < 500 Ohm[1)]
EE371-Sx Alarm output	2 potential-free relays (NC) 30V DC 0.6A / 35V AC 0.3A (resistive)	

General

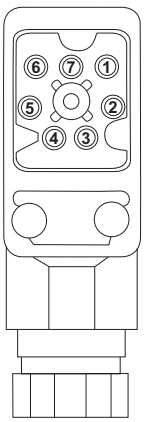
Supply voltage	10...30V DC
Current consumption at 24V DC	voltage output: typ. 40mA / during autocalibration: 100mA current output: typ. 80mA / during autocalibration: 140mA
Pressure range	0...20bar (0...290psi) / 0...100bar (0...1450psi)
System requirements for software	WINDOWS 2000 or later; serial interface
Serial interface for configuration	RS232C
Housing / protection class	Al Si 9 Cu 3 / IP65
Electrical connection	7-pole industrial plug: DIN VDE 0627 / IEC 61984 cable cross-section: 0.25 - 1 mm² cable connection: PG 11
Sensor protection	stainless steel sintered filter
Working temperature range	probe: -40...70°C (-40...158°F) electronic: -40...60°C (-40...140°F) with LC display: -20...50°C (-4...122°F)
Storage temperature range	-40...60°C (-40...140°F)
Electromagnetic compatibility according to	EN 61326-1 EN61326-2-3 ICES-003 ClassB Industrial Environment FCC Part15 ClassB

1) minimum supply voltage 15V DC

Dimensions (mm)



Connection Diagram



analogue output

1	V+
2	GND
3	GND
4	OUT1
5	OUT2
6	NC
7	NC

10...30V DC

V mA

relay output

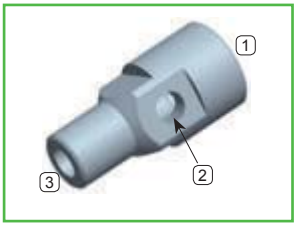
1	V+
2	GND
3	NC11
4	NC12
5	NC21
6	NC22
7	not connected

10...30V DC

Basic Sampling Cell

The basic sampling cell offers the possibility to integrate the EE371 into an existing or self-constructed sampling system.
Pressure range: 0...64 bar (0...928 psi)

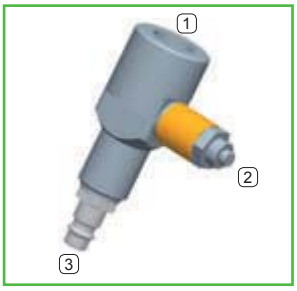
1 = G 1/2“ ISO or 1/2“ NPT
2 = G 1/4“ ISO or 1/4“ NPT
3 = G 1/4“ ISO or 1/4“ NPT



Sampling Cell with Quick Connector

The sampling cell is specially developed for use in compressed air lines and has a quick-connector suitable for standard compressed air connections.
It allows for the cell to be fitted and removed without interrupting the process.
The flow of gas can be adjusted using a bleed screw.
Pressure range: 0...10 bar (0...145 psi)

1 = G 1/2“ ISO
2 = Bleed screw
3 = Quick connector



Ordering Guide

						EE371-	EE371-
Hardware Configuration							
Model	transmitter					T	
	switch						S
Pressure range	up to 20bar					E	E
	up to 100bar (1450psi)					I	I
Pressure tight feedthrough	G1/2" male thread					HA03	HA03
	1/2" NPT thread					HA07	HA07
Display	without display						
	with display					D08	D08
Software Configuration							
Physical parameters of the outputs/relays	dew point temperature	Td	[°C/°F]	(C)	output/relay 1	select acoriding to Ordering Guide(C,D,P)	
	frost point temperature	Tf	[°C/°F]	(D)	output/relay 2	select according to Ordering Guide(C,D,P)	
	volume concentration	Wv	[ppm]	(P)			
Type of output signals	0-1V					1	
	0-5V					2	
	0-10V					3	
	0-20mA					5	
	4-20mA					6	
Measured value units for T / Td / Tf	metric/SI						
	non metric /US					E01	E01
Scaling of Td/Tf-ouput (in °C or °F)	-40...60 (Td/Tf02)	-60...20 (Td/Tf65)			Other Td/Tf-scaling refer to data sheet „Scaling of the outputs“	select according to Ordering Guide (Tdxx / Tfxx)	
	-10...50 (Td/Tf03)						
ppm range Wv	0...100ppm (X01)						
	0...500ppm (X02)	other measurment range: _____				select according to Ordering Guide	
	0...1000ppm (X03)						
Setting of alarm output	standard for configuration CC	R1: -40 °C (-40°F)	R2: -35°C (-31°F)				
		H1: 2 °C (3.6°F)	H2: 2°C (3.6°F)				
	other set points	relay 1: _____	relay 2: _____				SP
		hysteresis 1: ___	hysteresis 2: __				

Order Example

EE371-TEHA07D08/CD2-Td/Tf03

Model:	transmitter	Output 1:	Td
Pressure range:	up to 20bar (290psi)	Output 2:	Tf
Pressure tight feedthrough:	1/2” NPT thread	Output signal:	0-5V
Display:	with display	Measured value unit:	metric
		Scaling of output:	-10...50°C

Scope of Supply

- EE371 Transmitter according to Ordering Guide
- Operation Manual
- Inspection certificate according to DIN EN10204 - 3.1

Accessories

- Sampling cell with quick connector	(HA050102)
- Basic sampling cell ISO	(HA050103)
- Basic sampling cell NPT	(HA050105)
- Display	(D08)
- Stainless steel sintered filter	(HA010103)
- Product configuration adapter	see data sheet EE-PCA
- Product configuration software	EE-PCS (free download: www.epluse.com/configurator)

EE360

High-End Moisture in Oil Transmitter

EE360 is dedicated for reliable monitoring of lubrication, hydraulic and insulation oils as well as diesel fuel. In addition to highly accurate measurement of water activity (a_w) and temperature (T), EE360 calculates the absolute water content (x) in ppm.

The probe can be employed up to 180 °C (356 °F), 20 bar (290 psi) and is available with either ISO or NPT slide fitting, which allows for variable immersion depth. Using the optional ball valve, the probe can be mounted or removed even without process interruption.

The rugged polycarbonate enclosure facilitates easy mounting and maintenance. The measured values are available on two analogue outputs and on the Modbus RTU interface. An optional relays module can be used for alarms and process control.

The state of the art TFT colour display can show all measurands simultaneously and offers extensive error diagnostics. The integrated data logging function saves all measured data in the internal memory. The logged data can be displayed in a graph directly on the device or easily downloaded via USB interface.
The EE360 configuration and adjustment can be performed either directly on the device via display and push buttons or with the free EE-PCS software using the USB service interface.

Typical applications

Monitoring of transformer, lubrication, hydraulic or quench oil as well as diesel fuel.

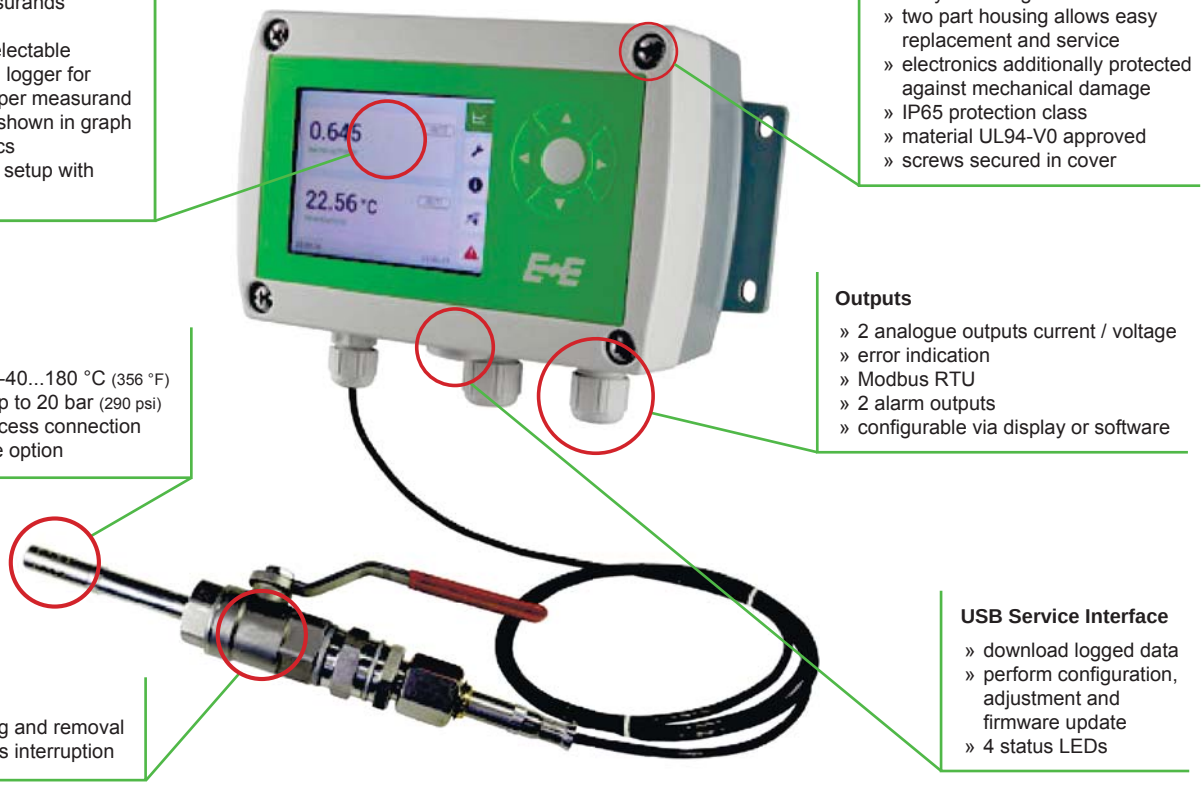
Features

3,5“ TFT Colour Display

» shows all measurands simultaneously
» layout freely selectable
» integrated data logger for 20.000 values per measurand
» logged values shown in graph
» error diagnostics
» intuitive device setup with push buttons

Enclosure

» easy mounting
» two part housing allows easy replacement and service
» electronics additionally protected against mechanical damage
» IP65 protection class
» material UL94-V0 approved
» screws secured in cover



Outputs

» 2 analogue outputs current / voltage
» error indication
» Modbus RTU
» 2 alarm outputs
» configurable via display or software

Probe

» oil temperature -40...180 °C (356 °F)
» pressure tight up to 20 bar (290 psi)
» ISO or NPT process connection
» pluggable probe option

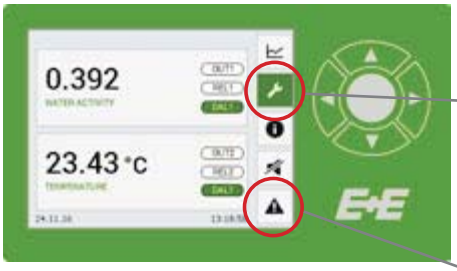
USB Service Interface

» download logged data
» perform configuration, adjustment and firmware update
» 4 status LEDs

Ball valve

» probe mounting and removal without process interruption

TFT colour display with integrated data logger (option D2)



Settings

» analogue, digital and alarm output setup
» one and two point adjustment for RH and T
» probe replacement (for pluggable probe)
» password protection for all relevant settings

Error Diagnostics

» error self-diagnosis
» error description
» audible and visual error warnings

Data logger

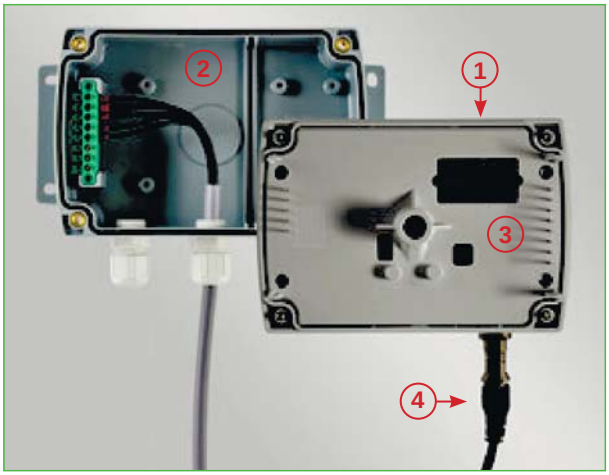
» 20.000 values saved per measurand
» selectable sampling rates
» view recorded data as graph
» download data via USB port and EE-PCS software

Modular Housing / Pluggable Probe

The upper part of the transmitter **(1),** which accommodates the electronics and the probe, can be plugged off for service or adjustment and can be replaced within seconds. This allows for the bottom part **(2)** to remain mounted with intact cabling.

A polycarbonate cover **(3)** on the inside of the housing protects the electronics during installation or service.

The remote probe models are also available with a pluggable probe **(4)** which can be easily exchanged by a push-pull plug. It is ideal for installation of long probe cables and in applications that might require periodical probe replacements.



Measurement of water activity a_w / water content x

The moisture in oil can be expressed in absolute or relative terms.

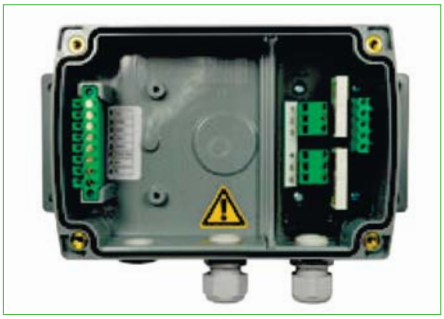
- **Water activity a_w** is the relative measure for moisture in oil. It represents the ratio between the actual amount of dissolved water and the maximum possible amount of dissolved water in the oil at a certain temperature T. Independently of the oil type, the water activity shows how close to saturation is the oil at a certain temperature.

  aw=0 indicates completely dry oil, while aw=1 fully saturated oil.
  EE360 measures directly the water activity.

- The **water content x** is an absolute measure equal to the share of water (dissolved, emulsified or separate) in the oil. The water content is measured in ppm (parts per million) and is independent from the oil temperature. For assessing how far is the oil from saturation, x must be regarded together with T.
  EE360 calculates x out of the measured aw and T values. The calculation is oil dependent and requires a set of oil specific parameters.

Alarm outputs (option AM2)

This optional module features two freely configurable relay outputs for control purposes. Various operation modes are available including hysteresis, window and error indication. When error indication is selected, a fault in the humidity or temperature measurement will trigger the alarm output. The measurands at the outputs as well as the thresholds and hysteresis can be set using the EE-PCS software or directly on the device via display and push buttons.



Integrated Power Supply Module (option AM3)

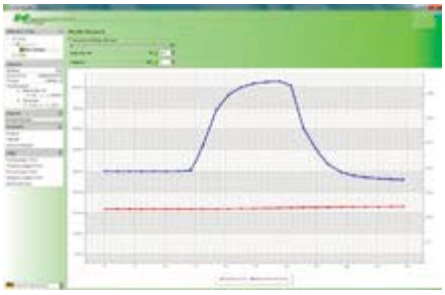
The module allows the device to be powered with 100…240 V AC (50/60 Hz).

E+E Product Configuration Software

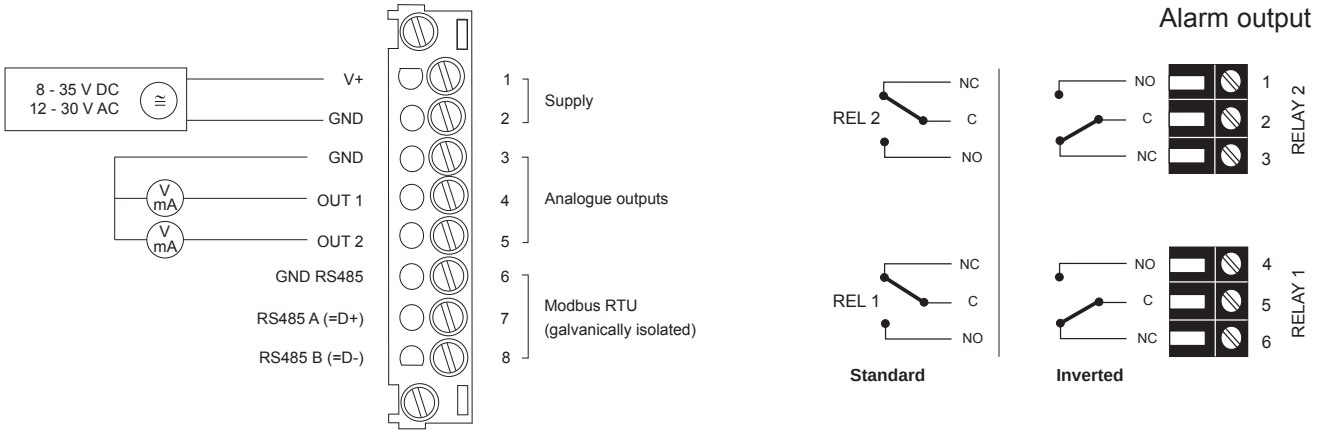
EE-PCS is an intuitive software that allows the user to perform:

- flexible, easy and fast setup of the analogue and alarm outputs
- 1 or 2 point adjustment of humidity and temperature
- replacement of the pluggable sensing probe
- Modbus RTU communication setup
- setup of the display layout
- download logged data
- view error diagnosis information

EE-PCS is available free of charge at: *http://www.epluse.com/configurator*

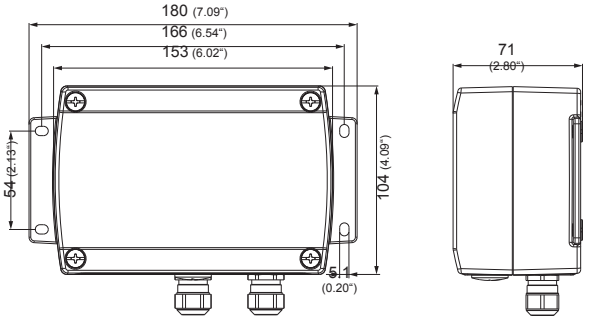


Connection diagram

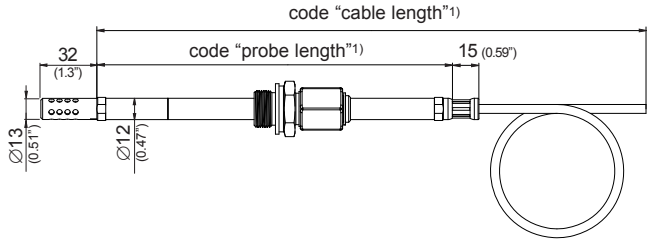


Dimensions (mm/inch)

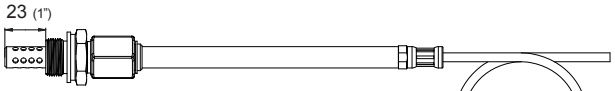
Housing:



Probe:

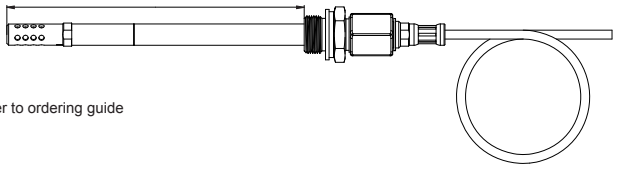


minimum installation depth



maximum installation depth

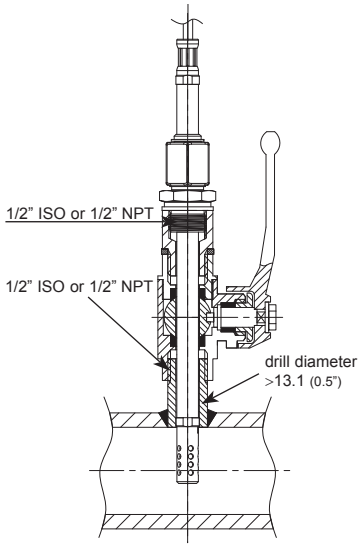
64 mm (2.5") for 100 mm (3.94") probe /
164 mm (6.5") for 200 mm (7.87") probe



1) Refer to ordering guide

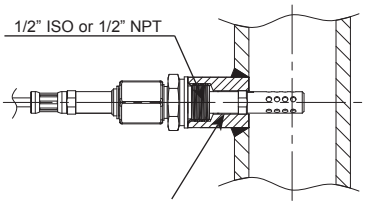
Ball valve installation

pressure-tight up to 20 bar (290 psi)
only for 200 mm (7.87") probe



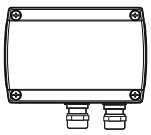
Direct installation

pressure-tight up to 20 bar (290 psi)



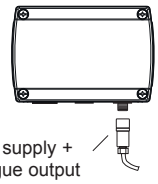
Electrical connection

standard

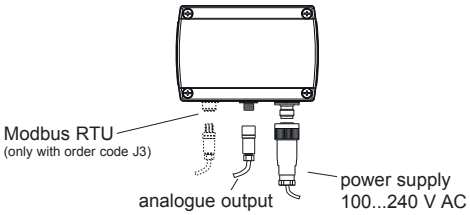


2x M16x1.5

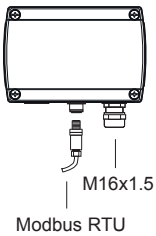
option E4



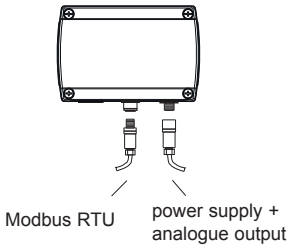
option AM3



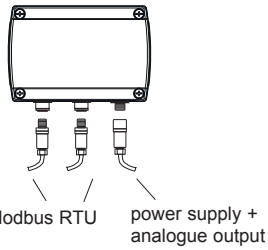
option E5



option E6



option E12



Mating plugs included in the scope of supply

Technical data

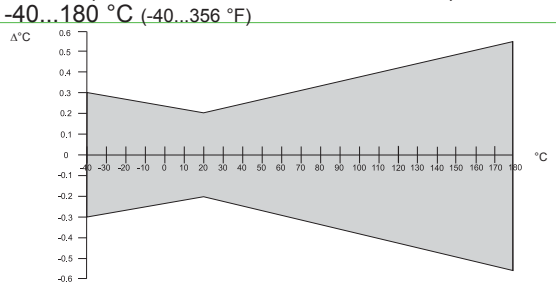
Measuring values

Water activity (a_w) / Water content (x)[1)]

Humidity sensor		HC1000-400
Measuring range		0...1 a_w / 0...100,000 ppm
Accuracy[2)]		
-15...40 °C (5...104 °F)	≤0.9 a_w	± (0.013 + 0.3%*mv) a_w
-15...40 °C (5...104 °F)	>0.9 a_w	± 0.023 a_w
-25...70 °C (-13...158 °F)		± (0.014 + 1%*mv) a_w
-40...180 °C (-40...356 °F)		± (0.015 + 1.5%*mv) a_w
Temperature dependence of electronics		typ. ± 0.0001 [1/°C] (typ. ± 5.6 * 10^{-5} [1/°F])
Temperature dependence of sensing probe		typ. ± (0.00002 + 0.0002 x a_w) x ΔT [°C] ΔT = T - 20 °C
Response time at 20 °C (68 °F) / t_{90}		typ. 10 min in still oil

mv = measured value

Temperature (T)

Temperature sensor	Pt1000 (tolerance class A, DIN EN 60751)
Working range sensing probe	-40...180 °C (-40...356 °F)
Accuracy	

Temperature dependence of electronics	typ. ± 0.005 °C/°C

Outputs

Two analogue outputs (freely selectable and scalable)	0 - 1 / 5 / 10 V		-1 mA < I_L < 1 mA
	4 - 20 mA	3-wire	R_L < 500 Ohm
	0 - 20 mA	3-wire	R_L < 500 Ohm
Digital interface	RS485 with Modbus RTU, up to 32 devices in one bus		

General

Power supply class III ⧫ (EU) / class 2 (NA)	8...35 V DC 12...30 V AC 100...240 V AC, 50/60Hz with option AM3 [3)]
Current consumption - 2x voltage output	for 24 V DC/AC: typ. 40 mA
- 2x current output	typ. 80 mA
Pressure range sensing probe	0.01...20 bar (0.15...300 psi)
Probe material	stainless steel 1.4404 (AISI 316L)
Enclosure material	Polycarbonate UL94-V0 approved
Protection class	IP65
Cable gland	M16 x 1.5 for cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	screw terminals up to max. 1.5 mm² (AWG 16)
Working and storage temperature electronics	-40...60 °C (-40...140 °F) without display -20...50 °C (-4...122 °F) with display
Electromagnetic compatibility	EN61326-1 Industrial Environment EN61326-2-3 ICES-003 ClassA FCC Part15 ClassA CE
Alarm outputs (2 relays) [3)]	250 V AC / 6 A 28 V DC / 6 A
System requirements for EE-PCS software	Windows XP or higher; USB port

1) ppm output is valid in the range 0...100 °C (32...212 °F)
2) Including hysteresis, non-linearity and repeatability, traceable to intern. standards, administrated by NIST, PTB, BEV...
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).
3) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

Scope of supply

	Included in versions
EE360 according to ordering guide	all versions
Operation manual English*	all versions
Inspection certificate according to DIN EN 10204 – 3.1	all versions
Mating plug for integrated power supply	AM3
Mating plug RKC 5/7	AM3 / E4 / E6 / E12
Mating plug RSC 5/7 (2 pcs. for option E12)	E5 / E6 / E12

*) Other languages can be downloaded at www.epluse.com/EE360

Ordering Guide

				EE360
	Cable length (incl. probe length)	2 m (6.6 ft)		no code
		5 m (16.4 ft)		K5
		10 m (32.8 ft)		K10
	Probe length	100 mm (3.94")		L100
		200 mm (7.87")		no code
	Process connection	1/2" ISO thread		no code
		1/2" NPT thread		PA25
	Electrical connection [1]	cable glands		no code
		1 plug for power supply and outputs		E4
		1 cable gland / 1 plug for Modbus RTU		E5
		2 plugs for power supply / outputs and for Modbus RTU		E6
		3 plugs for power supply / outputs and Modbus RTU network		E12
	Optional features	TFT colour display with integrated data logger [2]		D2
		Modbus RTU [3]		J3
		pluggable probe		PC4
		alarm outputs [4] [5]		AM2
		integrated power supply 100...240 V AC, 50/60 Hz [5] [6]		AM3
Setup - Analogue outputs	**Output 1**	water activity a_w	[ ]	no code
		other measurand	(xx see Measurand Code below)	MA*xx*
	Output Signal 1 [8]	0-1 V		GA1
		0-5 V		GA2
		0-10 V		GA3
		0-20 mA		GA5
		4-20 mA		GA6
	Scaling 1 low	0		no code
		value		SAL*value*
	Scaling 1 high	1		no code
		value		SAH*value*
	Output 2	temperature T	[°C]	no code
		other measurand	(xx see Measurand Code below)	MB*xx*
	Output Signal 2 [8]	0-1 V		GB1
		0-5 V		GB2
		0-10 V		GB3
		0-20 mA		GB5
		4-20 mA		GB6
	Scaling 2 low	value		SBL*value*
	Scaling 2 high	value		SBH*value*

Measurand Code

		Mx
Temperature	°C	1
	°F	2
Water activity	aw	67

		Mx
Water content x in mineral transformer oil	ppm	70
Water content x in customer specific oil	ppm	70PPMxxx

1) Plug options E5 / E6 / E12 only in combination with Modbus RTU output, (option J3).
2) Factory setup: the display shows the measurands selected for output 1 and output 2. Default language English, other languages selectable in display menu.
3) Factory settings: baudrate 9600, parity even, stop bit 1 / slave-ID 231 (16 bit integer).
4) Alarm outputs only available with cable glands
5) Combination of alarm output and integrated power supply is not possible
6) Integrated power supply includes 2 plugs for power supply and outputs (other connection options are not possible)
7) Available upon request.
8) Both analogue outputs are either voltage or current.

Order Example

EE360-D2J3GA3GA3GB3SBL-40SBH180

Cable length:	no code	2 m (6.6 ft)
Probe length:	no code	200 mm (7.87")
Process connection:	no code	1/2" ISO thread
Electrical connection:	no code	cable glands
Optional features:	D2	TFT colour display with integrated data logger
	J3	Modbus RTU

Output 1:	no code	water activity
Output Signal 1 & 2:	GA3	0-10 V
Scaling 1 low:	no code	0
Scaling 1 high:	no code	1
Output 2:	no code	temperature °C
Scaling 2 low:	SBL-40	-40
Scaling 2 high:	SBH180	180

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

- Replacement filter cap	HA010110
- Replacement probe [1]	refer to operation manual
- Replacement humidity sensor	FE09
- Bracket for installation onto mounting rails [2]	HA010203
- Investigation of oil specific parameters	ppm-cal
- Humidity calibration kit	refer to data sheet „Humidity calibration kit"
- Ball valve set 1/2" ISO	HA050101
- Ball valve set 1/2" NPT	HA050104
- RS485 add-on chip [3]	HA010605

1) Only for devices with PC4 option. 2) 2 pieces necessary per device. 3) For upgrade to Modbus RTU interface.

EE364

Compact moisture in oil transmitter

The EE364 is an innovative moisture in oil transmitter, suitable for OEM applications. The high measurement accuracy and excellent long-term stability make the EE364 ideal for online monitoring of moisture in transformer, lubricating and hydraulic oil, as well as diesel fuel.
The compact design and rugged stainless steel housing allow a space-saving installation in the most demanding applications. The EE364 measures water activity (aw), oil temperature (t) and calculates the absolute water content (x). The measured values are available on two 4-20mA outputs and one digital output with MODBUS RTU interface.
The analog outputs can be individually scaled and configured using the optional converter cable and the free EE-PCS Product Configuration software.

Typical applications

Monitoring of
- **Transformer oil**
- **Lubrication oil**
- **Hydraulic oil**
- **Engine oil**
- **Diesel fuel**

Features

Measurement of water activity (a_w), temperature and water content (x) in ppm
Two configurable 4...20 mA outputs
MODBUS-RTU interface
Pressure rating 20 bar
G ½" ISO or ½" NPT process connection

Technical data

Measurands

Water activity

Sensor	HC1000-400	
Measurement range	0...1 a_w	
Accuracy at 20°C[1)]	±0.02 a_w (0...0.9 a_w)	±0.03 a_w (0.9...1 a_w)
Response time t_{90}	< 10 min. in still oil	

Temperature

Sensor	Pt1000 DIN A	
Accuracy at 20°C in oil	±0.2 °C (0.36 °F)	

Output

2 x analogue output (freely selectable and scalable for a_w, T, ppm)	4 - 20 mA (3-wire technology)	R_L < 500 Ohm
Digital output	MODBUS RTU	

General

Supply voltage	10*)...28V DC	*) 10V+0.02*R_L
Power consumption at 24V DC	<40mA	
Pressure rating	0...20 bar (0...290 psi)	
Housing / protection rating	Stainless steel 1.4404 (AISI 316L) / IP65	
Electrical connection[2)]	M12x1 8-pin plug	
Sensor protection	Stainless steel filter	
Oil temperature	-40...80 °C (-40...176 °F) / -40...100 °C (-40...212 °F)	
Ambient temperature	-40...60 °C (-40...140 °F) / -40...80 °C (-40...176 °F)	
Storage temperature	-40...60 °C (-40...140 °F)	
Electromagnetic compatibility	EN61326-1 Industrial environment	EN61326-2-3

CE

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2 x 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) Flange receptacle for self assembly included in scope of supply.

Modbus Map

The measured values are 32Bit float values. The factory-set slave ID is 243 as integer 16Bit value. This ID can be customised in the register 0x00 (value range 1 - 247 permitted). For Modbus settings please see Application Note AN0103.
Transmission rate factory settings are: baud rate 9600, parity even and stop bit 1.

32Bit FLOAT:

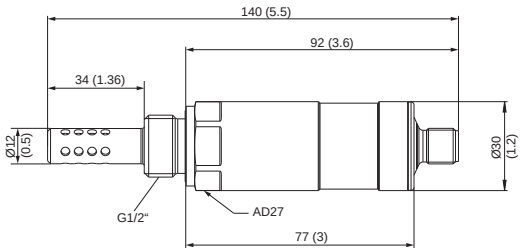
Register address	*Protocol address*	*Parameter name*
30052	0x33	Water activity Aw
30054	0x35	Water content Xm or Xk
30026	0x19	Temperature Tx
60101	0x64	Parameter A (write)
60103	0x66	Parameter B (write)

16Bit:

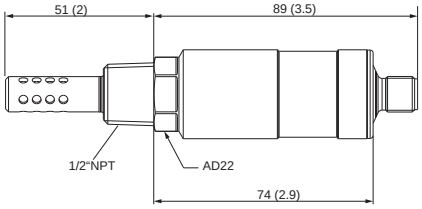
Register address	*Protocol address*	*Parameter name*
60001	0x00	Slave-ID
60002	0x01	RS485 Setting

Dimensions in mm (inch)

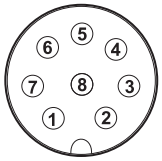
ISO



NPT



Connection diagram



Plug

1...NC
2...RS485 B
3...RS485 A
4...Analogue output 1
5...Analogue output 2
6...GND
7...NC
8...V+

Ordering information

MODEL	ANALOGUE	DIGITAL	OIL TEMPERATURE	PRESSURE RATING	PROCESS CONNECTION
Transmitter (T)	4-20 mA (6)	MODBUS RTU (RS485) (3)	80 °C (A)	20 bar (E)	G1/2" thread (A)
			100 °C (B)		1/2" NPT thread (C)
EE364-					

OUTPUT 1	SCALING 1[3]	OUTPUT 2	SCALING 2	UNIT
Water activity (Aw)[1]	0...100 (001)	Temperature (T)	-40... 60 (002)	metric (M)
Water content in mineral transformer oil (Xm)	0...500 (002)		0... 80 (021)	non-metric (N)
Water content in customer-specific oil (Xk)[2]	0...1000 (003)		-40... 80 (022)	
			-20... 80 (024)	
			-40...180 (052)	
			-40...140 (083)	
			32...132 (096)	

1) Factory setting Aw: 0...1
2) Oil-specific parameters can be determined on request.
3) Valid for Xm and Xk

Accessories (see accessories data sheet)

M12x1 8pin mating plug suitable for customer-specific assembly	HA010704	Stainless steel filter	HA010110
M12x1 8pin connection cable socket/flying leads 1.5m	HA010322	Modbus - USB converter cable	HA011013
M12x1 8pin connection cable socket/flying leads 5m	HA010324		
M12x1 8pin connection cable socket/flying leads 10m	HA010325		
Product Configuration Software	EE-PCS (free download: www.epluse.com/EE364)		

Order example

EE364-T63BEA/AwT002M

Model:	Transmitter	Output 1:	Water activity
Analogue output:	4-20 mA	Output 2:	Temperature
Digital output:	MODBUS RTU	Scaling 2:	-40...60
Oil temperature:	100 °C	Units:	metric [°C]
Pressure rating:	20 bar		
Process connection:	G1/2" thread		

EE381

Compact Transmitter / Switch for Moisture Content in Oil

E+E Transmitter Series EE381 are specially designed for the measurement of water content in oil. EE381 is ideal for online monitoring of moisture in lubrication or insulation oil, which is very important for the long-term performance and preventive maintenance of plant and machinery.
For instance, moisture affects dramatically the insulation characteristics of electrical transformer oil and therefore continuous monitoring is extremely important.

Humidity measurement in oil
Similar to the humidity in the air, the water content in oil can be indicated by the absolute value in ppm or by the relative value a_w:
- ppm (mass of water / mass of oil)
- a_w (actual water content as fraction of the water content in saturated oil)

a_w = 0 corresponds to water-free oil, while a_w = 1 indicates saturated oil. a_w measurement with the EE381 transmitter is based on the outstanding long term stability and resistance to pollution of the E+E capacitive sensor elements series HC.

The measured physical quantities are water activity a_w and temperature T. With these quantities EE381 calculates the water content x (ppm) in mineral transformer oils. Calculation of water content (ppm) in non-mineral oils and lubrication oils can be achieved by programming the specific parameters of the oil into the EE381.

Outputs

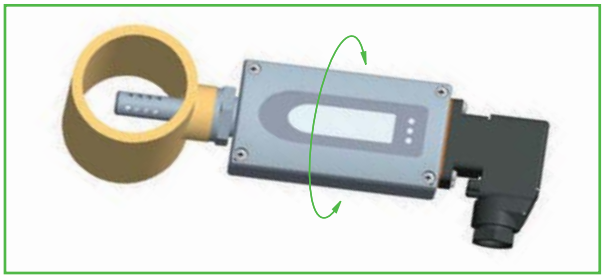
The EE381 transmitter has two freely selectable and scaleable outputs for water activity, water content or temperature.
The EE381 switch with two relay outputs is designed for control and alarm purposes. The status for early warning and main alarm is indicated by LED's.
Adjustment of the a_w/T/ppm set point and hysteresis can be achieved with the optional configuration software.

Configuration Software

The optional configuration software allows flexible and easy adjustment of the analogue resp. relay outputs to the respective requirements.
The adjustment / calibration of the transmitters can easily be performed.

Screw Connection for Mounting - 360° positionable

The construction of this screw connection enables any position / rotation of the mounted transmitter.
So an optimal position of the display resp. the cable outlet is guaranteed.



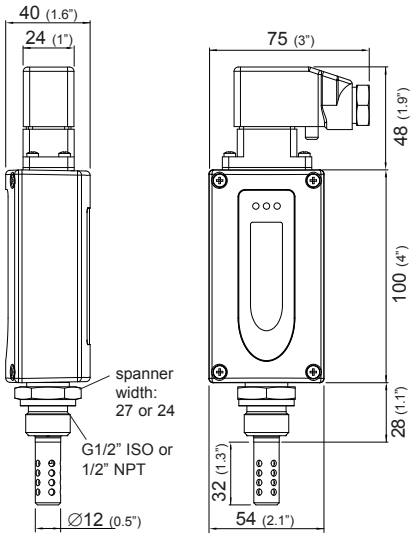
Typical Applications

monitoring of
- transformer oil
- hydraulic oil
- ship engines

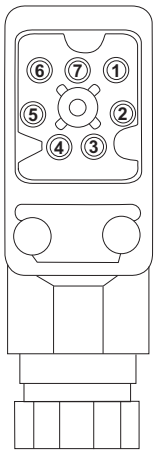
Features

measuring range 0...1 a_w
measurement of water content in ppm
medium temperature -40...80°C (-40...176°F)
two relay outputs for a_w/ppm/T

Dimensions in mm



Connection Diagram



analogue output

1	V+
2	GND
3	GND
4	OUT1
5	OUT2
6	NC
7	NC

10...30V DC; V mA; V mA

relay output

1	V+
2	GND
3	NC11
4	NC12
5	NC21
6	NC22
7	not connected

10...30V DC

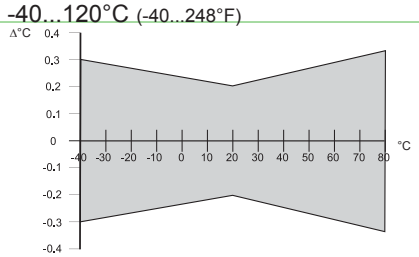
Technical Data

Measurement values

Water activity

Humidity sensor	HC1000-400K	
Measuring range	0...1a_w	
Accuracy incl. hysteresis and nonlinearity in air*	±0.02a_w (0...0.9a_w)	±0.03a_w (0.9...1a_w)
Temperature dependence	a_w: ±(0.00022 + 0.0002 x a_w) x ΔT [°C] T: ±(0.0003°C/°C)	ΔT = T - 20°C
Response time with stainless steel filter at 20°C / t_{90}	typ. 10min in still oil	

Temperature

Temperature sensor element	Pt 100 DIN A
Working range sensing probe	-40...120°C (-40...248°F)
Accuracy	

Outputs

EE381-Tx two freely selectable and scaleable analogue outputs for a_w, T, ppm	0 - 1V / 0 - 5V / 0 - 10V[1)] 4 - 20mA / 0 - 20mA	-1mA < I_L < 1mA R_L < 500 Ohm[1)]
EE381-Sx alarm output	2 potential-free relays (NC) 30V DC 0.6A / 35V AC 0.3A (resistive)	

General

Supply voltage	10...30V DC	
Current consumption at 24V DC	voltage output: typ. 40mA current output: typ. 80mA	
Pressure range	0...20bar (0...290psi) / 0...100bar (0...1450psi)	
System requirements for software	WINDOWS 2000 or later; serial interface	
Serial interface for configuration	RS232C	
Housing / Protection class	Al Si 9 Cu 3 / IP65	
Electrical connection	7-pole industrial plug: DIN VDE 0627 / IEC 61984 cable cross-section: 0.25 - 1 mm² / cable connection: PG 11	
Sensor protection	stainless steel filter (punched)	
Working temperature range	probe: -40...120°C (-40...248°F) electronic: -40...80°C (-40...176°F) with LC display: -20...50°C (-4...122°F)	
Storage temperature range	-40...60°C (-40...140°F)	
Electromagnetic compatibility according to	EN 61326-1 EN61326-2-3 Industrial Environment	ICES-003 ClassB FCC Part15 ClassB

CE

1) minimum supply voltage 15V DC

*) 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).

Ordering Guide

		EE381-	EE381-
Hardware Configuration			
Model	transmitter	T	
	switch		S
Pressure range	up to 20bar (290psi)	E	E
	up to 100bar (1450psi)	I	I
Pressure tight feedthrough	G1/2" male thread	HA03	HA03
	1/2" NPT thread	HA07	HA07
Display	without display		
	with display	D08	D08

Software Configuration								select according to Ordering Guide (B,K,L,M)
Physical parameters of outputs	Temperature			T		[°C / °F]	(B)	output/relay 1
	Water activity			a_w		[ ]	(K)	
	Water content in mineral transformer oil			x		[ppm]	(L)	output/relay 2
	Water content in lubrication or no mineral transformer oil 1)			x		[ppm]	(M)	select according to Ordering Guide (B,K,L,M)
Type of output signals (only for model T)	0-1V							1
	0-5V							2
	0-10V							3
	0-20mA							5
	4-20mA							6
Temperature unit	°C							E01
	°F							E01
Scaling of T-output (in °C or °F)	-40...60	(T02)	-20...100	(T14)	-40...140	(T83)		select according to Ordering Guide (Txx) other T-Scaling refer to data sheet „Scaling of the outputs“
	0...50	(T04)	0...120	(T16)	0...250	(T88)	output/relay T	
	0...100	(T05)	0...80	(T21)	32...120	(T90)		
	-30...70	(T08)	-20...80	(T24)	32...140	(T91)		
	-20...120	(T10)	-40...160	(T33)	32...250	(T94)		
	-40...120	(T12)	-40...250	(T81)	32...132	(T96)		
ppm Range x	0...100ppm	(X01)						select according to Ordering Guide
	0...500ppm	(X02)	other measuring range: _____				output/relay x	
	0...1000ppm	(X03)						
Setting of alarm relay outputs	standard for configuration KK:				R1: 0,8 [ ]		R2: 0,9 [ ]	
					H1: 0,05 [ ]		H2: 0,05 [ ]	
	other set points:				relay 1: _____		relay 2: _____	SP
					hysteresis 1: ___		hysteresis 2: _____	

1) Input of oil specific parameters necessary

Order Example

EE381-TEHA03D08/BL2-T05-X01

Model:	transmitter	Output 1:	T
Pressure range:	up to 20bar (290psi)	Output 2:	x
Pressure tight feedthrough:	G1/2" male thread	Output signal:	0-5V
Display:	with display	Temperature unit:	°C
		Scaling of T-output:	0...100°C
		ppm Range:	0...100ppm

EE381-SEHA03/KK

Model:	switch	Relay 1:	a_w
Pressure range:	up to 20bar (290psi)	Relay 2:	a_w
Pressure tight feedthrough:	G1/2" male thread	Temperature unit:	°C
Display:	without display	Setting of alarm output:	standard

Scope of Supply

- EE381 Transmitter according to ordering guide
- Mating connector
- Instruction manual
- Inspection certificate according to DIN EN10204 - 3.1

Accessories

- Stainless steel filter cap	HA010110
- Display	D08
- Configuration cable	HA010304

OILPORT 30 SET

Moisture in Oil Hand-Held

The moisture in oil hand-held OILPORT 30 measures water activity aw, temperature T and calculates the water content x (ppm) in different oils.
Up to ten sets of oil specific parameters can be stored and managed in the device. These parameters are used for accurate water content calculation in a certain oil.

The simple and intuitive operation via TFT touch screen and the built-in data logging function make the OILPORT 30 hand-held the ideal tool for fast and reliable oil analysis.

The set comes in a practical carrying case for safe storage of the device, probe and accessories.

The optional calibration kit is used for easy 1 and 2 point adjustment of the aw reading.


OILPORT 30 SET-1C01

Typical Applications

Monitoring of
- **Transformer oil**
- **Lubrication oil**
- **Hydraulic oil**
- **Engine oil**
- **Diesel fuel**

Features

Measurands: T, aw, x [ppm]
Up to 10 sets of oil specific paramters
Data logging function
Internal memory for 2 million measured values
Capacitive TFT touch screen
1/2-point customer adjustment for aw and T

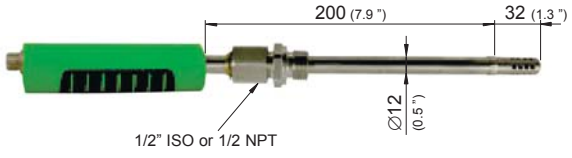
Technical Data

Basic Device

Power supply	4 x Alkaline LR6 AA batteries, 1.5 V (not in the scope of supply)		
Optional power supply	5V DC via USB (cable included)		
Temperature range	operation: handheld and handle of sensing probe: 0 °C...+50 °C (32 °F...+122 °F) storage: -20 °C...+60 °C (-4 °F...+140 °F) probe: see probe specifications		
Internal memory	for approx. 2 million measured values		
Housing / protection class	ABS / IP40		
Dimensions (HxWxD)	170 mm x 62 mm x 34 mm (6.69 " x 2.44 " x 1.34 ")		
Weight	approx. 205 g (0.45 lbs)		
Display	TFT display, 54 mm x 41 mm (2.13 " x 1.61"), illuminated		
CE compatibility	Hand-held:	EN61000-6-2:2005	EN61000-6-3:2007
	Oil Probe:	EN61326-1:2013	EN61326-2-3:2013

CE

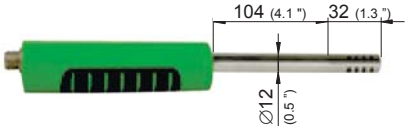
Pressure-Tight Oil Probe



Working range:	0 a_w...1 a_w / 0 ppm...20000 ppm / -40 °C...+120 °C (-40 °F... +248 °F)	
Accuracy:	±0.02 a_w (0 a_w...0.9 a_w)	±0.03 a_w (0.9 a_w...1 a_w)
	±0.2 °C @20 °C (±0.36 °F @68 °F)	±0.5 °C @-40 °C and +120 °C (±0.9 °F @-40 °F and +248 °F)

Response time τ_{90}: ≤ 10 min (in still oil)
Pressure rating: 0.01 bar...20 bar (0.15 psi...290 psi)
Temperature dependence: ±0.0003 a_w / °C

Short Oil Probe



Working range: 0 a_w...1 a_w/0 ppm...20000 ppm / -40 °C...+120 °C (-40 °F... +248 °F)
Accuracy: ±0.02 a_w (0 a_w...0.9 a_w) ±0.03 a_w (0.9 a_w...1 a_w)
±0.2 °C @20 °C ±0.5 °C @-40 °C and +120 °C
(±0.36 °F @68 °F) (±0.9 °F @-40 °F and +248 °F)
Response time τ_{90}: ≤ 10 min (in still oil)
Pressure rating: 0.01 bar...20 bar (0.15 psi...290 psi)
Temperature dependence: ±0.0003 a_w/ °C

Scope of Supply

- Basic device OMNIPORT 30 (batteries not in the scope of supply)
- USB-cable
- Oil probe
- Probe cable 2 m (6.6 ft)
- Calibration certificate for measuring probe
- Calibration certificate for basic device
- Protection cap for sensor head
- Carrying case

- Calibration device*)
- 5 ampoules 10 % RH humidity calibration solution*)
- 5 ampoules 80 % RH humidity calibration solution*)
- Accredited calibration certificate for humidity standards*)

*) version C01 only

Ordering Information

MODEL	PROBE		CALIBRATION SET	
(OILPORT 30 SET-)	pressure-tight oil probe 1/2" ISO	(1)	without calibration set	(--)
	pressure-tight oil probe 1/2" NPT	(2)	with calibration set	(C01)
	short oil probe	(3)		

Order Example

OILPORT 30 SET-1C01

OILPORT 30 SET
pressure tight oil probe 1/2" ISO
with calibration set

OILPORT 30 SET-3

OILPORT 30 SET
short oil probe
without calibration set

Accessories

Humidity standards / Calibration device	refer to data sheet "Humidity Calibration Set"
Protective cover for OMNIPORT 30	HA040907
Probe cable 5 m (16.4 ft)	HA010814
Ball valve set 1/2" ISO	HA050101*)
Ball valve set 1/2" NPT	HA050104*)

*) Suitable for pressure-tight oil probe only

Spare Parts

Hand-Held	OMNIPORT 30
Pressure tight oil probe 1/2" ISO	Logprobe36-ISO
Pressure tight oil probe 1/2" NPT	Logprobe36-NPT
Short oil probe	Logprobe38
Carrying case	HA040906
Probe cable 2 m (6.6ft)	HA010813

EE431

Duct / Immersion Temperature Sensor

The EE431 temperature sensor is used for air temperature measurement in heating, ventilation and air conditioning systems. It can be installed either with mounting flange or via external mounting holes at the enclosure (duct sensor).
For temperature measurement in liquids the temperature sensor EE431 is mounted with an immersion well (immersion sensor).
In addition to active outputs 0-10 V or 4-20 mA various types of sensing elements such as Pt1000, NTC10k or Ni1000 are available for passive temperature measurement.
The innovative IP65 housing and the mounting concept allow for fast and easy installation.
The optional adapter EE-PCA and the free configuration software EE-PCS facilitate the adjustment and setup of the active temperature sensors.

Features

External mounting holes
» Mounting with closed cover
» Protection against construction site pollution

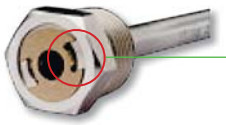
Bayonet screws
» Open/closed with a ¼ rotation

Mounting flange

Fixation via clamping
» No direct screwing onto probe
» Inclined screw for easy installation

Special sealing
» Foam gasket for good tightness
» No scratching of probe due to alignment notch

Immersion well



Innovative mounting spring
» For securing the probe inside the well
» No fastening screw, no tools required

Typical Applications

Building automation
Process and climate control
Measurement in air and liquids

CE RoHS compliant

Technical Data

Active Output

Operating temperature	duct sensor (probe):	-40 °C…+110 °C (-40 °F...+230 °F)
	immersion sensor (probe):	-40 °C…+150 °C (-40 °F...+302 °F)
	electronics:	-40 °C…+70 °C (-40 °F...+158 °F)
Sensing element	Pt1000 (class A, DIN EN60751)	
Output	0-10 V	-1 mA < I_L < 1 mA
	4-20 mA (two-wire)	R_L < 500 Ω
Accuracy	Standard:	±0.3 °C (±0.54 °F) at 20 °C (68 °F)
	Optional (TT2):	±0.2 °C (±0.36 °F) at 20 °C (68 °F)
Supply voltage (Class III)		
for 0-10 V		15-35 V DC or 24 V AC ±20%
for 4-20 mA		10 V DC + R_L x 20 mA < V+ < 35 V DC
Current demand	DC: typ. 5 mA	
	AC: typ. 12 mA_{eff}	
Electromagnetic compatibility	EN61326-1, EN61326-2-3	
	industrial environment	

Passive Output

Operating temperature (probe)	-40 °C…+110 °C (-40 °F...+230 °F) -40 °C…+150 °C (-40 °F...+302 °F) for immersion sensor with Pt and Ni T-sensors

Types of T-Sensors

Sensor Type	Nominal Resistance	Sensitivity	Standard
Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	-
NTC2.2k	R_{25}: 2.252 kΩ ± 0.2 K	$B_{25/85}$: 3977 K ± 0.3 %	-
NTC10k B3950	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-
NTC10k B3435	R_{25}: 10 kΩ ± 1 %	$B_{25/85}$: 3435 K	-
KTY81-210	R_{25}: 1980-2020 Ω	-	-
Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	DIN 43760
Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760

Measurement current	typ. < 1 mA[1)]
T-Sensor connection	two-wire
Electrical connection	screw terminal, 2x max. 2.5 mm² (0.004 in²)

General

Insulation resistance (probe)	> 100 MΩ at 20 °C (68 °F)
Response time τ_{63}	< 1 min, duct sensor at 3 m/s (590 ft/min) air velocity < 30 s, immersion sensor in liquid water bath
Probe pipe material	stainless steel (1.4571 / 316Ti)
Immersion well	
material	brass (nickel-plated) or stainless steel (pipe: 1.4571 / 316Ti, turned part: 1.4404 / 316L)
pressure rating	PN 15 bar (218 psi), brass PN 25 bar (363 psi), stainless steel

permissible inflow velocity

m/s (ft/min)	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	26 m/s (5118 ft/min)	12 m/s (2362 ft/min)	6 m/s (1181 ft/min)	1 m/s (197 ft/min)
stainless steel	29 m/s (5708 ft/min)	15 m/s (2953 ft/min)	9 m/s (1771 ft/min)	2 m/s (394 ft/min)

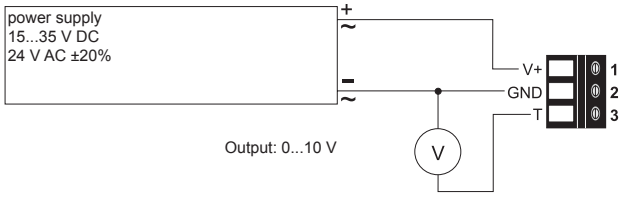
Enclosure material	polycarbonate, UL94-V0 approved, T-range: -40 °C...+110 °C (-40 °F...+230 °F)
Protection class	IP65 / NEMA 4
Cable gland	M16x1.5, UL94-V2
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F)
Working and storage humidity range	5 % rh...95 % rh, no condensation

1) according technical data of the specific T-sensors

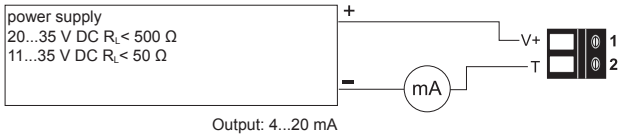
Connection Diagram

Active Output

EE431-T3xx



EE431-T6xx



Passive Output

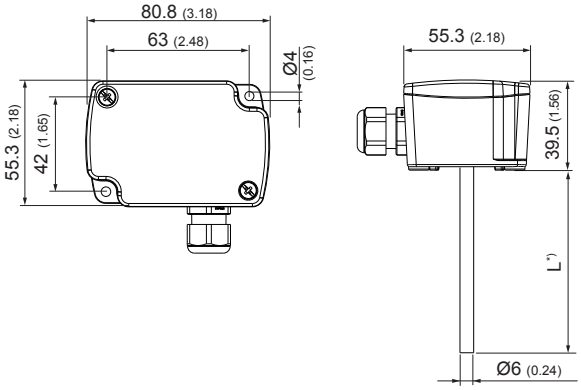
EE431-Txx

Scope of Supply

- EE431 Temperature sensor according to ordering guide
- Cable gland
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2 (for active output only)

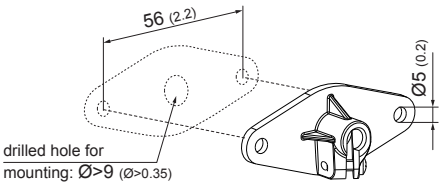
Dimensions in mm (inch)

Temperature Sensor



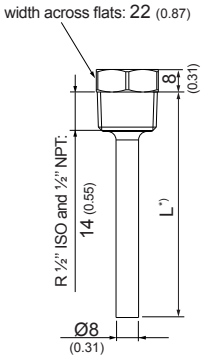
Mounting Accessories

Mounting flange



*) Length according to ordering guide

Immersion well



Ordering Guide

Position 1 - Temperature Sensor

MODEL		OUTPUT		PROBE LENGTH		TEMPERATURE TOLERANCE		SCALING[3] (analogue output only)		UNIT (analogue output only)	
Temperature	(T)	**Analogue**		65 mm (2.56")	(CPO)	±0.3	(no code)	-40...60	(002)	°C	(M)
		0-10 V	(3xx)	115 mm (4.53")	(NPO)	±0.2[2]	(TT2)	-20...80	(024)	°F	(N)
		4-20 mA	(6xx)	150 mm (5.91")	(EPO)			0...50	(004)		
		T-Sensor passive[1]		300 mm (11.81")	(GPO)			0...100	(005)		
		Pt100 DIN B	(xxB)					32...212	(075)		
		Pt1000 DIN B	(xxD)					-40...140	(083)		
		NTC1.8k	(xxG)								
		NTC2.2k	(xxV)								
		NTC10k B3950	(xxL)								
		NTC10k B3435	(xxO)								
		KTY81-210	(xxN)								
		Ni1000 TK6180 DIN B	(xxJ)								
		Ni1000 TK5000 DIN B	(xxT)								
EE431-											

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) Only available for analogue output (0-10 V or 4-20 mA)
3) other scaling upon request

Position 2 - Mounting Accessories

For Duct Sensor:
- Mounting flange HA401101

For Immersion Sensor:

IMMERSION WELL - THREAD: R ½" ISO				
Length	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	HA400101	HA400104	HA400102	HA400103
stainless steel	HA400201	HA400204	HA400202	HA400203

IMMERSION WELL - THREAD: ½" NPT				
Length	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	HA400111	HA400114	HA400112	HA400113
stainless steel	HA400211	HA400214	HA400212	HA400213

Order Example

Passive Output

Position 1:

EE431-TxxLEPO

Model:	Temperature
Output:	NTC10k B3950
Probe Length:	150 mm (5.91")
Temperature tolerance:	±0.3

Position 2:

HA400102

Immersion well - brass, R ½" ISO, 135 mm (5.31")

Active Output

Position 1:

EE431-T3xxCPO/004M

Model:	Temperature
Output:	0-10 V
Probe Length:	65 mm (2.56 ")
Temperature tolerance:	±0.3
Scaling:	0...50
Unit:	°C

Position 2:

HA400201

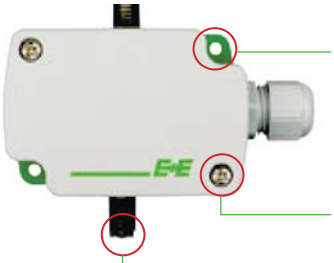
Immersion well - stainless steel, R ½" ISO, 50 mm (1.97 ")

EE441

Strap-on Temperature Sensor

EE441 strap-on sensors are used for temperature measurement on round ducts and pipes.
Typical applications are heating systems (warm and cold water pipes) and solar collectors. In addition to active outputs 0-10 V or 4-20 mA various types of sensing elements such as Pt1000, NTC10k or Ni1000 are available for passive temperature measurement.
The innovative IP65 housing and the mounting concept allow for fast and easy installation.
The optional adapter EE-PCA and the free configuration software EE-PCS facilitate the adjustment and setup of the active temperature sensors.

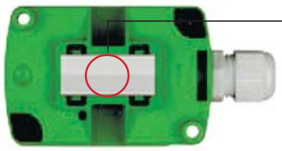
Features



External mounting holes
» Mounting with closed cover
» Mounting on plane surfaces
» Protection against construction site pollution

Bayonet screws
» Open/closed with a ¼ rotation

Hose clamp
» Installation on pipes



Aluminium contact surface
» Very good thermal transfer
» Fast response time

CE RoHS compliant

Technical Data

Active Output

Operating temperature	-40 °C…+70 °C (-40 °F...+158 °F)
Sensing element	Pt1000 (class A, DIN EN60751)
Output	0-10 V -1 mA < I_L < 1 mA 4-20 mA (two-wire) R_L < 500 Ω
Accuracy	±0.3 °C (±0.54 °F) at 20 °C (68 °F)
Supply voltage (Class III)	
for 0-10 V	15-35 V DC or 24 V AC ±20%
for 4-20 mA	10 V DC + R_L x 20 mA < V+ < 35 V DC
Current demand	DC: typ. 5 mA AC: typ. 12 mA_{eff}
Electromagnetic compatibility	EN61326-1, EN61326-2-3 industrial environment

Passive Output

Operating temperature (contact area)	-40 °C…+110 °C (-40 °F...+230 °F)

Types of T-Sensors

Sensor Type	Nominal Resistance	Sensitivity	Standard
Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	-
NTC2.2k	R_{25}: 2.252 kΩ ± 0.2 K	$B_{25/85}$: 3977 K ± 0.3 %	-
NTC10k B3950	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-
NTC10k B3435	R_{25}: 10 kΩ ± 1 %	$B_{25/85}$: 3435 K	-
KTY81-210	R_{25}: 1980-2020 Ω	-	-
Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	DIN 43760
Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760

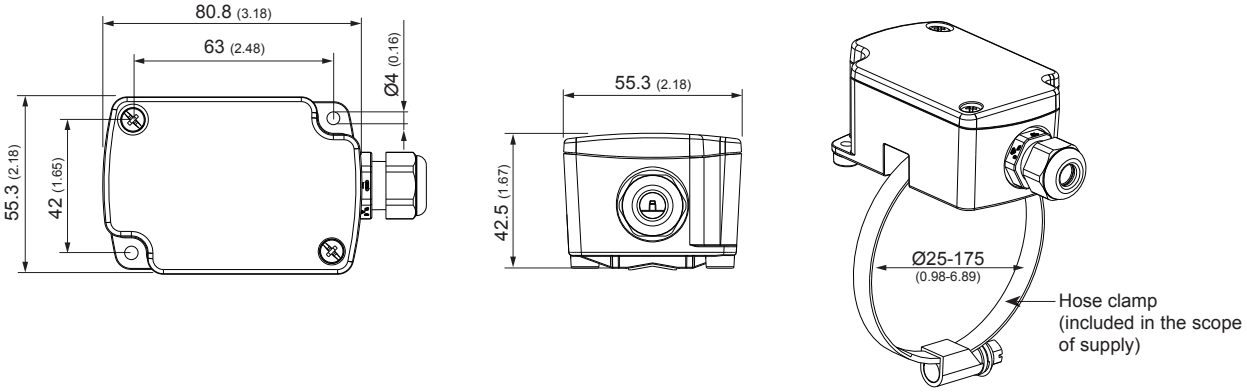
Measurement current	typ. < 1 mA[1)]
T-Sensor connection	two-wire
Electrical connection	screw terminal, 2x max. 2.5 mm^2 (0.004 in^2)

1) according technical data of the specific T-sensors

General

Insulation resistance	> 100 MΩ at 20 °C (68 °F)
Response time τ_{63}	< 1 min
Enclosure material	polycarbonate, UL94-V0 approved, T-range: -40 °C...+110 °C (-40 °F...+230 °F)
Protection class	IP65 / NEMA 4
Cable gland	M16x1.5, UL94-V2
Hose clamp material	stainless steel (corr. 1.4301 / 304)
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F)
Working and storage humidity range	5 % rh...95 % rh, no condensation

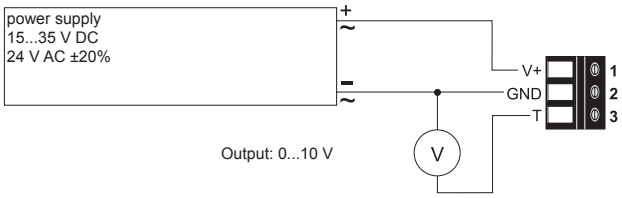
Dimensions in mm (inch)



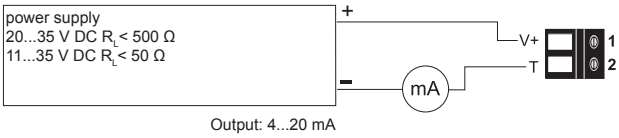
Connection Diagram

Active Output

EE441-T3xx



EE441-T6xx



Passive Output

EE441-Txx

Scope of Supply

- EE441 Temperature sensor according to ordering guide
- Cable gland
- Hose clamp
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2 (for active output only)

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/configurator)
Power supply adapter	V03 (see data sheet Accessories)
Conduit adapter, M16x1.5 to 1/2“	HA011110

Ordering Guide

MODEL		OUTPUT		DESIGN		SCALING[2] (analogue output only)		UNIT (analogue output only)	
Temperature	(T)	**Analogue**		Standard	(PO)	-40...60	(002)	°C	(M)
		0-10 V	(3xx)			-20...80	(024)	°F	(N)
		4-20 mA	(6xx)			0...50	(004)		
		T-Sensor passive[1]				0...100	(005)		
		Pt100 DIN B	(xxB)			32...212	(075)		
		Pt1000 DIN B	(xxD)			-40...140	(083)		
		NTC1.8k	(xxG)						
		NTC2.2k	(xxV)						
		NTC10k B3950	(xxL)						
		NTC10k B3435	(xxO)						
		KTY81-210	(xxN)						
		Ni1000 TK6180 DIN B	(xxJ)						
		Ni1000 TK5000 DIN B	(xxT)						
EE441-									

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) other scaling upon request

Order Example

Passive Output

EE441-TxxDPO

Model:	Temperature
Output:	Pt1000 DIN B
Design:	Standard

Active Output

EE441-T3xxPO/024M

Model:	Temperature
Output:	0-10 V
Desgin:	Standard
Scaling:	-20...80
Unit:	°C

EE451

Wall Mounted Temperature Sensor for Indoor and Outdoor

E+E sensors EE451 are used for temperature measurement in heating, ventilation and air conditioning systems enabling weather-dependent temperature regulation.
In addition to active outputs 0-10 V or 4-20 mA various types of sensing elements such as Pt1000, NTC10k or Ni1000 are available for passive temperature measurement.
The innovative enclosure concept (IP65) with a mounting bracket allows for easy installation and unbiased detection of ambient temperature.
The optional adapter EE-PCA and the free configuration software EE-PCS facilitate the adjustment and setup of the active temperature sensors.

Features

External mounting holes
» Mounting with closed cover
» Protection against construction site pollution

Bayonet screws
» Open/closed with a ¼ rotation

Mounting bracket
» Distance to wall for correct measurement of ambient temperature

CE RoHS compliant

Technical Data

Active Output

Sensing element	Pt1000 (class A, DIN EN60751)
Output	0-10 V -1 mA < I_L < 1 mA 4-20 mA (two-wire) R_L < 500 Ω
Accuracy	±0.3 °C (±0.54 °F) at 20 °C (68 °F)
Supply voltage (Class III)	
for 0-10 V	15-35 V DC or 24 V AC ±20%
for 4-20 mA	10 V DC + R_L x 20 mA < V+ < 35 V DC
Current demand	DC: typ. 5 mA AC: typ. 12 mA_{eff}
Electromagnetic compatibility	EN61326-1, EN61326-2-3 industrial environment

Passive Output

Types of T-Sensors

Sensor Type	Nominal Resistance	Sensitivity	Standard
Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	-
NTC2.2k	R_{25}: 2.252 kΩ ± 0.2 K	$B_{25/85}$: 3977 K ± 0.3 %	-
NTC10k B3950	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-
NTC10k B3435	R_{25}: 10 kΩ ± 1 %	$B_{25/85}$: 3435 K	-
KTY81-210	R_{25}: 1980-2020 Ω	-	-
Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	DIN 43760
Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760

Measurement current	typ. < 1 mA[1)]
T-Sensor connection	two-wire
Electrical connection	screw terminal, 2x max. 2.5 mm^2 (0.004 in^2)

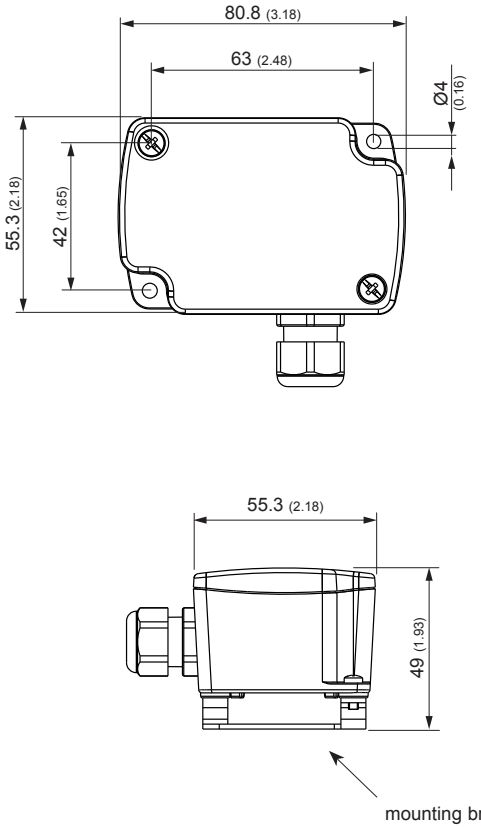
1) according technical data of the specific T-sensors

General

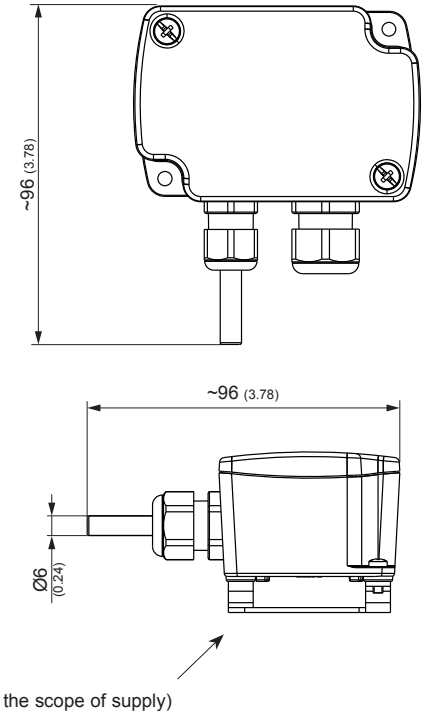
Operating temperature	-40 °C…+70 °C (-40 °F...+158 °F)
Enclosure material	polycarbonate, UL94-V0 approved
Protection class	IP65 / NEMA 4
Cable gland	M16x1.5, UL94-V2
Mounting bracket material	stainless steel (corr. 1.4301 / 304)
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F)
Storage humidity range	5 % rh...95 % rh, no condensation

Dimensions in mm (inch)

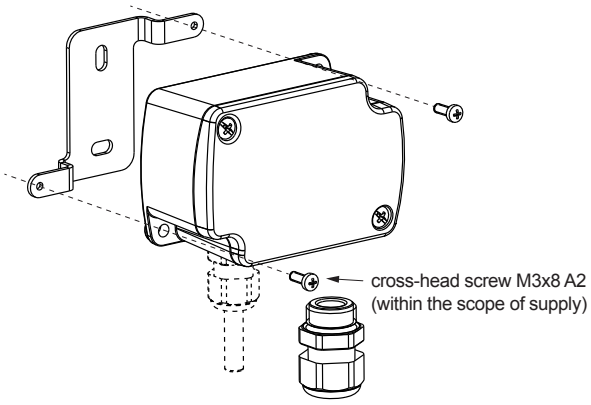
Housing passive type



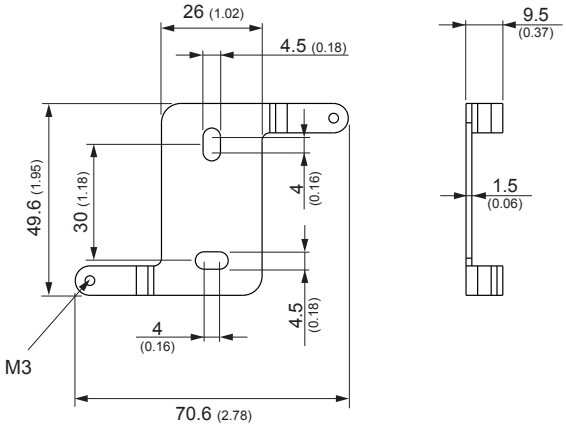
Housing active type



Mounting



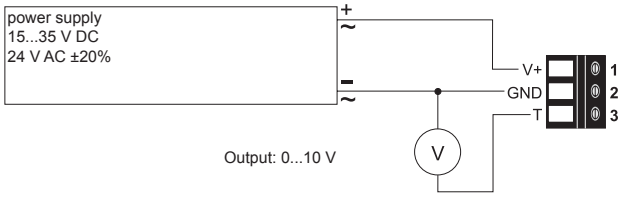
Mounting Bracket



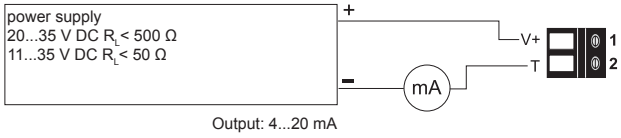
Connection Diagram

Active Output

EE451-T3xx



EE451-T6xx



Passive Output

EE451-Txx

Scope of Supply

- EE451 Temperature sensor according to ordering guide
- Cable gland
- Mounting bracket
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2 (for active output only)

Ordering Guide

MODEL		OUTPUT		DESIGN		SCALING[2] (analogue output only)		UNIT (analogue output only)	
Temperature	(T)	**Analogue**		Standard	(PO)	-40...60	(002)	°C	(M)
		0-10 V	(3xx)			-30...70	(008)	°F	(N)
		4-20 mA	(6xx)			0...50	(004)		
		T-Sensor passive[1]				0...100	(005)		
		Pt100 DIN B	(xxB)			32...212	(075)		
		Pt1000 DIN B	(xxD)			-40...140	(083)		
		NTC1.8k	(xxG)						
		NTC2.2k	(xxV)						
		NTC10k B3950	(xxL)						
		NTC10k B3435	(xxO)						
		KTY81-210	(xxN)						
		Ni1000 TK6180 DIN B	(xxJ)						
		Ni1000 TK5000 DIN B	(xxT)						
EE451-									

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) other scaling upon request

Order Example

Passive Output

EE451-TxxLPO

Model:	Temperature
Output:	NTC10k B3950
Design:	Standard

Active Output

EE451-T3xxPO/008M

Model:	Temperature
Output:	0-10 V
Design:	Standard
Scaling:	-30...70
Unit:	°C

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/configurator)
Power supply adapter	V03 (see data sheet Accessories)
Conduit adapter, M16x1.5 to 1/2“	HA011110

EE461

Cable Temperature Sensor

Cable sensors for passive temperature measurement are used in heating, ventilation and air conditioning systems as well as for process control.

Several types of sensing elements such as Pt1000, NTC10k or Ni1000 are available.
Due to an innovative production concept (star pressing of the sensor sleeve) a high protection class IP67 is provided.
Product-specific information is printed all along the cable.

Typical Applications

Building automation
Process and climate control

Features

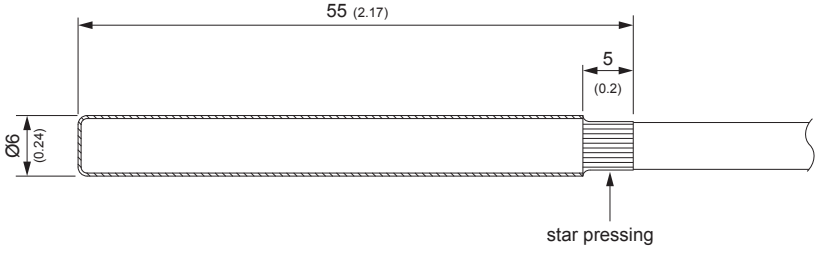
High protection class
Cable labeling
Various sensing elements and cable lengths

Technical Data

Operating temperature	PVC	-30 °C...+105 °C (-22 °F...+221 °F)		
Types of T-Sensors	Sensor Type	Nominal Resistance	Sensitivity	Standard
	Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
	Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
	NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	-
	NTC2.2k	R_{25}: 2.252 kΩ ± 0.2 K	$B_{25/85}$: 3977 K ± 0.3 %	-
	NTC10k B3950	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-
	NTC10k B3435	R_{25}: 10 kΩ ± 1 %	$B_{25/85}$: 3435 K	-
	KTY81-210	R_{25}: 1980-2020 Ω	-	-
	Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	DIN 43760
	Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760
Measurement current	typ. < 1 mA[1)]			
T-Sensor connection	two-wire, wire resistance see additional information below			
Insulation resistance	> 100 MΩ at 20 °C (68 °F)			
Response time τ_{63}	< 1 min, at 3 m/s (590 ft/min) air velocity			
	< 30 s, with immersion well in liquid water bath			
Sensor sleeve material	stainless steel (1.4571 / 316Ti)			
Cable material	PVC 2x0.22 mm²			
Protection class	IP67 / NEMA 4			
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F)			
Working and storage humidity range	5 % rh...95 % rh, no condensation			

1) according technical data of the specific T-sensors

Dimensions in mm (inch)



CE RoHS compliant

Ordering Guide

MODEL	T-SENSOR[1]	CABLE MATERIAL	CABLE LENGTH
Temperature (T)	Pt100 DIN B (B)	PVC (105 °C (221 °F)) (A)	0.5 m (1.6 ft) (A)
	Pt1000 DIN B (D)		2 m (6.6 ft) (D)
	NTC1.8k (G)		3 m (9.8 ft) (E)
	NTC2.2k (V)		5 m (16.4 ft) [2] (G)
	NTC10k B3950 (L)		6 m (19.7 ft) [3] (J)
	NTC10k B3435 (O)		10 m (32.8 ft) [2] (H)
	KTY81-210 (N)		
	Ni1000 TK6180 DIN B (J)		
	Ni1000 TK5000 DIN B (T)		
EE461-			

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) Only available with PT1000 DIN B T-sensor
3) Only available with NTC10k B3950 T-sensor

Order Example

EE461-TDAD

Model:	Temperature
T-Sensor	Pt1000 DIN B
Cable Material:	PVC
Cable Length:	2 m (6.6 ft)

Mounting Accessories

Immersion well - Thread: R ½" ISO

Length	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	HA400101	HA400104	HA400102	HA400103
stainless steel	HA400201	HA400204	HA400202	HA400203

Immersion well - Thread: ½" NPT

Length	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	HA400111	HA400114	HA400112	HA400113
stainless steel	HA400211	HA400214	HA400212	HA400213

For further information please see datasheet EE431.

Mounting with immersion well:

1. The spring inside the well must be removed and replaced by a standard M12x1.5 cable gland (not included in the scope of supply).
2. Insert the cable sensor and fix it by fastening the cable gland.

Please observe the operating temperature range of the cable gland!

Cable gland (M12x1.5, -40 °C...+100 °C / -40 °F... +212 °F, UL94-V0) HA403101

Hose clamp (for pipe mounting) HA402101
For further information please see datasheet EE441.

Additional Information

Wire Resistance / Temperature Offset

Cable length	Wire resistance	Temperature offset for Pt100*)
0.5 m (1.64 ft)	0.086 Ω	0.22 °C (0.396 °F)
2 m (6.56 ft)	0.344 Ω	0.88 °C (1.584 °F)
3 m (9.84 ft)	0.516 Ω	1.32 °C (2.376 °F)
5 m (16.4 ft)	0.860 Ω	2.2 °C (3.96 °F)
10 m (32.8 ft)	1.720 Ω	4.4 °C (7.92 °F)

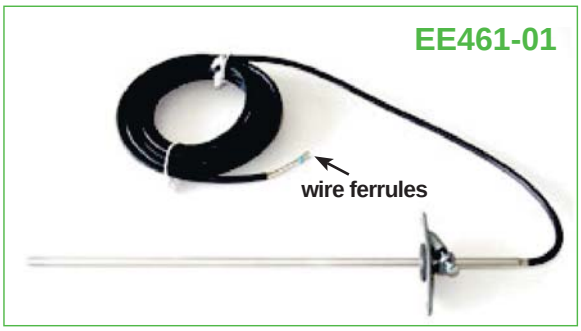
*) For high-resistance T-sensors (R ≥ 1000 Ω) the temperature offset is negligible.

EE461-01

Cable Temperature Sensor with flange

Cable sensors for passive temperature measurement are used in heating, ventilation and air conditioning systems as well as for process control.

Several types of sensing elements are available.
Due to an innovative production concept (star pressing of the sensor sleeve) a high protection class IP67 is provided.
Product-specific information is printed all along the cable.



Typical Applications

Building automation
Process and climate control

Features

High protection class
Cable labeling
Various sensing elements

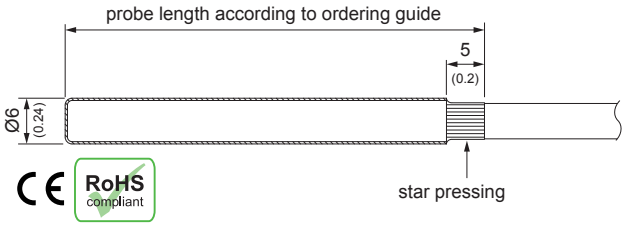
Technical Data

Operating temperature	PVC	-30 °C...+105 °C (-22 °F...+221 °F)		
Types of T-Sensors	Sensor Type	Nominal Resistance	Sensitivity	Standard
	Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
	Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
	Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760
Measurement current	typ. < 1 mA[1)]			
T-Sensor connection	two-wire, wire resistance see additional information below			
Insulation resistance	> 100 MΩ at 20 °C (68 °F)			
Response time τ_{63}	< 1 min, at 3 m/s (590 ft/min) air velocity < 30 s, with immersion well in liquid water bath			
Sensor sleeve	stainless steel (1.4571 / 316Ti)			
Cable	PVC; 2x0.22 mm²			
Protection class	IP67 / NEMA 4			
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F)			
Working and storage humidity range	5 % RH...95 % RH, no condensation			

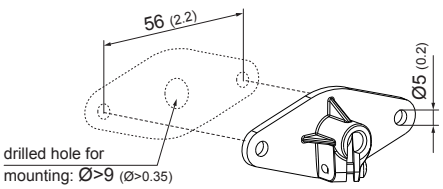
1) according technical data of the specific T-sensors

Dimensions in mm (inch)

Probe



Mounting flange



Ordering Guide

MODEL	T-SENSOR[1)]	CABLE MATERIAL	CABLE LENGTH	PROBE LENGTH
Temperature (T)	Pt100 DIN B (B) Pt1000 DIN B (D) Ni1000 TK5000 DIN B (T)	PVC (105 °C (221 °F)) (A)	5 m (G)	160 mm (E) 310 mm (G)
EE461-01-				

1) T-Sensor Details siehe www.epluse.com/R-T_Characteristics

Order example

EE461-01-TDAGE

Model:	Temperature
T-Sensor:	Pt1000 DIN B
Cable material:	PVC (105 °C (221 °F))
Cable length:	5 m
Probe length:	106 mm

EE461-01-TBAGG

Model:	Temperature
T-Sensor:	Pt100 DIN B
Cable material:	PVC (105 °C (221 °F))
Cable length:	5 m
Proble length:	310 mm

Additional Information

Wire Resistance / Temperature Offset

Cable length	Wire resistance	Temperature offset for Pt100*)
5 m (16.4 ft)	0.860 Ω	2.2 °C (3.96 °F)

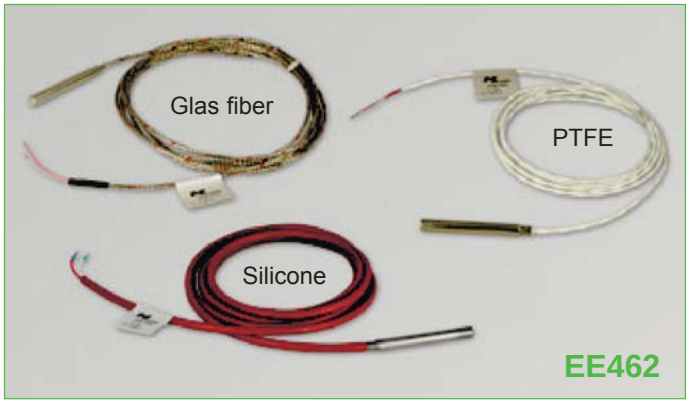
*) For high-resistance T-sensors (R ≥ 1000 Ω) the temperature offset is negligible.

EE462

Cable High-Temperature Sensor

Cable sensors for passive temperature measurement are used in heating, ventilation and air conditioning systems as well as for process control.

Several types of sensing elements such as Pt1000, NTC10k or Ni1000 are available.
Due to an innovative production concept (star pressing of the sensor sleeve) a high protection class IP67 is provided. Product specific information is printed on the cable label.



Typical Applications

Smoke gas applications
Process and climate control

Features

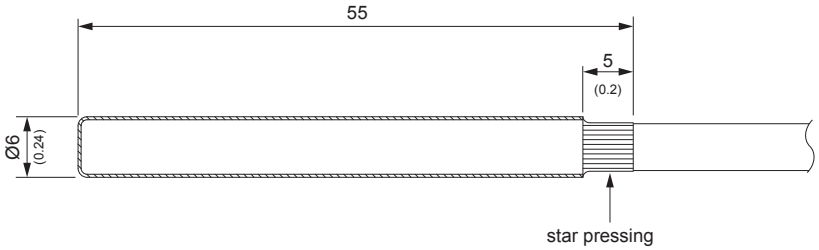
High protection class
Various sensing elements and cable lengths

Technical Data

Operating temperature	Glass fiber	0...+350 °C (32 °F...+662 °F)			
	PTFE	-20...+260 °C (-4 °F...+500 °F)			
	Silicone	-60...+180 °C (-76 °F...+356 °F)			
Types of T-Sensors	Sensor Type	Nominal Resistance	Sensitivity	Standard	T_max [°C]
	Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751	400
	Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751	400
	NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	-	125
	NTC2.2k	R_{25}: 2.252 kΩ ± 0.2 K	$B_{25/85}$: 3977 K ± 0.3 %	-	125
	NTC10k B3950	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-	110
	Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	DIN 43760	200
	Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760	200
Measurement current	typ. < 1 mA[1)]				
T-Sensor connection	two-wire, wire resistance see additional information				
Insulation resistance	typ. > 100 MΩ at 20 °C (68 °F)				
Response time τ_{63}	< 1 min, at 3 m/s (590 ft/min) air velocity < 30 s, with immersion well in liquid water bath				
Sensor sleeve material	stainless steel (1.4571 / 316Ti)				
Cord	2x0.22 mm²				
Protection class	IP67				
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F) (packaging)				
Working and storage humidity range	5 % rh...95 % rh, no condensation				

1) according technical data of the specific T-sensors

Dimensions in mm (inch)



CE RoHS compliant

Ordering Guide

MODEL	T-SENSOR[1]	CABLE MATERIAL	CABLE LENGTH
Temperature (T)	Pt100 DIN B (B)	Glass fibre [2] (G)	2 m (D)
	Pt1000 DIN B (D)	PTFE [2] (H)	3 m (E)
	NTC1,8k (G)	Silicone (J)	
	NTC2,2k (V)		
	NTC10k B3950 (L)		
	Ni1000 TK6180 DIN B (J)		
	Ni1000 TK5000 DIN B (T)		
EE462-			

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) Only with T-sensor PT100 DIN B and Pt1000 DIN B

Order Example

EE462-TDHD

Model:	Temperature
T-Sensor:	Pt1000 DIN B
Cable material:	PTFE
Cable length:	2 m

Mounting Accessories

Immersion well - Thread: R ½" ISO

Length	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	HA400101	HA400104	HA400102	HA400103
stainless steel	HA400201	HA400204	HA400202	HA400203

Immersion well - Thread: ½" NPT

Length	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	HA400111	HA400114	HA400112	HA400113
stainless steel	HA400211	HA400214	HA400212	HA400213

For further information please see datasheet EE431.

Mounting with immersion well:

1. The spring inside the well must be removed and replaced by a standard M12x1.5 cable gland (not included in the scope of supply).
2. Insert the cable sensor and fix it by fastening the cable gland.

Please observe the operating temperature range of the cable gland!

Cable gland (M12x1.5, -40 °C...+100 °C / -40 °F... +212 °F, UL94-V0) HA403101

Hose clamp (for pipe mounting) HA402101
For further information please see datasheet EE441.

Additional Information

Wire Resistance / Temperature Offset

Cable length	Wire resistance	Temperature offset for Pt100*)
2 m (6.56 ft)	0.344 Ω	0.88 °C (1.584 °F)
3 m (9.84 ft)	0.516 Ω	1.32 °C (2.376 °F)

*) For high-resistance T-sensors (R ≥ 1000 Ω) the temperature offset is negligible.

EE471

Temperature Sensor with Remote Probe

EE471 sensors with separate housing are used for temperature measurement in applications with space restrictions or where the electronics must be protected against high temperature or strong vibrations.
In addition to active outputs 0-10 V or 4-20 mA various types of sensing elements such as Pt1000, NTC10k or Ni1000 are available for passive temperature measurement. Due to an innovative cable outlet and housing concept a high protection class is provided. Product-specific information for the remote probe is printed all along the cable.
The optional adapter EE-PCA and the free configuration software EE-PCS facilitate the adjustment and setup of the active temperature sensors.

Features

External mounting holes
» Mounting with closed cover
» Protection against construction site pollution

Bayonet screws
» Open/closed with a ¼ rotation

Product-specific information

IP67 cable outlet
(star pressing of the sensor sleeve)

CE RoHS compliant

Technical Data

Active Output

Operating temperature	remote probe: -30 °C…+105 °C (-22 °F...+221 °F) electronics: -30 °C.... +70 °C (-22 °F...+158 °F)
Sensing element	Pt1000 (class A, DIN EN60751)
Output	0-10 V -1 mA < I_L < 1 mA 4-20 mA (two-wire) R_L < 500 Ω
Accuracy	±0.3 °C (±0.54 °F) at 20 °C (68 °F)
Supply voltage (Class III)	
for 0-10 V	15-35 V DC or 24 V AC ±20%
for 4-20 mA	10 V DC + R_L x 20 mA < V+ < 35 V DC
Current demand	DC: typ. 5 mA AC: typ. 12 mA_{eff}
Electromagnetic compatibility	EN61326-1, EN61326-2-3 industrial environment

Passive Output

Operating temperature	-30 °C…+105 °C (-22 °F...+221 °F)

Types of T-Sensors

Sensor Type	Nominal Resistance	Sensitivity	Standard
Pt100 DIN B	R_0: 100 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
Pt1000 DIN B	R_0: 1000 Ω	TC: 3.850 x 10^{-3}/°C	DIN EN 60751
NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	-
NTC2.2k	R_{25}: 2.252 kΩ ± 0.2 K	$B_{25/85}$: 3977 K ± 0.3 %	-
NTC10k B3950	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	-
NTC10k B3435	R_{25}: 10 kΩ ± 1 %	$B_{25/85}$: 3435 K	-
KTY81-210	R_{25}: 1980-2020 Ω	-	-
Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	DIN 43760
Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	DIN 43760

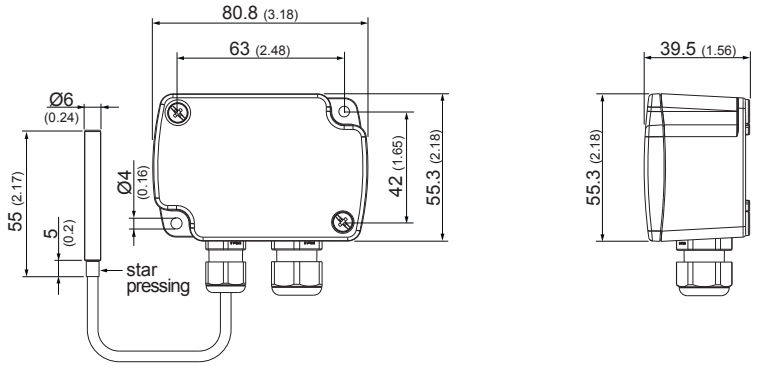
Measurement current	typ. < 1 mA[1)]
T-Sensor connection	two-wire, wire resistance see additional information below
Electrical connection	screw terminal, 2x max. 2.5 mm^2 (0.004 in^2)

1) according technical data of the specific T-sensors

General

Insulation resistance (remote probe)	> 100 MΩ at 20 °C (68 °F)
Response time τ_{63}	< 1 min, at 3 m/s (590 ft/min) air velocity < 30 s, with immersion well in liquid water bath
Sensor sleeve material	stainless steel (1.4571 / 316Ti)
Cable material	PVC
Enclosure material	polycarbonate, UL94-V0 approved
Protection class	IP65 / NEMA 4 (enclosure), IP67 / NEMA 4 (remote probe)
Cable gland	M16x1.5, UL94-V2
Storage temperature	-30 °C…+70 °C (-22 °F...+158 °F)
Working and storage humidity range	5 % rh...95 % rh, no condensation

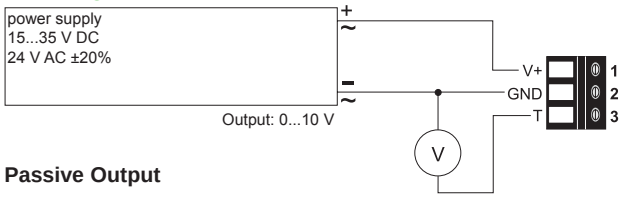
Dimensions in mm (inch)



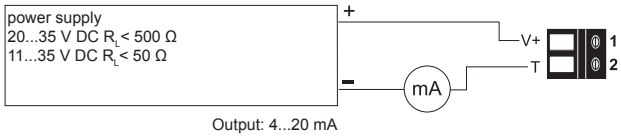
Connection Diagram

Active Output

EE471-T3xx



EE471-T6xx



Passive Output

EE471-Txx

Additional Information

Wire Resistance / Temperature Offset
(Only relevant for passive output!)

Cable length	Wire resistance	Temperature offset for Pt100*)
0.5 m (1.64 ft)	0.086 Ω	0.22 °C (0.396 °F)
2 m (6.56 ft)	0.344 Ω	0.88 °C (1.584 °F)
3 m (9.84 ft)	0.516 Ω	1.32 °C (2.376 °F)
5 m (16.4 ft)	0.860 Ω	2.2 °C (3.96 °F)

*) For high-resistance T-sensors (R ≥ 1000 Ω) the temperature offset is negligible.

Scope of Supply

- EE471 Temperature sensor according ordering guide
- Cable gland
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2 (for active output only)

Ordering Guide

MODEL	OUTPUT	CABLE MATERIAL	CABLE LENGTH	DESIGN	SCALING[3] (analogue output only)	UNIT (analogue output only)
Temperature (T)	**Analogue**	PVC (A)	0.5 m (1.6 ft) (A)	Standard (PO)	-40...60 (002)	°C (M)
	0-10 V (3xx)		2 m (6.6 ft) (D)		-20...80 (024)	°F (N)
	4-20 mA (6xx)		3 m (9.8 ft) (E)		0...50 (004)	
	T-Sensor passive[1]		5 m (16.4 ft)[2] (G)		0...100 (005)	
	Pt100 DIN B (xxB)				32...212 (075)	
	Pt1000 DIN B (xxD)				-40...140 (083)	
	NTC1.8k (xxG)					
	NTC2.2k (xxV)					
	NTC10k B3950 (xxL)					
	NTC10k B3435 (xxO)					
	KTY81-210 (xxN)					
	Ni1000 TK6180 DIN B (xxJ)					
	Ni1000 TK5000 DIN B (xxT)					
EE471-						

1) T-Sensor details see www.epluse.com/R-T_Characteristics
2) Only available for analogue output (0-10 V or 4-20 mA)
3) other scaling upon request

Order Example

Passive Output

EE471-TxxDADPO

Model:	Temperature
Output:	Pt1000 DIN B
Cable Material:	PVC
Cable Length:	2 m (6.6 ft)
Design:	Standard

Active Output

EE471-T3xxAEPO/024M

Model:	Temperature
Output:	0-10 V
Cable Material:	PVC
Cable Length:	3 m (9.8 ft)
Design:	Standard
Scaling:	-20...80
Unit:	°C

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/configurator)
Power supply adapter	V03 (see data sheet Accessories)
Conduit adapter, M16x1.5 to 1/2“	HA011110

Mounting

Immersion well - Thread: R ½” ISO

Length	50 mm (1.97“)	100 mm (3.94“)	135 mm (5.31“)	285 mm (11.22“)
brass	HA400101	HA400104	HA400102	HA400103
stainless steel	HA400201	HA400204	HA400202	HA400203

Immersion well - Thread: ½” NPT

Length	50 mm (1.97“)	100 mm (3.94“)	135 mm (5.31“)	285 mm (11.22“)
brass	HA400111	HA400114	HA400112	HA400113
stainless steel	HA400211	HA400214	HA400212	HA400213

For further information please see datasheet EE431.

Mounting with immersion well:

1. The spring inside the well must be removed and replaced by a standard M12x1.5 cable gland (not included in the scope of supply).
2. Insert the remote cable sensor and fix it by fastening the cable gland.

Please observe the operating temperature range of the cable gland!

Cable gland (M12x1.5, -40 °C...+100 °C / -40 °F... +212 °F, UL94-V0) HA403101

Hose clamp (for pipe mounting of remote probe) HA402101
For further information please see datasheet EE441.

EE10-T / EE10-P

Room Temperature Transmitters and Sensors

EE10 is the ideal solution for room temperature measurement in residential and commercial HVAC applications. The very stylish, snap-on enclosure allows for easy installation and replacement of the sensing unit for service purposes.

The EE10 transmitters supply a 0-10 V or 4-20 mA output, while the EE10 sensors have passive temperature output. An optional LCD display is available for the EE10 transmitters.

Two different enclosure designs ensure professional appearance according to regional standards.

Typical Applications

Residential and commercial building automation
Switching cabinets
Indoor climate control

Features

Excellent price / performance ratio
Easiest installation
Modern design

Technical Data

Measuring Quantities

Temperature (active output)

Analogue output 0...50 °C (32...122 °F)[1)]	0-10 V	-1 mA < I_L < 1mA
	4-20 mA (two wires)	R_L < (U_V-10)/0.02 < 500 Ohm
Accuracy at 20 °C (68 °F)	±0.3 °C (±0.54 °F)	

Temperature (passive output)

Type of T-Sensor	please see ordering guide

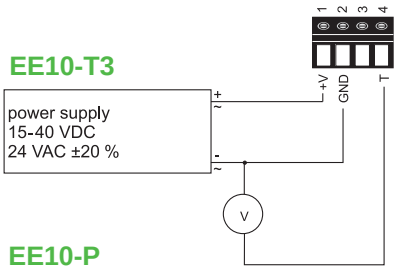
General Data

Voltage supply (U_V)		
for 0-10 V	15-40 V DC or 24 V AC ±20 %	
for 4-20 mA	28 V DC > U_V > 10 + 0.02 x R_L (R_L < 500 Ohm)	
Current consumption		
for DC supply:	typical 4 mA	
for AC supply:	typical 15 mA_{eff}	
Electrical connection	Screw terminals max. 1.5 mm^2 (AWG 16)	
Housing material	Polycarbonat US Version: UL94V-0 approved / EU Version: UL94HB approved	
Protection class	PC / IP30	
Display	only for EE10-Tx version: temperature	
CE compatibility according	EN61326-1 FCC Part15 ClassB EN61326-2-3 ICES-003 ClassB	CE
Temperature ranges	Working temperature range: -5...55 °C (23...131 °F) Storage temperature range: -25...60 °C (-13...140 °F)	

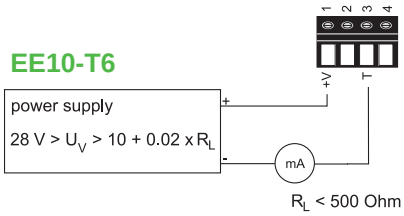
1) other scalings see datasheet „Scaling of the outputs“

Connection Diagram

EE10-T3

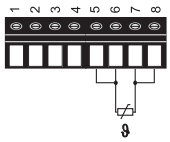


EE10-T6

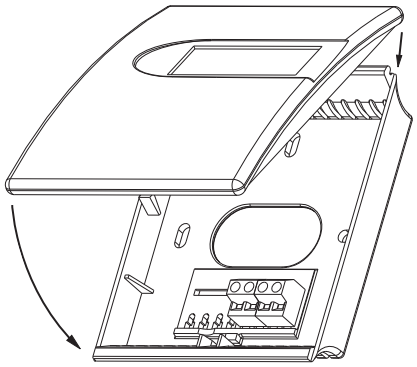


R_L < 500 Ohm

EE10-P



Dimensions



Housing colour:

Standard: (EU & US)

Front cover:	Signal white	RAL 9003
Back cover:	Light grey	RAL 7035

Optional (only EU):

Front and back cover	Grey	(Anthracite grey RAL 7016)
	Silver	(White aluminum RAL 9006)

EU:	W x H x D = 85 x 100 x 26mm	(3.3 x 3.9 x 1")
US:	W x H x D = 85 x 136 x 26mm	(3.3 x 5.4 x 1")

Ordering Guide

MODEL	OUTPUT	T-SENSOR PASSIVE[1]	DISPLAY	HOUSING DESIGN & COLOUR	T-UNIT	T-SCALE[2]
temperature (T) active	0 - 10 V (3)		without display (--)	EU-Standard (RAL9003/RAL7035) (--)	°C (--)	0...50 (T04)
	4 - 20 mA (6)		with display (D04)	EU-Grey (RAL7016) (G)	°F (E01)	-5...55 (T31)
				EU-Silver (RAL9006) (S)		0...40 (T55)
				US (RAL9003/RAL7035) (US)		20...120 (T15)
						32...132 (T96)
temperature (P) passive		Pt100 DIN A (A)		EU-Standard (RAL9003/RAL7035) (--)		
		Pt1000 DIN A (C)		EU-Grey (RAL7016) (G)		
		Pt1000 DIN B (D)		EU-Silver (RAL9006) (S)		
		NTC10k (E)		US (RAL9003/RAL7035) (US)		
		Ni1000 TK6180 DIN B (J)				
		Ni1000 TK5000 DIN B (T)				
EE10-						

1) T-Sensor details see www.epluse.com/R-T_Characteristics

2) other scalings see datasheet „Scaling of the outputs“

Order Example

Active Output

EE10-T6D04/T04

Model:	Temperature active
Output:	4-20 mA
Display:	with display
Housing design & colour:	EU-Standard RAL9003/RAL7035
T-Unit	°C
T-Scale:	0...50 (32...122 °F)

Passive Output

EE10-PCUS

Model:	Temperature passive
T-Sensor passive:	Pt1000 DIN A
Display:	without display
Housing design & colour:	RAL9003/RAL7035 Standard

Scope of supply

- EE10 transmitter or sensor according ordering guide
- Mounting material
- Test report according DIN EN10204 - 2.2 (for EE10-T)

EE22-T Series

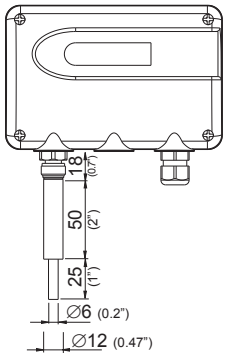
Temperature Transmitter with interchangeable probes

Unique for the EE22-T series are the interchangeable sensing probes with connector.
The calibration data is stored in the probes, which are therefore interchangeable and probe replacement does not affect the performance of EE22-T.
The outstanding accuracy over the entire temperature range is based on very precise calibration methods and on the latest microprocessor technology. Well-proven E+E humidity sensor elements ensure excellent long-term stability.
For high temperature applications (up to +80°C / +176°F) or in case of limited space availability, the sensing probes can be connected to EE22-T housing with cables (2m, 5m or 10m / 6.6ft, 16.4ft or 32.8ft) without any repercussions for the overall accuracy of the instrument.
Voltage 0 - 1 / 10V or current 4 - 20mA (2 wire) outputs are available, of which the temperature output can be scaled according to the application (see ordering guide).

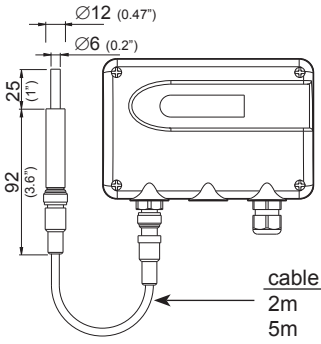
EE22-T is suitable for direct wall mounting and for installation on rails according to DIN EN 50022.
For easy duct mounting a duct mounting kit is available as an option.
An optional display indicates the actual T values.

Probe Dimensions (mm)

with plugable T probe
EE22-xTx1x

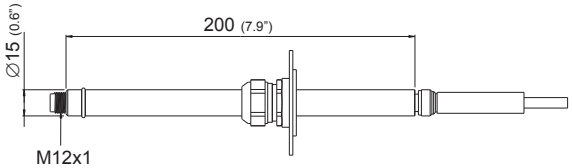


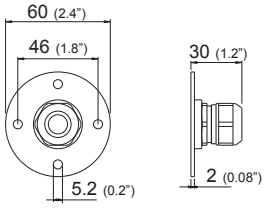
with remote T probe
EE22-xTx1x
+HAxxxx



cable length	ordering code
2m	HA010801
5m	HA010802
10m	HA010803

duct mounting kit:





Typical Applications

pharmaceutical industry
clean rooms
storage rooms
green houses
cooling chambers

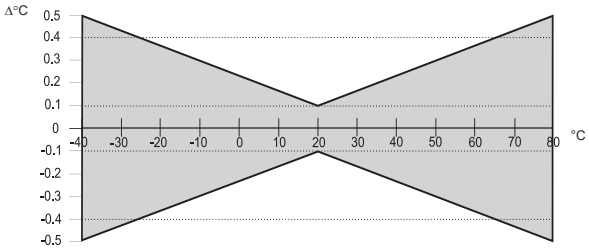
Features

accuracy ±0,1°C at 20°C
interchangeable probes
remote sensing probe up to 10m (32.8ft)
measuring range -40...80°C (-40...176°F)
optional display
traceable calibration
cost saving, easy loop-calibration of T probes

Technical Data

Measuring values of sensing probe

Temperature

Sensor element	Pt1000 (tolerance class A, DIN EN 60751)
Working range sensing probe	fixed sensing probe: -40...60°C (-40...140°F) remote sensing probe: -40...80°C (-40...176°F)
Accuracy (±0.1°C at 20°C)	
Temperature dependence of electronics	typ. ± 0.007°C/°C
Response time	t_{63}: typ. < 6min

Outputs

xx...yy°C[1] (temperature output scale according to Txx ordering code)	0 - 1V 0 - 10V 4 - 20mA (two wire)	-0.5mA < I_L < 0.5mA -1mA < I_L < 1mA R_L < 500 Ohm
Temperature dependence of analogue outputs	max. 0.2 $\frac{mV}{°C}$ resp. 1 $\frac{\mu A}{°C}$	
Resolution voltage output	0.6mV	
current output	4.3µA	

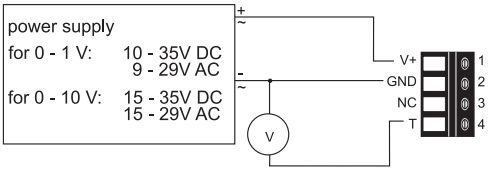
General

Supply voltage			
for 0 - 1V output	10 - 35V DC	or	9 - 29V AC
for 0 - 10V output	15 - 35V DC	or	15 - 29V AC
for 4 - 20mA output	10 - 35V DC		
Load resistor for 4 - 20mA output	$R_L < \frac{U_V - 10V}{0.02\,A}$ [Ω]		
Current consumption	typ. 10mA for DC supply		typ. 20mA_{eff} for AC supply
Electrical connection	screw terminals max. 2.5mm²		
Cable gland	M16x1.5 or connector (type: Lumberg, RSF 50/11)		
Material	housing: PC or Al Si 9 Cu 3		probe: stainless steel 1.4571 (316Ti)
Protection class of housing	IP65; Nema 4		
Electromagnetic compatibility	EN61326-1 Industrial Environment	EN61326-2-3	ICES-003 ClassB FCC Part15 ClassB
Working temperature range of probe	-40...60°C (-40...140°F) / 80°C (176°F) for remote sensing probe		
Working temperature range of electronics	-40...60°C (-40...140°F)		
Storage temperature range	-40...60°C (-40...140°F)		

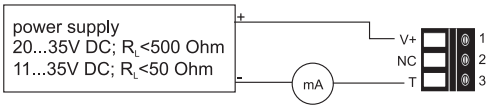
1) Refer to ordering guide

Connection Diagram

EE22-T1,3xx

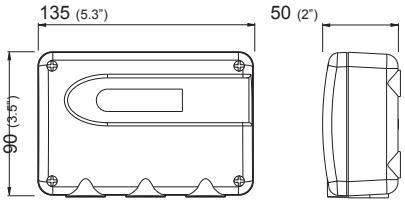


EE22-T6xx

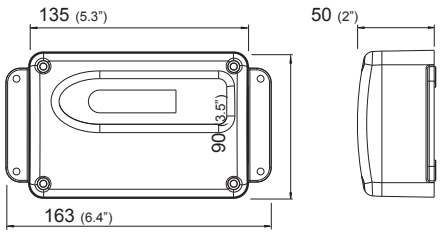


Housing Dimensions (mm)

polycarbonate housing



metal housing



For use in harsh industrial environments all models of EE22-T series are available in a robust metal housing.
The smooth surface and the rounded outlines allow for the use in clean room applications.

Ordering Guide

Position 1 - Transmitter

							EE22-
Hardware Configuration							
Housing	metal housing						**M**
	polycarbonate housing						**P**
Type	temperature						**T**
Output	0-1V						**1**
	0-10V						**3**
	4-20mA						**6**
Model	wall mounting - cable gland M16x1.5		cable Ø 4.5 - 10 mm (0.18 - 0.39")				**A**
	wall mounting - rear cable outlet						**F**
Probe	1 probe T						**1**
Display	without display						
	with display						**D07**
Plug	without plug						
	1 plug for power supply and outputs						**C03**
Software Configuration							
T-Unit	°C						
	°F						**E01**
Scaling of T-output in°C or °F	-40...60	**(T02)**	0...120	**(T16)**	-20...50	**(T48)**	**Select according to Ordering Guide (Txx)**
	-10...50	**(T03)**	-30...60	**(T20)**	-40...176	**(T80)**	
	0...50	**(T04)**	0...80	**(T21)**	0...140	**(T85)**	
	0...60	**(T07)**	-40...80	**(T22)**	0...176	**(T86)**	
	-30...70	**(T08)**	-20...80	**(T24)**	32...120	**(T90)**	**Other T-Scaling refer to data sheet „„T-Scalings““**
	-10...70	**(T11)**	-20...60	**(T25)**	32...140	**(T91)**	
	-40...120	**(T12)**	-30...50	**(T45)**	32...132	**(T96)**	

Position 2 - Probe cable

Cable length	2m (6.6ft)	**HA010801**
	5m (16.4ft)	**HA010802**
	10m (32.8ft)	**HA010803**

Accessories / Replacement Parts

(For further information see data sheet "„Accessories"")

- probe cable 2m (6.6ft) / 5m (16.4ft) / 10m (32.8ft) (HA0108xx)
- bracket for rail installation (HA010203)
- external supply unit (V02)
- Replacement probe T in metal (EE07-MT)
- Display + housing cover in polycarbonate (D07P)
- Display + housing cover in metal (D07M)
- Reference probes (HA010403)
- Duct mounting kit (HA010209)

Order Example

Position 1 - Transmitter:

EE22-MT3A1C03/T07

housing:	metal housing
type:	temperature
output:	0-10V
model:	wall mounting - cable gland M16x1.5
probe:	1probe T
display:	without display
plug:	1 plug for power supply and outputs
T-Unit:	°C
scaling of T-output:	0...60°C

Position 2 - Probe cable:

HA010802

cable length: 5m (16.4ft)

EE300Ex-xT

Temperature Transmitter for Intrinsically Safe Applications

The EE300Ex temperature transmitter has been designed specifically for measurement in explosion hazard areas. It complies with the classifications for **Europe (ATEX), International (IECEx) and USA / Canada (FM)**.
Accurate measurement over the range -70…200°C (-94...392°F) is also possible in applications under pressure from 0.1…20bar (1.5...300psi).

With a stainless steel enclosure and sensing probe the EE300Ex is the ideal transmitter for challenging industrial applications. The 2-part construction facilitates easy installation and fast replacement of the measuring section without time consuming wiring for both models: wall mounted and remote sensing probe up to 10 m (32.8 ft).

The entire EE300Ex can be placed in the explosion hazardous area. The model with remote probe can be used up to T6 temperature class.
Based on 2-wire technology, the transmitter can be powered by any intrinsically safe power source or via Zener barriers. The measured temperature values are available on a 4…20mA analog output and on the optional display.

The EE300Ex is factory-set to the required measuring range. When outside the hazardous area, the transmitter setup can be easily customized by using the supplied configuration software. This includes the configuration of the analog output and the calibration of temperature during service.

EE300Ex - wall mounting

EE300Ex - remote sensing probe

Typical Applications

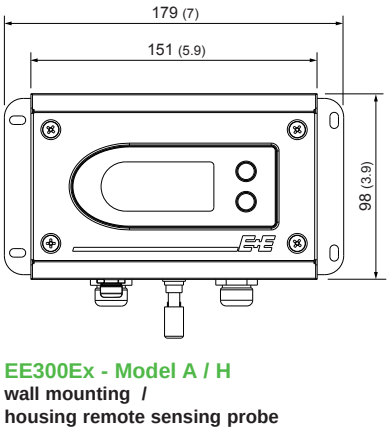
chemical process control
pharmaceutical industry
explosive / hazardous storage rooms
oil and gas industry

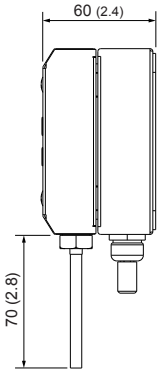
Features

approved for gas and dust installation in zone 0 / Div. 1
stainless steel housing and probe
highest accuracy up to 200°C (392°F)
pressure tight up to 20bar (300psi)

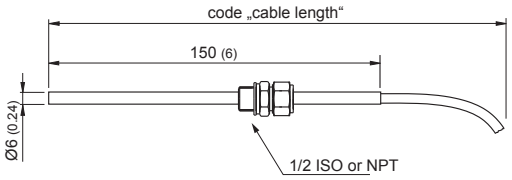
Models and Dimensions in mm (inches)

Model		pressure range	working range temperature	Ø-probe
A -	wall mounting		-40...60 °C (-40...140 °F)	6 (0.24)
M -	remote sensing probe	0.1...20 bar (1.5...300 psi)	-70...200° C (-94...392 °F)	6 (0.24)





EE300Ex - Model A / H
wall mounting /
housing remote sensing probe

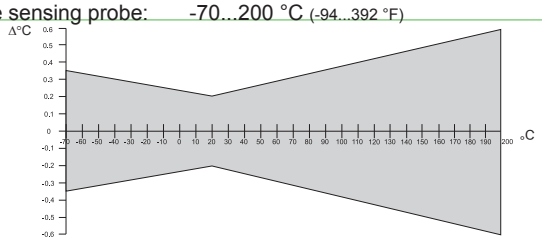


EE300Ex - Model H
remote sensing probe 20bar (300psi) with cut-in fitting

Technical Data EE300Ex

Measuring values

Temperature

Temperature sensor	Pt1000 (Tolerance class A, DIN EN 60751)	
Measuring range sensor head	wall mounting:	-40...60 °C (-40...140 °F)
	remote sensing probe:	-70...200 °C (-94...392 °F)
Accuracy[1]		
Temperature dependence of electronics	typ. 0.005 °C/°C	

Outputs

Scaleable analogue output	4 - 20 mA (2-wire)	R_L=(Vcc-9 V)/20 mA

General

Supply voltage (Class III)	$V_{cc\ min}$=(9+R_L*0.02) VDC	$V_{cc\ max}$=28 VDC	
Current consumption	max 20 mA		
Pressure range for pressure tight sensor probe	0.1 ... 20 bar (1.5...300 psi)		
Serial interface for communication [2]	RS232		
System requirements for software	WINDOWS XP or later		
Protection class of housing	IP65 / Nema 4		
Cable gland	M16 for cable diameter 5 - 10 mm (0.2 - 0.4“)		
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)		
Temperature range	sensor head	according measuring range	
	electronic	-40...60 °C (-40...140 °F)	
	electronic with display	-20...60 °C (-4...140 °F)	
Storage temperature range	electronic and sensor head	-20...60 °C (22...140 °F)	
Electromagnetic compatibility according	EN61326-1 Industrial Environment	EN61326-2-3	ICES-003 ClassB FCC Part15 ClassB
Material housing	stainless steel 1.4404		
probe cable	PTFE		
temperature probe	stainless steel 1.4541		

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) Configuration adapter EE-PCA and cable HA011061 necessary.

Ex - Classifications

Europe (ATEX)

Certificate:	TPS 13 ATEX 38892 003 X by TÜV SÜD Product Service GmbH		
Safety factors:	U_i = 28V; I_i = 100mA; P_i = 700mW; C_i = 2.2nF; L_i ≈ 0mH		
Ex-Designation:			
Transmitter without display	II 1 G Ex ia IIC T4 Ga	/	II 1 D Ex ia IIIC T80°C Da
Transmitter with display	II 2 G Ex ia IIC T4 Gb	/	II 1 G Ex ia IIB T4 Ga
Remote sensing probe	II 1 G Ex ia IIC T6-T1 Ga	/	II 1 D Ex ia IIIC T80°C...220°C Da

International (IECEx)

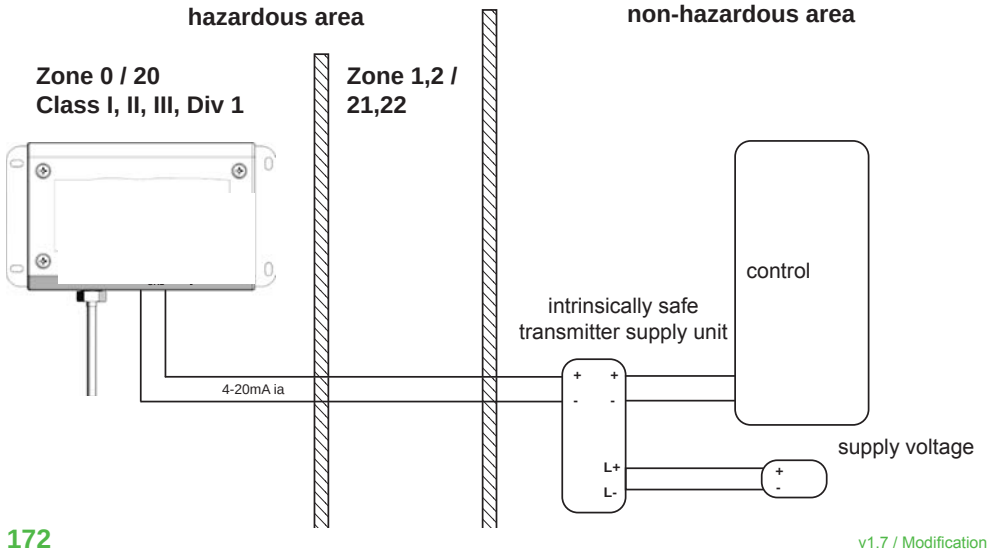
Certificate:	IECEx FMG 14.0017 X by FM Approvals		
Safety factors:	6.4 Vdc ≤ U_i ≤ 28Vdc; I_i = 100mA; P_i = 700mW; C_i = 2.2nF; L_i = 0mH		
Ex-Designation:			
Transmitter without display	Ex ia IIC T4 Ta = -40°C to 60°C Ga	/	Ex ia IIIC T131°C Da
Transmitter with display	Ex ia IIC T4 Ta = -40°C to 60°C Gb	/	Ex ia IIB T4 Ta = -40°C to 60°C Ga
Remote sensing probe	Ex ia IIC T6-T1 Ta = -70°C to 200°C Ga	/	Ex ia IIIC T80°C Da

USA and Canada (FM)

Certificate:	by FM Approvals
Safety factors:	6.4 Vdc ≤ V_{max} (or U_i) ≤ 28Vdc; I_{max} (or I_i) = 100mA; P_i = 700mW; C_i = 2.2nF; L_i = 0mH
Ex-Designation:	
Transmitter without display	IS/I,II,III/1/ABCDEFG/T4 -40°C < Ta < 60°C; Entity – M1_1309080; IP65 *USA:* NI/I,II,III/2/ABCDEFG/T4 -40°C < Ta < 60°C *Canada:* NI/I/2/ABCD/T4 -40°C < Ta < 60°C I/0/AEx ia IIC T4 -40°C < Ta < 60°C; Entity – M1_1309080; IP65 I/0/Ex ia IIC T4 -40°C < Ta < 60°C Ga; Entity – M1_1309080; IP65 20/ AEx ia IIIC T131°C -40°C < Ta < 60°C; Entity – M1_1309080; IP65
Transmitter with display	IS/I/1/CD/T4 -40°C < Ta < 60°C; Entity – M1_1309080 IS/I/2/ABCD/T4 -40°C < Ta < 60°C; Entity – M1_1309080 NI/I/2/ABCD/T4 -40°C < Ta < 60°C I/0/AEx ia IIB T4 -40°C < Ta < 60°C; Entity – M1_1309080 I/1/AEx ia IIC T4 -40°C < Ta < 60°C; Entity – M1_1309080 I/0/Ex ia IIB T4 -40°C < Ta < 60°C Ga; Entity – M1_1309080 I/1/Ex ia IIC T4 -40°C < Ta < 60°C Gb; Entity – M1_1309080
Remote sensing probe	IS/I,II,III/1/ABCDEFG/T6-T1 Entity – M1_1309080; IP65 *USA:* NI/I,II,III /2/ABCDEFG/T6-T1 *Canada:* NI/I/2/ABCD/T6-T1 I/0/AEx ia IIC T6-T1 Entity – M1_1309080; IP65 I/0/Ex ia IIC T6-T1 Ga Entity – M1_1309080; IP65 20/ AEx ia IIIC T80°C Entity – M1_1309080; IP65

Mounting Examples

EE300Ex - wall mounting in zone 0 or 20 / Class I, II, III; Div. 1:



Ordering Guide EE300Ex-xT

			EE300Ex-xT6S	EE300Ex-xT6S
Hardware Configuration	**Model**	wall mounting	A	
		remote sensing probe		H
	Display	without display	x	x
		with display [1]	D	D
	Electrical Connection	M16 cable gland	B	B
	Probe - Cable Length	wall mounting	x	
		1m (3.3ft) cable length		C
		2m (6.6ft) cable length		E
		5m (16.4ft) cable length		G
		10m (32.8ft) cable length		H
	Probe Length	wall mounting	x	
		remote sensing probe - 150mm (6“)		E
	Zone Feedthrough (probe fitting)	without probe fitting	x	x
		1/2“ ISO - cut-in fitting; 6mm (0.24“)		I
		1/2“ NPT - cut-in fitting; 6mm (0.24“)		J
	Ex-Certification	Europe (ATEX)	AT	AT
		International (IECEx)	IC	IC
		USA and Canada (FM)	FM	FM
Setting	**Measured Value Units**	metric [°C]	M	M
		non-metric [°F]	N	N
	Scaling Range	temperature	Tx	Tx
			yyy (select according table „scaling ranges“)	

[1] No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Group A&B)

Scaling Ranges

Tx - Temperature [°C or °F]											
yyy	*scaling*	*yyy*	*scaling*	*yyy*	*scaling*	*yyy*	*scaling*	*yyy*	*scaling*		
002	-40...60	007	0...60	015	20...120	081	-40...250	095	32...300		
003	-10...50	008	-30...70	022	-40...80	082	-40...350	153	-70...200		
004	0...50	012	-40...120	024	-20...80	083	-40...140	154	-94...392		
005	0...100	014	-20...100	077	20...140	085	0...140	155	-40...140		

Please observe the maximum adjustable scaling of the outputs (see Technical Data). Other scaling ranges on request.

Order Example

Example 1:

EE300Ex-xT6SHDBHEIAT/MTx005

Model:	remote sensing probe
Display:	with display
Electrical Connection:	M16 cable gland
Probe - Cable Length:	10m
Probe Length:	150mm
Zone Feedthrough:	1/2“ ISO - cut-in fitting
Ex-Certification:	ATEX
Measured Value Units:	metric
Scaling Range Temperature:	0...100°C

Example 2:

EE300EX-xT6SAxBxxxFM/NTx083

Model:	wall mounting
Display:	without display
Electrical Connection:	M16 cable gland
Probe - Cable Length:	wall mounting
Probe Length:	wall mounting
Zone Feedthrough:	without probe fitting
Ex-Certification:	USA and Canada (FM)
Measured Value Units:	non metric
Scaling Range Temperature:	-40...140 °F

Accessories

Configuration adapter for PC	(EE-PCA)
ATEX Connection cable with protective circuit	
EE300Ex to configuration adapter	(HA011061)
Blank cover for housing base	(HA011401)
Safety Barrier, 1-channel, STAHL 9002/13-280-093-001	(HA011410)
Intrinsically safe Transmitter Supply Unit, 1-channel, STAHL 9160/13-11-11	(HA011405)
Intrinsically safe Transmitter Supply Unit, 2-channel, STAHL 9160/23-11-11	(HA011406)
Sealing plug for unused cable glands	(HA011402)

EE75

High-Precision Air / Gas Velocity Transmitter for Industrial Applications

The EE75 series air velocity transmitters were developed to obtain accurate measuring results over a wide range of velocities and temperatures.
A high-quality hot film sensor element based on cutting-edge thin film technology ensures maximum sensitivity, even at lowest mass flows. At the same time, the innovative probe design produces reliable measuring results at high flow velocities of up to 40m/s (8000ft/min).

The integrated temperature compensation minimises the temperature cross-sensitivity of the EE75 series which, combined with the robust mechanical design, allows it to be used at process temperatures between -40 to +120 °C (-40 to 248 °F).

In addition to air velocity and temperature values, the transmitter calculates the volumetric flow rate in m³/min or ft³/min. The cross section of the duct needs to be determined for this purpose and the volumetric flow rate can be displayed and directed to one of the analogue outputs.

The configuration software included in the scope of supply allows to choose the appropriate output parameter and freely scale the display range and signal level of the two analogue outputs. In addition user-friendly calibration of the air velocity and temperature and the adjustment of key parameters (e.g. response time of the velocity measurement, low flow cut-off points, etc.) are supported as well.

An optional illuminated display with two control buttons integrated in the cover is available. In addition, this enables changes of the configuration to be made directly on the unit.

The EE75 series has a robust metal housing to protect against possible damage in rough industrial environments. There are four different models, providing a comprehensive range of mounting options:

- **Model A** for wall mounting
- **Model B** for duct mounting
- **Model C** with remote probe
- **Model E** with remote probe, pressure-tight up to 10bar (145psi)

The EE75 series can be used to measure the velocity of other gasses as well, although a correction has to be applied to the unit at the factory.


Model A


Model B


Model C

Typical Applications

- **monitoring incoming and outgoing air (energy management) in HVAC applications**
- **filter monitoring and laminar flow control in cleanrooms**
- **exhaust systems, exhaust hoods and glove boxes in the pharmaceutical, bio and semiconductor industries**
- **mass flow measurement during incineration processes**
- **monitoring and measurement of compressed air systems**
- **air conveying systems**
- **wind tunnels and climate simulators**

Features

high accuracy

working range 0...40 m/s (0...8000 ft/min) and -40...120 °C (-40...248 °F)

measurement of air velocity and temperature

calculation of volumetric flow rate

low dependence on angle of inflow

probe diameter 8 mm (0.3")

remote probe up to 10 m (32.8 ft)

easy mounting and maintenance

correction for pressure, humidity and media

low flow cut-off

pressure tight up to 10 bar (145 psi)

SI and US units selectable

Technical Data

Measuring value

Air velocity

Working range	0... 2 m/s (0...400 ft/min)	
	0...10 m/s (0...2000 ft/min)	
	0...40 m/s (0...8000 ft/min)	
Accuracy[1] in air at 25 °C (77 °F)[2]	0.06... 2 m/s (12...400 ft/min)	± 0.03 m/s / 6ft/min
at 45 % RH and 1013 hPa	0.15...10 m/s (30...2000 ft/min)	± (0.10 m/s / 20 ft/min + 1 % of measuring value)
0.2...	40 m/s (40...8000 ft/min)	± (0.20 m/s / 40 ft/min + 1 % of measuring value)
Uncertainty of factory calibration[1]	± (1 % of measuring value, min. 0.015 m/s (3 ft/min))	
Temperature dependence electronics	typ. -0.005 % of measuring value / °C	
Temperature dependence probe	± (0.1 % of measuring value/°C)	
Dependence	of angle of inflow:	< 3 % for α < 20°
	of direction of inflow:	< 3 %
Response time τ_{90}[3]	< 1.5...40 s (configurable)	

Temperature

Working range	probe:	-40...120 °C (-40...248 °F)
	probe cable:	-40...105 °C (-40...221 °F)
	electronic:	-40...60 °C (-40...140 °F)
	electronic with display:	-30...60 °C (-22...140 °F)
Accuracy at 20 °C (68 °F)	±0.5 °C (±0.9 °F)	
Temperature dependence electronics	typ. -0.01 °C / °C	
Response time τ_{90}[3]	10 s	

Outputs

output signals and display ranges are freely scaleable (see ranges below)

voltage	0-10 V (e.g: 0-5 V, 1-5 V etc.)	-1 mA < I_L < 1 mA
current (3-wire)	0-20 mA (e.g: 4-20 mA etc.)	R_L < 350 Ohm
v-scaling	0...2 / 10 / 40 m/s (0...400 / 2000 / 8000 ft/min)	
T-scaling	-40...120 °C (-40...248 °F)	
Vol-scaling	0...10000 m³/min (0...353147 ft³/min)	

General

Supply voltage	24 V DC/AC ± 20 %		
Current consumption	max. 100 mA; max. 160 mA (with display)		
Working range humidity	0...99 % RH - no condensation		
Connection	screw terminals max. 1.5 mm² (AWG 16)		
Electromagnetic compatibility	EN61326-1	EN61326-2-3	ICES-003 ClassB
	Industrial Environment		FCC Part15 ClassB
Pressure range	Model E pressure tight up to 10 bar (145 psi)		
Material	housing / protection class:	metal (AlSi3Cu) / IP65; Nema 4	
	measuring probe:	stainless steel	
	measuring head:	PBT (polybuthylenterephthalat)	
System requirements for configuration software	Windows 2000 or higher		
Interface	USB 1.1		

CE

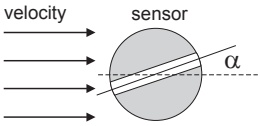
1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
2) Accuracy refers to measurement in air
3) Response time τ_{90} is measured from the beginning of a step change to the moment of reaching 90% of the step.

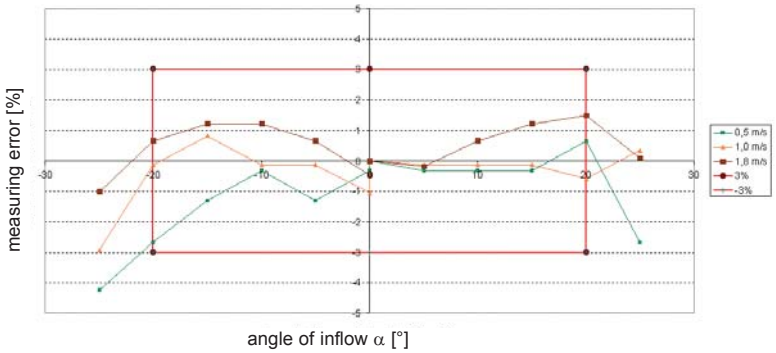
Configuration Software

An easy setup of the EE75 can be made via standard USB interface and the software included in the scope of supply.
The user can easily set the response time, correct for the gas (air) pressure, perform an one or two point adjustment and define the duct cross section for the volumetric flow rate.

Angular Dependence

The innovative design of the probe head minimises the effect of the angle of inflow on the measuring result. The deviation of the measuring value remains < 3 % up to an angle of inflow (α) of ± 20° between the direction of inflow and the sensor element's longitudinal axis.





Low flow cut-off

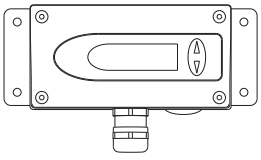
Small temperature differences in shut-off pipes and ducts can cause minimal flows. Even these would be detected and measured by the EE75. The resulting fluctuations in the output signal can be suppressed by the low flow cut-off. Cut-off point and switching hysteresis can be specified using the configuration software.

Calculation of volumetric flow

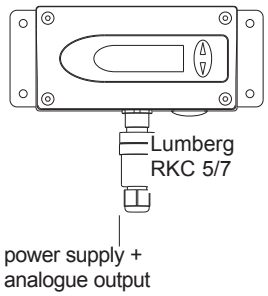
The EE75 measures air velocity in m/s or ft/min. The configuration software can be used to enter the cross-section. This enables the transmitter to calculate the volumetric flow rate in m³/min or ft³/min. The data can be displayed and directed to one of the analogue outputs.

Connection versions

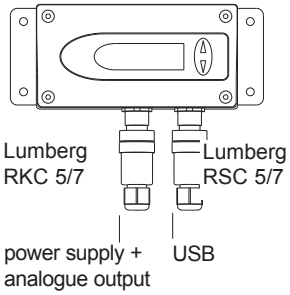
standard



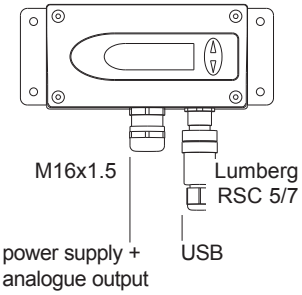
plug option C12



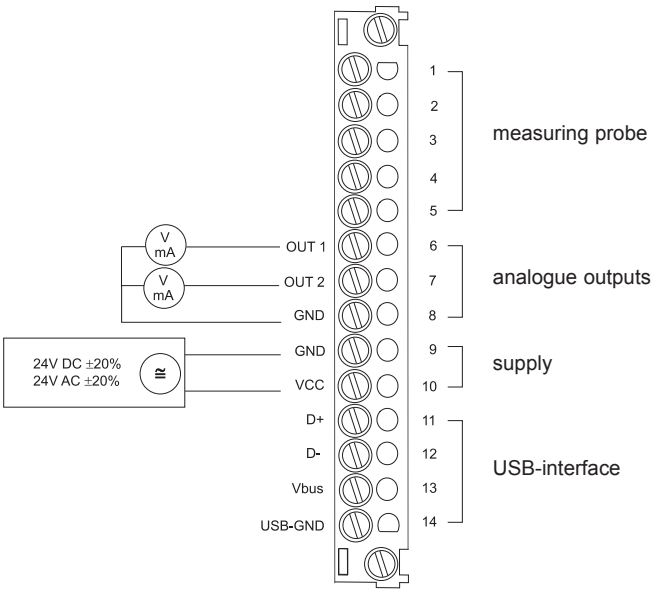
plug option C13



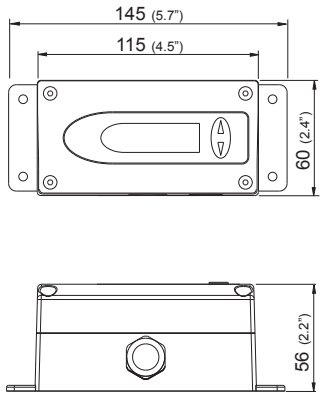
plug option C14

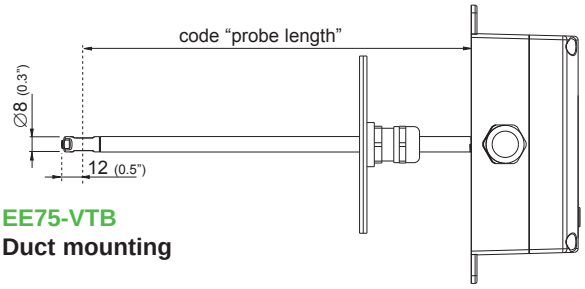


Connection Diagram

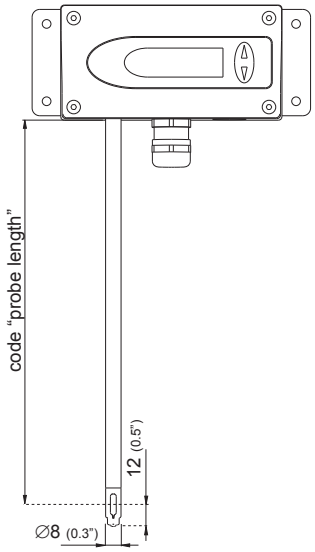


Dimensions in mm

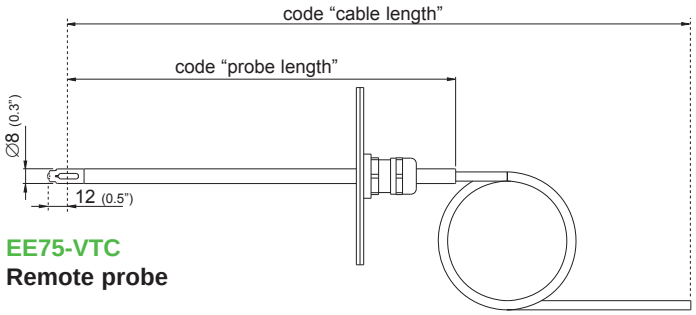




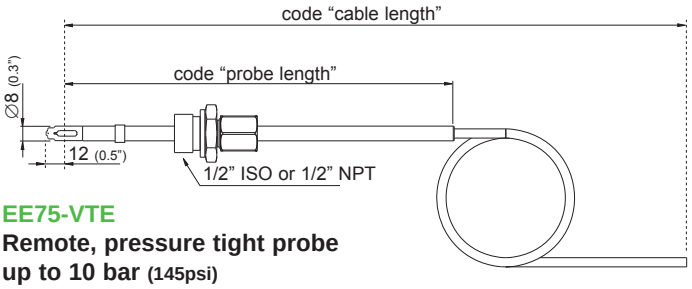
EE75-VTB
Duct mounting



EE75-VTA
Wall mounting

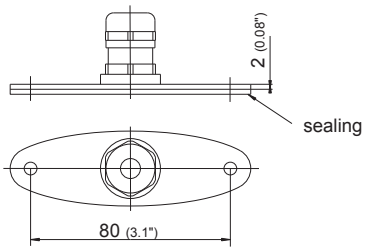


EE75-VTC
Remote probe



EE75-VTE
Remote, pressure tight probe up to 10 bar (145psi)

Mounting flange (included in the scope of supply)



Ordering Guide

		EE75-VTA	EE75-VTB	EE75-VTC	EE75-VTE
Hardware Configuration					
Output	0...10 V	3	3	3	3
	4...20 mA	6	6	6	6
Working range	0...2 m/s	1	1	1	1
	0...10 m/s	2	2	2	2
	0...40 m/s	3	3	3	3
Probe length	200 mm	5	5	5	5
	400 mm	6	6	6	6
	600 mm	7	7	7	7
Cable length	2 m			K200	K200
	5 m			K500	K500
	10 m			K1000	K1000
Display	without display				
	with display	D06	D06	D06	D06
Pressure tight feedthrough	1/2" ISO thread				HA03
	1/2" NPT thread				HA07
Plug	cable glands				
	1 plug for power supply and outputs	C12	C12	C12	C12
	2 plugs for power supply / outputs and USB	C13	C13	C13	C13
	1 plug for USB	C14	C14	C14	C14

Software Configuration								
Physical parameters outputs	Temperature		T [°C]		(B)		output 1	Select according to Ordering Guide (B,N,O)
	Velocity		v [m/s]		(N)		output 2	Select according to Ordering Guide (B,N,O)
	Volume[1]		v [m³/min]		(O)			
Measured value units	metric /SI							E01 E01 E01 E01
	non metric / US							
Scaling of v-output in m/s or ft/min	0...0.5	(V01)	0...30	(V10)	0...2000	(V18)		Select according to Ordering Guide (Vxx)
	0...1	(V02)	0...35	(V11)	0...3000	(V19)		
	0...1.5	(V03)	0...40	(V12)	0...4000	(V20)		
	0...2	(V04)	0...100	(V13)	0...5000	(V21)		
	0...5	(V05)	0...200	(V14)	0...6000	(V22)		
	0...10	(V06)	0...300	(V15)	0...7000	(V23)		
	0...15	(V07)	0...400	(V16)	0...7800	(V24)		
	0...20	(V08)	0...1000	(V17)	0...8000	(V25)		
	0...25	(V09)						
Scaling of T-ouput in °C or °F	-40...60	(T02)	-30...120	(T09)	0...80	(T21)		Select according to Ordering Guide (Txx)
	-10...50	(T03)	-20...120	(T10)	-40...80	(T22)		
	0...50	(T04)	-10...70	(T11)	-20...80	(T24)		
	0...100	(T05)	-40...120	(T12)	-20...60	(T25)		
	0...60	(T07)	20...120	(T15)	-30...50	(T45)		Other T Scaling refer to data sheet „T-Scalings"
	-30...70	(T08)	-30...60	(T20)	-20...50	(T48)		
Measurement	Air							B B B B
	Nitrogen N							C C C C
	Carbon dioxide CO_2							

1) Please declare the duct cross-section [m²] with your order.

Order Example

EE75-VTB325C12/BN-V05-T07

Model:	duct mounting
Output:	0...10 V
Working range:	0...10 m/s (0...2000 ft/min)
Probe length:	200 mm (7.9")
Display:	without
Plug:	1 plug for power supply and outputs
Output 1:	T
Output 2:	v
Measured value units:	metric / SI
v-Scaling:	0...5 m/s
T-Scaling:	0...60 °C
Measurement media:	air

EE650

Air Velocity Transmitter for HVAC Applications

The EE650 air velocity transmitter is dedicated for accurate and reliable measurement in building automation and ventilation applications.

EE650 employs the new VTQ air velocity sensor element, which operates on the thermal anemometer principle and is manufactured by E+E in state-of-the-art thin film technology. Due to its innovative design, the VTQ sensor element is very robust and highly insensitive to pollution, which leads to outstanding long-term performance.

The measuring range 0-10/15/20 m/s (0-2000/3000/4000 ft/min), the output signal 4-20 mA or 0-10 V as well as the response time 1 or 4 seconds are selectable by jumpers.

The enclosure design and the mounting flange included in the scope of supply allow for easy installation or replacement. EE650 can be adjusted by the user via digital interface.

EE650 - Duct mounting

EE650 - Remote sensor probe

Features

Bayonet Screws
» Open/closed with a ¼ rotation

Appropriate for US mounting requirements
» Knock-out for ½" conduit fitting

External mounting holes
» Mounting with a closed cover
» Electronics protected against construction site pollution

Electronics on the underside of the PCB
» Optimum protection against mechanical damage during installation

Jumper adjustment
» Measuring range, output signal and response time selectable by jumper.

E+E Air velocity sensor VTQ
» High insensitivity to pollution
» Long-term stable
» Measurement from 0.2 m/s (40 ft/min)

VTQ - Air velocity sensor

VTQ is the new thin film air velocity sensor element from E+E Elektronik and features exceptional mechanical stability and resistance to pollution. These are achieved by combining the advantages of thin film anemometer operation principle with those of state-of-the-art transfer-moulding technology.

Hot-film anemometer measuring principle

All air velocity measuring devices from E+E Elektronik are based on the thermal anemometer principle and include E+E thin-film sensor elements. The thermal flow measurement offers special advantages compared to differential pressure or vane probes:

- Wear-free due to no moving parts
- Negligible pressure loss in the duct thanks to compact probe design
- Outstanding accuracy over the entire measuring range
- Volume flow measurement possible without additional sensors
- Easy installation
- Excellent price/performance ratio

Technical data

Measuring range

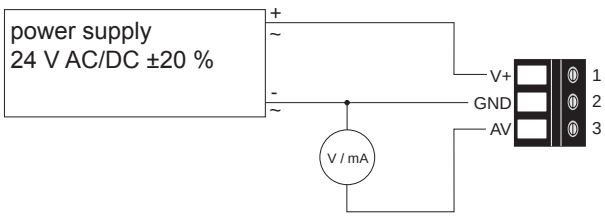
Working range [1]	0...10 m/s (0...2000 ft/min)	
	0...15 m/s (0...3000 ft/min)	
	0...20 m/s (0...4000 ft/min) (factory setting)	
Output [1]	0 - 10 V	-1 mA < I_L < 1 mA
0...10 m/s / 0...15 m/s / 0...20 m/s	4 - 20 mA (factory setting)	R_L< 500 Ω (linear, 3-wires)
Accuracy at 20 °C (68 °F),	0.2...10 m/s (40...2000 ft/min)	± (0.2 m/s (40 ft/min) + 3 % of m. v.)
45 % RH, 1013 hPa	0.2...15 m/s (40...3000 ft/min)	± (0.2 m/s (40 ft/min) + 3 % of m. v.)
	0.2...20 m/s (40...4000 ft/min)	± (0.2 m/s (40 ft/min) + 3 % of m. v.)
Response time τ_{90} [1) 2)]	typ. 4 sec. (factory setting) or	typ. 1 sec. at constant temperature

General

Power supply	24V AC/DC ± 20 %	
Current consumption for AC supply	max. 170 mA	
for DC supply	max. 70 mA	
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Cable gland	M16x1.5	
Electromagnetic compatibility	EN61326-1 Industrial Environment	EN61326-2-3 CE
Housing material	Polycarbonate, UL94V-0 approved	
Protection class	Enclosure IP65 / NEMA 4, remote probe IP20	
Temperature range	working temperature probe	-25 ... +50 °C (-13...122 °F)
	working temperature electronic	-10 ... +50 °C (14...122 °F)
	storage temperature	-30 ... +60 °C (-22...140 °F)
Working range humidity	5...95 % RH (non-condensing)	

1) Selectable by jumper
2) Response time τ_{90} is measured from the beginning of a step change of air velocity to the moment of reaching 90% of the step.

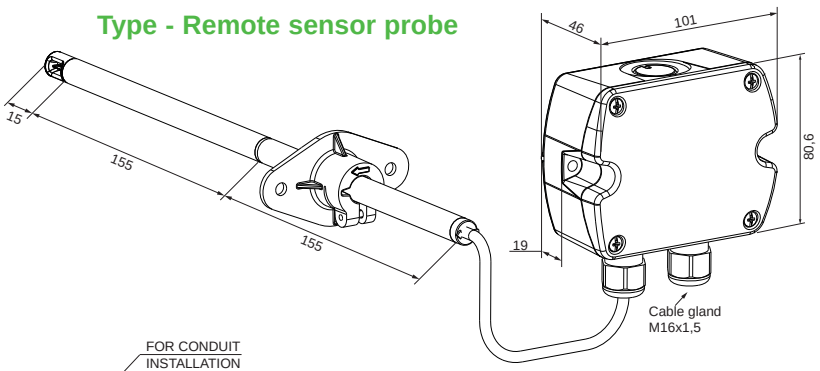
Connection Diagram



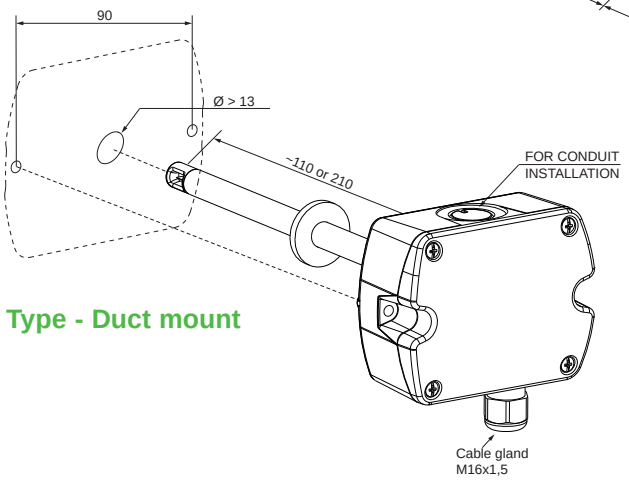
V+ = supply voltage
GND = ground
AV = air velocity output

Dimensions (mm)

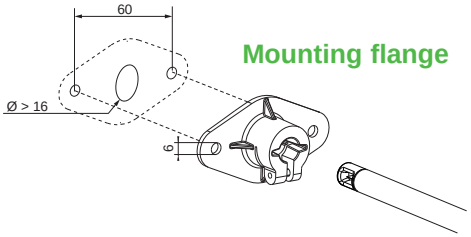
Type - Remote sensor probe



Type - Duct mount



Mounting flange



Ordering Guide

		EE650-	
Type	duct mount	T2	
	remote sensor probe		T3
Analogue output	4-20 mA (selectable by jumper to 0-10 V)	A6	A6
Probe length	100 mm	L100	
	200 mm	L200	
	300 mm (2 x 150 mm)		L300
Cable length	not applicable	no code	
	1 m		K1
	2 m		K2
	5 m		K5
	10 m		K10

Order Example

EE650-T2A6L200
Type: duct mount
Analogue output: 4-20 mA
Probe length: 200 mm

EE650-T3A6L300K2
Type: remote sensor probe
Analogue output: 4-20 mA
Probe length: 300 mm
Cable length: 2 m

Note:
Measuring range, output signal and response time selectable by jumper.

Scope of Supply

- EE650 Transmitter according to ordering guide
- Cable gland
- Mounting flange
- Mounting materials
- Protection cap
- Instruction manual
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2

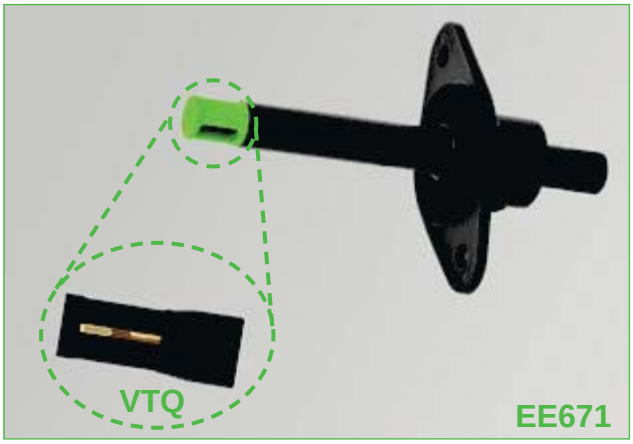
Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/EE650)
Power supply adapter	V03 (see data sheet Accessories)

EE671

HVAC Miniature Air Flow Transmitter

EE671 is a compact air velocity probe for HVAC applications. The built-in flow sensing element VTQ combines the advantages of state-of-the-art E+E thin-film manufacturing and of the newest transfer molding technology.
It operates on the hot-film anemometer principle and ensures high accuracy and excellent long-term stability. The flow sensing element ist very robust and highly insensitive to contamination.
EE671 is available with fixed cable or M12 connector. The alignment strip on the probe and the matching mounting flange within the scope of supply simplify installation and precise positioning in the air flow. The flange enables the immersion depth to be infinitely variable.
The measured air velocity up to 20 m/s (4000 ft/min) is available as linear voltage output 0 - 1 V, 0 - 5 V or 0 - 10 V. The digital version of EE671 with Modbus RTU interface facilitates integration into modern building automation systems. With an optional configuration kit it is easy to scale the output, set the Modbus parameters and perform the adjustment of the probe.



Typical Applications

Heating and ventilation systems
Flow monitoring and control
Inlet air monitoring in ovens

Features

High accuracy and long-term stability
Outstanding resistance to contamination
Easy and quick mounting
User configurable

Technical Data

Flow measurement

Measurement range[1]	0...5 m/s (0...1000 ft/min) 0...10 m/s (0...2000 ft/min) 0...15 m/s (0...3000 ft/min) 0...20 m/s (0...4000 ft/min)
Output signal	
analogue[1]	0 - 1 V (max. 1 mA) 0 - 5 V (max. 1 mA) 0 - 10 V[2] (max. 1 mA)
RS485	Modbus RTU
Accuracy[3] at 20 °C (68 °F) / 45 % rh and 1013 hPa (14.7 psi)	0.5...5 m/s (100...1000 ft/min): ±(0.2 m/s / 40 ft/min + 3 % of measured value) 1... 10 m/s (200...2000 ft/min): ±(0.3 m/s / 60 ft/min + 4 % of measured value) 1... 15 m/s (200...3000 ft/min): ±(0.35 m/s / 70 ft/min + 5 % of measured value) 1... 20 m/s (200...4000 ft/min): ±(0.4 m/s / 80 ft/min + 6 % of measured value)
Response time τ_{90}	typ. 4 s

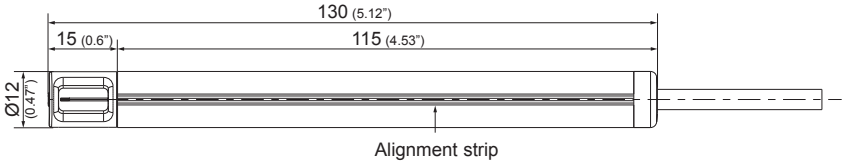
General

Supply voltage (Class III)	10...29 V DC SELV
Current demand	max. 50 mA at 20 m/s (4000 ft/min)
Temperature range	operation: -20...60 °C (-4...140 °F) storage: -30...60 °C (-22...140 °F)
Operating range humidity	5...95 % rh (non-condensing)
Connection	
Cable version	0.5 m (1.6 ft) / 2 m (6.6 ft) cable, PVC, temperature-flexible, 5x0.25 mm² (AWG 23) with ferrules
Plug version	M12 connector system, 5-pin
Electromagnetic compatibility[4]	EN61326-1 EN61326-2-3
Material / protection class	polycarbonate / IP50 (probe head); IP54 (housing)

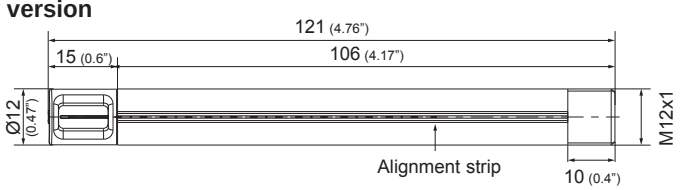
1) See ordering information
2) Only at supply voltage V+ ≥ 15 V
3) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-fold standard deviation). The tolerance was calculated in accordance with EA-4/02 following the GUM (Guide to the Expression of Uncertainty in Measurement).
4) The EE671 is not short-circuit-proof and not surge-proof (ESD-sensitive device).

Dimensions (mm/inch)

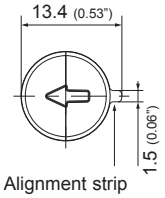
Cable version



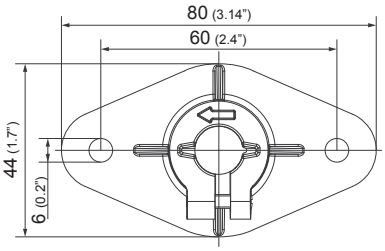
Plug version

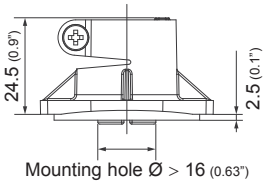


Front view Measurement head:



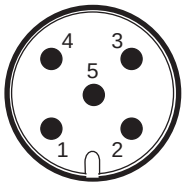
Flange (within the scope of supply):





Connection diagram

The device is not short-circuit-proof and not surge-proof (ESD-sensitive device). The two digital lines must not be connected to the supply!



view on sensor plug

Plug version	Cable version	Analog output	Modbus RTU output
1	grey	SDA (digital setup interface E2)	V+ = Supply voltage
2	brown	GND	RS485-B (=D-)
3	green	AV = Analog output	RS485-A (=D+)
4	yellow	SCL (digital setup interface E2)	GND
5	white	V+ = Supply voltage	n.c.

Modbus Map

The EE671 air flow transmitter can be operated in a Modbus RTU network with max. 32 devices. For Modbus protocol settings see Application Note Modbus AN0103 (www.epluse.com/EE671).

READ REGISTERS (function code 0x03 / 0x04)

Register [DEC]	Protocol address [HEX]	Measured value	Unit	Type
30001	0x00	Serial number		ASCII
30009	0x08	Software version		Binary
30010	0x09	Transmitter name		ASCII
30026	0x19	Temperature	°C	32-bit float
30028	0x1B	Temperature	°F	32-bit float
30030	0x1D	Temperature	K	32-bit float
30032	0x1F	Air velocity	m/s	32-bit float
30034	0x21	Air velocity	ft/min	32-bit float
30046	0x2D	Temperature	°C x 100	16-bit integer
30047	0x2E	Temperature	°F x 100	16-bit integer
30048	0x2F	Temperature	K x 100	16-bit integer
30049	0x30	Air velocity	m/s x 100	16-bit integer
30050	0x31	Air velocity	ft/min x 100	16-bit integer

WRITE REGISTERS (function code 0x06)

Register [DEC]	Protocol address [HEX]	Measured value	Unit	Type
60001	0x00	Network address		
60002	0x01	Communication parameter		

Ordering Information

MODEL		OUTPUT		MEASUREMENT RANGE		TYPE	
air velocity	(V)	0 - 1 V	(1x)	0...5 m/s (0...1000 ft/min)	(C)	cable version 0.5 m	(KA)
		0 - 5 V	(2x)	0...10 m/s (0...2000 ft/min)	(D)	cable version 2 m	(KD)
		0 - 10 V	(3x)	0...15 m/s (0...3000 ft/min)	(E)	plug version	(Sx)
		RS485	(x3)	0...20 m/s (0...4000 ft/min)	(F)		
EE671-							

Digital output setup

PROTOCOL		BAUDRATE		PARITY		STOPBITS		UNIT	
Modbus RTU	(1)	9600	(A)	odd	(O)	1 stopbit	(1)	metric	(M)
		19200	(B)	even	(E)			non-metric	(N)
		38400	(C)	no parity	(N)				

Order Example

EE671-V2xDKA

Model:	air velocity
Output:	0 - 5 V
Measurement range:	0...10 m/s (0...2000 ft/min)
Type:	cable version 0.5 m

EE671-Vx3ESX/1AE1M

Model:	air velocity
Output:	RS485
Measurement range:	0...15 m/s
Type:	plug version
Protocol:	Modbus RTU
Baudrate:	9600
Parity:	even
Stopbits:	1 stopbit
Unit:	metric

Scope of Supply

- EE671 transmitter according to ordering guide
- Protection cap
- Mounting flange
- User manual

Accessories (see data sheet „Accessories“)

Product configuration adapter	see data sheet EE-PCA
Connections set for EE671 analogue	HA011064
RS485 USB-converter	HA011016
Product configuration software (free download: www.epluse.com/EE671)	EE-PCS
Mounting flange	HA010214
Especially for plug version (Design S):	
Mating plug (self assembling)	HA010708
Connecting cable, 5-pin, 2 m (79“), M12 plug	HA010816
Connecting cable, 5-pin, 5 m (197“), M12 plug	HA010817
Connecting cable, 5-pin, 1.5 m (59“), flying leads	HA010819
Connecting cable, 5-pin, 5 m (197“), flying leads	HA010820

EE660

Transmitter for Very Low Air Velocity

The EE660 is designed for highly accurate measurement of very low air velocity. It is the ideal solution for laminar flow control and special ventilation applications for instance in clean rooms.

The E+E thin film sensor used in EE660 operates on the hot film anemometer principle, which stands for excellent accuracy down to 0.15 m/s (30 ft/min) and high insensitivity to pollution.

The measured data is available on the current and voltage outputs (both signals are available on the terminal) as well as on the optional LCD backlight display. The measurement range and the response time can be selected via a jumper.

Low angular dependence and the mounting flange enable easy, cost-effective installation.

An optional kit facilitates easy adjustment of EE660 and configuration of the display.

EE660 - duct mounting

EE660 - remote probe

Features

Display

» Large, easily readable
» Back-light
» 180° rotatable

Smooth cover surface

» No accumulation of dust in protruding edges

Electronics on the underside of the PCB

» Optimum protection against mechanical damage during installation

E+E Air velocity sensor VTM

» Long-term stability
» Measurement from 0.15 m/s
» Lowest sensitivity to dirt

Appropriate for US mounting requirements

» Knock-out for ½" conduit fitting

External mounting holes

» Mounting with a closed cover
» Electronics protected against construction site pollution
» Easy and fast mounting

Bayonet Screws

» Open/closed with a ¼ rotation

Technical Data

Measuring values

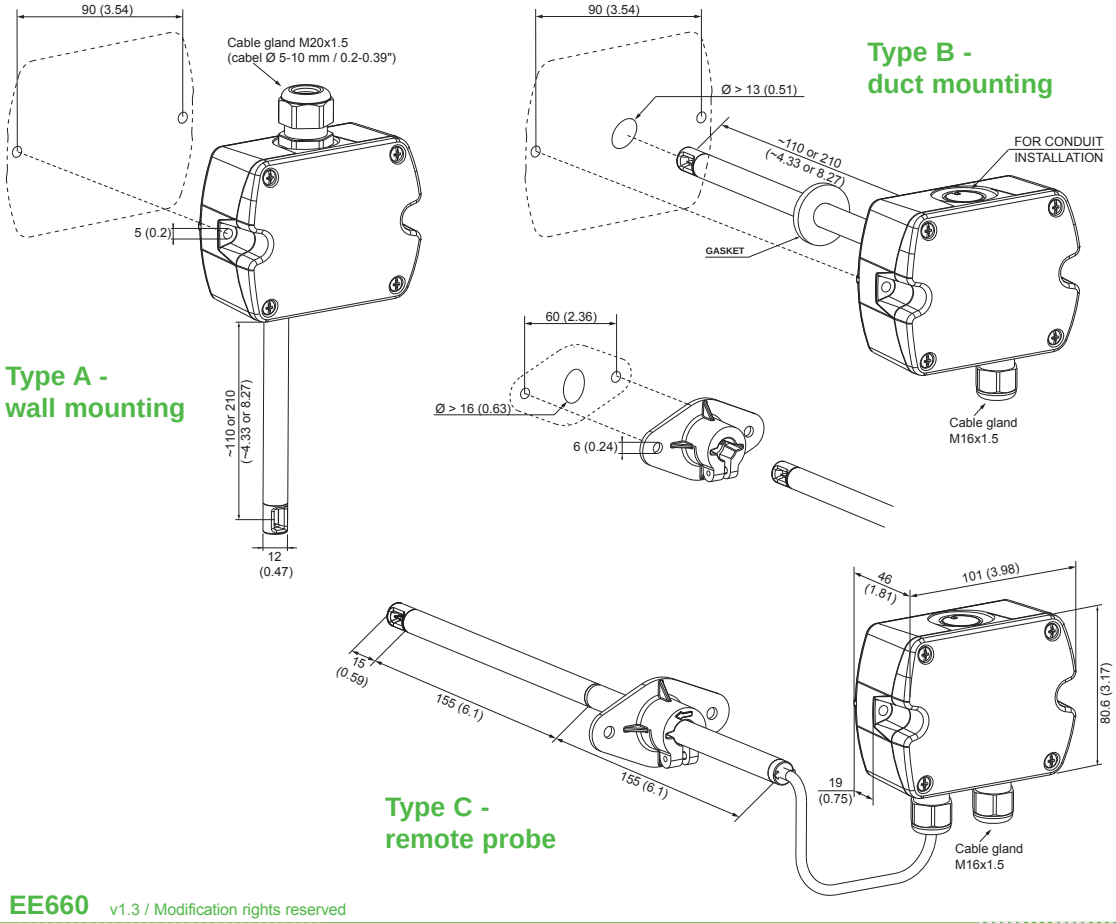
Working range [1]	0...1 m/s (0...200ft/min) 0...1.5 m/s (0...300ft/min) 0...2 m/s (0...400ft/min)	
Output 0...1 m/s / 0...1.5 m/s / 0...2 m/s	0 - 10 V -1 mA < I_L < 1 mA 4 - 20 mA R_L < 450 Ω (linear, 3-wires)	
Accuracy at 20 °C (68 °F), 45 % RH, 1013 hPa	0.15...1 m/s (30...200 ft/min) ± (0.04 m/s (7.9 ft/min) + 2 % of mv) 0.15...1.5 m/s (30...300 ft/min) ± (0.05 m/s (9.8 ft/min) + 2 % of mv) 0.15...2 m/s (30...400 ft/min) ± (0.06 m/s (11.8 ft/min) + 2 % of mv)	
Response time τ_{90} [1) 2)]	typ. 4 sec or typ. 1 sec (at constant temperature)	

General

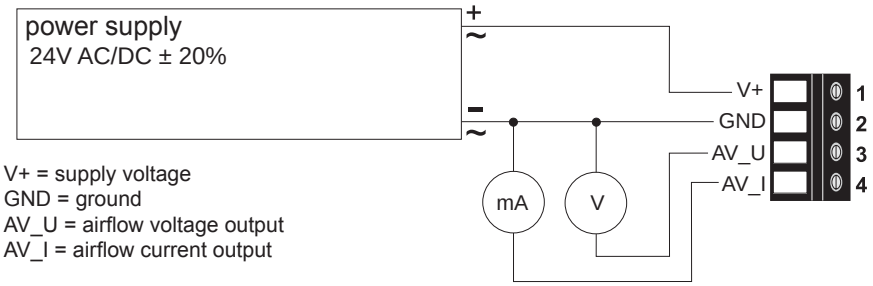
Power supply	24V AC/DC ± 20%
Current consumption	
for AC supply	max. 180 mA rms (with Display), 74 mA rms (without Display)
for DC supply	max. 85 mA (with Display), 41 mA (without Display)
Angular dependence	< 3% of the measured value at | Δα | < 10°
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)
Cable gland	M16x1.5
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial Environment
Housing material	Polycarbonate, UL94V-0 (with Display UL94HB) approved
Protection class	Enclosure IP65 / NEMA4, remote probe IP20
Temperature range	working temperature probe -25 ... +50 °C (-13...122°F) working temperature electronic -10 ... +50 °C (14...122°F) storage temperature -30 ... +60 °C (-22...140°F)
Working range humidity	5...95 % RH (non-condensing)

1) Selectable by jumper
2) Response time τ_{90} is measured from the beginning of a step change of air velocity to the moment of reaching 90% of the step.

Dimensions mm (inch)



Connection Diagram



V+ = supply voltage
GND = ground
AV_U = airflow voltage output
AV_I = airflow current output

Ordering Guide

			EE660-	EE660-	EE660-
Configuration	**Model**	Velocity	V	V	V
	Output	0-10V / 4-20mA	7x	7x	7x
	Housing		A	B	C
	Probe length	100 mm	D	D	x
		200 mm	F	F	x
	Cable length	1 m	x	x	B
		2 m	x	x	D
		5 m	x	x	G
		10 m	x	x	H
	Display	with Display	D	D	D
		without Display	x	x	x
	Unit (Display)[1)]	metric [m/s]	M	M	M
		non-metric [ft/min]	N	N	N

1) Only available with display

Order Example

EE660-V7xBFxx

Model:	Velocity
Housing:	Duct mounting
Probe length:	200mm
Display:	no Display

EE660-V7xCxDD/M

Model:	Velocity
Housing:	remote Probe
Cable length:	2m
Display:	with Display metric (m/s)

Scope of Supply

- EE660 Transmitter according ordering guide
- Cable gland
- Mounting flange (for Type B & C only)
- Mounting kit
- Protection cap
- Operation manual
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2

Accessories

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/EE660)
Power supply adapter	V03 (see data sheet Accessories)

EE576

Miniature Air Velocity Transmitter for Measurement of Lowest Velocity

The EE576 is a compact air velocity transmitter designed for measurement of lowest velocity. Equipped with a newly developed sensor head and utilizing the proven E+E hot-film element, already tested a million times in the automotive industry, these transmitters are less sensitive to dust and dirt than conventional hot-wire elements. This is reflected in the excellent reproducibility and proven long-term stability of the measuring results.
The factory calibration with a special wind tunnel for lowest velocity ensures optimal precision and maximum sensitivity.
The EE576 can be mounted fast and easily.
The alignment strip along the probe's tube and the matching mounting flange determine the orientation of the sensor probe. The mounting flange allows for an infinitely variation of the depth of the sensor probe.
The electronics integrated in the probe tube provide a linear analogue signal of 0-5 V or 0-10 V for the velocity range 0...1 m/s (0...200 ft/min) or 0...2 m/s (0...400 ft/min).

Typical Applications

laminar flow control
filter monitoring
exhaust systems
glove boxes

Features

excellent price/performance ratio
compact housing
easy and fast mounting

Technical Data

Measuring values

Working range[1]	0...1 m/s (0...200 ft/min) 0...2 m/s (0...400 ft/min)	
Output signal[1] 0...1 m/s / 0...2m/s	0-5 V (max. 1 mA) 0-10 V (max. 1 mA)	
Accuracy[2] at 20 °C / 68 °F / 45 % RH and 1013 hPa	0.2...1 m/s (40...200 ft/min): ±(0.05 m/s +2 % of m.v.)	0.2...2 m/s (40...400 ft/min): ±(0.08 m/s +4 % of m.v.)
Response time at 1 m/s (200 ft/min) t_{90}	typ. 4 sec.	

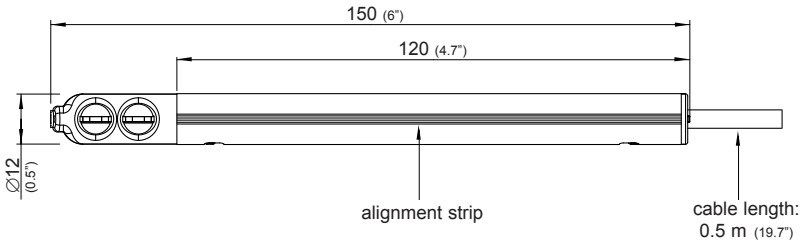
General

Supply voltage[1] (Class III)	10 - 19 V DC or 19 - 29 V DC	
Current consumption	max. 70 mA at 2 m/s (400 ft/min)	
Working range	humidity: working temperature: storage temperature:	10...95 % RH (non-condensing) -20…60 °C (-4...140 °F) -30…60 °C (-22...140 °F)
Connection	0.5 m cable, PVC 3x0.25 mm² with cable end sleeves	
Electromagnetic compatibility	EN61326-1 EN61326-2-3	CE
Housing / Protection class	polycarbonate / IP20 (sensor); IP40 (housing)	

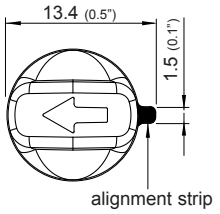
1) refer to ordering guide
2) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Dimensions (mm)

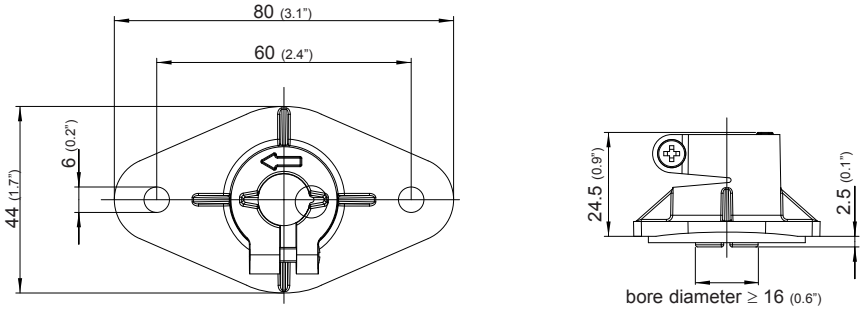
Probe:



Front view sensor head:



Flange (included in the scope of supply):



Cable Assignment

white → V+
brown → GND
green → output signal

Ordering Guide

MODEL		OUTPUT		WORKING RANGE		SUPPLY		CABLE LENGTH	
air velocity	(V)	0 - 5 V	(2)	0...1 m/s (0...200 ft/min)	(A)	10 - 19 V DC	(1)	0,5 m	(no code)
		0 - 10 V[1)]	(3)	0...2 m/s (0...400 ft/min)	(B)	19 - 29 V DC	(2)	2 m	(K200)
EE576-									

1) with supply 19-29 V DC only

Order Example

EE576-V2B1K200

Model:	air velocity
Output:	0 - 5 V
Working range:	0...2 m/s
Supply:	10 - 19 V DC
Cable length:	2 m

Scope of supply

- EE576 air velocity transmitter according to ordering guide
- Mounting flange
- Manual

EE741

Modular, compact, inline flow meter for compressed air and gases

The EE741 inline flow meter is dedicated for accurate metering and monitoring of compressed air and technical gases. With three different gauge mounting blocks, one and the same transmitter unit can be installed on DN15 (1/2”), DN20 (3/4”) and DN25 (1”) pipes.
The thermal measuring principle and the well-proven E+E hot film sensor element lead to best long-term stability and fast response time.
Outstanding measuring accuracy, even in the lower measuring range is achieved by an application-specific multi-point factory adjustment, which is performed at 7 bar (102 psi). This allows reliable leak detection and corresponding energy savings.
The construction of the EE741 is optimized for easy installation and maintenance.


EE741

The EE741 is user configurable and can be easily adapted to any measuring task. The configuration can be set either using the optional display and push buttons or with the free product configuration software EE-PCS.

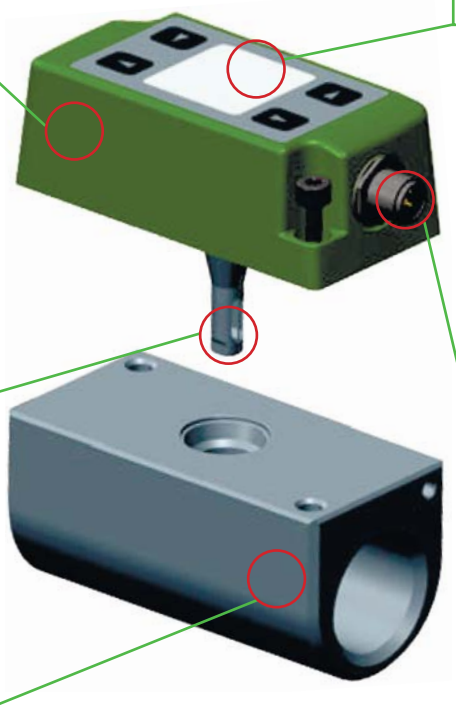
Typical applications

- Compressed air consumption measurement
- Flow measurement of technical gases (O_2, N_2, Ar, CO_2, He)
- Nitrogen generators
- Leak detection

Features

Transmitter
» Can be used for three different pipe diameters
» Installation and removal without disassembling the pipework facilitates regular calibration
» Application-specific adjustment under pressure for best accuracy

Display (optional)
» Shows instantaneous values and overall consumption
» Intuitive device setup with push-buttons
» Can be rotated in 90° increments



Sensor head and thermal flow sensor
» Robust design in stainless steel
» Very fast response time
» Wide measuring range
» Long-term stable and accurate
» Negligible pressure drop
» Highly insensitive to contamination
» No additional pressure and temperature compensation required

Output
» User configurable via display or software
» Analogue 0-20 / 4-20 mA
» 2 switch outputs
» Pulse output
» Modbus RTU
» M-Bus

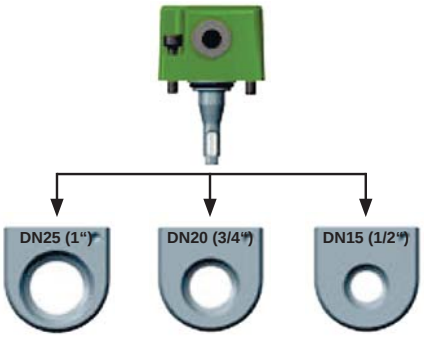
Measurands
» Standard volume flow
» Mass flow
» Standard flow
» Temperature
» Integrated consumption meter (totalisator) for cost-effective consumption analysis without additional datalogger

Gauge mounting block
» Precise and reproducible inline installation of the transmitter for best accuracy
» Aluminum or stainless steel
» Can be operated with sealing plug also without transmitter

Modular design

With the DN15 (1/2”), DN20 (3/4”) and DN25 (1”) gauge mounting blocks, one and the same transmitter unit can be installed on all three pipe diameters. The pipe diameter can easily be changed via display menu or with the EE-PCS product configuration software.

Once the gauge mounting block is built into the pipeline, the transmitter can be installed and removed without disassembling the pipework. As a result, the EE741 is also ideal for temporary measurements or even mobile use. The sealing plug included in the scope of supply enable the normal operation of the compressed air system when the transmitter is removed.



Technical data

Measured values

Flow

Measurands	m^3/h, m^3/min, l/min, l/s, kg/h, kg/min, m/s, SCFM, ft/min, °C, °F
Standard conditions (factory setting)	1013.25 mbar (14.7 psi), 0 °C (32 °F) (configurable)
Measuring range[1] in air	DN15 (1/2”): 0.2...76.3 Nm^3/h (0.12...44.88 SCFM) DN20 (3/4”): 0.4...135.6 Nm^3/h (0.24...79.77 SCFM) DN25 (1”): 0.6...212 Nm^3/h (0.36...124.71 SCFM)
Accuracy[2] in air at 7 bar (102 psi) (abs) and 23 °C (73 °F)	± (3 % of measured value + 0.3 % of full scale)
Temperature coefficient	± 0.25 % of the measured value / °C deviating from 23 °C (73 °F)
Pressure coefficient[3]	+ 0.5 % of the measured value / bar deviating from 7 bar (102 psi)
Response time t_{90}	< 2 sec.
Measuring rate	0.1 sec.

Temperature

Measuring range	-20...60 °C (-4...140 °F)
Accuracy at 20 °C (68 °F) and flow >0.5 Nm/s	± 0.7 °C (1.26 °F)

Outputs

Analogue output (scalable)	0 - 20 mA / 4 - 20 mA R_L<500 Ohm
Switch output	DC PNP, max. 100 mA, V_{drop} <2.5 V, 10 kOhm Pull-down Configurable: N/C or N/O, hysteresis, window
Pulse output	Consumption meter, pulse length 0.02...2 sec.
Bus-interface	Modbus RTU (max. 32 units in one bus) or M-BUS (Meter-Bus)
Configuration interface	USB

General

Supply voltage	18 - 30 V DC
Current consumption (max.)	
with display	I_{max} ≤120 mA (P_{max} ≤2,5 W)
without display	I_{max} ≤60 mA (P_{max} ≤1,6 W)
Operating pressure (max.)	16 bar (232 psi)/ PN16
Ambient temperature	
with display	0...50 °C (32...122 °F)
without display	-20...60 °C (-4...140 °F)
Medium and storage temperature	-20...60 °C (-4...140 °F)
Humidity	0…100 % RH, non-condensing
Medium	Compressed air, nitrogen, oxygen, helium, CO_2, argon
Electrical connection	M12x1 4 pol. plug
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial environment CE
Material	
Enclosure	Polycarbonate
Sensor head / sensor element	Stainless steel 1.4404 / glass
Gauge mounting block	Aluminium anodized or stainless steel 1.4404
Enclosure protection class	IP65

1) Factory setting of the output see manual.
2) The tolerance specifications include the uncertainty of the factory calibration with a coverage factor k=2 (2 x standard deviation). The tolerance was calculated in accordance with EA-4/02 following the GUM (Guide to the Expression of Uncertainty in Measurement).
3) The flow meter is factory adjusted at 7 bar (102 psi) (abs). At operating pressure other than 7 bar (102 psi) (abs), the error can be corrected by entering the actual system pressure via display menu or with EE-PCS configuration software.

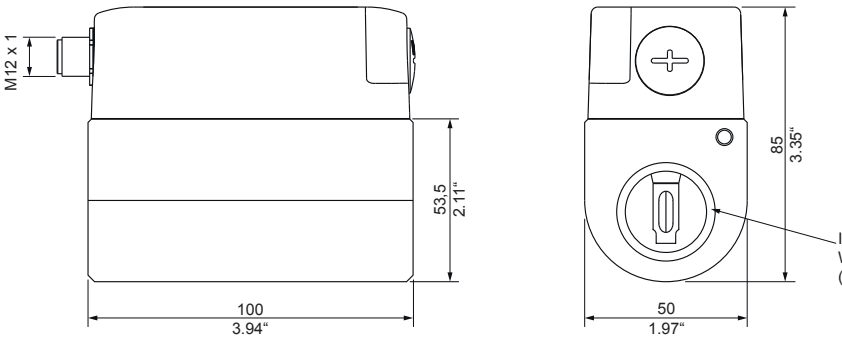
Display (optional)

The state-of-the-art LCD shows the current measured values and the overall consumption. The user specific device setup can be easily performed with the push buttons and intuitive menu guidance.

The display can be rotated in 90° increments with a push button for convenient orientation in any mounting position of the flow meter.

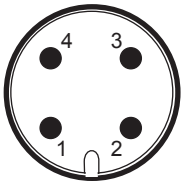
The EE741 without display can be configured by the user via USB interface with the free EE-PCS product configuration software.

Dimensions (mm/inch)



Mounting block	Thread R_p or NPT
DN15	1/2"
DN20	3/4"
DN25	1"

Connection diagram



M12 plug on device

Analogue/switch/ pulse output	Modbus RTU	M-Bus / Meter-bus
1...V+	1...V+	1...V+
2...Output 1	2...RS485 A (=D+)	2...M-Bus
3...GND	3...GND	3...GND
4...Output 2	4...RS485 B (=D-)	4...M-Bus

The output signal is freely selectable and scalable by the user:
Output 1: Analogue [mA] or switch
Output 2: Pulse or switch

Accessories

- Inlet and outlet path BSP thread, stainless steel, for mounting block	DN15 (1/2“)	HA070215
	DN20 (3/4“)	HA070220
	DN25 (1“)	HA070225

Scope of supply

Item 1: EE741:
- EE741 according to ordering guide
- 1 x Allen key
- 1 x USB cable
- Operating instructions
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Inspection certificate according to DIN EN10204 - 3.1

Item 2: Gauge mounting block:
- Gauge mounting block incl. sealing plug

Ordering information

A complete flow meter consists of a transmitter (Item 1) and a gauge mounting block (Item 2).

Item 1 - Transmitter				EE741-	EE741-
Hardware	**Output**	Analogue/switch/pulse output		A6	
		RS485 Modbus RTU			J3P1
		M-Bus			J5P4
	Display	No display		No code	No code
		With display		D2	D2
	Accessories for electrical connection	None		No code	No code
		M12x1 straight socket, can be assembled		AC2	AC2
	Cleaning	without		No code	No code
		degreased for oxygen measurement		AF2	AF2
Software configuration	**Pipe diameter** (user selectable)	DN15 (1/2“)		DN15	DN15
		DN20 (3/4“)		DN20	DN20
		DN25 (1“)		DN25	DN25
	Output 1	Analogue output	4-20 mA	No code	
			0-20 mA	GA5	
		Switch output		GA9	
	Output 2	Pulse output	(Only with Measurand output 2 = Consumption)	No code	
		Switch output		GB9	
	Measurand output 1	Standard volume flow	V'_n [Nm³/h]	No code	
			V'_n [Nm³/min]	MA84	
			V'_n [l/min]	MA85	
			V'_n [l/s]	MA86	
			V'_n [SCFM]	MA87	
		Mass flow	m‘ [kg/h]	MA80	
			m‘ [kg/min]	MA81	
		Standard flow	v_n [Nm/s]	MA22	
			v_n [SFPM]	MA23	
		Temperature	T [°C]	MA1	
			T [°F]	MA2	
	Measurand output 2	Consumption	Q_n [Nm³] (Only for output 2 = Pulse output)	No code	
		Standard volume flow	V'_n [Nm³/h]	MB83	
			V'_n [Nm³/min]	MB84	
			V'_n [l/min]	MB85	
			V'_n [l/s]	MB86	
			V'_n [SCFM]	MB87	
		Mass flow	m‘ [kg/h]	MB80	
			m‘ [kg/min]	MB81	
		Standard flow	v_n [Nm/s]	MB22	
			v_n [SFPM]	MB23	
		Temperature	T [°C]	MB1	
			T [°F]	MB2	
	Unit for process parameters	SI units [mbar, °C]		No code	No code
		US units [psi, °F]		U2	U2
	Medium	Air		No code	No code
		Nitrogen		FU2	FU2
		CO_2		FU3	FU3
		Oxygen [1]		FU4	FU4
		Helium		FU6	FU6
		Argon		FU7	FU7

Item 2 - Gauge mounting block		BSP-thread	NPT-thread
Aluminum gauge mounting block	DN15 (1/2“)	HA079015	HA179015
	DN20 (3/4“)	HA079020	HA179020
	DN25 (1“)	HA079025	HA179025
Stainless steel gauge mounting block	DN15 (1/2“)	HA078015	HA178015
	DN20 (3/4“)	HA078020	HA178020
	DN25 (1“)	HA078025	HA178025
Stainless steel gauge mounting block for oxygen [1]	DN15 (1/2“)	HA081015	HA181015
	DN20 (3/4“)	HA081020	HA181020
	DN25 (1“)	HA081025	HA181025

1) The parts of the transmitter/mounting block in contact with the medium are oil and grease-free.

Order Example

Item 1 - Transmitter

EE741-A6D2DN15

Output:	Analogue/switch/pulse output
Display:	With display
Accessories for electrical connection:	None
Pipe diameter (user selectable):	DN15 (1/2”)
Unit for process parameters:	SI units [mbar, °C]
Medium:	Air

Item 2 - Gauge mounting block

HA079015

Aluminum gauge mounting block	DN15 (1/2“)

EE771/EE772

Inline Flow meter for compressed air and gases DN15 (1/2“) - DN80 (3“)

The inline flow meter EE771/EE772, based on the measurement principle of thermal mass flow, is ideally suited for the measurement of flow in pipelines DN15 (1/2”) up to DN80 (3”). Measurement of for instance the usage of compressed air, nitrogen, CO_2, O_2, helium or other non-corrosive, non-flammable gasses.

The flow meters are setting new standards in terms of measurement accuracy and reproducibility thanks to their application-specific adjustment during production. As such, the EE771/EE772 is adjusted under a pressure of 7 bar.
The unique mounting concept with a measurement valve with shut-off function permits rapid installation and removal of the device for periodical calibration. It simultaneously ensures high measurement accuracy through exact and reproducible positioning in the pipe.

The core design of the flow meter is based on the E+E hot film sensor element, which is produced using the most modern thin film technology. This flow sensor features excellent long-term stability, a fast response time and an extremely high degree of reliability.

Two outputs are available, for further processing of the measurement data. Depending on the application, these outputs can be configured as analogue (current or voltage), switch output or as pulse output for the measurement of the consumption.

Bus interface for Modbus RTU or M-Bus
Optionally, the flow meter is available with an additional bus interface for Modbus RTU or M-BUS (Meter-Bus).

Configuration software
The flow meter can be configured conveniently, to meet the requirements of the application with the standard configuration software and the integrated USB interface.

Functionality of the software:
- Configuration of the output (scale / set point)
- 2-point user calibration for flow and temperature
- Readout of the counter values
- Reset of min / max values and counter
- Indication of the measurement value

EE771 Compact


EE772 remote probe

Attribute	EE771	EE772
Sensor exchange under pressure with short flow interruption	✓	
Sensor exchange under pressure without flow interruption		✓
pipeline DN15...DN50 (1/2“...2“)	✓	
pipeline DN40...DN80 (1 1/2“...3“)		✓
Additional assembly of dew point- and pressure sensors		✓
max. working pressure 16 bar 232 PSI	✓	✓
max. working pressure 40 bar 580 PSI		✓

Typical Applications

Measurement of consumption of compressed air
Compressed air counter
Mass flow measurement of industrial gases

Features

high accuracy ± 1.5 % of reading
factory adjustment under pressure
exceptional reproducibility
quick sensor exchange at line pressure
broad working range of 1:400
very service friendly
Bus interface for Modbus RTU or M-Bus

EE771 - Measurement valve with shut-off function

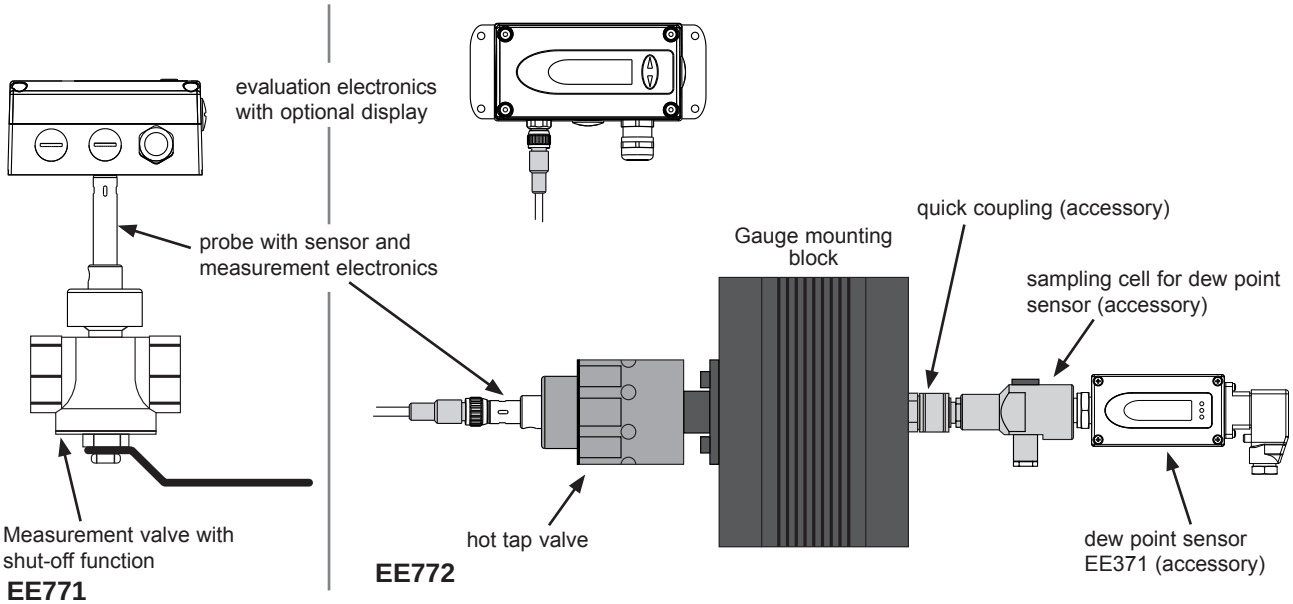
The measurement valve with shut-off function allows the exact alignment of the sensing head within seconds during instalment and removal, with only interrupting the process flow for a short moment.
The measurement valve is suitable for pressures up to 16 bar (232 PSI) and available for pipe diameters DN15 (1/2") to DN50 (2").

EE772 - Gauge mounting block with hot tap valve

The unique assembly concept with one mounting valve permits simple installation and removal of the sensors for regular calibration, and also ensures a high level of measurement accuracy via precise and reproducible positioning of the flow sensor in the pipeline.
The gauge mounting block with hot tap valve is used in applications where flow interruption is not permissible. The flow meter can be removed for calibration or maintenance with no flow interruption.
The gauge mounting block with hot tap valve assembly is suitable for applications up to 40 bar (PN40) and is available for line sizes of DN40 (1 1/2“) to DN80 (3“).
The additional option of integrating dewpoint or pressure sensors saves on installation costs. The gauge mounting block with hot tap valve makes it easy to set up a comprehensive compressed air monitoring system.

Construction

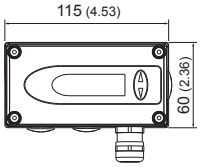
The flow meter consist of the transmitter and the mounting valve. The transmitter is modular and consist of the probe and the evaluation electronics. The measurement probe contains the sensor element and the measurement electronics, in which the data of the factory calibration is stored. The enclosure with the signal conditioning is mounted either on the measurement probe (compact) or is remote with a sensor cable up to 10 meter (33 feet).

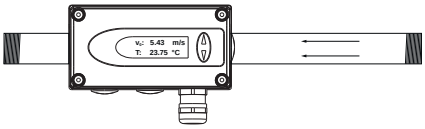


Measurement of consumption (totalizer)

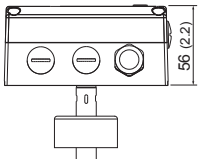
The EE771/EE772 holds an integrated counter for the usage. The amount is indicated in the display and stored; the data will not be lost due to a power outage. The availability of the consumption amount as a free configurable pulse output is another helpful feature.

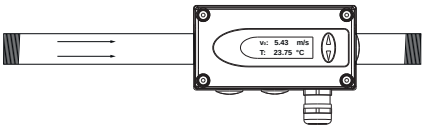
Dimensions in mm (inch)



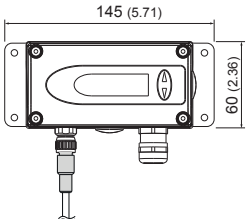


EE77x-A direction of flow is right to left





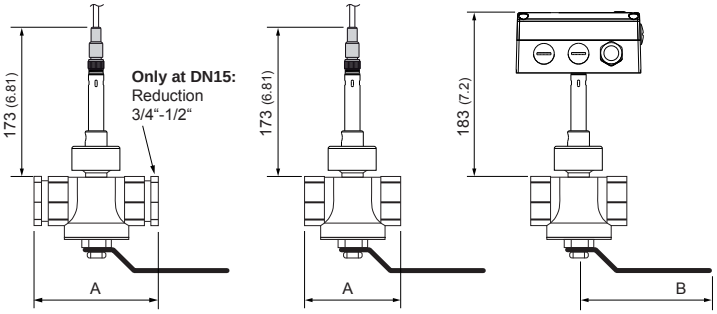
EE77x-B direction of flow is left to right



EE77x-A / EE77x-B
Compact

EE77x-B direction of flow is left to right

EE77x-C
Remote probe

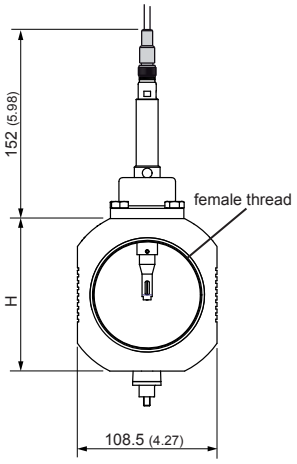


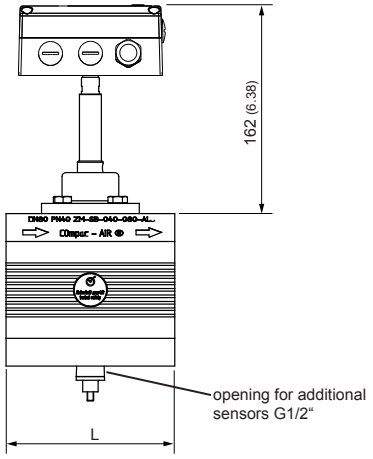
Measure-ment valve	Thread	A	B
DN15	R_p1/2"	100±8 (3.94±0.32)	92 (3.62)
DN20	R_p or NPT 3/4”	72 (2.83)	92 (3.62)
DN25	R_p or NPT 1”	83 (3.27)	124 (4.88)
DN32	R_p1 1/4"	100 (3.94)	124 (4.88)
DN40	R_p or NPT 1 1/2"	110 (4.33)	147 (5.79)
DN50	R_p or NPT 2”	131 (5.16)	147 (5.79)

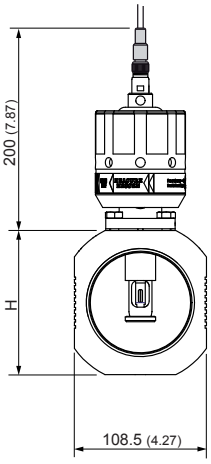
dimensions in mm (inch)

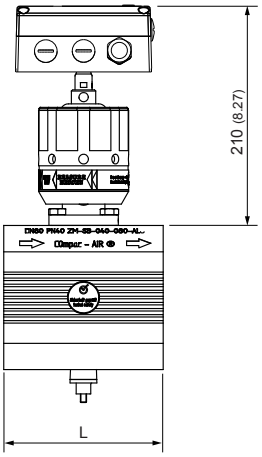
Female thread:
BSP thread acc. EN 10226 (old DIN 2999) or NPT

HA075xxx
Measurement valve with shut-off function









HA071xxx
Gauge mounting block

HA072xxx
Gauge mounting block with hot tap valve

pipe diameter	Thread	L	H
DN40 (1 1/2”)	R_p or NPT 1 1/2"	110 (4.33)	108.5 (4.27)
DN50 (2”)	R_p or NPT 2"	131 (5.16)	108.5 (4.27)
DN65 (2 1/2”)	R_p or NPT 2 1/2"	131 (5.16)	108.5 (4.27)
DN80 (3”)	R_p or NPT 3"	131 (5.16)	118.5 (4.67)

dimensions in mm (inch)

female thread:
Whitworth-Thread acc. EN 10226 (old DIN 2999) or NPT

Technical data

Measuring value

Flow

Measurand			Volumetric flow at standard conditions acc. DIN 1343 P_0 = 1013.25 mbar (14.7 PSI); t_0 = 0 °C (32 °F)			
Measuring range			low (L1)		high (H1)	
standardized volumetric flow in air		DN15 (1/2"):	0.32...63 Nm³/h	0.19...37.1 SCFM	0.32...126 Nm³/h	0.19...74.1 SCFM
		DN20 (3/4"):	0.57...113 Nm³/h	0.34...66.5 SCFM	0.57...226 Nm³/h	0.34...133 SCFM
		DN25 (1"):	0.90...176 Nm³/h	0.53...103.5 SCFM	0.90...352 Nm³/h	0.53...207.1 SCFM
		DN32 (1 1/4"):	1.45...289 Nm³/h	0.85...170.0 SCFM	1.45...578 Nm³/h	0.85...340 SCFM
		DN40 (1 1/2"):	2.26...452 Nm³/h	1.33...265.9 SCFM	2.26...904 Nm³/h	1.33...531.8 SCFM
		DN50 (2"):	3.50...700 Nm³/h	2.06...411.8 SCFM	3.50...1400 Nm³/h	2.06...823.6 SCFM
		DN65 (2 1/2"):			5.97...1400 Nm³/h	3.51...823.6 SCFM
		DN80 (3"):			9.04...1400 Nm³/h	5.32...823.6 SCFM
standardized flow in air, CO_2,		≤DN50 (2"):	0.5...100 Nm/s	100...19685 SFPM	0.5...200 Nm/s	100...39370 SFPM
	nitrogen, argon	DN65 (2 1/2"):			0.5...117 Nm/s	100...23031 SFPM
		DN80 (3"):			0.5...77 Nm/s	100...15157 SFPM
	helium	≤DN50 (2"):	2...100 Nm/s	400...19685 SFPM	2...120 Nm/s	400...23622 SFPM
		DN65 (2 1/2"):			2...117 Nm/s	400...23031 SFPM
		DN80 (3"):			2...77 Nm/s	400...15157 SFPM
	O_2	≤DN25 (1"):	0.5...100 Nm/s	100...19685 SFPM	0.5...200 Nm/s	100...39370 SFPM
Accuracy in air at 7bar (101.5 Psi) (abs) and 23°C (73°F)[1]			± (1.5 % of measuring value + 0.5% of full scale)			
Temperature coefficient			± (0.1 % of measuring value/°C)			
Pressure coefficient [2]			0.5 % of measuring value / bar			
Response time t_{90}			< 1 sec.			
Sample rate			0.1 sec.			

Temperature

Measuring range	-20...80 °C (-4...176 °F)
Accuracy at 20°C (68°F)	± 0.7 °C (1.26 °F)

Outputs

Output signal and display ranges are freely scalable

Analogue output	voltage	0 - 10 V	max. 1 mA
	current (3-wire)	0 - 20 mA and 4 - 20 mA	R_L<500 Ohm
Switching output		potential-free max. 44 VDC, 500 mA switching capacity	
Pulse output		Totalizer, pulse length: 0.02...2 sec.	
Bus interface (optional)		Modbus RTU or M-BUS (Meter-Bus)	
Digital interface		USB (for configuration)	

Input

Optional pressure compensation	4 - 20 mA (2-wire; 15 V) for pressure sensor

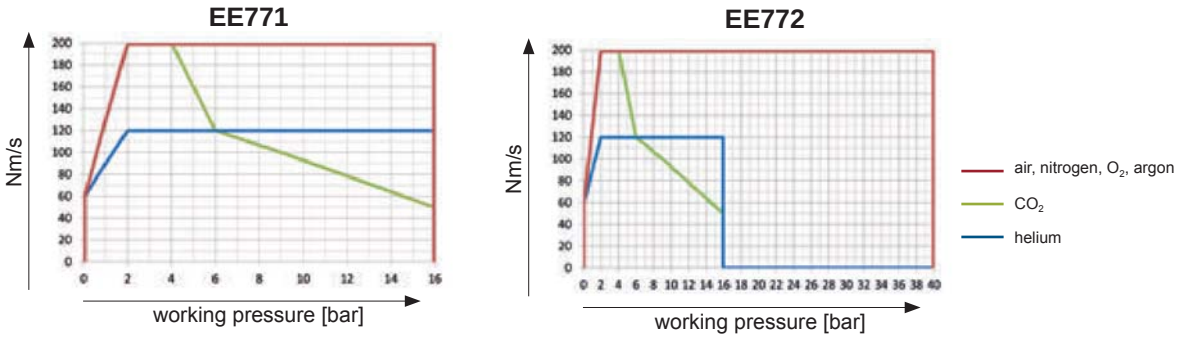
General

Supply voltage		18 - 30 V AC/DC	
Current consumption		max. 200 mA (with display)	
Temperature range		ambient temperature:	-20...60 °C (-4...140 °F)
		medium temperature:	-20...80 °C (-4...176 °F)
		storage temperature:	-20...60 °C (-4...140 °F)
Nominal pressure		EE771 up to 16 bar (232 Psi) EE772 up to 40 bar (580 Psi)	
Humidity		no condensation	
Medium		compressed air or none corrosive gases	
Connection		cable gland M16x1.5 (optional connector M12x1 8 pol.)	
Electromagnetic compatibility		EN61326-1 Industrial Environment	EN61326-2-3 CE
Material	housing	metal (AlSi3Cu)	
	probe	stainless steel	
	sensor head	stainless steel / glass	
	measurement ball valve	brass	
	gauge mouting block	Aluminium	
Housing protection class		IP65 / Nema 4	

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was culated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

2) The flow meter is calibrated at 7 bar (abs) 101.5 Psi. If the working pressure is different from 7 bar (101.5 Psi) you can compensate the error by setting the actual pressure with the configuration software.

Flow measuring range in dependence on operating pressure

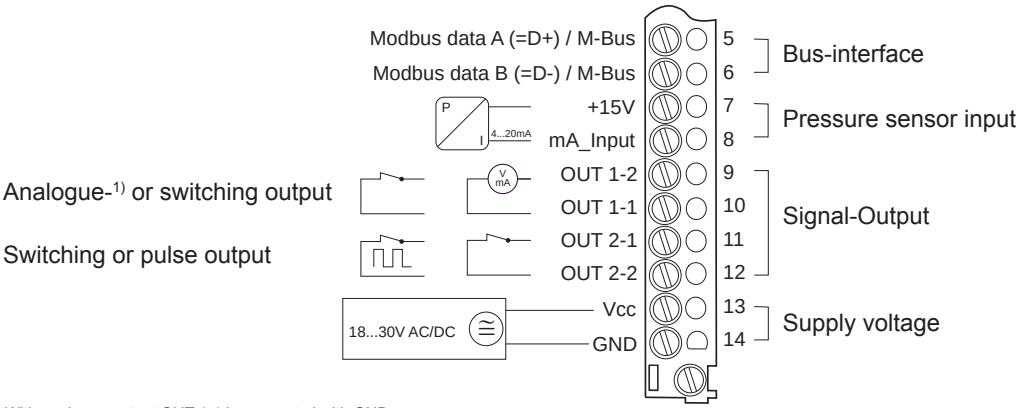


Formula for calculating the standardized volumetric flow:

$V'_n = v_n * id^2 * \pi/4 * 3600$

V'_n ... standardized volumetric flow [m^3/h]
v_n ... standardized flow [m/s]
id ... inner pipe diameter [m]
π ... 3,1415

Connection Diagram



With analogue output OUT 1-1 is connected with GND.
Switching and pulse output are potential-free.

Ordering Guide Accessories

- Dew point sensor	see datasheet EE371
- Sampling cell for dew point sensor	HA050102
- Quick coupling G1/2“ for gauge mounting block	HA070202
- Inlet and outlet pipe segment for measurement valve DN15*)	HA070215
- Inlet and outlet pipe segment for measurement valve DN20*)	HA070220
- Inlet and outlet pipe segment for measurement valve DN25*)	HA070225
- Inlet and outlet pipe segment for measurement valve DN32*)	HA070232
- Inlet and outlet pipe segment for measurement valve DN40*)	HA070240
- Inlet and outlet pipe segment for measurement valve DN50*)	HA070250

*) Inlet and outlet pipe segment is only available for measurement valve with BSP thread

Scope of supply

- EE771 respectively EE772 Transmitter according Ordering Guide
- 1 x Cable gland
- 1 x Allen key
- 1 x USB cable
- User Guide (GERMAN / ENGLISH / FRENCH)
- Inspection certificate according to DIN EN10204 - 3.1
- Configuration software

Ordering Guide

The complete Flow meter consists of the Transmitter (pos. 1) and the measurement valve with shut-off function (pos. 2). Both have to be ordered together! The probe cable (pos. 3) is only necessary for model C.

Position 1 - Transmitter

				EE771-	EE772-
Hardware Configuration	**Model**	Compact ri-le	direction od flow right to left	A	A
		Compact le-ri	direction od flow left to right	B	B
		remote probe		C	C
	Working range	low		L1	
		high		H1	H1
	Measurement valve for pipe diameter	DN15 (1/2“)		N015	
		DN20 (3/4“)		N020	
		DN25 (1“)		N025	
		DN32 (1 1/4“)		N032	
		DN40 (1 1/2“)		N040	N040
		DN50 (2“)		N050	N050
		DN65 (2 1/2“)			N065
		DN80 (3“)			N080
	Display	without display		x	x
		with display		D	D
	Mounting	measurement valve with shut-off function		K	
		gauge mounting block			M
		gauge mounting block with hot tap valve			W
	Electric connection	cable gland		A	A
		1 plug for power supply and outputs		Q	Q
	Bus-Interface	without bus-interface		x	x
		Modbus RTU		1	1
		M-Bus (Meter-Bus)		5	5
Software Configuration	**Physical parameters of ouput 1**	temperature	T [°C] *[°F]*	B	B
		standardized volumetric flow	V‘$_n$ [Nm³/h] *[SCFM]*	R	R
		mass flow	m‘ [kg/h]	S	S
		standardized flow	v_n [Nm/s] *[ft/min]*	T	T
	Physical parameters of output 2	temperature	T [°C] *[°F]*	B	B
		standardized volumetric flow	V‘$_n$ [Nm³/h] *[SCFM]*	R	R
		mass flow	m‘ [kg/h]	S	S
		standardized flow	v_n [Nm/s] *[ft/min]*	T	T
		consumption [1]	Q_n [Nm³] *[ft³]*	I	I
	Output 1	analogue output	0-5 V	2	2
			0-10 V	3	3
			0-20 mA	5	5
			4-20 mA	6	6
		switching output		S	S
	Output 2	switching ouput		S	S
		pulse output [1]		I	I
	Measured value unit	metric / SI		M	M
		non metric US / GB		N	N
	Medium	air		A	A
		nitrogen		B	B
		CO_2		C	C
		O_2 [2]		D	
		helium		F	F
		argon		G	G

Position 2 - measurement valve

	BSP-Thread	NPT-Thread		BSP-Thread	NPT-Thread
DN15 - measurement valve	HA075015	not available	DN40 - Gauge mounting block	HA071040	HA171040
DN20 - measurement valve	HA075020	HA175020	DN50 - Gauge mounting block	HA071050	HA171050
DN25 - measurement valve	HA075025	HA175025	DN65 - Gauge mounting block	HA071065	HA171065
DN32 - measurement valve	HA075032	not available	DN80 - Gauge mounting block	HA071080	HA171080
DN40 - measurement valve	HA075040	HA175040	DN40 - Gauge mounting block with hot tap valve	HA072040	HA172040
DN50 - measurement valve	HA075050	HA175050	DN50 - Gauge mounting block with hot tap valve	HA072050	HA172050
DN15 - measurement valve for O_2 [2]	HA076015	not available	DN65 - Gauge mounting block with hot tap valve	HA072065	HA172065
DN20 - measurement valve for O_2 [2]	HA076020	HA176020	DN80 - Gauge mounting block with hot tap valve	HA072080	HA172080
DN25 - measurement valve for O_2 [2]	HA076025	HA176025			

Position 3 - Probe cable (only model C)

cable length	2 m (6.56 ft)	HA010816
	5 m (16.4 ft)	HA010817
	10 m (32.8 ft)	HA010818

1) consumption measuring is possible only with pulse output (output 2 = I)
2) Medium O_2 only for mounting valve DN15 up to DN25. The mounting valve and the sensor is oil and grease-free.

Order Example

Position 1 - Transmitter

EE771-AL1N025xKAx/RI6IMA

Model:	Compact ri-le	Phys. parameter output 1:	standardized volumetric flow
Working range:	low 0.9 ... 176 Nm³/h	Phys. parameter output 2:	consumption
Measuring pipe-diameter:	DN25 (1”)	Output 1:	4-20 mA
Display:	no	Output 2:	pulse output
Mounting:	measurement ball valve	Measured value unit:	metric SI
El. connection:	cable gland	Medium:	air
Bus-Interface:	without bus-interface		

Position 2 - measurement valve

HA070025

DN25 - measurement valve with shut-off function

EE776

Insertion Flowmeter for compressed air and gases DN50 - DN700 (2” - 28”)

The EE776 flow meter is based on the thermal mass flow measurement and is ideal for measuring the flow of compressed air and gases in pipes from DN50 (2”) to DN700 (28”). With the EE776, the consumption of compressed air, nitrogen, CO2 or other non-corrosive and non-flammable gases can be measured up to a pressure of 16 bar (232 PSI), for example.

Patented non-return protection for secure mounting

The EE776 flow meter set new standards in terms of safety and easy assembly. The patented non-return protection combines three functions in one device:

- **Non-return protection**
  The sensor can only be pushed in one direction during installation. The sensor cannot return at all, even if it is released.
- **Seal**
  By means of an encapsulated O-ring, no compressed air can escape under pressure during assembly.
- **Precise positioning**
  The precise positioning with respect to immersion depth and orientation is easy to perform, guaranteeing accurate measurement results.

The high measurement accuracy of 1.5% from reading results from the application-oriented factory adjustments, which are undertaken at 9 bar (130 PSI) pressure. For optimum adaptation to different measurement tasks, you can choose between two measuring ranges 0.2...100 Nm/s (40...19685 SFPM) or 0.2...200 Nm/s (40...39370 SFPM) and three different probe lengths with a maximum immersion depth of 165 mm (6.5”) / 315 mm (12.4”) / 465 mm (18.3”). The inner diameter of the distribution pipe which is measured can be entered via the USB port and the included configuration software.

Two signal outputs are available to output the measured values. Depending on the application, these can be configured as an analogue output (current or voltage), switching output or pulse output for consumption measuring.

Bus interface for Modbus RTU or M-Bus

Optionally, the flow meter is available with an additional bus interface for MODBUS RTU or M-BUS (Meter-Bus).

Typical Applications

Measurement of consumption of compressed air

Compressed air counter

Mass flow measurement of industrial gases

Features

Non-return protection for secure mounting

Assembly/disassembly under pressure without flow interruption

easy and accurate positioning

high accuracy ± 1.5% of reading

factory adjustment under pressure

Pipe diameters DN50 (2”) to DN700 (28”)

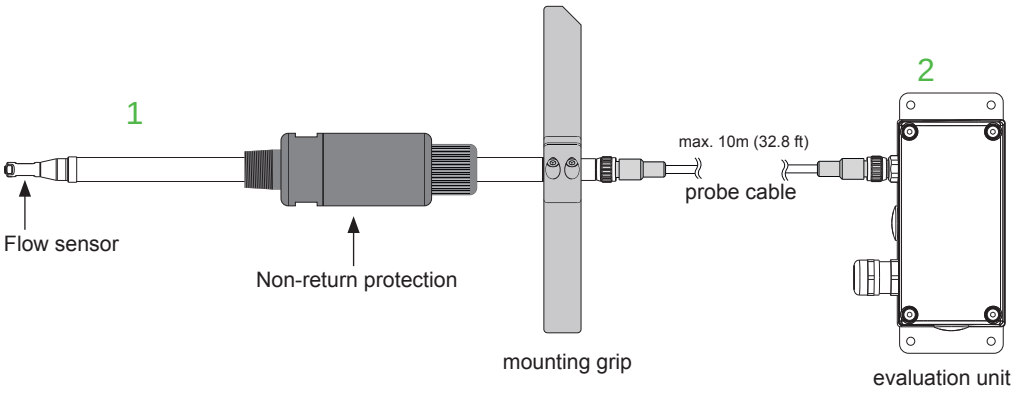
Pressure range up to 16 bar (232 PSI)

Wide measuring range up to 200 Nm/s (39370 SFPM)

Bus interface for Modbus RTU or M-Bus

Design

The EE776 flow meter has a modular design and consists of probes (1) and evaluation electronics (2). The probe includes sensor and measuring electronics, in which the factory adjustment data is stored. The evaluation electronics communicates digitally with the probe and can be located up to 10 m (32.8 ft) from the probe.



Assembly

With the right accessories, the EE776 flow meter can be easily integrated into any measurement task.
An assembly without welding and drilling into the pressurised supply line without flow interruption, can be implemented very easily with the tapping sleeve.
An optional ½“ ball valve on the tapping sleeve enables the installation and removal of the sensor without interrupting the flow in the compressed air line.
The ball valve on the tapping sleeve closes the measuring point pressure-tight after removing the flow meter. Regular calibration, without taking into account the device downtime, is therefore always an option.

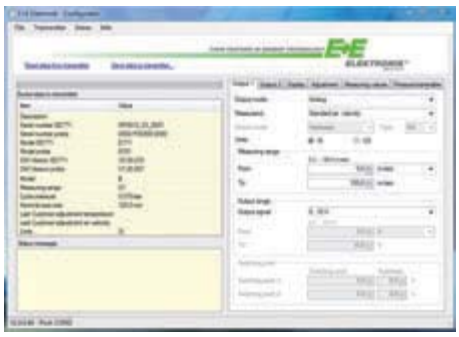

Tapping sleeve

Measurement of consumption (totalizer)

The EE776 holds an integrated counter for the usage. The amount is stored and the data will not be lost due to a power outage. The availability of the consumption amount as a free configurable pulse output is another helpful feature.

Configuration software

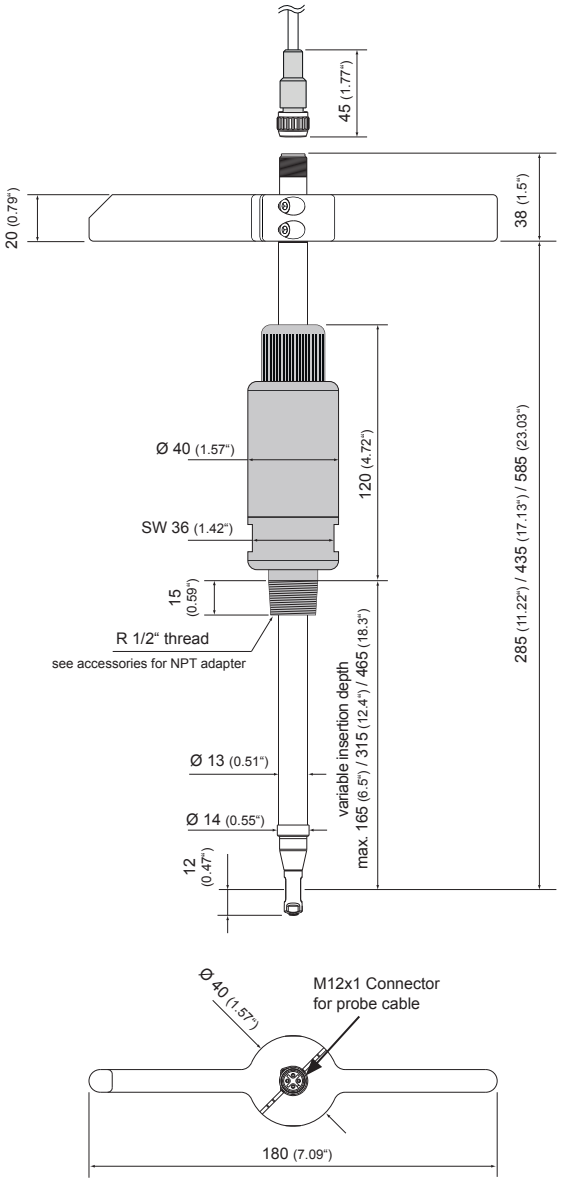
The EE776 flowmeter can be configured conveniently, to meet the requirements of the application with the standard configuration software and the integrated USB interface.



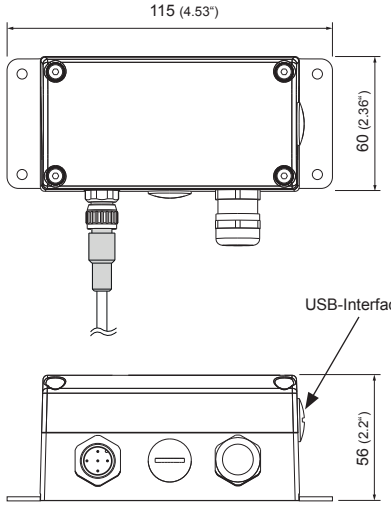
Functionality:

- Configuration of the output (scale / set point)
- Setting the pipe diameter
- 2-point user calibration for flow and temperature
- Readout of the counter values
- Reset of min / max values and counter
- Indication of the measurement value
- Configuration of the bus interface

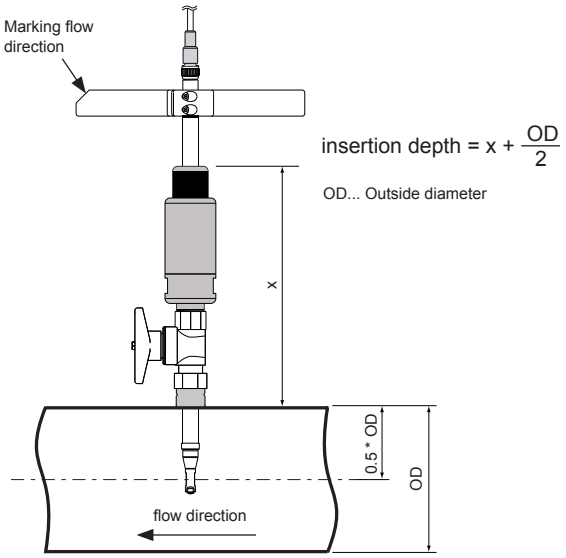
Dimensions in mm (inch)



EE776
Sensor probe

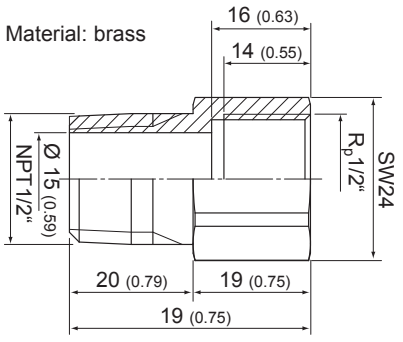


EE776
Enclosure - signal conditioning unit

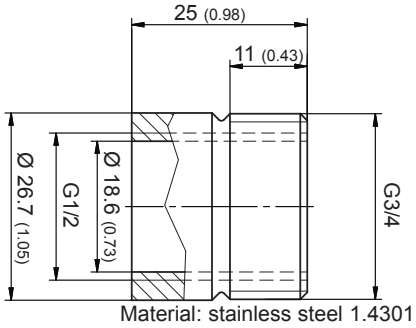


EE776
Assembly - insertion depth

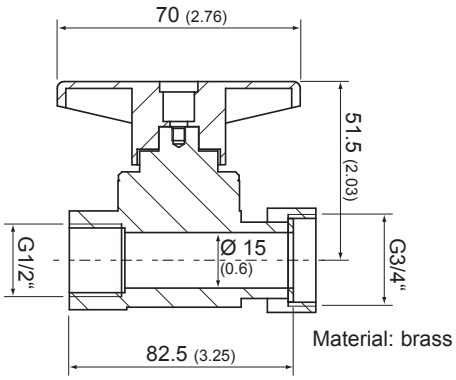
Dimensions accessories in mm (inch)



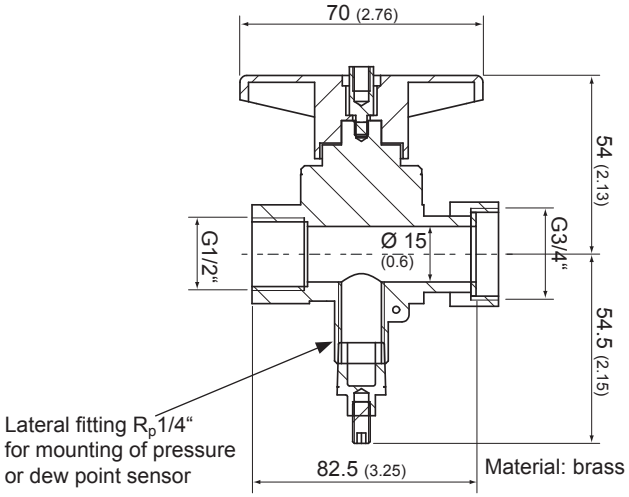
HA074004
Adapter BSP - NPT



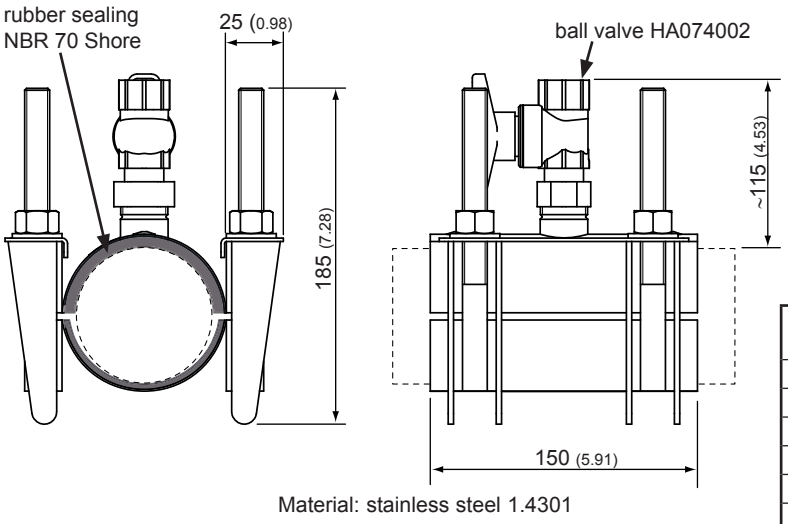
HA074001
Welding nipple



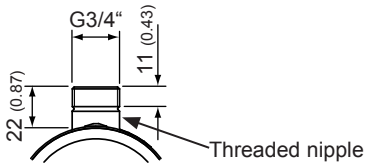
HA074002
Ball valve 1/2“



HA074003
Ball valve 1/2“ for parallel measurement



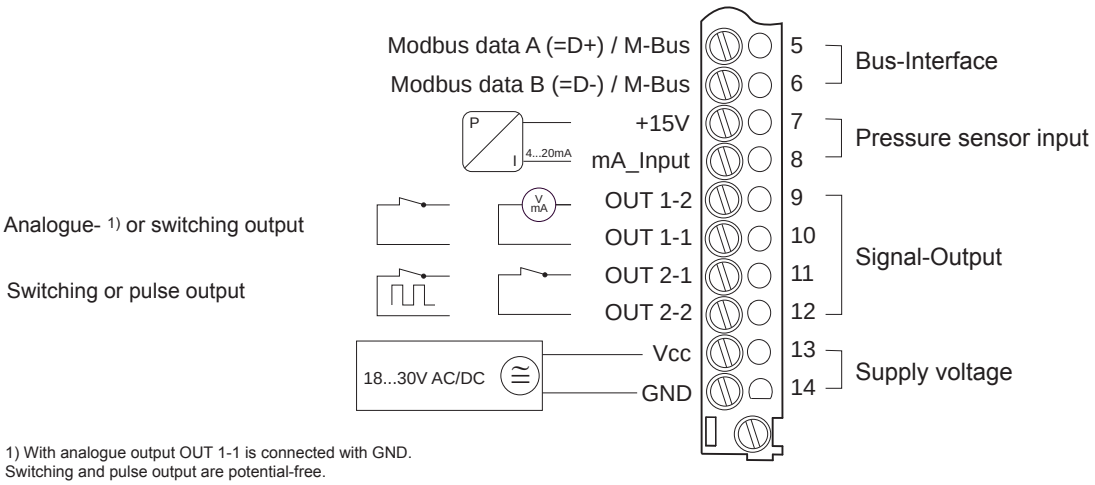
Material: stainless steel 1.4301



HA074xxx
Tapping sleeve (delivery without ball valve)

pipe	clamping range [mm (inch)]		max. working pressure
DN50 (2“)	47 - 67	(1.85 - 2.64)	16bar (232psi)
DN65 (2 1/2“)	73 - 93	(2.87 - 3.66)	16bar (232psi)
DN80 (3“)	86 - 106	(3.39 - 4.17)	16bar (232psi)
DN100 (4“)	107 - 127	(4.21 - 5.00)	16bar (232psi)
DN125 (5“)	128 - 148	(5.04 - 5.83)	16bar (232psi)
DN150 (6“)	149 - 171	(5.87 - 6.73)	16bar (232psi)
DN200 (8“)	216 - 236	(8.50 - 9.29)	16bar (232psi)
DN250 (10“)	260 - 280	(10.24 - 11.02)	10bar (145psi)
DN300 (12“)	315 - 335	(12.40 - 13.19)	10bar (145psi)

Connection Diagram



1) With analogue output OUT 1-1 is connected with GND.
Switching and pulse output are potential-free.

Technical Data

Measuring value

Flow

Measurand	Volumetric flow at standard conditions acc. DIN 1343 P_0 = 1013.25 mbar (14.7 PSI); t_0 = 0 °C (32 °F)
Measuring range	0.2...100 Nm/s (40...19685 SFPM) or 0.2...200 Nm/s (40...39370 SFPM)
Accuracy in air at 9bar (130.5psi) (abs) and 23°C (73°F)[1)]	± (1.5% of measuring value + 0.8% of full scale)
Temperature coefficient	± (0.1% of measuring value / °C)
Pressure coefficient [2)]	+ 0.5% of measuring value / bar
Response time t_{90}	< 1 sec.
Sample rate	0.5 sec.

Temperature

Measuring range	-20...80 °C (-4...176 °F)
Accuracy at 20°C (68°F)	± 0.7 °C (1.26 °F)

Outputs

Output signal and display ranges are freely scalable

Analogue output	voltage	0 - 10 V max. 1 mA
	current (3-wire)	0 - 20 mA and 4 - 20 mA RL<500 Ohm
Switching output		potential-free max. 44 VDC, 500 mA switching capacity
Pulse output		Totalizer, pulse length: 0.02...2 sec.
Bus interface		MODBUS RTU or M-BUS (Meter-Bus)
Digital interface		USB (for configuration)

Input

Optional pressure compensation	4 - 20 mA (2-wire; 15 V) for pressure sensor

General

Supply voltage		18 - 30 V AC/DC
Current consumption		max. 200 mA
Temperature range		ambient temperature: -20...60 °C (-4...140 °F) medium temperature: -20...80 °C (-4...176 °F) storage temperature: -20...60 °C (-4...140 °F)
Humidity working range		0...99 %RH no condensation
max. working pressure		16 bar (232 Psi)
Medium		compressed air or Non-Corrosive gases
Electrical connection		cable gland M16x1.5 (optional connector M12x1 8pol.)
Electromagnetic compatibility		EN61326-1 EN61326-2-3 Industrial Environment
Material	housing	metal (AlSi3Cu)
	probe	stainless steel
	sensor head	stainless steel / glass
	non-return protection	brass
Housing protection class		IP65 / Nema 4

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was culated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

2) The flow meter is calibrated at 9 bar (abs) 130.5 psi. If the working pressure is different from 9 bar (130.5 psi) you can compensate the error by setting the actual pressure with the configuration software.

Flow measuring range in dependence on pipe diameter

pipe	inner Ø	measuring range	
	mm (inch)	0.2...100 Nm/s (40...19685 SFPM)	0.2...200 Nm/s (40...39370 SFPM)
DN50 / 2“	54.5 (2.15“)	1.7...839 Nm³/h 1.0...493.8 SCFM	1.7...1679 Nm³/h 1.0...987.6 SCFM
DN65 / 2 1/2“	70.3 (2.77“)	2.8...1397 Nm³/h 1.6...821.6 SCFM	2.8...2793 Nm³/h 1.6...1643.2 SCFM
DN80 / 3“	82.5 (3.25“)	3.8...1923 Nm³/h 2.3...1131.5 SCFM	3.8...3847 Nm³/h 2.3...2263.0 SCFM
DN100 / 4“	107.1 (4.22“)	6.5...3242 Nm³/h 3.8...1906.9 SCFM	6.5...6483 Nm³/h 3.8...3813.8 SCFM
DN125 / 5“	131.7 (5.19“)	9.8...4902 Nm³/h 5.8...2883.5 SCFM	9.8...9803 Nm³/h 5.8...5766.9 SCFM
DN150 / 6“	159.3 (6.27“)	14.3...7171 Nm³/h 8.4...4218.7 SCFM	14.3...14343 Nm³/h 8.4...8437.3 SCFM
DN200 / 8“	206.5 (8.13“)	24.1...12051 Nm³/h 14.2...7089.0 SCFM	24.1...24101 Nm³/h 14.2...14178.0 SCFM
DN250 / 10“	260.4 (10.25“)	38.3...19163 Nm³/h 22.5...11272.6 SCFM	38.3...38325 Nm³/h 22.5...22545.3 SCFM
DN300 / 12“	309.7 (12.19“)	54.2...27105 Nm³/h 31.9...15945.1 SCFM	54.2...54211 Nm³/h 31.9...31890.1 SCFM
DN350 / 14“	339.6 (13.37“)	65.2...32591 Nm³/h 38.3...19172.5 SCFM	65.2...65183 Nm³/h 38.3...38345.0 SCFM
DN400 / 16“	388.8 (15.31“)	85,4...42719 Nm³/h 50.3...25130.2 SCFM	85.4...85438 Nm³/h 50.3...50260.0 SCFM
DN500 / 20“	486 (19.13“)	133,5...66749 Nm³/h 78,5...39266.0 SCFM	133.5...133498 Nm³/h 78,5...78531.9 SCFM
DN600 / 24“	585 (23.03“)	193,4...96712 Nm³/h 113.8...56892.6 SCFM	193.4...193425 Nm³/h 113.8...113785.1 SCFM
DN700 / 28“	682.6 (26.87“)	263,4...131675 Nm³/h 154.9...77459.8 SCFM	263.4...263350 Nm³/h 154.9...154919.6 SCFM

Formula for calculating the standardized volumetric flow:

$V'_n = v_n * id^2 * \pi/4 * 3600$

V'_n ... standardized volumetric flow [m³/h]

v_n ... standardized flow [m/s]

id ... inner pipe diameter [m]

π ... 3.1415

Ordering Guide

				EE776-
Position 1 - Flow meter				
Hardware Configuration	**Model**	remote probe		C
	Working range	low 0.2...100 Nm/s *(40...19685 SFPM)*		L1
		high 0.2...200 Nm/s *(40...39370 SFPM)*		H2
	pipe diameter / probe length	DN50 (2“) / 165 mm *(6.5“)*		N050
		DN65 (2 1/2“) / 165 mm *(6.5“)*		N065
		DN80 (3“) / 165 mm *(6.5“)*		N080
		DN100 (4“) / 165 mm *(6.5“)*		N100
		DN125 (5“) / 315 mm *(12.4“)*		N125
		DN150 (6“) / 315 mm *(12.4“)*		N150
		DN200 (8“) / 315 mm *(12.4“)*		N200
		DN250 (10“) / 315 mm *(12.4“)*		N250
		DN300 (12“) / 315 mm *(12.4“)*		N300
		DN350 (14“) / 465 mm *(18.3“)*		N350
		DN400 (16“) / 465 mm *(18.3“)*		N400
		DN500 (20“) / 465 mm *(18.3“)*		N500
		DN600 (24“) / 465 mm *(18.3“)*		N600
		DN700 (28“) / 465 mm *(18.3“)*		N700
	Display	without Display		x
		with Display		D
	Electrical connection	cable gland M16x1.5		A
		1 plug M12x1 for power supply and outputs		Q
	Bus-Interface	without bus-interface		x
		Modbus RTU		1
		M-Bus (Meter-Bus)		5
Software Configuration	**Physical parameters of output 1**	Temperature	T [°C] *[°F]*	B
		standardized volumetric flow	V'_n [Nm³/h] *[SCFM]*	R
		mass flow	m‘ [kg/h]	S
		standardized flow	v_n [Nm/s] *[ft/min]*	T
	Physical parameters of output 2	Temperature	T [°C] *[°F]*	B
		standardized volumetric flow	V'_n [Nm³/h] *[SCFM]*	R
		mass flow	m‘ [kg/h]	S
		standardized flow	v_n [Nm/s] *[ft/min]*	T
		consumption 1)	Q_n [Nm³] *[ft³]*	I
	Output 1	analogue output	0-5 V	2
			0-10 V	3
			0-20 mA	5
			4-20 mA	6
		switching output		S
	Output 2	switching output		S
		pulse output 1)		I
	Measured value unit	metric / SI		M
		non metric US / GB		N
	Medium	air		A
		nitrogen		B
		CO2		C
		helium		F
		argon		G
Position 2 - probe cable				
	cable length	2 m		HA010816
		5 m		HA010817
		10 m		HA010818

1) consumption measuring is possible only with pulse output (output 2 = I)

Accessories

tapping sleeve DN50 (2“)	HA074050	welding nipple	HA074001
tapping sleeve DN65 (2 1/2“)	HA074065	ball valve 1/2“	HA074002
tapping sleeve DN80 (3“)	HA074080	ball valve 1/2“ for parallel measurement	HA074003
tapping sleeve DN100 (4“)	HA074100	adapter R_p1/2“ IT to NPT 1/2“ ET	HA074004
tapping sleeve DN125 (5“)	HA074125		
tapping sleeve DN150 (6“)	HA074150		
tapping sleeve DN200 (8“)	HA074200	Dew point sensor	see data sheet EE371
tapping sleeve DN250 (10“)	HA074250	Sampling cell for dew point sensor	HA050102
tapping sleeve DN300 (12“)	HA074300	Quick coupling G1/4“ ET	HA070203

Order Example

Position 1 - Flow meter

EE776-CL1N100xAx/RI6IMA

Model:	remote probe
Working range:	0.2...100 Nm/s
pipe diameter - probe length:	DN100 / 165 mm
Display:	without Display
El. connection:	cable gland
Bus-Interface:	without bus-interface
Phys. parameter output 1:	standardized volumetric flow
Phys. parameter output 2:	consumption
Output 1:	4-20mA
Output 2:	pulse output
Measured value unit:	metric SI
Medium:	air

Position 2 - probe cable

HA010816
probe cable 2m

EE800

HVAC Room Transmitter for CO_2, Temperature and Relative Humidity

EE800 combines CO_2, temperature (T) and relative humidity (RH) measurement in one device with modern design. Additionally, it calculates the dewpoint temperature (Td).

The EE800 incorporates the E+E dual wavelength NDIR CO_2 sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability. A multiple point CO_2 and T factory adjustment procedure leads to excellent CO_2 measurement accuracy over the entire T working range.

EE800 with analogue outputs features an optional passive T sensor, while at EE800 with RS485 additional physical quantities are available on the Modbus RTU and BACnet MS/TP interface: absolute humidity, mixing ratio, enthalpy, frost point temperature and water vapor partial pressure.

The snap-on enclosure saves installation costs and it is available in two sizes according to regional standards.
An optional USB configuration adapter facilitates easy setup and adjustment of EE800.

Typical Applications

Demand controlled ventilation
Heating, ventilation and air conditioning
Building management

Key Features

CO_2 autocalibration
Modbus, BACnet or analogue outputs
Outstanding long-term stability
Temperature compensation
Optional passive T output
Easy installation

Technical Data

Measured values

CO_2

Measurement principle	Dual Wavelength Non-Dispersive Infrared Technology (NDIR)	
Working range	0...2000 / 5000 ppm	
Accuracy at 25 °C (77 °F)	0...2000 ppm:	< ± (50 ppm +2 % of measuring value)
and 1013 mbar	0...5000 ppm:	< ± (50 ppm +3 % of measuring value)
Response time τ_{63}	typ. 110 s	
Temperature dependence	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113° F)	
Calibration interval[1)]	>5 years	

Temperature

Accuracy[2)] at 20 °C (68 °F)	±0.3 °C (±0.54 °F) RS485 digital interface	
	±0.3 °C (±0.54 °F) voltage output / ±0.7 °C (±1.26 °F) current output	

Relative Humidity

Working range	10...90 % RH	
Accuracy at 20 °C (68 °F)	±3 % RH (30...70 % RH)	±5 % (10...90 % RH)

Calculated values

Dewpoint temperature[3)]

Working range	-30...55 °C (-22...131 °F)	
Accuracy	< ±2 °C (3.6 °F) for |T| - |Td| < 25 °C (45 °F)	
	< ±3 °C (5.4 °F) for |T| - |Td| < 30 °C (54 °F)	

Outputs

Analogue

0...2000 / 5000 ppm	0-5 V / 0-10 V	-1 mA < IL < 1 mA
	4-20 mA	R_L < 500 Ohm
Digital Interface	RS485 with max. 32 devices on one bus	
Protocol	Modbus RTU or BACnet MS/TP	
Temperature passive	please see ordering guide (only in combination with analogue outputs)	

1) Under normal operating conditions.
2) U_V = 24 V DC and R_L = 250 Ω for version with current output
3) Additional calculated physical quantities available only on the Modbus and BACnet interface: absolute humidity, mixing ratio, enthalpy, frost point temperature and water vapor partial pressure.

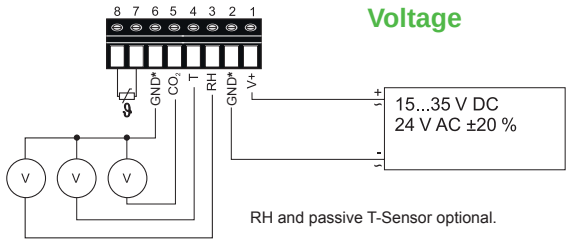
General

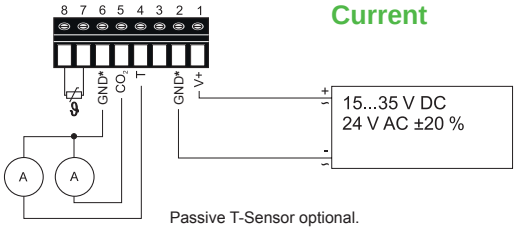
Supply voltage	24 V AC ±20 %	15-35 V DC
Current consumption		
Analogue	typ. 14 mA + output current; peak 0.3 A for 0.3 s	
Digital	bias:	typ. 11 mA at 15…35 V DC typ. 30 mA at 24 V AC ±20 %
	peak:	150 mA at 15…35 V DC, 24 V AC ±20 %
Housing (polycarbonate)	US Version: UL94V-0 approved / EU Version: UL94HB approved	
Protection class	IP30	
Display[4)]	LC display: alternating CO_2 / T / RH or Td	
Electrical connection	screw terminals max. 1.5 mm² (AWG16)	
Electromagnetic compatibility	EN61326-1	EN61326-2-3
	FCC Part 15	ICES-003 ClassB
Working / Storage T-range	0...90 % RH (non condensing) / -20...60 °C (-4...140 °F)	

4) Analogue outputs: The display shows the physical quantities selected for the outputs.
Digital interface: The display shows CO_2 and T for Model M11 and CO_2, T, and RH for Model M12

Connection Diagram

Analogue Output

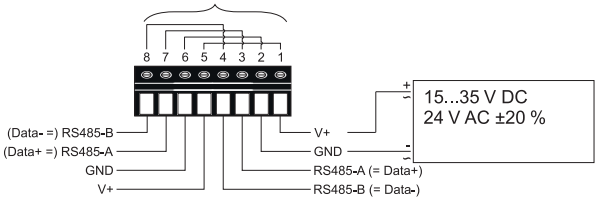




***Very important:** for failure-free operation and performance according to the specs the supply GND and the measurement GND must be wired separately.

Digital Interface

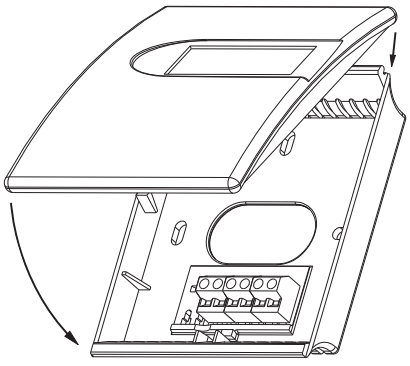
Connection on the electronics board.



The bus address can be set with DIP-Switches on the electronics board.

Screw terminals appropriate for daisy-chain wiring

Housing



Housing colour:

Standard (EU & US):

Front cover:	Signal white	RAL 9003
Back cover:	Light grey	RAL 7035

Optional (only EU):

Front and back cover	Grey	(Anthracite grey RAL 7016)
	Silver	(White aluminum RAL 9006)

EU:
W x H x D = 85 x 100 x 26 mm (3.3 x 3.9 x 1")

US:
W x H x D = 85 x 136 x 26 mm (3.3 x 5.4 x 1")

Ordering Guide

			EE800
Hardware Configuration	**Model**	CO_2 + T	M11
		CO_2 + T + RH	M12
	CO_2 Range	0 - 2000 ppm	no code
		0 - 5000 ppm	HR5000
	Output	0-5 V	A2
		0-10 V	A3
		4-20 mA[1)]	A6
		RS485	J3
	T-Sensor passive[2)]	none	no code
		Pt100A	TP1
		Pt1000A	TP3
		NTC 10k	TP5
		Ni1000 Tk6180	TP9
	Housing design & colour	EU - Standard (RAL 9003 / RAL 7035)	no code
		EU - Grey (RAL 7016)	CH74
		EU - Silver (RAL 9006)	CH93
		US (RAL 9003 / RAL 7035)	RG2
	Display	none	no code
		yes	D1
Setup - Analogue outputs	**Output 1 CO_2**	Scaling according to selected "CO_2 Range" as above	
	Output 2 Temperature	T (°C)	no code
		T (°F)	MB2
	Scale 2 low	0	no code
		value[3)]	SBL *value*
	Scale 2 high	50	no code
		value[3)]	SBH *value*
	Output 3 Measurands	Relative Humidity (% RH)	MC10
		Dew Point (°C)	MC52
		Dew Point (°F)	MC53
		none	no code
	Scale 3 low	0	no code
		value[3)]	SCL *value*
	Scale 3 high	100	no code
		value[3)]	SCH *value*
Setup - Digital output	**Protocol**	Modbus RTU[4)]	no code
		BACnet MS/TP[5)]	P3
	Baud rate	9600	no code
		19200	BD6
		38400	BD7
		57600[6)]	BD8
		76800[6)]	BD9
	Parity (Modbus)	no parity	PY0
		odd	no code
		even	PY2
	Stopbit (Modbus)	1 stopbit	no code
		2 stopbits	BT2
	Unit	metric-SI	no code
		non-metric	U2

1) not with M12
2) not with J3 / T-Sensor details see www.epluse.com/R-T_Characteristics
3) Within working range. For scaling beyond working range limits please contact the E+E sales representative.
4) Modbus Map and setup instructions: See User Guide and Modbus Application Note at www.epluse.com/EE800
5) Product Implementation Conformance Statement (PICS) availbale at www.epluse.com/EE800
6) Only for BACnet

Order Example

EE800-M11A3CH74

Model:	CO_2 + T
CO_2 Range:	0 - 2000 ppm
Output:	0-10 V
Housing design & colour:	EU - Grey RAL7016
Output 2 Temperature:	T (°C)
Temperature Scale:	0...50

EE800-M12A3MC52SCL-10SCH10

Model:	CO_2 + T + RH
CO_2 Range:	0 - 2000 ppm
Output:	0-10 V
Housing design & colour:	EU - Standard RAL9003 / RAL7035
Output 2 Temperature:	T (°C)
Temperature Scale:	0...50
Output 3:	Dew Point (°C)
Dew Point Scale:	-10...10

EE800-M12HR5000J3RG2D1P3BD8PY2BT2U2

Model:	CO_2 + T + RH
CO_2 Range:	0 - 5000 ppm
Digital output:	RS485
Housing design & colour:	US RAL9003 / RAL7035
Display:	yes
Protocol:	BACnet
Baud rate:	57600
Parity:	even
Stopbit:	2
Unit:	non-metric

Scope of supply

- EE800 Transmitter according to ordering guide
- Mounting materials
- Test report according to DIN EN10204 - 2.2
- Quick Guide - EE800 with digital interface (only for EE800 with RS485 interface)

Accessories (see data sheet „Accessories“)

USB configuration adapter	HA011066
Power supply adapter	V03 (see data sheet Accessories)
Product configuration software	EE-PCS (free download: www.epluse.com/configurator)

EE850

CO_2 and Temperature Transmitter for Duct Mounting

The EE850 is designed for use in building management applications. A multiple point CO_2 and temperature factory adjustment procedure leads to excellent CO_2 measurement accuracy over the entire temperature working range.

The EE850 incorporates the E+E dual wavelength NDIR CO_2 sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability.

Installed into a duct, a small amount of air will flow through the divided probe into the transmitter housing, where the CO_2 sensing cell is located, and back into the duct. The temperature sensor is located inside the probe.

The CO_2 concentration up to 10,000 ppm and the temperature are available on the voltage or current analogue outputs. The EE850 offers an additional option for a passive temperature sensor output with 2-wires connection. An optional kit facilitates easy configuration and adjustment of EE850.

Typical Applications

Building management
Demand controlled ventilation
Process control

Key Features

CO_2 Autocalibration
Outstanding long-term stability
Temperature compensation
Easy installation
IP65 / NEMA 4 enclosure

Technical Data

Measuring Values

CO_2

Measurement principle	dual wavelength non-dispersive infrared technology (NDIR)
Measuring range	0...2000 / 5000 / 10000 ppm
Accuracy at 25 °C (77 °F) and 1013 mbar (14.7 psi)	0...2000 ppm: < ± (50 ppm +2% of measured value) 0...5000 ppm: < ± (50 ppm +3% of measured value) 0...10000 ppm: < ± (100 ppm +5% of measured value)
Response time τ_{63}	< 100 s at 3 m/s (590 ft/min) air speed in the duct
Temperature dependency	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)
Calibration interval [1]	>5 years
Sample rate	approx. 15 s

Temperature

Working range	-20...60 °C (-4...140 °F); scaling see ordering guide
Accuracy at 20 °C (68 °F)	±0.3 °C (±0.54 °F)
Response time τ_{63}	< 50 s

Outputs

Analogue Output

CO_2: 0...2000 / 5000 / 10000 ppm **T**: according ordering guide	0 - 5 / 0 - 10 V 4 - 20 mA	-1 mA < I_L < 1 mA R_L < 500 Ohm

Passive T-Output

2-wire	see ordering guide
Wires resistance (terminal - sensor)	typ. 0.4 Ohm

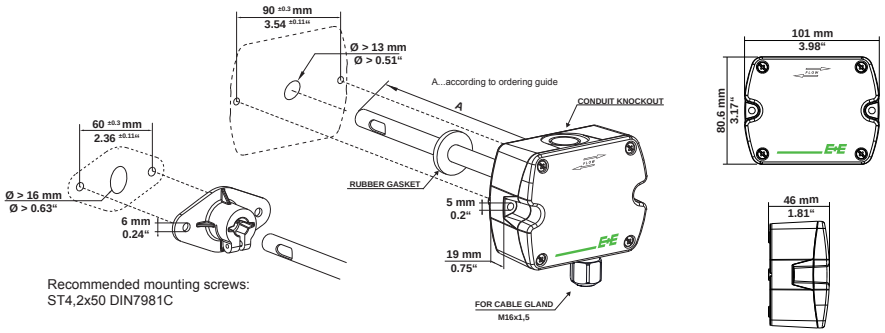
General

Supply voltage	24 V AC ±20% 15 - 35 V DC
Current consumption	typ. 15 mA + output current max. 350 mA for 0.3 s
Min. flow speed	1 m/s (196 ft/min) recommended
Housing material	Polycarbonate, UL94V-0 approved
Protection class	Enclosure: IP65 / NEMA 4, probe: IP20
Cable gland	M16 x 1.5
Electrical connection	screw terminals max. 2.5 mm² (AWG 14)
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial Environment FCC Part 15 ICES-003 ClassB
Working and storage conditions	-20...60 °C (-4...140 °F) 0...95 % RH (non-condensing)

CE

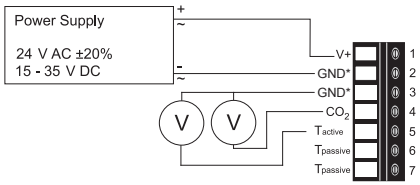
1) under normal operating conditions

Dimensions (mm/inch)

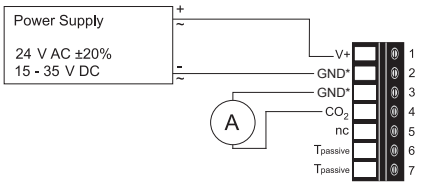


Connection Diagram

Voltage output



Current output



* **Very important:** for failure-free operation and performance according to the specs the supply GND and the measurement GND must be wired separately.

Ordering Guide

Voltage output

MODEL		OUTPUT		PASSIVE T-SENSOR 1) 2)		PROBE LENGTH (see dimensions „A")	
CO_2	(C)	0-5V	(2x)	Pt1000A	(C)	50mm (1.97") 3)	(BP)
CO_2+T	(CT)	0-10V	(3x)	NTC10k	(E)	200mm (7.87")	(FP)
				Ni1000, TK6180	(J)		
				none	(x)		
EE850-							

Current output

MODEL		OUTPUT		PASSIVE T-SENSOR 2) 4)		PROBE LENGTH (see dimensions „A")	
CO_2	(C)	4-20mA	(6x)	Pt1000A	(C)	50mm (1.97")	(BP)
				NTC10k	(E)	200mm (7.87")	(FP)
				Ni1000, TK6180	(J)		
				none	(x)		
EE850-							

OUTPUT 1		OUTPUT 2 1)			
CO2-SCALING		**T-SCALING 5)**		**UNIT**	
0...2000ppm	(002)	0...50	(T004)	°C	(M)
0...5000ppm	(005)	-5...55	(T031)	°F	(N)
0...10000ppm	(010)	0...40	(T055)		
		20...120	(T015)		
		32...122	(T076)		
		32...132	(T096)		

1) only available for CT model
2) T-Sensor details see www.epluse.com/R-T_Characteristics
3) only available with model C
4) only with 200 mm probe length
5) other scaling upon request

Ordering Example

EE850-CT3xCFP-002T031M

Model:	CO_2 + T	Output 1	
Analog:	0-10V	CO_2 Scaling:	0...2000ppm
Passive T-Sensor:	Pt1000A	Output 2	
Probe length:	200mm	T-Scaling:	-5..55 °C

Accessories (see data sheet „Accessories“)

E+E Product configuration adapter	see data sheet EE-PCA
E+E Product configuration software	EE-PCS (free download: www.epluse.com/EE850)
Power supply adapter	V03

Scope of Supply

- EE850 transmitter according ordering guide
- Cable gland
- Mounting flange + seal
- Mounting materials
- Test report according to DIN EN10204 - 2.2

Support Literature

www.epluse.com/EE850

EE80

HVAC Room CO_2 Switch

EE80 room CO_2 switch is based on the non-dispersive infrared (NDIR) measurement principle. A patented auto-calibration procedure compensates for the aging of the infrared source and ensures outstanding long term stability.

The switch threshold and hysteresis can be set with potentiometers on the electronics board. The measured CO_2 data can be indicated on the optional LC display.

Two different enclosure designs ensure professional appearance according to regional standards.

Typical Applications

building management for residential and office areas
ventilation control

Features

modern design
optional display
easiest installation
long-term stable

Technical Data

Measured values

CO_2

Measurement principle	Non-Dispersive Infrared Technology (NDIR)	
Sensor	E+E Dual Source Infrared System	
Working range	0...2000 / 5000 ppm	
Accuracy at 25 °C (77 °F)	0...2000 ppm:	< ± (50 ppm +2 % of measuring value)
and 1013 mbar	0...5000 ppm:	< ± (50 ppm +3 % of measuring value)
Response time t_{63}	< 195s	
Temperature dependence	typ. 2 ppm CO_2/°C	
Long term stability	typ. 20 ppm / year	
Sample rate	approx. 15 s	

Switch Output

Max. switching voltage	50 V AC / 60 V DC	
Max. switching load	0.7 A at 50 V AC	1A at 24 V DC
Min. switching load	1 mA at 5 V DC	
Contact material	Ag+Au clad	

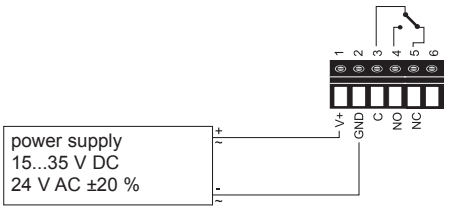
General

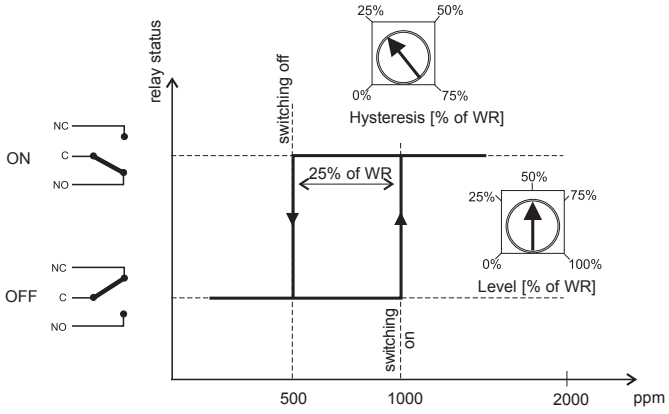
Supply voltage	24 V AC ±20 %	15 - 35 V DC
Current consumption	typ. 10 mA	
	max. 0.5 A for 0.3 s	
Warm up time[1)]	< 5 min	
Housing material	Polycarbonate	
	US Version: UL94V-0 approved / EU Version: UL94HB approved	
Protection class	IP30	
Display	LC display	
Electrical connection	screw terminals max. 1.5 mm² (AWG16)	
Electromagnetic compatibility	EN61326-1	FCC Part 15
	EN61326-2-3	ICES-003 ClassB
Working temperature range	0...90 % RH (non condensing) / -20...60 °C (-4...140 °F)	
Storage temperature range	0...90 % RH (non condensing) / -20...60 °C (-4...140 °F)	

CE

1) warm up time for performance according specification

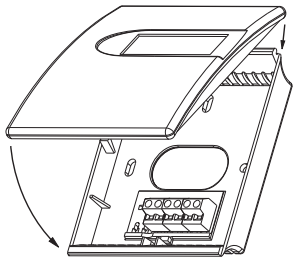
Connection Diagram





NO = normally open
NC = normally closed
WR = working range

Housing Dimensions (mm)



Europe: W x H x D = 85 x 100 x 26 mm (3.3 x 3.9 x 1")
USA: W x H x D = 85 x 136 x 26 mm (3.3 x 5.4 x 1")

Housing colour:

Standard (EU & US):

Front cover:	Signal white	RAL 9003
Back cover:	Light grey	RAL 7035

Optional (only EU):

Front and back cover	Grey	(Anthracite grey RAL 7016)
	Silver	(White aluminum RAL 9006)

Ordering Guide

WORKING RANGE		MODEL		DISPLAY		HOUSING DESIGN & COLOUR		
0...2000 ppm	(2)	CO_2 Switch	(CS)	without Display	(--)	EU-Standard	(RAL9003 / RAL7035)	(--)
0...5000 ppm	(5)			with Display	(D04)	EU-Grey	(RAL7016)	(G)
						EU-Silver	(RAL9006)	(S)
						US	(RAL9003 / RAL7035)	(US)
EE80-								

Order Example

EE80-2CSD04G

Working range:	0...2000 ppm
Model:	CO_2 Switch
Display:	with Display
Housing design & colour:	EU-Grey (RAL7016)

EE80-5CSUS

Working range:	0...5000 ppm
Model:	CO_2 Switch
Display:	without Display
Housing design & colour:	US (RAL9003 / RAL7035)

EE85

Duct mount CO_2 Switch

EE85 is optimized for building automation as well as for process control applications. It measures CO_2 concentration based on the Non-Dispersive Infrared (NDIR) technology. A patented auto-calibration procedure compensates for the aging of the infrared source and leads to outstanding long-term stability.

The air from the duct flows through the probe into the EE85 enclosure and back into the duct. Inside the enclosure the air diffuses through a membrane into the CO_2 sensing cell. As there is no flow through the sensing cell, this is very well protected against dust.

EE85 is available with measuring ranges of 0...2000, 0…5000 or 0…10000ppm and with two probe lengths. The switch threshold and hysteresis can be set with potentiometers on the printed circuit board.
The mounting flange included in the scope of supply facilitates installation in the ventilation ducts.

Typical Applications

building automation for residental and commercial areas
process control

Features

very simple installation
compact size
auto-calibration

Technical Data

Measuring Values

CO_2

Measurement principle	Non-Dispersive Infrared Technology (NDIR)	
Sensing element	E+E Dual Source Infrared System	
Measuring range	0...2000 / 5000 / 10000ppm	
Accuracy at 25°C (77°F)	0...2000ppm:	< ± (50ppm +2% of measuring value)
and 1013mbar	0...5000ppm:	< ± (50ppm +3% of measuring value)
	0...10000ppm:	< ± (100ppm +5% of measuring value)
Response time τ_{63} [1]	< 195s	
Temperature dependence	typ. 2ppm CO_2/°C	
Long term stability	typ. 20ppm / year	
Sample rate	approx. 15s	

Switch Output

Max. switching voltage	50V AC / 60V DC	
Max. switching load	0.7A at 50V AC	1A at 24V DC
Min. switching load	1mA at 5V DC	
Contact material	Ag+Au clad	

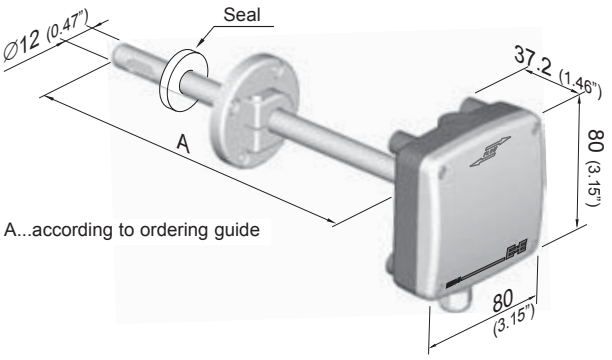
General

Supply voltage	24V AC ±20%	15 - 35V DC
Current consumption	typ. 10mA	
	max. 0.5A for 0.3s	
Warm up time [2]	< 5 min	
Housing / protection class	PC / housing: IP65, probe: IP20	
Cable gland	M16 x 1.5	cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Electromagnetic compatibility	EN61326-1	FCC Part 15
	EN61326-2-3	ICES-003 ClassB
Working temperature and conditions	-20...60°C (-4...140°F)	0...95% RH (non-condensing)
Storage temperature and conditions	-20...60°C (-4...140°F)	0...95% RH (non-condensing)

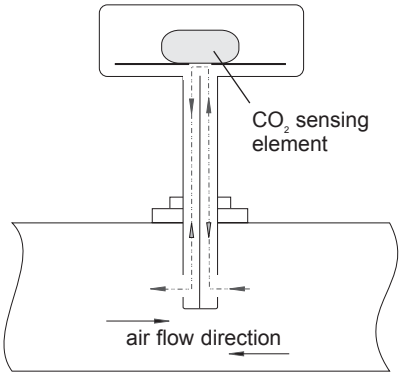
CE

1) minimum flow speed 1m/s (200ft/min)
2) warm up time for performance according to specification

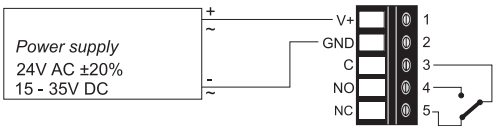
Dimensions (mm)



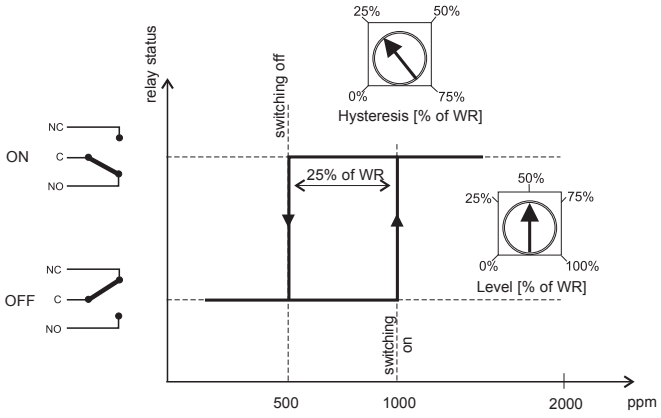
Operation Principle



Connection Diagram



NO = normally open
NC = normally closed
WR = working range



Ordering Guide

MEASURING RANGE		MODEL		PROBE LENGTH (see dimensions „A")	
0...2000ppm	(2)	CO_2 Switch	(CS)	50mm	(2)
0...5000ppm	(5)			200mm	(5)
0...10000ppm	(10)				
EE85-					

Order Example

EE85-5CS5

Measuring range:	0...5000ppm
Model:	CO_2 Switch
Probe length:	200mm

EE240 Series

Wireless Sensor for Humidity / Temperature / CO_2

State of the art sensor technology, highest reliability of data transmission and the ease of system installation are the outstanding features of the wireless sensor series EE240. Indifferent whether a point-to-point connection or a complex network is required, the series EE240 offers the ideal solution.


EE245 Transmitter

Wireless Transmitter EE245

The elegant housing combines the measurement of temperature, humidity and CO_2. An optional display is available to provide local indication. As a standard, batteries provide for the power supply. For more power demanding applications the device can be powered through an external adapter.


EE244 Transmitter

Wireless Transmitter EE244

The industrial housing can be equipped with up to three sensing probes to contact the interchangeable probes. An optional display is available to provide local indication. As a standard, batteries provide for the power supply. For more power demanding applications the device can be powered through an external adapter.

Interchangeable Sensing probes

A modular structure and easy extendable assortment of sensing probes allow the usage in many applications. For many years, the proven sensor technology of E+E for the measurement values of humidity, temperature, and CO_2 guarantee precise measurements and the highest longtime stability.
The standard interface and the stored calibration data of the sensing probe allow for any choice or combination of the available sensing probes offered. An adaptation or expansion of the number of sensing probes afterwards or an exchange for service purposes can be achieved in seconds – a must-have for uninterrupted data acquisition. For high temperature applications or installations in small spaces, the sensing probe can be connected with a sensor cable of up to 10 m (33 ft) in length.


Sensing Probes for EE244

Base Station EE241 and EE242

Do you have to traverse a street? The inexpensive point-to-point connection can be accomplished very easily with the **EE241**.
The configuration at the factory of the up to four transmitted measurement values is done in accordance with your specifications, meaning that the values are available as analogue outputs (0 – 5 / 10 V or 4 - 20 mA) immediately after installation.
For more complex networks (up to 500 transmitters or up to 2000 measurement values) is the user-configurable **EE242** available.
Independent of the topology of the network the integrated Webserver and the Ethernet interface warrants highest flexibility in the configuration of the network with a computer. A simple integration of the measurement system in the customer's network and the easy remote access and diagnostic of the measurement data are additional helpful features. The output values can be transferred as an analogue signal, as well as in digital form (via Ethernet). For a bus integration, Modbus will be supported. The actual measurement values and some operational information can be indicated on an optional display.


EE241 Base Station EE242


Router EE244-R

Router Series EE244-R

The radio range is greatly depending on local circumstances. With the router series EE244-R obstacles can be bypassed or the transmission distance expanded.

Typical Applications

Pharmaceutical Industry
Warehouses
Control Rooms
Cooling Chambers
Museums
HVAC Systems
Food Industry

Features

Interchangeable Sensing Probes
Remote Probes up to 10 m (33 ft)
Battery Operating Life up to 1 Years
Webserver
Ethernet
Long Rangeability

Highest Transmission Reliability

The data transmission is based on the IEEE 802.15.4 protocol with a transmission frequency of 2.4 GHz, which can be used all over the world without any additional cost. A special identification address, checksums, handshakes, and bidirectional communication provide the highest transmission reliability. Typical radio ranges are 100 m (330 ft) for indoor applications and 1000 m (3300 ft) in the open field. Greater radio ranges are easy obtainable with routers. The self-configuring, scalable, and self-healing mesh network, even when a connection fails, is another component contributing to the improvement of the transmission reliability and security. The highest possible data security level is accomplished with a preset encryption key according to AES-128.

Digital bus connection

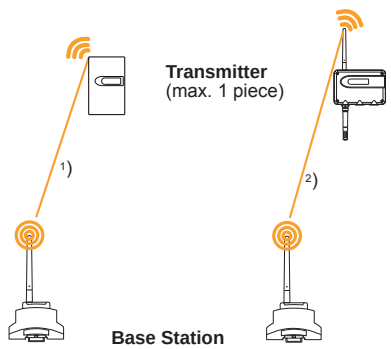
For bus integration, Modbus is supported. Communication is implemented via Ethernet or RS485 interface. Bus connection is only supported by the base station EE242.

Installation / Remote Access / Maintenance via Webserver

The integrated Webserver allows platform-independent installation, remote access and easy maintenance with any commercially available browser (Internet Explorer, Firefox, OPERA...) on a computer without additional software.

Wireless Networks

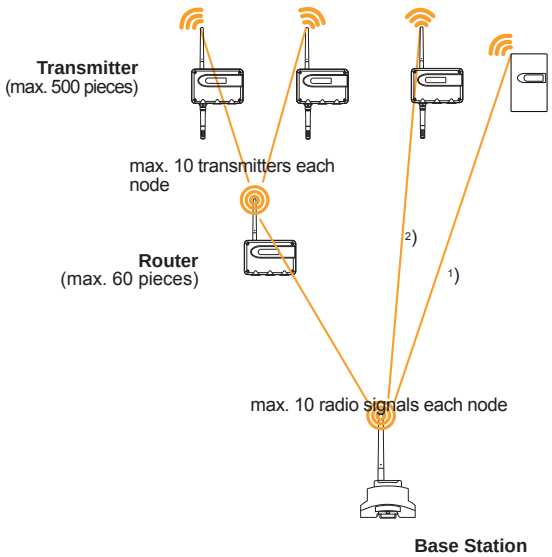
EE241 (point-to-point connection)



1) Radio ranges:
- up to 60m (197 ft) indoors

2) Radio ranges:
- up to 100m (330 ft) indoors
- up to 1000m (3300 ft) in open field

EE242 (wireless network)



Comparison	EE241	EE242
Transmitter:		
max. number of transmitters EE244 / EE245	1	500
Router:		
maximum number of routers EE244-R	60	60
Base Station:		
configuration of analogue outputs	acc. to order code	✓ via Webserver
user-configurable after delivery	--	✓ via Webserver
digital interface	--	✓ Ethernet, Modbus

Technical data Transmitter EE244 & EE245

General

Transmission frequency	2.4 GHz	
Transmission system	IEEE 802.15.4	
Transmission power	10mW	
Radio range	up to 100m (330 ft) indoors, up to 1000m (3300 ft) in open field	
Approval	ETSI / FCC Part 15.247 / IC	
Electromagnetic compatibility	EN61326-1 Industry EN61326-2-3 Industry	FCC Part 15 Class B ICES-003 Class B

CE

EE244 (Transmitter, Router)

Supply transmitter (EE244-A)	battery 4x1.5V AA (not in the scope of supply)	
Battery lifetime	> 1 year with a measuring data transmission every 5 min. (for T / %RH)	
External supply transmitter (EE244-B)	8...28V DC SELV, typ. I_L = 20mA at 24V; max. I_L = 35mA at 24V DC	
External supply router (EE244-R)	8...28V DC SELV, typ. I_L = 20mA at 24V; max. I_L = 35mA at 24V DC	
Housing material	polycarbonate (PC)	
Protection class housing	IP65	
Temperature ranges	working temperature range of probe: working temperature range: storage temperature range:	refer to respective data sheet of sensing probe -40...+50°C (-40...122°F) (with display: -20...+50°C / -4...122°F) -40...+50°C (-40...122°F) (with display: -20...+50°C / -4...122°F)
Max. number of sensing probes	3 (2*)	
Max. number of measuring signals	6 (4*) (T / RH / CO_2**)	

EE245 (Transmitter)

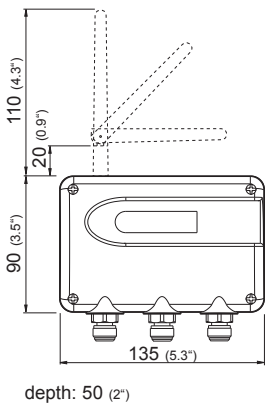
Power Supply	battery 4x1.5V AA (not in the scope of supply)
Battery lifetime	> 1 year with a measuring data transmission every 5 min. (for T / %RH)
Radio Range	up to 60m (197 ft) indoors
Antenna	internal
External supply transmitter (EE245)	DC 8-28V SELV / AC 12V (±20%)
Housing material	polycarbonate (PC)
Protection class housing	IP30
Temperature ranges	working temperature range: 0...90%RH (non-condensing) / -5...+55°C (23...131°F) storage temperature range: 0...90%RH (non-condensing) / -5...+55°C (23...131°F)
Max. numbers of measuring values	3 (T / RH / CO_2**)
Accuracy	T: ± 0,3 °C (at 20 °C) / ± 0,4 °C (20...55 °C) Rh: ± 3 % (30...70 %) / ± 5 % (70...90 %) CO_2: 2000ppm (± 50ppm +2 % of m.v.) 5000ppm (± 50ppm +3 % of m.v.)
Connection	screw terminal 1,5mm²

*) with external power supply

**) For CO_2 an external power supply is recommended.

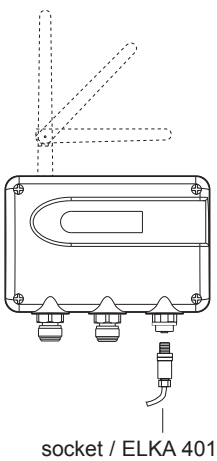
Dimensions in mm

EE244-Ax3:



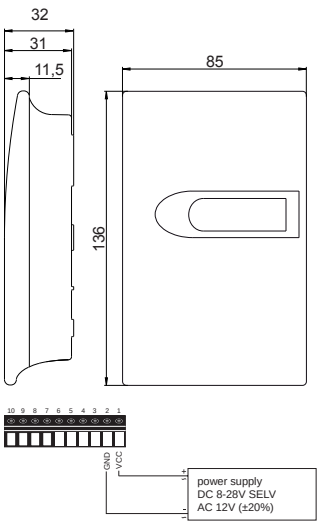
depth: 50 (2")

EE244-Bx2:



socket / ELKA 4012 PG7[1)]

EE245



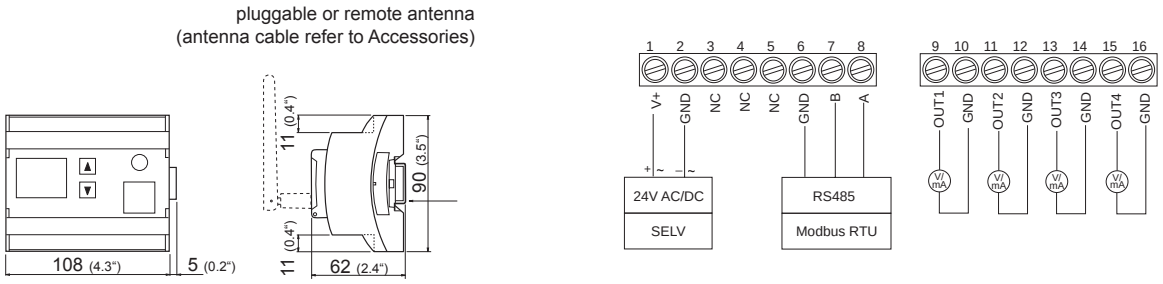
1) included in the scope of supply

Technical data Base Station EE241 & EE242

EE241/EE242 (Base Station)

Supply voltage SELV		24V AC/DC ±20%
digital interface		• Ethernet • Modbus (RTU / ASCII / TCP)
Current consumption	EE241	typ. I_L = 70mA at 24V DC; max. I_L = 100mA at 24V DC
	EE242	typ. I_L = 150mA at 24V DC; max. I_L = 180mA at 24V DC
Analogue outputs		0-5V -0.5mA < I_L < 0.5mA 0-10V -1mA < I_L < 1mA 0-20mA / 4-20mA R_L < 500 Ohm
Number of analogue outputs		4
Accuracy of analogue outputs		±5mV resp. ±10µA
Temperature dependence of analogue outputs		max. 0.1 $\frac{mV}{°C}$ resp. 1 $\frac{\mu A}{°C}$
Resolution of analogue outputs		0.7mV resp. 1.50µA
Electrical connection		screw terminals max. 2.5mm²
Housing material		polycarbonate (PC)
Protection class housing		IP20
Temperature ranges		working temperature range: -30...+50°C (-22...122°F) (with display: -20...+50°C / -4...122°F) storage temperature range: -30...+50°C (-22...122°F) (with display: -20...+50°C / -4...122°F)

Dimensions in mm - connection Diagram EE241 / EE242



Overview of EE244 Sensing Probes

Application	Picture	Measuring Range	Accuracy	Order Code
Humidity/Temperature Probes				
RH/T probe for standard applications		0...100% RH -40...80°C (-40...176°F)	±2% RH (0...90% RH) ±3% RH (90...100% RH) ±0.1°C (±0.18°F) at 20°C (68°F)	EE07-PFT1
RH/T probe for clean room applications, food and pharmaceutical industry		0...100% RH -40...80°C (-40...176°F)	±2% RH (0...90% RH) ±3% RH (90...100% RH) ±0.1°C (±0.18°F) at 20°C (68°F)	EE07-MFT9
RH/T module for installation in small spaces or unobtrusive mounting		0...95% RH -40...85°C (-40...185°F)	±3% RH (10...100% RH) at 21°C (69.8°F) ±0.3°C (±0.54°F) at 20°C (68°F)	EE03-FT9
Temperature Probes				
T probe for standard applications		-40...80°C (-40...176°F)	±0.1°C (±0.18°F) at 20°C (68°F)	EE07-PT1
T probe for clean room applications, food and pharmaceutical industry		-40...80°C (-40...176°F)	±0.1°C (±0.18°F) at 20°C (68°F)	EE07-MT
CO_2 Probes				
CO_2 probe for standard applications		0…2000ppm 0…5000ppm 0…10000ppm	±(50ppm+2% of m.v.) ±(50ppm+3% of m.v.) ±(100ppm+5% of m.v.)	EE871

Ordering Guide

BASE STATION - „point-to-point connection“ (EE241) and „wireless network“ (EE242)

							EE241-	EE242-
Hardware Configuration								
Frequency	2,4GHz (10mW)						A	A
Output signal	0-5V						2	2
	0-10V						3	3
	0-20mA						5	5
	4-20mA						6	6
Display	with						D	D
	without						-	-
Software Configuration								
Physical parameters of outputs	relative humidity		RH	[%]	(A)	output 1	A	A / B / C / R
	temperature		T	[°C]	(B)	output 2	B	A / B / C / R
	dew point temperature		Td	[°C]	(C)	output 3	C	A / B / C / R
	CO_2		CO_2	[ppm]	(R)	output 4	R	A / B / C / R
Unit	metric / SI						-	-
	non metric / US						E01	E01
T-Scaling (in °C or °F)	-40...60	(T02)	0...50		(T04)	output T	Select Txx code	Select Txx code
Td-Scaling (in °C or °F)	-20...50	(T48)	further scalings on request			output Td	Select Tdxx code	Select Tdxx code
CO_2-Scaling (in ppm)	0...2.000	(C20)	0...10.000		(C22)		Select Cxx code	Select Cxx code
	0...5.000	(C21)						

TRANSMITTER EE245

		EE245-
Type	RH + T + CO_2	FTC
	RH + T	FTx
	CO_2 +T	xTC
	T	xTx
CO_2 (only for TC and FTC)	0...2000ppm	2
	0...5000ppm	5
	without CO_2 measurement	x
Frequency	2,4GHz (10mW)	A
Display	with	D
	without	x
Software Configuration		
Unit	°C	-
	°F	E01

TRANSMITTER / ROUTER EE244

		EE244-	EE244-
Type	transmitter	A	
	transmitter for external supply[1)]	B	
	router		R
Frequency	2,4GHz (10mW)	A	A
Number of sensing probes	1	1	
	2	2	
	3 (not possible with type B - transmitter with external supply)	3	
Display	with	D	
	without	-	

1) External power supply units not included in the scope of supply

SENSING PROBES FOR EE244

Humidity / Temperature	probe RH/T (polycarbonat)	EE07-PFT1
	probe RH/T (metal)	EE07-MFT9
	module RH/T	EE03-FT9
Temperature	probe T (polycarbonat)	EE07-PT1
	probe T (metal)	EE07-MT
CO_2	probe CO_2	EE871

Accessories / Replacement Parts

Base Station:

- Antenna cable 2m (7ft) (HA010330)
- Crossover cable (PC to base station) (HA010333)
- External power supply unit (V03)

Transmitter:		**EE244**	**EE245**
- Probe cable for EE07 - 2m (7ft) / 5m (16ft) / 10m (33ft)	(HA0108xx)	(✓)	
- Connection cable for EE03, 2m (7ft)	(HA010328)	(✓)	
- Connection cable for EE03, 5m (16ft)	(HA010329)	(✓)	
- Antenna cable 2m (7ft)	(HA010330)	(✓)	
- Bracket for rail installation	(HA010203)	(✓)	
- Reference probes	(HA010403)	(✓)	
- Duct mounting kit for EE07	(HA010209)	(✓)	
- External power supply unit	(V03)	(✓)	(✓)

Oder Example

1)

Position 1 - Base Station:
EE242-A3D/ABCR-T04-Td48-C20

Frequency:	2,4GHz
Output signal:	0-10V
Display:	yes
Outputs:	RH, T, Td, CO_2
Unit:	SI
Scaling:	T: 0...50; Td: -20...50

Position 2 - Transmitter / Router:
EE244-BA1D

Type:	Industral transmitter with external supply
Frequency:	2,4GHz
Probe:	1
Display:	yes

Position 3 - Sensing Probes:
EE07-PFT1, EE07-MT

2)

Position 1 - Base Station:
EE242-A3D/ABCR-T04-Td48-C20

Frequency:	2,4GHz
Output signal:	0-10V
Display:	yes
Outputs:	RH, T, Td, CO_2
Unit:	SI
Scaling:	T: 0...50; Td: -20...50

Position 2 - Transmitter:
EE245-FTC5Ax

Type:	Room transmitter for relative Humidity, Temperature and CO_2
CO_2:	0...5000ppm
Frequency:	2,4GHz
Display:	without

EE820

CO_2 Transmitter for Demanding Applications

The EE820 is designed for use in harsh, demanding applications. A multiple point CO_2 and temperature factory adjustment procedure leads to excellent CO_2 measurement accuracy over the entire temperature working range, so the EE820 can even be installed outdoors.

The EE820 incorporates the E+E dual wavelength NDIR CO_2 sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability. With its robust, functional housing with a special integrated filter the EE820 can be installed in polluted applications such as in agriculture and live stock barns.
For fast response time requirements there is an EE820 version with forced air circulation created by a fan installed behind the filter. An optional M12 connector facilitates easy removal of EE820 before site cleaning operations.

The measured data range of up to 10,000ppm is available on the voltage or current analogue outputs. An optional kit facilitates easy configuration and adjustment of the EE820.

Typical Applications

Greenhouses
Fruit and vegetable storage
Stables
Hatchers and Incubators
Vehicles, Trains, Trams

Key Features

Autocalibration
Outstanding long-term stability
Temperature compensation
High resistance to pollution
Easy installation

Technical Data

Measured values

Measuring principle	dual wavelength non-dispersive infrared technology (NDIR)		
Measurement range	0...2000 / 5000 / 10000 ppm		
Accuracy at 25 °C and 1013 mbar (77 °F...14,7 psi)	0...2000 ppm:	< ± (50 ppm +2 % of measured value)	
	0...5000 ppm:	< ± (50 ppm +3 % of measured value)	
	0...10000 ppm:	< ± (100 ppm +5 % of measured value)	
Response time τ_{63}	standard:	typ. 300 s	
	fast:	typ. 140 s (with a forced air circulation module)	
Temperature dependency	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)		
Sample rate	approx. 15 s		

Output

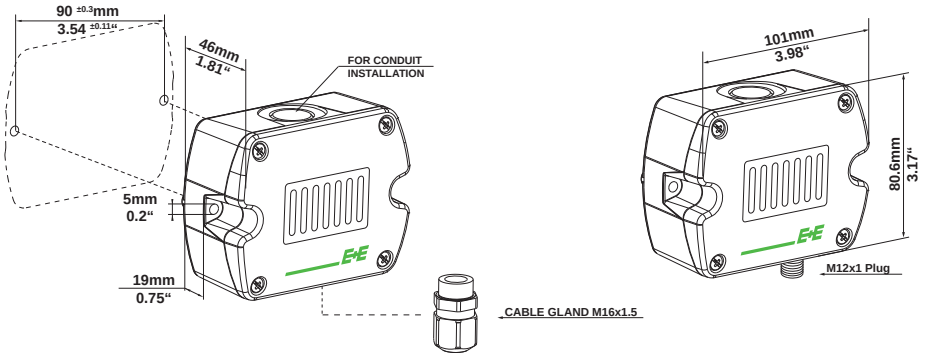
0...2000 / 5000 / 10000 ppm	0 - 5 / 0 - 10 V	-1mA < I_L < 1 mA
	4 - 20 mA	R_L < 500 Ohm

General

Supply voltage	24 V AC ±20%	15 - 35 V DC	
Current consumption	standard:	typ. 15 mA + output current	
	fast:	typ. 60 mA + output current	
Current peak	max. 350 mA for 0.3 s		
Warm up time[1)]	< 5 min		
Housing material	Polycarbonate, UL94V-0 approved		
Protection class	IP54		
Electrical connection	Screw terminals 2.5 mm² or M12 plug		
Electromagnetic compatibility	EN61326-1	EN61326-2-3	Industrial Environment
	FCC Part 15	ICES-003 ClassB	
Working conditions	-20...60 °C (-4...140°F) 0...100 % RH (non-condensing)		
Storage conditions	-20...60 °C (-4...140°F) 0...95 % RH (non-condensing)		

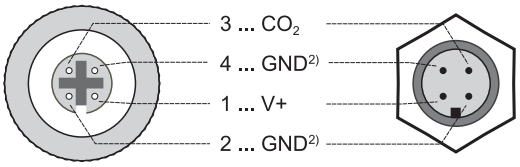
1) for performance according to specification

Dimensions (mm/inch)

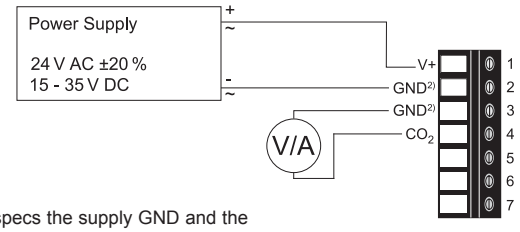


Connection Diagram

EE820 with M12 plug[1)]



EE820 with cable gland



1) Mating M12x1 connector for self assembly is included in the scope of supply
2) ***Very important:*** for failure-free operation and performance according to the specs the supply GND and the measurement GND must be wired separately.

Ordering Guide

MODEL		OUTPUT		HOUSING		CONNECTION		SCALING		RESPONSE TIME	
CO_2	(C)	0-5V	(2x)	standard	(P)	cable gland	(P)	0...2000ppm	(002)	standard	(S)
		0-10V	(3x)			M12 plug	(N)	0...5000ppm	(005)	fast[1)]	(F)
		4-20mA	(6x)					0...10000ppm	(010)		
EE820-											

1) Includes a forced air circulation module.

Order Example

EE820-C6xPP-002S

Model:	CO_2
Analog output:	4-20mA
Housing:	standard
Connection:	cable gland
Scaling:	0...2000ppm
Response time:	standard

Accessories (see data sheet „Accessories“)

Product configuration adapter	see data sheet EE-PCA
Product configuration software	EE-PCS (free download: www.epluse.com/EE820)
Mating connector 4pol. self assembly M12x1	HA010707
Connection cable 5 pins, M12x1 socket - flying leads,shielded, 1,5m (3.3ft)	HA010819
Connection cable 5 pins, M12x1 socket - flying leads,shielded, 5m (16.4ft)	HA010820
Connection cable 5 pins, M12x1 socket - flying leads,shielded, 10m (32.8ft)	HA010821
Protective cap for female M12 connectors	HA010781
Protective cap for male M12 connectors	HA010782
Power supply adapter	V03
Forced air circulation module	EE820-FAC
Replacement cover with filter	EE820-COVER

Scope of Supply

- EE820 Transmitter according to ordering guide
- Cable gland (only for EE820 with cable gland)
- Mounting set (screws and rowlplugs/screw anchors)
- Mating M12x1 connector for self assembly (only for EE820-CxxxNxx with installed M12x1 connector)
- Quick Guide - EE820 Connection Diagram (only for EE820 with M12 connector)
- Test report according to DIN EN 10204 – 2.2

Support Literature

www.epluse.com/EE820

EE82

CO_2 Switch for harsh environment

EE82 is optimized for harsh climate control applications such as life stock barns or storage of fruit and vegetables. The robust enclosure has been tailored for best protection of the CO_2 sensing cell. The air diffuses first through the filter on the front cover into the instrument enclosure and then through a second membrane filter into the CO_2 sensing cell. As there is no flow through the sensing cell, this is very well protected against pollution.

The CO_2 measurement is based on the Non-Dispersive Infrared (NDIR) technology. A patented auto-calibration procedure compensates for the aging of the infrared source and leads to outstanding long-term stability.

EE82 is available with measuring ranges of 0...2000, 0…5000 or 0…10000ppm. The switch threshold and hysteresis can be set with potentiometers on the printed circuit board.

The EE82 with snap-in mounting flange and M12 electrical connector allows for easiest installation, replacement or removal of the device during site cleaning and sterilizing operation.

Typical Applications

fruit and vegetable storage
life stock barns

Features

easy installation
compact housing
auto-calibration

Technical Data

Measured values

Measuring principle	Non-Dispersive Infrared Technology (NDIR)	
Sensing element	E+E Dual Source Infrared System	
Measuring range	0...2000 / 5000 / 10000ppm	
Accuracy at 25°C (77°F)	0...2000ppm:	< ± (50ppm +2% of measuring value)
and 1013mbar	0...5000ppm:	< ± (50ppm +3% of measuring value)
	0...10000ppm:	< ± (100ppm +5% of measuring value)
Response time τ_{63}	< 195s	
Temperature dependence	typ. 2ppm CO_2/°C	
Long term stability	typ. 20ppm / year	
Sample rate	approx. 15s	

Switch Output

Max. switching voltage	50V AC / 60V DC	
Max. switching load	0.7A at 50V AC	1A at 24V DC
Min. switching load	1mA at 5V DC	
Contact material	Ag+Au clad	

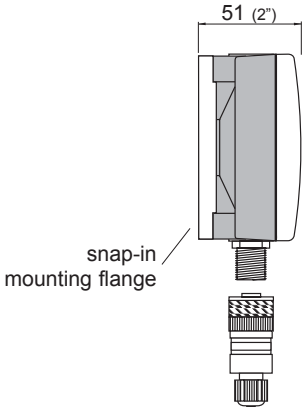
General

Supply voltage	24V AC ±20%	15 - 35V DC
Current consumption	typ. 10mA	
	max. 0.5A for 0.3s	
Warm up time[1)]	< 5 min	
Housing / protection class	PC / IP54	
Electrical connection	M12 plug	
Electromagnetic compatibility	EN61326-1	FCC Part 15
	EN61326-2-3	ICES-003 ClassB
Working temperature and conditions	-20...60°C (-4...140°F)	0...100% RH (non-condensing)
Storage temperature and conditions	-20...60°C (-4...140°F)	0...95% RH (non-condensing)

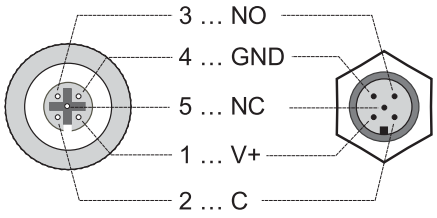
CE

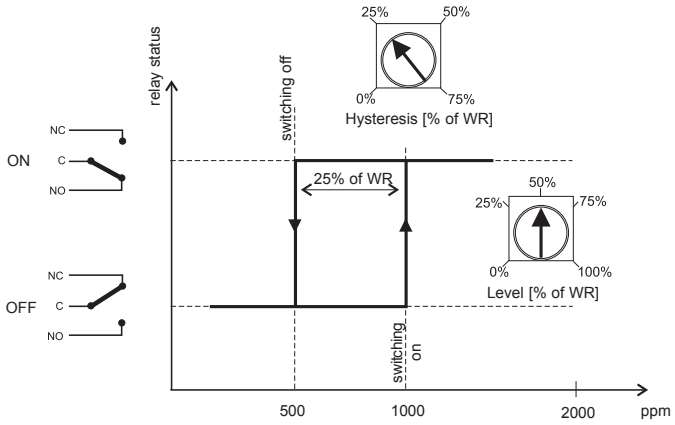
1) warm up time for performance according specification

Dimensions (mm)



Connection Diagram





NO = normally open
NC = normally closed
WR = working range

Ordering Guide

MEASURING RANGE		MODEL	
0...2000ppm	(2)	CO_2 Switch	(CS)
0...5000ppm	(5)		
0...10000ppm	(10)		
EE82-			

Order Example

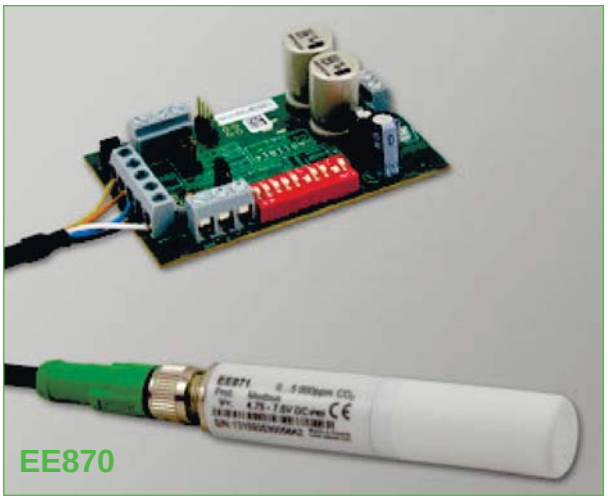
EE82-5CS

Measuring range: 0...5000ppm
Model: CO_2 Switch

EE870

Modular CO_2 Transmitter for Demanding Applications

The modular E+E CO_2 transmitter EE870 is designed for easy integration into OEM equipment for demanding applications. EE870 consists of a CO_2 sensing probe, a conversion board and a connection cable.



The interchangeable CO_2 probe incorporates the dual wavelength NDIR CO_2 sensor, which compensates for ageing effects, is highly insensitive to pollution and offers outstanding long term stability. A multiple point CO_2 and temperature adjustment leads to excellent measurement accuracy over the entire temperature working range, ideal for use in agriculture and outdoors.

The IP65 enclosure of probe and the replaceable PTFE filter offer excellent protection in harsh, polluted environment. The compact size, the M12 connector and the optional mounting flange allow for fast probe installation, replacement or removal during the cleaning of the site, for instance a stable or an incubator. With the optional radiation shield, the probe can be also installed outdoors.

The measured data range of up to 5 % CO_2 (50,000 ppm) is available on the analog outputs of the conversion board. Several voltage and current ranges can be selected with jumpers. Additionally, the data is available on the Modbus RTU interface, which can be configured by the user with DIP switches on the board. An optional kit facilitates easy configuration and adjustment of the probe.

Typical Applications

Greenhouses and livestock barns
Fruit and vegetable storage
Hatchers and incubators
Outdoor CO_2 monitoring

Key Features

Auto-calibration
Outstanding long-term stability
Temperature compensation
Interchangeable probe
Analogue and Modbus RTU outputs

Technical Data

Digital CO_2 Probe EE871

Measuring principle	Dual wavelength (non-dispersive infrared technology) NDIR	
Measurement range / Accuracy at 25 °C and 1013 mbar[1] (77 °F...14,69 psi)	0...2000 ppm:	< ± (50 ppm + 2 % from the measured value)
	0...5000 ppm:	< ± (50 ppm + 3 % from the measured value)
	0...10,000 ppm:	< ± (100 ppm + 5 % from the measured value)
	0...3 %: 0...5 %:	< ± (1,5 % from full scale + 2 % from the measured value)
Response time t_{90}	105 s with measured data averaging (smooth output) 60 s without measured data averaging	
Temperature dependency (-20...45 °C) (-4...113 °F)	0...2000 ppm: 0...5000 ppm: 0...10,000 ppm:	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C
	0...3 %: 0...5 %:	typ. -0,3 % from the measured value/°C
Housing / Protection class	Plastic PC / Housing IP65	
Cable length	max. 10 m (32 ft)	
Electromagnetic compatibility (Industrial enviroment)	EN61326-1 EN61326-2-3	CE

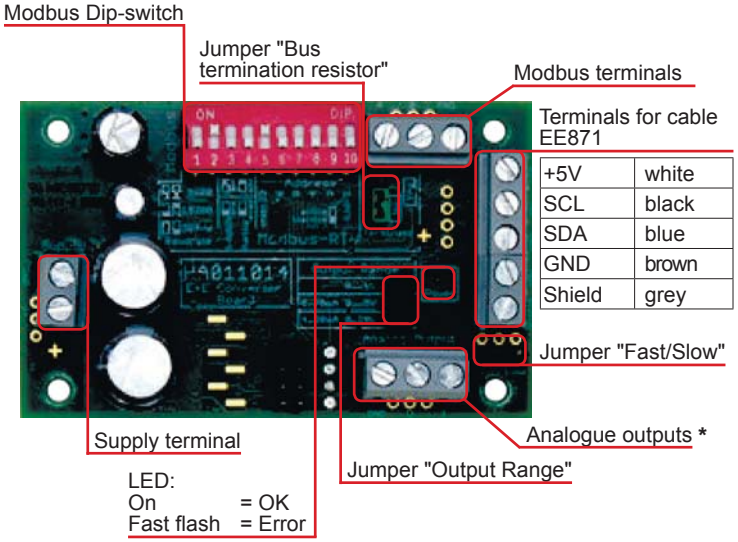
Conversion Board

Supply voltage	10-35 V DC / 10-28.8 V AC
Supply current	120 mA at 24 V DC / 300 mA at 10 V DC
Protection class	IP00

1) For averaging output

Electrical connection	screw terminal size: 2.5 mm²		
Analog outputs	0-1 V; 0-5 V; 0-10 V	-1 mA < I_L < 1 mA	
selectable by jumpers	0-20 mA; 4-20 mA	R_L < 500 Ohm	
Resolution	12 bit		
Response time t_{90}	60 s or 105 s selectable by jumpers		
Modbus RTU	setup with dip-switches (see operation manual)		
Temperature dependence	Voltage:	typ. ±0.2 mV/°C (0 – 1V)	
		typ. ±0.5 mV/°C (0 – 5V)	
		typ: ±0.6 mV/°C (0 – 10V)	
	Current:	typ. ±1 µA / °C	
EE870 Operating conditions	-40...60 °C (-40...140 °F)	0...100 % RH (not condensating)	85...110 kPa (12.33...15.95 psi)
EE870 Storage condition	-40...60 °C (-40...140 °F)	0...100 % RH (not condensating)	70...110 kPa (10.15...15.95 psi)

Connection

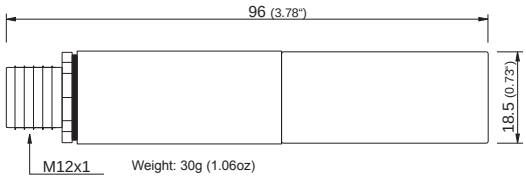


+5V	white
SCL	black
SDA	blue
GND	brown
Shield	grey

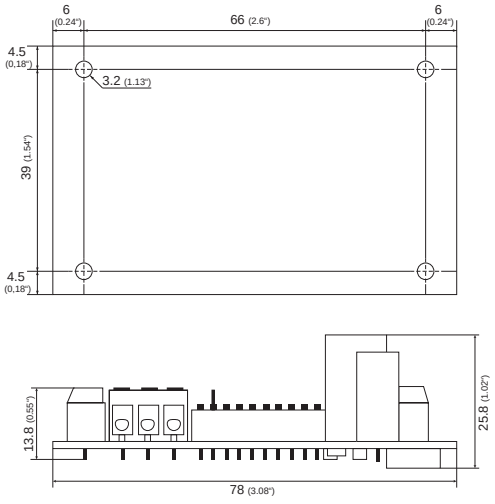
Very important:
for failure-free operation and performance according to the specs the supply GND and the measurement GND must be wired separately.

Dimensions (mm/inch)

Digital CO_2 Probe EE871



Conversion Board



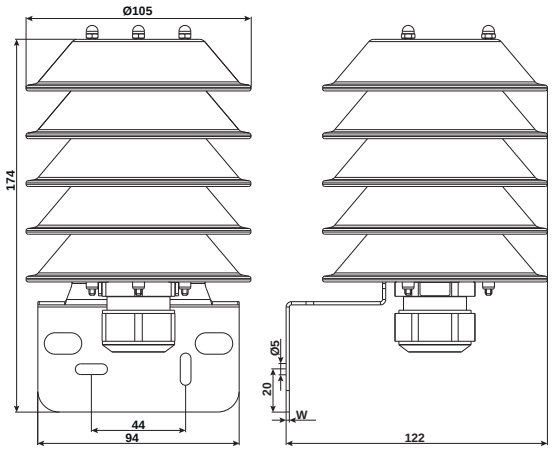
Scope of Supply

- EE871 probe according to ordering guide
- Test report according to DIN EN10204 - 2.2 for EE871
- Conversion board HA011014
- Connecting cable HA0108xx
- Operation manual
- Test report according to DIN EN10204 - 2.2 for conversion board

Operation outdoors

For outdoor applications, the probe of EE870 must be used with the radiation shield order no. HA010507, which protects the device against rain, snow, ice, and solar radiation. The convertor board must protected IP65 (NEMA4) or better.


EE871 with radiation shield



Ordering Guide

		EE870
CO_2 range	0...2000 ppm	HR2000
	0...5000 ppm	HR5000
	0...10,000 ppm	HR1
	0...3 %	HR3
	0...5 %	HR5
Cable length	1 m	no code
	2 m	KL200
	5 m	KL500
	10 m	KL1000

Ordering Example

EE870-HR2000KL500

CO_2 range: 0...2000 ppm
Cable length: 5 m

EE870-HR5

CO_2 range: 0...5 %
Cable length: 1 m

Accessories (see data sheet "Accessories")

Replacement probe EE871-HRxJ2	see data sheet EE871
Cable M12 - flying leads (1 m (39.37") / 2 m (78.74") / 5 m (196.85") / 10 m (393.70"))	HA0108**09/10/11/12**
Mounting flange for probe	HA010212
Radiation shield	HA010507
PFTE Filter cap	HA010116
Protection cap for the M12 cable socket	HA010781
Protection cap for the M12 probe plug	HA010782

Support Literature

www.epluse.com/EE870

EE871

Digital CO_2 Probe for Demanding Applications

The E+E CO_2 probe EE871 is designed for use in harsh, demanding OEM applications. A multiple point CO_2 and temperature adjustment procedure leads to excellent CO_2 measurement accuracy over the entire temperature working range, ideal for use in agriculture or outdoors. EE871 incorporates the dual wavelength NDIR CO_2 sensor, which automatically compensates for ageing effects and is highly insensitive to pollution.

The IP65 enclosure and the replaceable PTFE filter offer excellent protection in harsh, polluted environment. The compact size, the M12 connector and the optional mounting flange allow for fast probe installation or replacement. With the optional radiation shield, EE871 can be also used outdoors.

The measured data range of up to 5 % CO_2 (50,000 ppm) is available on E2 digital interface and up to 1 % CO_2 (10.000 ppm) is available on Modbus RTU interface.

An optional kit facilitates easy configuration and adjustment of EE871. The measurement interval can be set according to the application requirements, by this the average current consumption can be reduced to 120 µA for battery-operated devices.

Typical Applications

Greenhouses and livestock barns
Fruit and vegetable storage
Hatchers and incubators
Outdoor CO_2 monitoring
Data loggers and handhelds

Key Features

Auto-calibration
Outstanding long-term stability
Temperature compensation
Very low current consumption
IP65 enclosure
Modbus RTU or E2 interface

Technical Data

Measured values

CO_2

Measuring principle	Dual wavelength (non-dispersive infrared technology) NDIR	
Measurement range	0...2000 ppm:	< ± (50 ppm + 2 % from the measured value)
Accuracy at 25 °C and	0...5000 ppm:	< ± (50 ppm + 3 % from the measured value)
1013 mbar [1] (77 °F...14,69 psi)	0...10,000 ppm:	< ± (100 ppm + 5 % from the measured value)
	0...3 %: 0...5 %:	< ± (1,5 % from full scale + 2 % from the measured value)
Response time t_{90}	105 s with measured data averaging (smooth output) 60 s without measured data averaging	
Temperature dependency	0...2000 ppm:	
(-20...45 °C) (-4...113 °F)	0...5000 ppm: 0...10,000 ppm:	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C
	0...3 %: 0...5 %:	typ. -0,3 % from the measured value/°C
Measurement interval	adjustable from 15 s to 1 h (Factory setting: 15 s)	

General

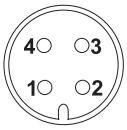
Digital interface	Modbus RTU or E2 (details: www.epluse.com)
Supply voltage	4.75 - 7.5 VDC

1) For averaging output

Average current consumption 2)	120 µA (at 1 h measurement interval)...4.3 mA (at 15 sec. measurement interval)
Current peak	max. 350 mA for 0.05 s
Housing / Protection class	Plastic PC / Housing IP65
Electrical connection	Connector M12 x 1
Cable length E2 interface	max. 10 m (32.8 ft)
Electromagnetic compatibility (Industrial enviroment)	EN61326-1 EN61326-2-3
Operating conditions	-40...60 °C (-40...140 °F) 0...100 % RH (non-condensing) 85...110 kPa (12,33...15,95 psi)
Storage conditions	-40...60 °C (-40...140 °F) 0...100 % RH (non-condensing) 70...110 kPa (10,15...15,95 psi)

2) The average current consumption depends on the measurement interval

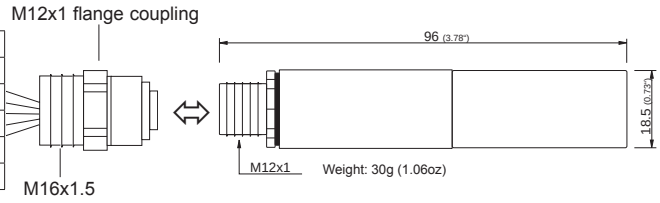
Connection



	Modbus	E2
1...	+UB	GND
2...	B-RS485	+UB
3...	A-RS485	DATA
4...	GND	CLOCK

Modbus	E2	
+UB	GND	brown
B-RS485	+UB	white
A-RS485	DATA	blue
GND	CLOCK	black
Shielding		grey

Dimensions (mm/inch)



Modbus Map

The measured values are saved as a 32Bit *float* value from 0x2D to 0x30. The factory setting for the Slave-ID is 246 as an *integer* 16Bit value. This ID can be customised in the register 0x00 (permitted values 1 - 247).

FLOAT (read register):

Coil / Register Numbers	*Data-Addresses*	*Parameter name*
30046	0x2D	CO_2 Response time = 60s
30048	0x2F	CO_2 Response time = 105s

INTEGER (write register):

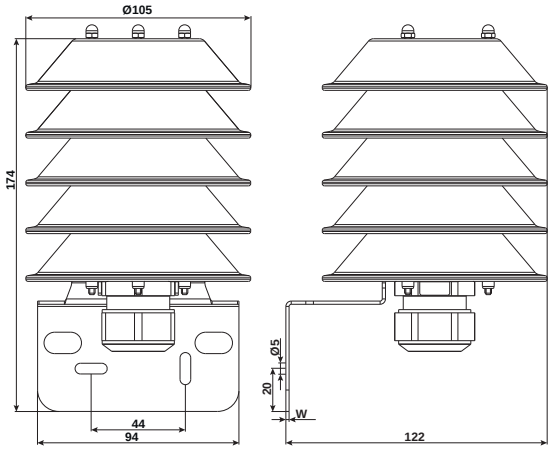
Coil / Register Numbers	*Data-Addresses*	*Parameter name*
60001	0x00	Slave-ID
60002	0x01	RS485 Setting
60003	0x02	Measuring time interval

For Modbus protocol setting please see Application Note (www.epluse.com/EE871).

Operation outdoors

For outdoor applications EE871 must be used with the radiation shield order no. HA010507, which protects the device against rain, snow, ice, and solar radiation.


EE871 with radiation shield



Scope of Supply

- EE871 probe according to ordering guide
- Test report according to DIN EN10204 - 2.2

Ordering Guide

			EE871
Hardware	**CO_2 Range**	0...2000 ppm	HR2000
		0...5000 ppm	HR5000
		0...10,000 ppm	HR1
		0...3 % (only with E2 Interface)	HR3
		0...5 % (only with E2 Interface)	HR5
	Digital Output	E2 Interface	J2
		Modbus RTU	no code
Software[1)]	**Baudrate**	9600	no code
		19200	BD6
		38400	BD7
	Parity	no parity	PY0
		odd	no code
		even	PY2
	Stopbits	1 stopbit	no code
		2 stopbits[2)]	BT2

1) Only for Modbus RTU
2) Only in combination with „no parity“

Ordering Example

EE871-HR5J2

CO_2 range:	0...5 %
Digital Output:	E2 Interface

EE871-HR2000PY2BT2

CO_2 range:	0...2000 ppm
Digital Output:	Modbus RTU
Baudrate:	9600
Parity:	even
Stopbits:	2

Accessories (For further information, see data sheet “Accessories”)

Mounting flange	HA010212
M12x1 flanged coupling with 50mm (1,97”) stranded wire	HA010705
Modbus configuration adapter	HA011012
E2 Test and configuration adapter	HA011010
E+E Product configuration software (Download: www.epluse.com/Configurator)	EE-PCS
Connecting cable M12 - flying leads (1.5 m (59.06”) / 5 m (196.85”) / 10 m (393.70”))	HA0108**19/20/21**
T-Coupler M12 - M12	HA030204
M12 Connector for self assembly	HA010707
PTFE filter cap	HA010116
Radiation shield	HA010507
Protection cap for the M12 cable socket	HA010781
Protection cap for the M12 plug of EE871	HA010782

Support Literature

www.epluse.com/EE871

EE893

Digital CO_2 Sensor Module for OEM Applications

The E+E CO_2 module EE893 is designed for OEM applications and for demanding environment. A multiple point CO_2 and temperature adjustment procedure leads to excellent CO_2 measurement accuracy over the entire temperature working range; this is a must for process control and outdoor applications.

The E+E dual wavelength NDIR CO_2 sensing procedure compensates automatically for ageing effects. EE893 is highly insensitive to pollution and offers outstanding long term stability.

With its small dimensions and electrical connection via contact pins and pads, EE893 is the optimal choice for OEM devices such as wireless transmitters, hand-helds or data loggers. The measured data, with a range of up to 10000ppm, is available on the E2 digital interface.

An optional kit facilitates easy configuration and adjustment of the module. The measurement interval can be set according to the application requirements; by this the average current consumption can be reduced to less than 60 µA for battery-operated devices.

Typical Applications

Data loggers
Hand helds
Wireless transmitters
Building management
Demand controlled ventilation

Key features

Autocalibration
Outstanding long-term stability
Temperature compensation
Low power consumption
Very small size

Technical Data

Measured values

CO_2

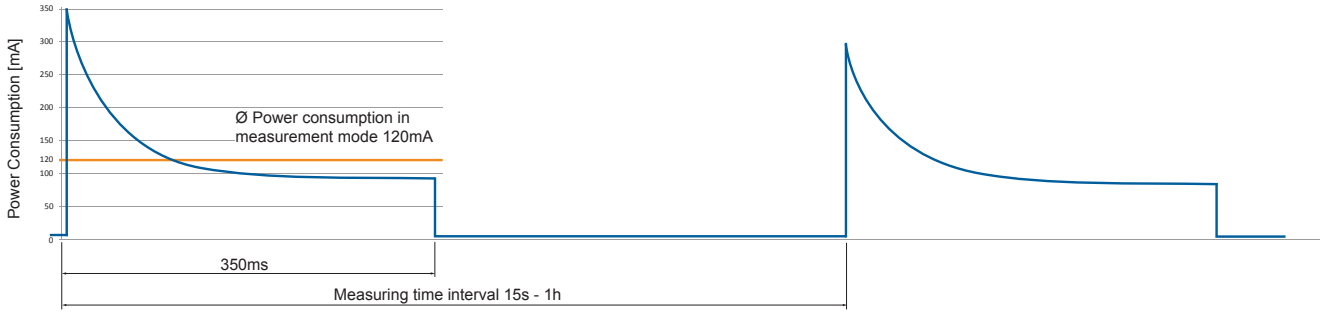
Measurement principle	Dual wavelength (non-dispersive infrared technology) NDIR	
Working range	0...2000 / 5000 / 10000 ppm	
Accuracy at 25 °C and 1013 mbar [1] (77 °F and 14.69 psi)	0...2000 ppm:	< ± (50ppm +2% of measuring value)
	0...5000 ppm:	< ± (50ppm +3% of measuring value)
	0...10000 ppm:	< ± (100ppm +5% of measuring value)
Response time t_{90}	105 s with measured data averaging (smooth output) 60 s without measured data averaging	
Temperature dependency	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)	
Calibration interval [2]	>5 years	
Measuring time interval	adjustable from 15 s up to 1 h (factory setting: 15 s)	

General

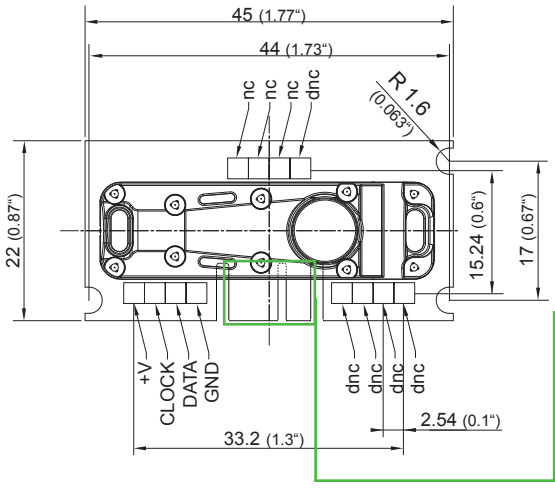
Digital interface	E2 (details: www.epluse.com)
Supply voltage	4.75 - 7.5 V DC
Average power consumption [3]	58 µA (at 1 h measurement interval) ...3.7 mA (at 15 s measurement interval)
Peak current	see power consumption graph
Electrical connection	contact pins, edge card socket (e.g. type MEC1-108-2)
Working conditions	-40...60 °C (-40...140 °F) 0...95 % RH (not condensating) 85...110 kPa (12.33...15.95 psi)
Storage conditions	-40...60 °C (-40...140 °F) 0...95 % RH (not condensating) 70...110 kPa (10.15...15.95 psi)

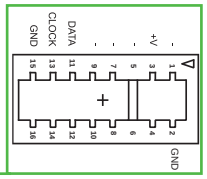
1) for averaging output
2) under normal operating conditions
3) the average power consumption depends on the adjusted measuring time interval

Power Consumption



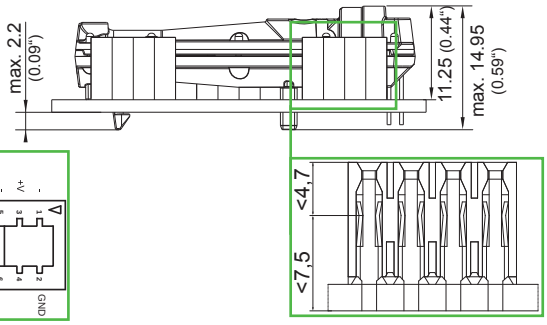
Connection Diagram / Dimensions in mm (inch)





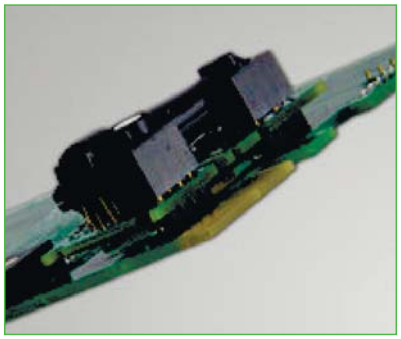
edge card socket
(e.g. MEC1-108-02, Samtec)

Weight: ca. 8g (0.28oz)

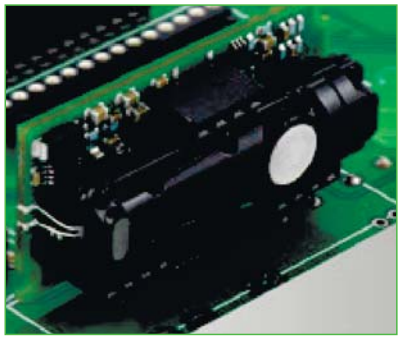


Female connector strip fits for 0.64 □ pins
contact spacing 2.54 mm (0.1")

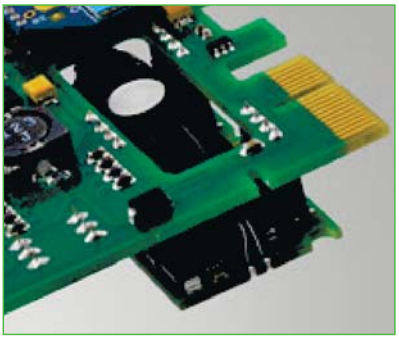
Mounting Possibilities



Mounting from the top



Mounting with edge card socket



Mounting from the bottom
(space saving)

Ordering Guide

MEASURING RANGE		TYPE		OUTPUT
0...2000 ppm	(02)	CO_2	(C)	E2 interface(2)
0...5000 ppm	(05)			
0...10000 ppm	(10)			
EE893-				

Order Example

EE893-02C2

measuring range: 0...2000 ppm
type: CO_2
output: E2 interface

Accessories (see also data sheet "Accessories")

E2 Test and Configuration Adapter HA011010
E+E Product Configuration Software EE-PCS (Download: www.epluse.com/Configurator)

Support Literature

www.epluse.com/EE893

EE892

Digital CO_2 Sensor Module for OEM Applications

The E+E CO_2 module EE892 is designed for OEM applications and for demanding environment. A multiple point CO_2 and temperature adjustment procedure leads to excellent CO_2 measurement accuracy over the entire temperature working range; this is a must for process control and outdoor applications.

The E+E dual wavelength NDIR CO_2 sensing procedure compensates automatically for ageing effects. EE892 is highly insensitive to pollution and offers outstanding long term stability.

With its small dimensions and electrical connection via contact pins and pads, EE892 is the optimal choice for OEM devices such as wireless transmitters, hand-helds or data loggers. The measured data, with a range of up to 10000 ppm, is available on the E2 digital interface.

An optional kit facilitates easy configuration and adjustment of the module. The measurement interval can be set according to the application requirements; by this the average current consumption can be reduced to less than 60 µA for battery-operated devices.

Typical Applications

Automotive
Data loggers, Hand helds
Wireless transmitters
Building management
Demand controlled ventilation

Key features

Autocalibration
Outstanding long-term stability
Temperature compensation
Low power consumption
Very small size

Technical Data

Measured values

CO_2

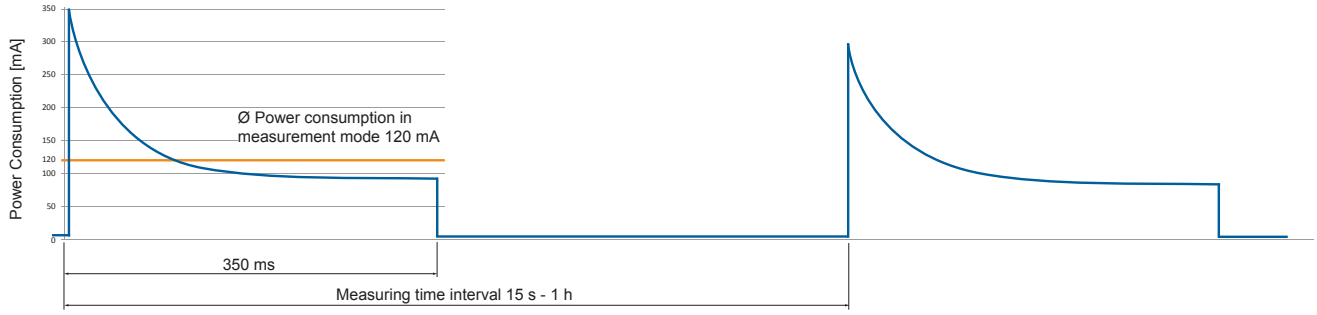
Measurement principle	Dual wavelength (non-dispersive infrared technology) NDIR	
Working range	0...2000 / 5000 / 10000 ppm	
Accuracy at 25 °C and 1013 mbar[1] (77 °F and 14.69 psi)	0...2000 ppm:	< ± (50 ppm +2 % of measuring value)
	0...5000 ppm:	< ± (50 ppm +3 % of measuring value)
	0...10000 ppm:	< ± (100 ppm +5 % of measuring value)
Response time t_{90}	105 s with measured data averaging (smooth output) 60 s without measured data averaging.	
Temperature dependency	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)	
Calibration interval [2]	>5 years	
Measuring time interval	adjustable from 15 s up to 1 h (factory setting: 15 s)	

General

Digital interface	E2 (details: www.epluse.com)
Supply voltage	4.75 - 7.5 V DC
Average power consumption [3]	58 µA (at 1h measurement interval) ...3.7 mA (at 15 s measurement interval)
Peak current	see power consumption graph
Electrical connection	contact pins, edge card socket
Working conditions	-40...60 °C (-40...140 °F) 0...95 % RH (not condensating) 85...110 kPa (12.33...15.95 psi)
Storage conditions	-40...60 °C (-40...140 °F) 0...95 % RH (not condensating) 70...110 kPa (10.15...15.95 psi)

1) for averaging output
2) under normal operating conditions
3) the average power consumption depends on the adjusted measuring time interval

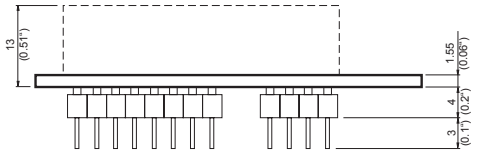
Power Consumption

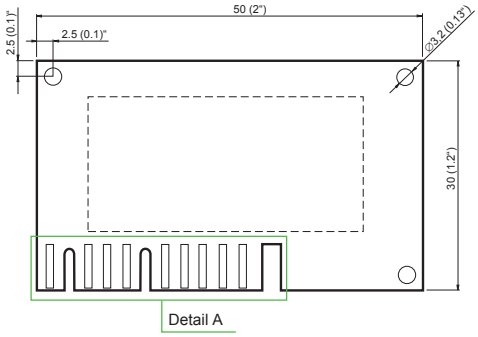


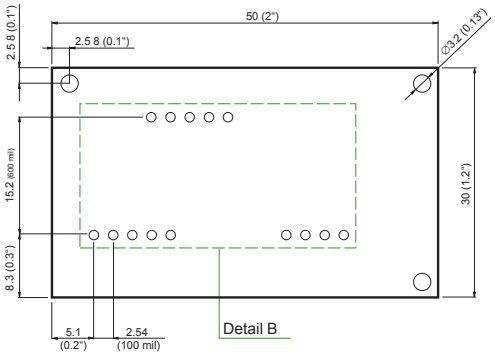
Connection Diagram / Dimensions in mm (inch)

Mounting X (Contact Pads)

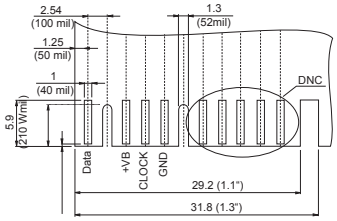
Mounting Y (Contact Pins)
designed for 28 pin socket or PCB soldering



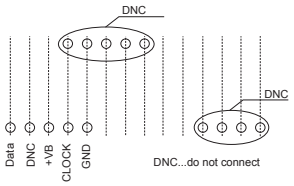




Detail A / Connection Diagram:



Detail B / Connection Diagram:



Ordering Guide

MEASURING RANGE		TYPE		OUTPUT		MOUNTING	
0...2000 ppm	(02)	CO_2	(C)	E2 interface	(2)	contact pads	(X)
0...5000 ppm	(05)					contact pins	(Y)
0...10000 ppm	(10)						
EE892-							

Order Example

EE892-02C2X

measuring range: 0...2000 ppm
type: CO_2
output: E2 interface
mounting: contact pads

Accessories (see also data sheet "Accessories")

E2 Test and Configuration Adapter — HA011010
E+E Product Configuration Software — EE-PCS (Download: www.epluse.com/Configurator)

HUMOR 20

High-precision Humidity Calibrator

The role of humidity calibrations that are accurate, reproducible, and documentable is becoming more and more important.
ISO quality guidelines and regulations according to FDA guidelines in the pharmaceutical industry, etc., require that humidity instruments have a traceable, accurate calibration.
The humidity calibrator HUMOR 20 developed by E+E is the ideal reference instrument for these requirements.

HUMOR 20

The HUMOR 20 can be used in the humidity range of 10-95% RH both for monitoring cylindrical sensors (transmitters, hand-held instruments,...) and also for monitoring instruments with cubic dimensions (data loggers, wall instruments,...).
A temperature sensor integrated in the measurement chamber also permits the monitoring of an optional temperature output.


Automatic Calibration Module

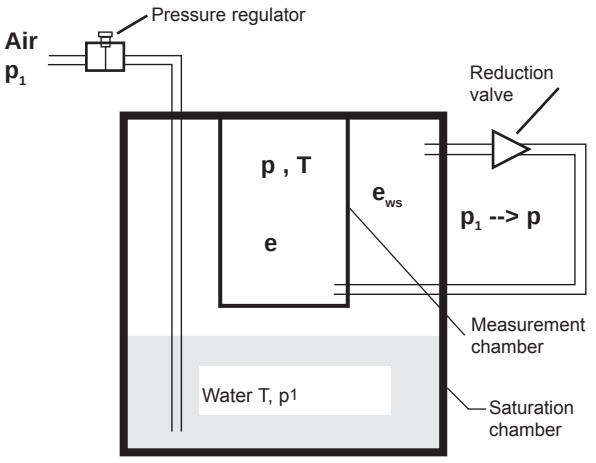
The HUMOR 20 is traceable to international standards and can be delivered with an official, internationally recognised OEKD calibration certificate. Due to its high accuracy, the HUMOR 20 is the basis for accredited calibration laboratories for relative humidity.

Based on its operating principle, the HUMOR 20 can be used under typical conditions in a laboratory climate. This means that expensive, fully air-conditioned rooms are not necessary. For operation HUMOR 20 requires only distilled water, filtered oil-free air with a pressure of 10 bar and a power supply between 90-230 V AC. The specimen can be powered by 24 V DC that is available directly on the HUMOR 20.

Operation

The operation of the HUMOR 20 is based on a fundamental two-pressure process and thus is similar to instruments used in national bureaus for standards.
Air or nitrogen at a pressure $\mathbf{p_1}$ is led through a water-filled saturation chamber and saturated to 100 % RH at $\mathbf{p_1}$. By means of a reduction valve, the saturated air is reduced to the ambient pressure **p** and fed into the measurement chamber. Due to the construction, the saturation chamber and the measurement chamber are at the same temperature. Under these conditions, the water-vapour partial pressure $\mathbf{e_{ws}}$ is reduced at the same ratio as the total pressure.
Essentially, the following applies:

$$\mathbf{e = e_{ws} * p / p_1}$$



Schematic Illustration of a Two-pressure Reactor

From this it follows that: $\mathbf{RH = e / e_{ws} = p / p_1}$

Thus, the generated relative humidity essentially depends on the ratio of the two pressures.
Constructionspecific deviations from this ratio are corrected during factory adjustments. By adjusting the pressure $\mathbf{p_1}$ the relative humidity is brought to the desired value in the measurement chamber.

Typical Applications

calibration laboratories
reference device
bureau of standards
manufacturers of measurement instruments

Features

highest accuracy
traceable calibration
independent of ambient temperature
easy handling
traceable to international standards
OEKD certificatable

Automatic Calibration Module

The optional available Automatic Calibration Module enables an automatic set point adjustment of the desired reference humidity. With the software, included in the scope of supply, checkpoints, stabilisation times, etc. can be set. Furthermore the instrument allows for an automatic print out of a calibration protocol for a transmitter with analogue standard interface.

Calibration and Adjustment using HUMOR 20

24 V DC electrical supply for the test sample are provided directly at HUMOR 20.
Furthermore, four inputs for the voltage or current outputs of transmitters are available when using the Automatic Calibration Module for generating calibration protocols.

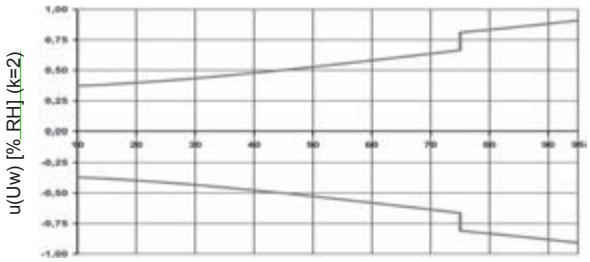
The software which is included in the scope of supply allows the user to record measurement values in a log file, to print out calibration protocols and to configure or to readjust the HUMOR 20.

Software - Features:

- Freely selectable numbers of measuring points and stabilisation times when using the Automatic Calibration Module
- Creation and print out of professional calibration protocols with:
  - Specimen number
  - Calibration date
  - Reference and actual values
- Temperature display can be switched between °C and °F
- 1-point customer humidity calibration of the HUMOR 20
- 6-point customer humidity calibration of the HUMOR 20
- 1-point customer temperature calibration
- Reset of HUMOR 20 to factory calibration

Technical Data

General

Function principle	two-pressure-reactor
Working range	10...95 % RH
Protection class	I
Protection type	IP40
Surge voltage category	II
Installation altitude	up to 2000 m above sea level
Application	Indoors
Accuracy of measurement[1) 2)]	
Accuracy temperature measurement in measuring chambe[2)]	typ. ±0.3 °C (±0.54 °F)
Power supply	100...230 V AC, 50/60 Hz, max. 20 W
Work equipment	• compressed air, filtered and free of oil or nitrogen N_2 with max. 10 bar (145 psi) • distilled water
Stabilisation time HUMOR 20	< 3 min/measuring point
Stabilisation time specimen	typ. 20 min/measuring point
Integrated power supply	24 V DC, max. 200 mA
Number of measuring inputs	4 (switchable between 4...20 mA / 0...20 mA / 0...1 V / 0...5 V / 0...10 V)
Typ. error for display inputs	Voltage measuring: < 5 mV Current measuring: < 30 µA
Display	Dot-matrix display with backlight
Gas flow	3 l/min or RH > 85 % the gas flow is reduced to 1.5 l/min at 95 % RH
Recommended interval for recalibration	1 year
Interface for PC connection	RS232 (COM-Port)
System requirements for software tools	MS Windows 2000 mit SP 2 / Windows XP / Windows Vista
Environmental conditions	temperature: 10...40 °C (50...104 °F) humidity: 10...80 % RH
CE conformity	EN61000-6-3:2007 EN61326-1:2006 EN61000-6-2:2006 EN61010-1:2010
Additional Standards	EN60068-2-6 EN60068-2-29
Dimensions	400 x 260 x 240 mm (15.7 x 10.2 x 9.4")
Weight	HUMOR 20: about 23 kg (51 lbs) HUMOR 20 incl. aluminium transport case: about 36.5 kg (80.5 lbs)

Measuring Chamber

The construction of the measuring chamber allows the calibration and adjustment of cylindrical sensor probes with a diameter of 8-25.5 mm (0.3-1") (hand-held instruments, duct-mounted versions, ...) as well as of cubic measuring units (room transmitters, data loggers, ...) with maximum dimensions of 100 x 85 x 40 mm (3.9 x 3.3 x 1.6") or 95 x 95 x 40 mm (3.9 x 3.9 x 1.6").

By using the Plexiglas cover (standard supply), it is possible to calibrate and adjust compact room devices (e.g., the EE10) with the HUMOR 20.

The overall accuracy of the calibration is influenced by the absence of the metal cover. The additional error depends on the position of the specimen in the chamber as well as on the relative humidity.

1) The extended inaccuracy of measurement results from the standard inaccuracy increased by a multiplying factor of K=2.
2) Valid for metal covers for the measuring chambers

Accessories

Oil-free compressor

Technical Data:

Max. operation pressure	12 bar (174 psi)
Supply voltage	230 V AC // 50 or 60 Hz
Noise level	57 dB(A)/lm
Dimensions (l x w x h)	410 x 410 x 500 mm (16 x 16 x 20“)
Weight	21 kg (46 lbs)

Optional covers for the measuring chambers

Various covers for the measuring chamber accommodate probes of all diameters available on the market.
With these covers up to four probes can be calibrated simultaneously.

SUITABLE FOR	NUMBER OF FEEDTHROUGHS	ORDER-CODE
Humor cover 12 - 16 mm (0.5 - 0.6”)	for 2 Probes	HA020201
Humor cover 16 - 20.5 mm (0.6 - 0.8”)	for 1 Probe	HA020202
Humor cover 20.5 - 25.5 mm (0.8 - 1”)	for 1 Probe	HA020203
Humor cover 8 - 12 mm (0.3 - 0.5”)	for 3 Probes	HA020204
Humor cover 12 - 13 mm (0,5 - 0,52”)	for 4 Probes	HA020205
Humor cover 12 - 16 mm (0.5 - 0.6”)	for 4 Probes	HA020207
Humor cover 16 - 20.5 mm (0.6 - 0.8”)	for 4 Probes	HA020208
Humor cover 30 mm (1,2”)	for 1 Probe	HA020209
Adapter for EE33 - modell J[1)]		HA020401

1) only useable in combination with HA020204 or HA020201

Calibration certificate

To meet the requirements of Quality Management Systems such as ISO9001 regarding calibration and certification of measurement and test instrumentation, the HUMOR 20 is available with an official OEKD accredited calibration certificate.

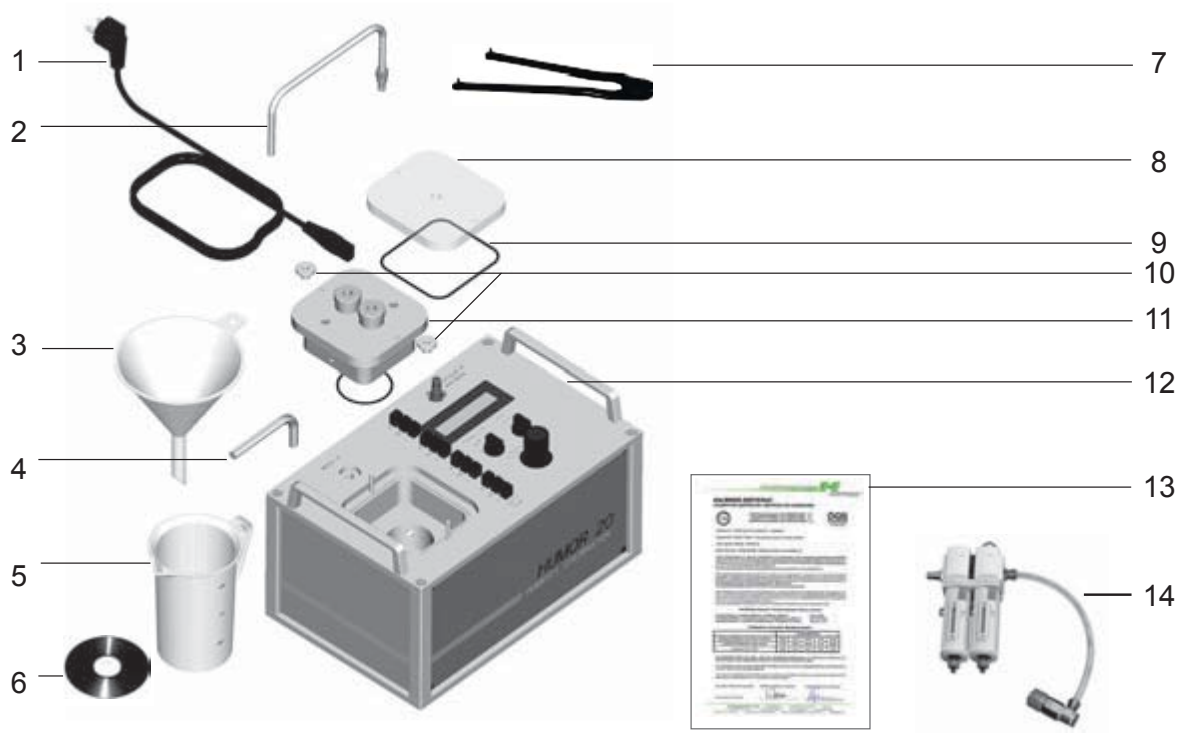
Automatic Calibration Module

For the fully automatic measurement of the characteristics of a transmitter.

Technical Data:

Weight	- weight of instrument: 9 kg (20 lbs) - instrument incl. aluminium transport case: 23 kg (51 lbs)	
Dimensions	260 x 260 x 240 mm (LxBxH); (10.2” x 10.2” x9.4”)	
Supply	100...230 V AC, 50/60 Hz max. 15 W	
Interface to PC	RS232 (COM Port)	
Compressed air supply	min. 9.8 bar (142 psi); max. 12 bar (174 bar); filtered oil-free compressed air, max. size of particle: 5 µm	
Protection type	IP40	
Protection class	I	
Pollutional index	2	
Surge voltage category	II	
Installation altitude	up to 2000 m above sea level	
Application	Indoors	
CE conformity	EN61000-6-3:2007 EN61000-6-2:2006	EN61326-1:2006 EN61010-1:2010
Additional Standards	EN60068-2-6	EN60068-2-29

HUMOR 20 - Scope of Supply



1	Power supply cable IEC Europe (230 V) + power supply cable IEC Northamerica (110 V)	8	Plexiglas cover for room transmitter testing
2	Water drain pipe with connector	9	O-ring for room transmitter
3	Funnel	10	Knurled nut
4	Allen key (10 mm / 0.4")	11	Cover for measuring chamber (ordering code HA0202xx) (not inlcuded in the scope of supply HUMOR 20)
5	Measuring beaker	12	Fixing bracket for filter set (pre-mounted)
6	Measuring and calibration software	13	Works certificate acc. DIN EN 10204-3.1
7	Face pin wrench	14	Filter set with oil separator

Ordering Information

HUMIDITY CALIBRATOR			
HUMOR 20			HUMOR20
Automatic Calibration Module			HA020301

COVER FOR MEASURING CHAMBER			
Humor cover 12 - 16 mm (0.5 - 0.6")	-	for 2 Probes	HA020201
Humor cover 16 - 20.5 mm (0.6 - 0.8")	-	for 1 Probe	HA020202
Humor cover 20,5 - 25.5 mm (0.8 - 1")	-	for 1 Probe	HA020203
Humor cover 8 - 12 mm (0.3 - 0.5")	-	for 3 Probes	HA020204
Humor cover 12 - 13 mm (0,5 - 0,52")	-	for 4 Probes	HA020205
Humor cover 12 - 16 mm (0.5 - 0.6")	-	for 4 Probes	HA020207
Humor cover 16 - 20.5 mm (0.6 - 0.8")	-	for 4 Probes	HA020208
Humor cover 30 mm (1,2")	-	for 1 Probe	HA020209
Adapter for EE33 - modell J[1)]			HA020401

1) only useable in combination with HA020204 or HA020201

ACCESSORIES	
Oil-free compressor for 230 V power supply	HA020101
ÖKD-calibration certificate	OEKD20/xH
USB <=> RS232 converter	HA020110
Face pin wrench adjustable	HA020402

Humidity Calibration Kit

The E+E Humidity Calibration Kit offers a cost effective method for calibrating humidity measuring devices with sensing probes Ø 10-12 mm (0.4-0.47 inch). It is very easy to use and it does not require highly qualified technical staff. The kit consists of a humidity calibration chamber and a choice of E+E Humidity Standard Sets.

Humidity Standards:
The E+E Humidity Standards are non-saturated salt solutions available in sets of five or fifty single-use ampoules, which may be stored an indefinite time. The salt solutions are non-harmful, handling them does not require specific safety measures. Safety data sheet is available upon request.
Each E+E Humidity Standard Set is supplied with a traceable calibration certificate, issued by the Austrian National Metrology Institute (NMI).

Accuracy of the E+E Humidity Standards

humidity value	accuracy at 23 °C (73.4 °F)
0 % RH	±0.3 % RH
5 % RH	±0.5 % RH
10 % RH	±0.5 % RH
20 % RH	±0.5 % RH
35 % RH	±0.5 % RH
50 % RH	±0.9 % RH
65 % RH	±0.9 % RH
80 % RH	±1.2 % RH
95 % RH	±1.2 % RH

For calibration procedure using the Humidity Calibration Kit please see the user guide at www.epluse.com.


Calibration chamber


Humidity Standard Set


Calibration Certificate

Ordering Guide

Humidity Standards	order code	Humidity Standards	order code
5 ampoules 0 % RH + 5 textile pads	HA010400	50 ampoules 0 % RH	HA011500
5 ampoules 5 % RH + 5 textile pads	HA010405	50 ampoules 5 % RH	HA011505
5 ampoules 10 % RH + 5 textile pads	HA010410	50 ampoules 10 % RH	HA011510
5 ampoules 20 % RH + 5 textile pads	HA010420	50 ampoules 20 % RH	HA011520
5 ampoules 35 % RH + 5 textile pads	HA010435	50 ampoules 35 % RH	HA011535
5 ampoules 50 % RH + 5 textile pads	HA010450	50 ampoules 50 % RH	HA011550
5 ampoules 65 % RH + 5 textile pads	HA010465	50 ampoules 65 % RH	HA011565
5 ampoules 80 % RH + 5 textile pads	HA010480	50 ampoules 80 % RH	HA011580
5 ampoules 95 % RH + 5 textile pads	HA010495	50 ampoules 95 % RH	HA011595

Calibration Chamber	
for sensor probes ∅ 10...12 mm (0.4...0.47")	HA010401

Textile pads	
50 pcs. packed	HA010498

E+E Calibration Services

Increasing demands for product quality and the various guidelines for quality control such as ISO9001, QS9000, VDA6.1 and TS16949 require monitoring of measurement and test equipment on a regular basis. Calibrations performed in E+E's calibration labs guarantee the user reliable measurement results and is the metrological fundament for measurement and test equipment to be in accordance with quality assurance regulations.

Which certificates are available?

- OEKD Certificate
- ISO Calibration Certificate

OEKD CERTIFICATES

The E+E OEKD Laboratory is accredited according to DIN EN ISO/IEC 17025 standard.
The accreditation and inspection is performed by the Federal Ministry of Economy, Family and Youth of the Republic of Austria (BMWFJ). BMWFJ, the Austrian Accreditation Organisation for Calibration laboratories, is member of

- EA (European co-operation for Accreditation)

and of

- ILAC (International Laboratory Accreditation Organisation).


CERTIFICATE OF ACCREDITATION

E + E Elektronik GmbH

humidity of air and temperature

Based on the agreements between the members of EA and ILAC, calibration certificates issued by E+E laboratories are in accordance with worldwide recognized standards. Therefore, the OEKD Calibration Certificates have the highest acceptability and are legally recognized.
Measurement equipment, which require a high level of reliability, such as factory standards, should have an OEKD calibration certificate. Increasing requirements with respect to traceability in pharmaceutical, biotech and medical industries require also accredited certificates. The OEKD calibration certificates are available for the following physical quantities:

- relative humidity
- temperature
- dew point
- mixing ratio
- specific humidity
- volume ratio
- water vapour density


KALIBRIER ZERTIFIKAT
CALIBRATION CERTIFICATE

ISO CALIBRATION CERTIFICATES

An ISO calibration is a comparison to E+E internal reference instruments or systems which are traceable with defined uncertainty to international standards. These calibrations are performed in accordance to an E+E internal procedure, conforming to ISO 9000 and TS 16949 standards.
ISO calibration uses high end measuring equipment and offers price effective information on the calibration status by stating the deviations from reference of the instrument under test.
ISO calibration certificates can cover certain requirements of standards like ISO/QS 9000 / ISO10012-1 / GMP / CFR / VDA ISO TS 16949.

E+E Elektronik can issue ISO calibration certificates for:

- temperature
- relative humidity
- air velocity

EE-PCA

Product Configuration Adapter

The EE-PCA is an adapter set used to connect E+E measurement devices to a personal computer. Together with the free Product Configuration Software EE-PCS, the Product Configuration Adapter enables setup and configuration of various E+E transmitters and probes.

The EE-PCA and EE-PCS functionality depends on the E+E measurement device and may include:

- View actual measured data
- Selection of physical quantities and measurement units at the outputs
- Output scaling
- Offset 1 or 2 point adjustment
- Settings of alarm outputs
- Display settings
- Digital communication settings

The scope of supply includes the converter unit, USB and RS232 connection cables and an additional power adapter.

Setup

Connection to PC

EE-PCA can be connected to a PC via either USB or RS232 cable.

- For RS232, the EE-PCA shall be powered with the adapter in the scope of supply.
- For connection to an USB port, the power adapter is not necessary.

Connection to E+E device

The connection cable is device specific. It is not included in the scope of supply and shall be ordered separately.

Power supply according to device data sheet.
EE300Ex, EE03, EE07 and EE08 type D do not require power supply when used with EE-PCA

Ordering Guide

POSITION 1	**PRODUCT CONFIGURATION ADAPTER**	EE-PCA
POSITION 2	**CABLE** (choose according to device)	
	EE33, EE35, EE36, EE37x, EE38x	HA011063
	EE300Ex	HA011061
	EE03 (only display of measured values)	HA011056
	EE07	HA011057
	EE08 type D	HA011060
	EE160 analogue	HA011059
	EE210, EE211, EE160 digital, EE650, EE660, EE820, EE850	HA011062
	EE65, EE66	HA011058
	EE671 converter set	HA011064
	EE150, EE4x1 with analogue output	HA011065

Order Example

Position 1: EE-PCA
E+E Product Configuration Adapter

Position 2: HA011061
Cable for EE300EX

Accessories

EE-PCS — free download at www.epluse.com/configurator
Power supply adapter — V03 (see data sheet „Accessories“)

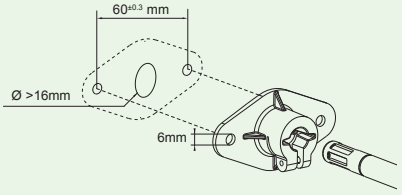
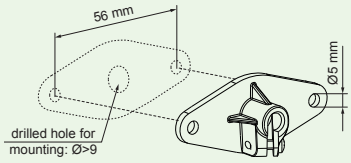
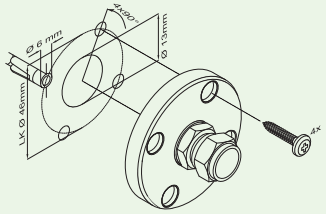
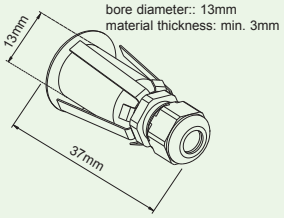
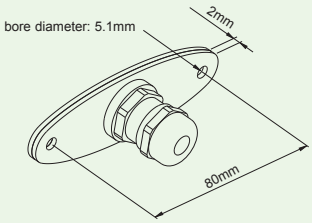
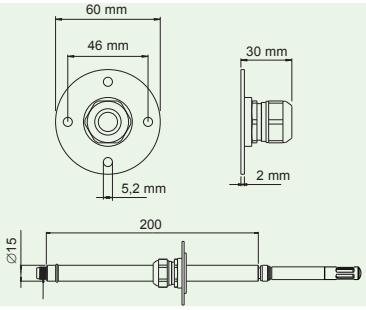
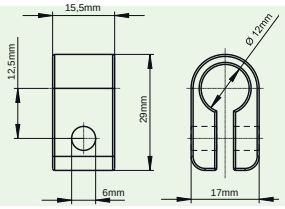
Accessories

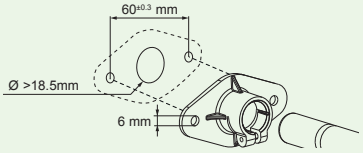
Filter Caps for Humidity and Dewpoint Transmitters

The choice of appropriate filter cap is essential for the long term performance of the sensor in a certain application.
For assistance please contact your local support - http://www.epluse.com/en/service-support/locations-distributors/.

FILTER NAME	CONSTRUCTION	FEATURES	APPLICATIONS	TYPE NO.
MEMBRANE 	Body: polycarbonate Filter: PTFE membrane Pores size: 1µm Length: 34mm (1.34“)	Very good protection against fine dust T range: -40…80°C (-40...176°F) Response time $t_{10/90}$: 15s	Building automation Dusty environment	HA010101
STAINLESS STEEL SINTERED 	Material: sintered stainless steel Pores size: 10µm Length: 33mm (1.30“)	For high mechanical stress and strong pollution T range: -40…180°C (-40...356°F) Response time $t_{10/90}$: 30s	Industrial process control Agriculture Life stock barns Unsuitable for condensing environment	HA010103 (for plastic probes) HA010117 (for metal probes)
PTFE 	Material: PTFE sintered Pores size: 50µm Length: 33mm (1.30“)	For very dirty, oily environment T range: -40…180°C (-40...356°F) Response time $t_{10/90}$: 14s	Industrial process control Chemical industry Very polluted environment Unsuitable for condensing environment	HA010105
METAL GRID 	Body: polycarbonate Filter: stainless steel wire mesh Pores size: 30µm Length: 33mm (1.30“)	For low mechanical stress and low pollution level For high RH / condensing environment T range: -40…120°C (-40...248°F) Response time $t_{10/90}$: 15s	Climate control Dryers and humidifiers HVAC	HA010106
STAINLESS STEEL GRID 	Body: stainless steel Filter: stainless steel wire mesh Pores size: 30µm Length: 39mm (1.54”)	For average mechanical stress and low pollution level For high RH / condensing environment T range: -40…180°C (-40...356°F) Response time $t_{10/90}$: 15s	Industrial process control Clean rooms	HA010109
H_2O_2 	Material: PTFE sintered Pores size: 50µm Length: 33mm (1.30“)	Catalytic filter for H_2O_2 environment T range: -40…180°C (-40...356°F) Response time $t_{10/90}$: 14s	Pharmaceutical Biotech Sterilization with H_2O_2	HA010115
PTFE STAINLESS STEEL 	Body: stainless steel Filter: PTFE membrane, replaceable Pores size: 2µm Length: 39mm (1.54”)	For average mechanical stress and high pollution levels T range: -40…180°C (-40...356°F) Response time $t_{10/90}$: 14s Water ingression pressure > 0.5bar	For EE33-J and EE33-K in: Meteorology Continuous high humidity Condensing environment	HA010114: complete filter HA010114ME: PTFE membrane
METAL GRID FOR EE08 	Body: polycarbonate Filter: stainless steel wire mesh Pores size: 30µm Length: 25mm (1”)	For low mechanical stress Low pollution level For high RH / condensing environment T range: -40…120°C (-40...248°F) Response time $t_{10/90}$: 15s	Meteorology Climate control	HA010113
STAINLESS STEEL 	Material: stainless steel Openings: ø3mm Length: 32mm (1.26”)	For moisture in oil transmitters and Oilport 30 handheld	Hydraulic, lubrication and isolation oil monitoring	HA010110

Mounting Flanges

NAME	SUITABLE FOR	DIMENSIONS (in mm)	ORDER CODE
Plastic mounting flange 12mm (0.47“) 	EE650, EE660, EE160, EE210 EE850 EE671, EE060, EE061 max. temperature: 60°C (140°F)		HA010202 (light grey) HA010214 (black)
Plastic mounting flange 6mm (0.24“) 	EE431 EE150		HA401101
Stainless steel mounting flange 12mm (0.47“) 	EE23, EE31, EE33		HA010201
Stainless steel mounting flange 5mm (0.2“) 	EE23 - model H		HA010208
Stainless steel mounting flange 8mm (0.3“) 	EE75 EE33-MFTJ (temperature probe)		HA010207
Duct mounting kit 	EE07, EE071 EE220		HA010209
Wall mounting clip Ø12mm (0.47“) 	For all probes with Ø12mm (0.47“) -35...105°C (-31...221°F)		HA010211

NAME	SUITABLE FOR	DIMENSIONS (in mm)	ORDER CODE
Plastic mounting flange Ø18.5mm (0.73“) 	EE871		HA010212

LC Displays

NAME	SUITABLE FOR		ORDER CODE
LC display + cover 	EE220	metal	D07M
		polycarbonate	D07P
	EE23	metal	D03M
		polycarbonate	D03P
	EE31, EE35, EE36	metal	D05M
		polycarbonate	D05P
	EE33	metal	D05M

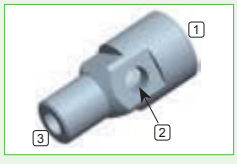
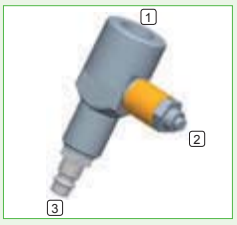
Power Supply Unit

NAME	DESCRIPTION	SUITABLE FOR	ORDER CODE
Power supply adapter 	External power supply suitable for Europe / US / UK / Korea / China input: 100-240V AC / 50-60Hz 0.5A output: 24V / 0.625A	HVAC and industrial transmitters	V03

Replacement Sensors

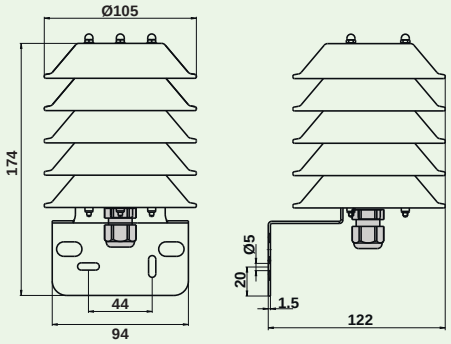
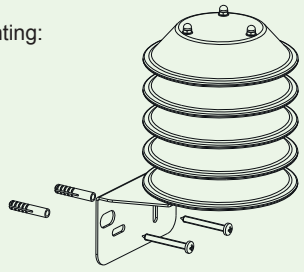
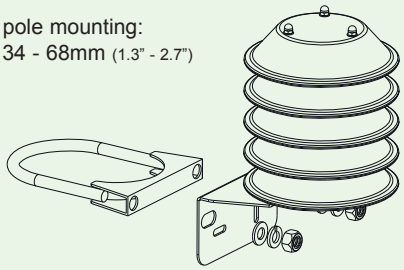
NAME	DESCRIPTION	SUITABLE FOR	ORDER CODE
Replacement sensors 	Replacement humidity sensor Replacement temperature sensor	EE23, EE31	FE09 FE09-HC01 (with coating) TE38

Sampling Cell

NAME	DESCRIPTION	SUITABLE FOR	ORDER CODE
Basic Sampling Cell 	For integration into an existing or self-constructed sampling system. Pressure range: 0...64 bar (0...928 psi) **ISO** **NPT** 1 = G 1/2“ 1/2“ 2 = G 1/4“ 1/4“ 3 = G 1/4“ 1/4“	EE371, EE375 EE354, EE355	ISO: HA050103 NPT: HA050105
Sampling Cell with Quick Connector 	For use in compressed air lines, quick-connector suitable for standard compressed air connections, the cell can be fitted and removed without interrupting the process, the flow of gas can be adjusted using a bleed screw. Pressure range: 0...10 bar (0...145 psi) 1 = G 1/2“ ISO 2 = Bleed screw 3 = Quick connector DN 7.2	EE371, EE375 EE354, EE355	HA050102

Radiation Protection Shield

For outdoor applications the transmitters shall be equipped with radiation shield. This causes a forced ventilation which largely prevents overheating of the sensing probe in the sun and thus a distortion of the measured values.
All radiation shields are suitable for wall and pole mounting.

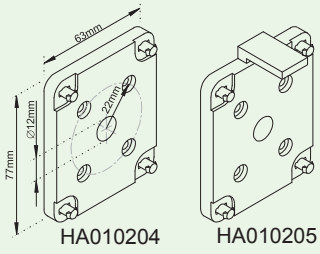
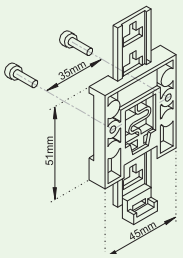
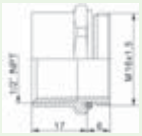
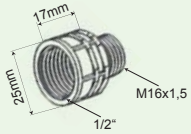
NAME	SUITABLE FOR	DIMENSIONS / MOUNTING	ORDER CODE
Radiation shield for EE210 	EE210-Outdoor	Example: HA010506 	HA010501
Radiation shield with fixed clamping ring (M20x1.5) for probes with Ø12mm (0.47“) 	EE23, EE31, EE210 with remote sensing probe EE060, EE061 EE07, EE071 EE08 type E EE33-J (RH probe)	mounting options: - wall mounting: 	HA010502
Radiation shield with screw-in thread (M16x1.5) and additional cable gland for probes with Ø6mm (0.24“) 	EE33-J (T probe) EE08 type D	- pole mounting: 34 - 68mm (1.3” - 2.7”) 	HA010506

Dripping Water Protection

In applications with high humidity and condensation or for outdoor use, sensor probes should be protected against dripping water.

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Dripping water protection cap 	All sensor probes with Ø12mm (0.47“)	Screw connection for probe fixation Ø85 mm (3.35“)	HA010503

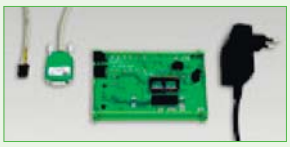
Mounting and Connecting Aids

NAME	SUITABLE FOR	DIMENSIONS / DESCRIPTION	ORDER CODE
Snap-in mounting flange for wall and duct mounting 	EE16-T EE65, EE66	 HA010204 HA010205	for wall mounting: HA010204 for duct mounting: HA010205
Bracket for top-hat rail mounting  1) Only for plastic housing, not for metal housing	EE220, EE23, EE31, EE35, EE36[1)]		HA010203
US conduit screw adapter 	Devices with cable gland M16x1.5	Adapter M16x1.5 to ½“ NPT (US conduit fitting) 	HA011101
Conduit adapter, M16x1.5 to 1/2” 	Devices with cable gland M16x1.5	Adapter M16x1.5 to ½“ (US conduit fitting) 	HA011110
Pressure tight screw connection 	EE33-MFTJx EE33-MFTKx	For probes with Ø12mm (0.47“) and Ø6mm (0.24“) Probe assembly up to 20bar (300psi)	HA011102: ½“ISO, probe: Ø12mm (0.47“) HA011103: ½“NPT, probe: Ø12mm (0.47“) HA011104: ½“ISO, probe: Ø6mm (0.24“) HA011105: ½“NPT, probe: Ø6mm (0.24“)

Reference Probes

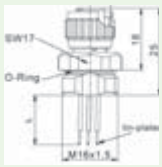
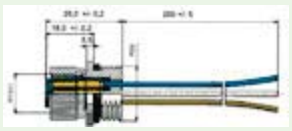
NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Reference probe 	EE220	EE07 probes with defined measuring values to check the digital/analogue conversion of the EE220 basic unit (with test report) probe 1: 90% RH / 5°C (41°F) probe 2: 10% RH / 45°C (113°F)	HA010403

Interface Convertors and Interface Cables

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
RS232 to RS485 	EE31, EE33 with RS485 interface	- Converter from RS232 to RS485 - Supports AutoPro, i.e. automatic adjustement of the Baudrate from 300 bps to 115200 bps - Enables to control 256 data acquisition modules in a RS-485 network - Solation 3000 Vrms	HA010603
RS232 to USB 	Devices with RS232 interface	- High speed converter from RS232 to USB - Certified: Microsoft WHQL approved	HA020110
E2 to RS232 for EE07 	EE07	Converter for E2-interface to RS232, incl. software for test and data cable length: 2m (6.6ft)	HA011001
E2 to RS232 for EE03 	EE03	Converter for E2 interface to RS232, incl. software for test and data recording cable length: 2m (6.6ft)	HA011002
E2 Test and Configuration Adapter 	EE893, EE892, EE891 EE871	Connecting CO_2 modules and probes with E2 interface to a PC for test and configuration. inkl. Software	HA011010
E2 to RS232 for EE08 	EE08	Converter for E2-interface to RS232, incl. software für configuration, adjustement or test cable length: 2m (6.6ft)	HA011005
RS232 Interface Cable for Screw Terminals 	EE31, EE33 EE35 EE36	RS232 interface cable for connection to screw terminals on the board cable length: 2m (6.6ft)	HA010301
RS232 Interface Cable with Pin Connector 	EE31, EE33 EE35, EE371 EE36, EE381	RS232 interface cable to connect directly on the board cable length: 2m (6.6ft)	HA010304

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
RS232 Interface Cable with External Plug 	EE31, EE33, EE35, EE36	RS232 interface cable to plug into the external socket on the housing C06 cable length: 2m (6.6ft)	HA010311
Modbus Configuration Adapter 	EE071 EE871	Connecting transmitters with Modbus interface to a PC for test and configuration	HA011012
	EE354, EE355 EE364		HA011013

Plugs / Sockets / Connecting Cables

NAME	SUITABLE FOR	DESCRIPTI ON	ORDER CODE
Flange Coupling, 5 pins 	EE060 type PM EE07, EE071 EE871	M12x1 Flange Coupling for housing assembly L = 50mm (2“) 	HA010705
Flange Coupling, 8 pins 	EE060 type PV EE08 type D	M12x1 Flange Coupling for housing assembly L = 200mm (8“) 	HA010703
Mating Plug, 4 pins 	EE07, EE071 EE060 type PM EE820 EE871 HUMLOG20 E	Mating Plug 4 pins, M12x1, suitable for customer-specific assembly, IP67 (NEMA 4)	HA010707
Mating Plug, 5 pins 	EE354 EE355 EE33 - C03/C08 EE31 - C03/C08 EE23 - C03 EE35 - C03 EE36 - C03/C07 EE75 - C12/C13 EE671 type S EE77x - type Q	Mating Plug 5 pins, M12x1, suitable for customer-specific assembly, IP67 (NEMA 4)	HA010708
Mating Plug, 8 pins 	EE08 type PV EE08 type D EE820	Mating Plug 8 pins, M12x1, suitable for customer-specific assembly, IP67 (NEMA 4)	HA010704

NAME	SUITABLE FOR	DESCRIPTI ON	ORDER CODE
Connecting Cable EE220/EE244 	EE07 - EE220/EE244 EE871 - EE244	Connecting cable for remote measurement: - EE07 with EE220/EE244 - EE871 with EE244 5 pins, M12x1 plug-socket, shielded (shield connected to pin 5), PUR	HA010801 (2m / 6.6ft) HA010802 (5m / 16.4ft) HA010803 (10m / 32.8ft)
Connecting Cable, 5 pins 	LOGPROBE20-HUMLOG20 E EE060 PM EE671 type S EE354, EE355 EE771, EE772, EE776	Connecting cable for remote measurement: - LOGPROBE20 mit HUMLOG20 E - EE771, EE772, EE776 - EE060 PM 5 pins, M12x1 plug-socket, shielded, PUR	HA010816 (2m / 6.6ft) HA010817 (5m / 16.4ft) HA010818 (10m / 32.8ft)
Connecting Cable, 5 pins 	EE060 type PM EE07, EE071 EE671 type S EE354, EE355 EE820, EE871	5 pins, M12x1 socket - flying leads, shielded, PUR	HA010819 (1.5m / 4.9ft) HA010820 (5m / 16.4ft) HA010821 (10m / 32.8ft)
Connecting Cable, 8 pins 	EE06 type PV EE08 type D EE364	8 pins, M12x1 socket - flying leads, shielded, PUR	HA010322 (1.5m / 4.9ft) HA010323 (3m / 9.8ft) HA010324 (5m / 16.4ft) HA010325 (10m / 32.8ft)
Connecting Cable OMNIPORT / OILPORT 	OMNIPORT 30 OILPORT 30	Connecting cable for remote sensing probes 5 pins, M12x1 plug-socket, unshielded, PUR	HA010813 (2m / 6.6ft) HA010814 (5m / 16.4ft) HA010815 (10m / 32.8ft)

Scaling of the outputs

Output scale beyond the operating range limits specified in the product data sheet does not extend the working range of the product.
Example: Although the T output of EE160 can be scaled 0-10V = -30...70 °C, the T operating range remains -15…60°C.

Temperature (Tx/Td/Tf/Tw) - [°C or °F]

Following ordering codes apply to:

- **temperature (T)**
- **dew point temperature (Td)**
- **frost point temperature (Tf)**
- **wet bulb temperature (Tw)**

-112…32	108
-110…70	099
-100…20	141
-100…200	148
-100…0	167
-94…392	154
-90…10	138
-80…60	028
-80…0	032
-80…20	063
-80…100	067
-80…180	116
-80…80	123
-80…10	159
-76…140	100
-70…40	034
-70…180	118
-70…60	120
-70…200	153
-60…60	064
-60…20	065
-60…120	097
-60…212	098
-60…40	104
-60…0	111
-60…80	125
-50…50	027
-50…70	051
-50…100	066
-50…10	127
-50…150	131
-50…160	135
-50…40	151
-50…80	166
-40…60	002
-40…120	012
-40…80	022
-40…160	033
-40…70	038
-40…50	044
-40…180	052
-40…150	068
-40…356	074
-40…248	078
-40…100	079
-40…176	080
-40…250	081
-40…350	082
-40…140	083
-40…300	084
-40…40	105
-40…32	109
-40…10	126
-40…20	133
-40…85	136
-40…140	155
-40…110	163
-35…35	043
-35…50	110
-35…110	156
-35…75	158
-30…40	001
-30…70	008
-30…120	009
-30…60	020
-30…130	023
-30…20	039
-30…50	045
-30…35	054
-30…100	103
-30…30	124
-30…170	168
-25…25	119
-25…125	137
-25…70	162
-25…50	164
-23…85	113
-20…120	010
-20…100	014
-20…80	024
-20…60	025
-20…180	029
-20…150	047
-20…50	048
-20…140	057
-20…40	060
-20…70	073
-20…20	122
-20…85	129
-20…130	152
-15…25	102
-15…85	147
-15…60	161
-15…50	165
-13…257	139
-10…50	003
-10…70	011
-10…40	018
-10…100	042
-10…60	050
-10…30	059
-10…25	070
-10…35	132
-10…90	144
-10…110	169
-10…120	170
-5…45	006
-5…55	031
-5…100	061
-5…50	062
-5…30	134
0…50	004
0…100	005
0…60	007
0…120	016
0…70	017
0…80	021
0…180	026
0…160	030
0…150	036
0…130	037
0…75	046
0…170	049
0…40	055
0…5	056
0…20	069
0…140	085
0…176	086
0…248	087
0…250	088
0…350	089
0…200	107
0…30	112
0…65	142
0…25	157
5…40	150
10…100	019
10…30	058
10…50	106
10…40	115
10…60	160
15…25	013
15…35	117
20…120	015
20…180	040
20…140	077
20…80	128
20…85	130
20…150	143
20…50	145
20…60	146
32…212	075
32…122	076
32…120	090
32…140	091
32…180	092
32…248	093
32…250	094
32…300	095
32…132	096
32…350	101
45…70	149
50…130	071
50…140	072
55…95	121
60…110	041
60…180	114
80…120	053
80…180	140
100…180	035

Humidity (UW) - [% rF]

0…100	001
20…100	003

Water vapour partial pressure (Ex) - [mbar]

0…200	001
0…1000	002

Mixing ratio (Rx) - [g/kg]

0…10	005
0…40	003
0…100	004
0…400	001
0…900	002

Absolute humidity (DV) - [g/m³]

0…50	003
0…150	001
0…700	002

Specific enthalpy (Hx) - [kJ/kg]

-50…400	001
-50…2800	002
0…100	003
0…400	004

Volume fraction water vapour (Wv) - [ppm]

0…30	012	0…500	002	0…5000	006	0…30000	008
0…100	001	0…1000	003	0…6000	005	0…100000	011
0…200	010	0…2000	013	0…10000	004		
0…300	007	0…2500	014	0…20000	009		

Water activity (AW)

0…1	001

Water content (X) - [ppm]

0…30	012	0…500	002	0…5000	006	0…30000	008
0…100	001	0…1000	003	0…6000	005	0…100000	011
0…200	010	0…2000	013	0…10000	004	0…200000	015
0…300	007	0…2500	014	0…20000	009		

CO2 (C) - [ppm]

0…1100	903
0…2000	002
0…5000	005
0…10000	010
400…1100	902
800…1400	901

Air velocity (V) - [m/s or ft/min]

0…0,5	001
0…1	002
0…1,5	003
0…2	004
0…2,5	026
0…5	005
0…10	006

0…12	027
0…15	007
0…20	008
0…25	009
0…30	010
0…35	011
0…40	012

0…100	013
0…200	014
0…300	015
0…400	016
0…1000	017
0…2000	018
0…3000	019

0…4000	020
0…5000	021
0…6000	022
0…7000	023
0…7800	024
0…8000	025

R-T Characteristics

Pt100 DIN B - E+E Order Code: B
Pt1000 DIN B - E+E Order Code: D

Sensor Type	Nominal Resistance	Sensitivity	E+E Order Code
Pt100 DIN B	R_0: 100 Ω	TC: 3850 x 10^{-3}/°C	B
Pt1000 DIN B	R_0: 1000 Ω	TC: 3850 x 10^{-3}/°C	D

Tabulated R-T Characteristics for Pt100 (according to DIN EN 60751, resistance values in Ω)

For Pt1000 temperature sensors, the resistance values have to be multiplied by 10.

°C	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-200	18.520									
-190	22.825	22.397	21.967	21.538	21.108	20.677	20.247	19.815	19.384	18.952
-180	27.096	26.671	26.245	25.819	25.392	24.965	24.538	24.110	23.682	23.254
-170	31.335	30.913	30.490	30.067	29.643	29.220	28.796	28.371	27.947	27.552
-160	35.543	35.124	34.704	34.284	33.864	33.443	33.022	32.601	32.179	31.757
-150	39.723	39.306	38.889	38.472	38.055	37.637	37.219	36.800	36.382	35.963
-140	43.876	43.462	43.048	42.633	42.218	41.803	41.388	40.972	40.556	40.140
-130	48.005	47.593	47.181	46.769	46.356	45.944	45.531	45.117	44.704	44.290
-120	52.110	51.700	51.291	50.881	50.470	50.060	49.649	49.239	48.828	48.416
-110	56.193	55.786	55.378	54.970	54.562	54.154	53.746	53.337	52.928	52.519
-100	60.256	59.850	59.445	59.039	58.633	58.227	57.821	57.414	57.007	56.600
-90	64.300	63.896	63.492	63.088	62.684	62.280	61.876	61.471	61.066	60.661
-80	68.325	67.924	67.552	67.120	66.717	66.315	65.912	65.509	65.106	64.703
-70	72.335	71.934	71.534	71.134	70.733	70.332	69.931	69.530	69.129	68.727
-60	76.328	75.929	75.530	75.131	74.732	74.333	73.934	73.534	73.134	72.735
-50	80.306	79.909	79.512	79.114	78.717	78.319	77.921	77.523	77.125	76.726
-40	84.271	83.875	83.479	83.083	82.687	82.290	81.894	81.497	81.100	80.703
-30	88.222	87.827	87.432	87.038	86.643	86.248	85.853	85.457	85.062	84.666
-20	92.160	91.767	91.373	90.980	90.586	90.192	89.798	89.404	89.010	88.616
-10	96.086	95.694	95.302	94.909	94.517	94.124	93.732	93.339	92.946	92.553
0	100.000	99.609	99.218	98.827	98.436	98.044	97.653	97.261	96.870	96.478

°C	0	1	2	3	4	5	6	7	8	9
0	100.000	100.391	100.781	101.172	101.562	101.953	102.343	102.733	103.123	103.513
10	103.903	104.292	104.682	105.071	105.460	105.849	106.238	106.627	107.016	107.405
20	107.794	108.182	108.570	108.959	109.347	109.735	110.123	110.510	110.898	111.286
30	111.673	112.060	112.447	112.835	113.221	113.608	113.995	114.382	114.768	115.155
40	115.541	115.927	116.313	116.699	117.085	117.470	117.856	118.241	118.627	119.012
50	119.397	119.782	120.167	120.552	120.936	121.321	121.705	122.090	122.474	122.858
60	123.242	123.626	124.009	124.393	124.777	125.160	125.543	125.926	126.309	126.692
70	127.075	127.458	127.840	128.223	128.605	128.987	129.370	129.752	130.133	130.515
80	130.897	131.278	131.660	132.041	132.422	132.803	133.184	133.565	133.946	134.326
90	134.707	135.087	135.468	135.848	136.228	136.608	136.987	137.367	137.747	138.126
100	138.506	138.885	139.264	139.643	140.022	140.400	140.779	141‘158	141.536	141.914
110	142.293	142.671	143.049	143.426	143.804	144.182	144.559	144.937	145.314	145.691
120	146.068	146.445	146.822	147.198	147.575	147.951	148.328	148.704	149.080	149.456
130	149.832	150.208	150.583	150.959	151.334	151.710	152.085	152.460	152.865	153.210
140	153.584	153.959	154.333	154.708	155.082	155.456	155.830	156.204	156.578	156.952
150	157.325	157.699	158.072	158.445	158.818	159.191	159.564	159.937	160.309	160.682
160	161.054	161.427	161.799	162.171	162.543	162.915	163.286	163.658	164.030	164.401
170	164.772	165.143	165.514	165.885	166.256	166.627	166.997	167.368	167.738	168.108
180	168.478	168.848	169.218	169.588	169.958	170.327	170.696	171.066	171.435	171.804
190	172.173	172.542	172.910	173.279	173.648	174.016	174.384	174.752	175.120	175.488
200	175.856	176.224	176.591	176.959	177.326	177.693	178.060	178.427	178.794	179.161
210	179.528	179.894	180.260	180.627	180.993	181.359	181.725	182.091	182.456	182.822
220	183.188	183.553	183.918	184.283	184.648	185.013	185.378	185.743	186.107	186.472
230	186.836	187.200	187.564	187.928	188.292	188.656	189.019	189.383	189.746	190.110
240	190.473	190.836	191.199	191.562	191.924	192.287	192.649	193.012	193.374	193.736
250	194.098	194.460	194.822	195.183	195.545	195.906	196.268	196.629	196.990	197.351
260	197.712	198.073	198.433	198.794	199.154	199.514	199.875	200.235	200.595	200.954
270	201.314	201.674	202.033	202.393	202.752	203.111	203.470	203.829	204.188	204.546

°C	0	1	2	3	4	5	6	7	8	9
280	204.905	205.263	205.622	205.980	206.338	206.696	207.054	207.411	207.769	208.127
290	208.484	208.841	209.198	209.555	209.912	210.269	210.626	210.982	211.339	211.695
300	212.052	212.408	212.764	213.120	213.475	213.831	214.187	214.542	214.897	215.252
310	215.608	215.962	216.317	216.672	217.027	217.381	217.736	218.090	218.444	218.798
320	219.152	219.506	219.860	220.213	220.567	220.920	221.273	221.626	221.979	222.332
330	222.685	223.038	223.390	223.743	224.095	224.447	224.799	225.151	225.503	225.855
340	226.206	226.558	226.909	227.260	227.612	227.963	228.314	228.664	229.015	229.366
350	229.716	230.066	230.417	230.767	231.117	231.467	231.816	232.166	232.516	232.865
360	233.214	233.564	233.913	234.262	234.610	234.959	235.308	235.656	236.005	236.353
370	236.701	237.049	237.397	237.745	238.093	238.440	238.788	239.135	239.482	239.829
380	240.176	240.523	240.870	241.217	241.563	241.910	242.256	242.602	242.948	243.294
390	243.640	243.986	244.331	244.677	245.022	245.367	245.713	246.058	246.403	246.747
400	247.092	247.437	247.781	248.125	248.470	248.814	249.158	249.502	249.845	250.189
410	250.533	250.876	251.219	251.562	251.906	252.248	252.591	252.934	253.277	253.619
420	253.962	254.304	254.646	254.988	255.330	255.672	256.013	256.355	256.696	257.038
430	257.379	257.720	258.061	258.402	258.743	259.083	259.424	259.764	260.105	260.445
440	260.785	261.125	261.465	261.804	262.144	262.483	262.823	263.162	263.501	263.840
450	264.179	264.518	264.857	265.195	265.534	265.872	266.210	266.548	266.886	267.224
460	267.562	267.900	268.237	268.574	268.912	269.249	269.586	269.923	270.260	270.597
470	270.933	271.270	271.606	271.942	272.278	272.614	272.950	273.286	273.622	273.957
480	274.293	274.628	274.963	275.298	275.633	275.968	276.303	276.638	276.972	277.307
490	277.641	277.975	278.309	278.643	278.977	279.311	279.644	279.978	280.311	280.644
500	280.978	281.311	281.643	281.976	282.309	282.641	282.974	283.306	283.638	283.971
510	284.303	284.634	284.966	285.298	285.629	285.961	286.292	286.623	286.954	287.285
520	287.616	287.947	288.277	288.608	288.938	289.268	289.599	289.929	290.258	290.588
530	290.918	291.247	291.577	291.906	292.235	292.565	292.894	293.222	293.551	293.880
540	294.208	294.537	294.865	295.193	295.521	295.849	296.177	296.505	296.832	297.160
550	297.487	297.814	298.142	298.469	298.795	299.122	299.449	299.775	300.102	300.428
560	300.754	301.080	301.406	301.732	302.058	302.384	302.709	303.035	303.360	303.685
570	304.010	304.335	304.660	304.985	305.309	305.634	305.958	306.282	306.606	306.930
580	307.254	307.578	307.902	308.225	308.549	308.872	309.195	309.518	309.841	310.164
590	310.487	310.810	311.132	311.454	311.777	312.099	312.421	312.743	313.065	313.386
600	313.708	314.029	314.351	314.672	314.993	315.314	315.635	315.956	316.277	316.597
610	316.918	317.238	317.558	317.878	318.198	318.518	318.838	319.157	319.477	319.796
620	320.116	320.435	320.754	321.073	321.391	321.710	322.029	322.347	322.666	322.984
630	323.302	323.620	323.938	324.256	324.573	324.891	325.208	325.526	325.843	326.160
640	326.477	326.794	327.110	327.427	327.744	328.060	328.376	328.692	329.008	329.324
650	329.640	329.956	330.271	330.587	330.902	331.217	331.533	331.848	332.162	332.477
660	332.792	333.106	333.421	333.735	334.049	334.363	334.677	334.991	335.305	335.619
670	335.932	336.246	336.559	336.872	337.185	337.498	337.811	338.123	338.436	338.748
680	339.061	339.373	339.685	339.997	340.309	340.621	340.932	341.244	341.555	341.867
690	342.178	342.489	342.800	343.111	343.422	343.732	344.043	344.353	344.663	344.973
700	345.284	345.593	345.903	346.213	346.522	346.832	347.141	347.451	347.760	348.069
710	348.378	348.686	348.995	349.303	349.612	349.920	350.228	350.536	350.844	351.152
720	351.460	351.768	352.075	352.382	352.690	352.997	353.304	353.611	353.918	354.224
730	354.531	354.837	355.144	355.450	355.756	256.062	356.368	356.674	356.979	357.285
740	357.590	357.896	358.201	358.506	358.811	359.116	359.420	359.725	360.029	360.334
750	360.638	360.942	361.246	361.550	361.854	362.158	362.461	362.765	363.068	363.371
760	363.674	363.977	364.280	364.583	364.886	365.188	365.491	365.793	366.095	366.397
770	366.699	367.001	367.303	367.604	367.906	368.207	368.508	368.810	369.111	369.412
780	369.712	370.013	370.314	370.614	370.914	371.215	371.515	371.815	372.115	372.414
790	372.714	373.013	373.313	373.612	373.911	374.210	374.509	374.808	375.107	375.406
800	375.704	376.002	376.301	376.599	376.897	377.195	377.493	377.790	378.088	378.385
810	378.683	378.980	379.277	379.574	379.871	380.167	380.464	380.761	381.057	381.353
820	381.650	381.946	382.242	382.537	382.833	383.129	383.424	383.720	384.015	384.310
830	384.605	384.900	385.195	385.489	385.784	386.078	386.373	386.667	386.961	387.255
840	387.549	387.843	388.136	388.430	388.723	389.016	389.310	389.603	389.896	390.188
850	390.481									

R-T Characteristics

NTC10k - E+E Order Code: L

Sensor Type	Nominal Resistance	Sensitivity	E+E Order Code
NTC10k	R_{25}: 10 kΩ ± 0.5 %	$B_{25/85}$: 3989 K ($B_{25/50}$: 3950 K ± 1.0 %)	L

Tabulated R-T Characteristics (according to supplier's specifications)

T(°C)	Rmin(Ω)	Rnom(Ω)	Rmax(Ω)
-40	3.327E+05	3.470E+05	3.618E+05
-39	3.113E+05	3.244E+05	3.380E+05
-38	2.913E+05	3.034E+05	3.159E+05
-37	2.728E+05	2.839E+05	2.954E+05
-36	2.556E+05	2.658E+05	2.763E+05
-35	2.395E+05	2.489E+05	2.587E+05
-34	2.246E+05	2.333E+05	2.422E+05
-33	2.107E+05	2.187E+05	2.269E+05
-32	1.978E+05	2.051E+05	2.127E+05
-31	1.857E+05	1.925E+05	1.995E+05
-30	1.745E+05	1.807E+05	1.871E+05
-29	1.640E+05	1.697E+05	1.757E+05
-28	1.542E+05	1.595E+05	1.649E+05
-27	1.451E+05	1.499E+05	1.550E+05
-26	1.365E+05	1.410E+05	1.456E+05
-25	1.285E+05	1.327E+05	1.369E+05
-24	1.211E+05	1.249E+05	1.288E+05
-23	1.141E+05	1.176E+05	1.212E+05
-22	1.075E+05	1.108E+05	1.141E+05
-21	1.014E+05	1.044E+05	1.075E+05

T(°C)	Rmin(Ω)	Rnom(Ω)	Rmax(Ω)
-20	9.569E+04	9.846E+04	1.013E+05
-19	9.031E+04	9.287E+04	9.550E+04
-18	8.528E+04	8.764E+04	9.007E+04
-17	8.055E+04	8.274E+04	8.497E+04
-16	7.612E+04	7.813E+04	8.020E+04
-15	7.196E+04	7.382E+04	7.573E+04
-14	6.805E+04	6.977E+04	7.153E+04
-13	6.438E+04	6.596E+04	6.759E+04
-12	6.093E+04	6.239E+04	6.389E+04
-11	5.768E+04	5.903E+04	6.042E+04
-10	5.463E+04	5.588E+04	5.716E+04
-9	5.176E+04	5.292E+04	5.409E+04
-8	4.906E+04	5.013E+04	5.121E+04
-7	4.652E+04	4.750E+04	4.850E+04
-6	4.412E+04	4.503E+04	4.595E+04
-5	4.186E+04	4.269E+04	4.355E+04
-4	3.972E+04	4.050E+04	4.128E+04
-3	3.771E+04	3.842E+04	3.915E+04
-2	3.581E+04	3.647E+04	3.714E+04
-1	3.402E+04	3.463E+04	3.524E+04

T(°C)	Rmin(Ω)	Rnom(Ω)	Rmax(Ω)
0	3.233E+04	3.289E+04	3.345E+04
1	3.073E+04	3.124E+04	3.176E+04
2	2.921E+04	2.969E+04	3.017E+04
3	2.779E+04	2.822E+04	2.866E+04
4	2.644E+04	2.684E+04	2.724E+04
5	2.516E+04	2.553E+04	2.590E+04
6	2.395E+04	2.429E+04	2.463E+04
7	2.281E+04	2.312E+04	2.343E+04
8	2.173E+04	2.201E+04	2.230E+04
9	2.071E+04	2.097E+04	2.123E+04
10	1.974E+04	1.997E+04	2.022E+04
11	1.882E+04	1.904E+04	1.926E+04
12	1.795E+04	1.815E+04	1.835E+04
13	1.712E+04	1.731E+04	1.749E+04

T(°C)	Rmin(Ω)	Rnom(Ω)	Rmax(Ω)
14	1.634E+04	1.651E+04	1.667E+04
15	1.560E+04	1.575E+04	1.590E+04
16	1.489E+04	1.503E+04	1.517E+04
17	1.423E+04	1.435E+04	1.447E+04
18	1.359E+04	1.370E+04	1.382E+04
19	1.299E+04	1.309E+04	1.319E+04
20	1.242E+04	1.251E+04	1.260E+04
21	1.187E+04	1.195E+04	1.203E+04
22	1.135E+04	1.143E+04	1.150E+04
23	1.086E+04	1.093E+04	1.099E+04
24	1.039E+04	1.045E+04	1.051E+04
25	9.950E+03	1.000E+04	1.005E+04
26	9.518E+03	9.570E+03	9.622E+03
27	9.107E+03	9.161E+03	9.215E+03

T(°C)	Rmin(Ω)	Rnom(Ω)	Rmax(Ω)
28	8.717E+03	8.772E+03	8.828E+03
29	8.345E+03	8.402E+03	8.458E+03
30	7.991E+03	8.049E+03	8.107E+03
31	7.654E+03	7.713E+03	7.772E+03
32	7.333E+03	7.393E+03	7.452E+03
33	7.028E+03	7.087E+03	7.148E+03
34	6.736E+03	6.797E+03	6.857E+03
35	6.459E+03	6.519E+03	6.580E+03
36	6.194E+03	6.255E+03	6.316E+03
37	5.942E+03	6.003E+03	6.064E+03
38	5.701E+03	5.762E+03	5.823E+03
39	5.472E+03	5.532E+03	5.593E+03
40	5.253E+03	5.313E+03	5.373E+03
41	5.043E+03	5.103E+03	5.163E+03
42	4.843E+03	4.903E+03	4.963E+03
43	4.653E+03	4.711E+03	4.771E+03
44	4.470E+03	4.529E+03	4.588E+03
45	4.296E+03	4.354E+03	4.412E+03
46	4.130E+03	4.187E+03	4.245E+03
47	3.971E+03	4.027E+03	4.084E+03
48	3.818E+03	3.874E+03	3.931E+03
49	3.673E+03	3.728E+03	3.784E+03
50	3.534E+03	3.588E+03	3.643E+03
51	3.401E+03	3.454E+03	3.509E+03
52	3.273E+03	3.326E+03	3.380E+03
53	3.151E+03	3.204E+03	3.256E+03
54	3.035E+03	3.086E+03	3.138E+03
55	2.923E+03	2.973E+03	3.025E+03
56	2.816E+03	2.866E+03	2.916E+03
57	2.713E+03	2.762E+03	2.812E+03
58	2.615E+03	2.663E+03	2.712E+03
59	2.521E+03	2.568E+03	2.616E+03
60	2.430E+03	2.477E+03	2.524E+03
61	2.343E+03	2.389E+03	2.435E+03
62	2.260E+03	2.305E+03	2.351E+03
63	2.180E+03	2.224E+03	2.269E+03
64	2.104E+03	2.147E+03	2.191E+03
65	2.030E+03	2.073E+03	2.116E+03
66	1.960E+03	2.001E+03	2.044E+03
67	1.892E+03	1.933E+03	1.975E+03
68	1.827E+03	1.867E+03	1.908E+03
69	1.764E+03	1.804E+03	1.844E+03

T(°C)	Rmin(Ω)	Rnom(Ω)	Rmax(Ω)
70	1.704E+03	1.743E+03	1.782E+03
71	1.647E+03	1.684E+03	1.723E+03
72	1.591E+03	1.628E+03	1.666E+03
73	1.538E+03	1.574E+03	1.611E+03
74	1.486E+03	1.522E+03	1.559E+03
75	1.437E+03	1.472E+03	1.508E+03
76	1.390E+03	1.424E+03	1.459E+03
77	1.344E+03	1.378E+03	1.412E+03
78	1.300E+03	1.333E+03	1.367E+03
79	1.258E+03	1.290E+03	1.323E+03
80	1.217E+03	1.249E+03	1.281E+03
81	1.178E+03	1.209E+03	1.240E+03
82	1.140E+03	1.170E+03	1.201E+03
83	1.104E+03	1.133E+03	1.164E+03
84	1.069E+03	1.098E+03	1.128E+03
85	1.035E+03	1.063E+03	1.093E+03
86	1.002E+03	1.030E+03	1.059E+03
87	9.709E+02	9.983E+02	1.026E+03
88	9.407E+02	9.675E+02	9.951E+02
89	9.116E+02	9.379E+02	9.649E+02
90	8.835E+02	9.092E+02	9.357E+02
91	8.565E+02	8.817E+02	9.076E+02
92	8.304E+02	8.551E+02	8.805E+02
93	8.052E+02	8.294E+02	8.543E+02
94	7.809E+02	8.046E+02	8.290E+02
95	7.574E+02	7.807E+02	8.046E+02
96	7.348E+02	7.575E+02	7.810E+02
97	7.129E+02	7.352E+02	7.581E+02
98	6.918E+02	7.136E+02	7.361E+02
99	6.714E+02	6.927E+02	7.148E+02
100	6.516E+02	6.726E+02	6.942E+02
101	6.326E+02	6.531E+02	6.743E+02
102	6.142E+02	6.343E+02	6.550E+02
103	5.964E+02	6.160E+02	6.364E+02
104	5.791E+02	5.984E+02	6.184E+02
105	5.625E+02	5.814E+02	6.009E+02
106	5.464E+02	5.649E+02	5.840E+02
107	5.308E+02	5.490E+02	5.677E+02
108	5.158E+02	5.335E+02	5.519E+02
109	5.012E+02	5.186E+02	5.366E+02
110	4.871E+02	5.042E+02	5.218E+02

R-T Characteristics

NTC1.8k - E+E Order Code: G

Sensor Type	Nominal Resistance	Sensitivity	E+E Order Code
NTC1.8k	R_{25}: 1.8 kΩ ± 0.2 K	$B_{25/85}$: 3500 K ± 1.0 %	G

Tabulated R-T Characteristics (according to supplier's specifications)

T(°C)	R/R(25°C)
-40	21.6800
-35	16.3100
-30	12.3800
-25	9.4850
-20	7.3290
-15	5.7090
-10	4.4820
-5	3.5460
0	2.8250
5	2.2660
10	1.8300
15	1.4870
20	1.2160
25	1.0000
30	0.8270
35	0.6876
40	0.5747
45	0.4827
50	0.4074
55	0.3454
60	0.2941
65	0.2515
70	0.2160
75	0.1862
80	0.1612
85	0.1400
90	0.1220
95	0.1067
100	0.0937
105	0.0825
110	0.0728
115	0.0645
120	0.0573
125	0.0510
130	0.0456
135	0.0408
140	0.0366
145	0.0330
150	0.0298

T(°C)	R Value (Ω)
-40	39024.00
-35	29358.00
-30	22284.00
-25	17073.00
-20	13192.20
-15	10276.20
-10	8067.60
-5	6382.80
0	5085.00
5	4078.80
10	3294.00
15	2676.60
20	2188.80
25	1800.00
30	1488.60
35	1237.68
40	1034.46
45	868.86
50	733.32
55	621.72
60	529.38
65	452.70
70	388.80
75	335.16
80	290.16
85	252.00
90	219.60
95	192.06
100	168.66
105	148.50
110	131.04
115	116.10
120	103.14
125	91.80
130	82.10
135	73.40
140	65.90
145	59.40
150	53.60

R-T Characteristics

Ni1000 TK6180 DIN B
E+E Order Code: J

Sensor Type	Nominal Resistance	Sensitivity	E+E Order Code
Ni1000 TK6180 DIN B	R_0: 1000 Ω	TC: 6180 ppm/K	J

Tabulated R-T Characteristics (according to supplier's specifications and based on DIN 43760, resistance values in Ω)

°C	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-60	695.20									
-50	742.55	737.75	732.97	728.20	723.44	718.70	713.97	709.26	704.56	699.87
-40	791.31	786.37	781.45	776.54	771.64	766.76	761.89	757.03	752.19	747.36
-30	841.46	836.38	831.32	826.27	821.23	816.21	811.21	806.21	801.23	796.26
-20	892.96	887.75	882.56	877.37	872.20	867.04	861.90	856.77	851.65	846.55
-10	945.82	940.47	935.14	929.82	924.51	919.22	913.94	908.68	903.43	898.19
0	1000.00	994.52	989.06	983.60	978.17	972.74	967.33	961.93	956.55	951.17

°C	0	1	2	3	4	5	6	7	8	9
0	1000.00	1005.49	1011.00	1016.51	1022.05	1027.59	1033.15	1038.72	1044.31	1049.90
10	1055.52	1061.14	1066.78	1072.43	1078.09	1083.77	1089.46	1095.17	1100.89	1106.62
20	1112.36	1118.12	1123.90	1129.68	1135.48	1141.29	1147.12	1152.96	1158.81	1164.68
30	1170.56	1176.45	1182.36	1188.28	1194.21	1200.16	1206.13	1212.10	1218.09	1224.09
40	1230.11	1236.14	1242.19	1248.25	1254.32	1260.41	1266.51	1272.62	1278.75	1284.89
50	1291.05	1297.22	1303.41	1309.61	1315.82	1322.05	1328.29	1334.55	1340.82	1347.10
60	1353.40	1359.72	1366.05	1372.39	1378.75	1385.12	1391.51	1397.91	1404.33	1410.76
70	1417.21	1423.67	1430.14	1436.64	1443.14	1449.67	1456.20	1462.75	1469.32	1475.91
80	1482.50	1489.12	1495.75	1502.39	1509.05	1515.73	1522.42	1529.13	1535.85	1542.59
90	1549.34	1556.12	1562.90	1569.71	1576.53	1583.36	1590.21	1597.08	1603.97	1610.87
100	1617.79	1624.72	1631.67	1638.64	1645.62	1652.62	1659.64	1666.68	1673.73	1680.80
110	1687.89	1694.99	1702.11	1709.25	1716.41	1723.58	1730.77	1737.98	1745.21	1752.45
120	1759.72	1767.00	1774.30	1781.61	1788.95	1796.30	1803.68	1811.07	1818.48	1825.90
130	1833.35	1840.82	1848.30	1855.80	1863.33	1870.87	1878.43	1886.01	1893.61	1901.23
140	1908.87	1916.52	1924.20	1931.90	1939.62	1947.35	1955.11	1962.89	1970.69	1978.51
150	1986.35	1994.21	2002.09	2009.99	2017.91	2025.85	2033.82	2041.80	2049.81	2057.84
160	2065.89	2073.96	2082.05	2090.16	2098.30	2106.46	2114.64	2122.84	2131.06	2139.31
170	2147.58	2155.87	2164.19	2172.52	2180.88	2189.26	2197.67	2206.10	2214.55	2223.03
180	2231.53	2240.05	2248.59	2257.16	2265.76	2274.38	2283.02	2291.68	2300.37	2309.09
190	2317.83	2326.59	2335.38	2344.20	2353.04	2361.90	2370.79	2379.70	2388.64	2397.61
200	2406.60	2415.62	2424.66	2433.73	2442.82	2451.95	2461.09	2470.27	2479.47	2488.70
210	2497.95	2507.23	2516.54	2525.88	2535.24	2544.63	2554.05	2563.50	2572.97	2582.47
220	2592.00	2601.56	2611.15	2620.76	2630.40	2640.08	2649.78	2659.51	2669.26	2679.05
230	2688.87	2698.72	2708.59	2718.50	2728.43	2738.40	2748.40	2758.42	2768.48	2778.56
240	2788.68	2798.83	2809.01	2819.22	2829.46	2839.73	2850.03	2860.37	2870.73	2881.13
250	2891.56	2902.02	2912.52	2923.04	2933.60	2944.19	2954.82	2965.48	2976.16	2986.89
260	2997.64	3008.43	3019.26	3030.11	3041.00	3051.92	3062.88	3073.87	3084.90	3095.96
270	3107.06	3118.19	3129.35	3140.55	3151.78	3163.05	3174.36	3185.70	3197.07	3208.49
280	3219.93	3231.42	3242.94	3254.49	3266.08	3277.71	3289.38	3301.08	3312.82	3324.60
290	3336.41	3348.26	3360.15	3372.08	3384.04	3396.04	3408.08	3420.16	3432.28	3444.43
300	3456.63									

R-T Characteristics

Ni1000 TK5000 DIN B
E+E Order Code: T

Sensor Type	Nominal Resistance	Sensitivity	E+E Order Code
Ni1000 TK5000 DIN B	R_0: 1000 Ω	TC: 5000 ppm/K	T

Tabulated R-T Characteristics (according to supplier's specifications and based on DIN 43760, resistance values in Ω)

°C	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9
-60	751.79									
-50	790.88	786.93	783.00	779.07	775.14	771.23	767.33	763.43	759.54	755.66
-40	830.84	826.80	822.78	818.76	814.75	810.75	806.76	802.78	798.80	794.84
-30	871.69	867.57	863.45	859.34	855.24	851.15	847.07	843.00	838.94	834.88
-20	913.48	909.26	905.05	900.85	896.65	892.47	888.30	884.13	879.98	875.83
-10	956.24	951.92	947.61	943.31	939.02	934.74	930.47	926.21	921.96	917.72
0	1000.00	995.58	991.17	986.77	982.37	977.99	973.62	969.26	964.91	960.57

°C	0	1	2	3	4	5	6	7	8	9
0	1000.00	1004.43	1008.87	1013.33	1017.79	1022.26	1026.75	1031.24	1035.75	1040.27
10	1044.79	1049.33	1053.88	1058.44	1063.01	1067.59	1072.18	1076.78	1081.39	1086.02
20	1090.65	1095.30	1099.96	1104.62	1109.30	1113.99	1118.70	1123.41	1128.13	1132.87
30	1137.62	1142.37	1147.14	1151.92	1156.72	1161.52	1166.34	1171.16	1176.00	1180.85
40	1185.71	1190.59	1195.47	1200.37	1205.28	1210.20	1215.13	1220.07	1225.03	1230.00
50	1234.98	1239.97	1244.97	1249.99	1255.02	1260.06	1265.11	1270.18	1275.25	1280.34
60	1285.45	1290.56	1295.69	1300.83	1305.98	1311.14	1316.32	1321.51	1326.71	1331.92
70	1337.15	1342.39	1347.64	1352.91	1358.18	1363.47	1368.78	1374.09	1379.42	1384.77
80	1390.12	1395.49	1400.87	1406.26	1411.67	1417.09	1422.53	1427.97	1433.43	1438.91
90	1444.39	1449.90	1455.41	1460.94	1466.48	1472.03	1477.60	1483.18	1488.77	1494.38
100	1500.00	1505.64	1511.29	1516.95	1522.63	1528.32	1534.03	1539.75	1545.48	1551.22
110	1556.98	1562.76	1568.55	1574.35	1580.17	1586.00	1591.84	1597.70	1603.58	1609.47
120	1615.37	1621.28	1627.22	1633.16	1639.12	1645.10	1651.08	1657.09	1663.11	1669.14
130	1675.19	1681.25	1687.33	1693.42	1699.52	1705.65	1711.78	1717.93	1724.10	1730.28
140	1736.48	1742.69	1748.91	1755.15	1761.41	1767.68	1773.97	1780.27	1786.59	1792.92
150	1799.27	1805.63	1812.01	1818.41	1824.82	1831.24	1837.68	1844.14	1850.61	1857.10
160	1863.60	1870.12	1876.65	1883.20	1889.77	1896.35	1902.95	1909.56	1916.19	1922.84
170	1929.50	1936.18	1942.87	1949.58	1956.31	1963.05	1969.81	1976.58	1983.37	1990.18
180	1997.00	2003.84	2010.70	2017.57	2024.46	2031.37	2038.29	2045.23	2052.19	2059.16
190	2066.15	2073.15	2080.17	2087.21	2094.27	2101.34	2108.43	2115.54	2122.66	2129.80
200	2136.96	2144.13	2151.33	2158.53	2165.76	2173.00	2180.26	2187.54	2194.84	2202.15
210	2209.48	2216.82	2224.19	2231.57	2238.97	2246.39	2253.82	2261.27	2268.74	2276.23
220	2283.73	2291.26	2298.80	2306.35	2313.93	2321.52	2329.14	2336.77	2344.41	2352.08
230	2359.76	2367.46	2375.18	2382.92	2390.68	2398.45	2406.24	2414.05	2421.88	2429.73
240	2437.59	2445.48	2453.38	2461.30	2469.24	2477.20	2485.17	2493.17	2501.18	2509.21
250	2517.27									

E+E Elektronik Headquarters

E+E ELEKTRONIK - YOUR PARTNER IN SENSOR TECHNOLOGY.

E+E Elektronik GmbH, with headquarters in Engerwitzdorf, Austria, has been established in 1979 and is part of Dr. Johannes Heidenhain GmbH group.

Diverse. E+E Elektronik is a leading manufacturer of sensors and transmitters for a multitude of physical quantities and applications. Data loggers, hand-held meters as well as calibration systems and services round up the product portfolio.

Reliable. Best quality made in Austria, high accuracy and outstanding long-term stability, together with advanced understanding of customer specific requirements are the main competitive advantages of E+E Elektronik.

Versatile. Measuring devices from E+E Elektronik are used all over the world in most diverse industries such as building automation, meteorology, agriculture, food, pharmaceutical, process control or automotive.

Flexible. With own clean room sensor manufacturing, in-house design of state of the art electronics and highest competence in calibration, E+E Elektronik is the ideal partner for OEM customers.

Certified. The E+E quality assurance system is certified according to ISO 9001 and ISO/TS 16949. The company also complies with the environmental standard ISO 14001. The in-house calibration laboratories are accredited according to EN ISO/IEC 17025.

Global. E+E Elektronik sales subsidiaries are located in China, Germany, France, Italy, Korea and the USA. Additionally, E+E maintains a worldwide network of distribution partners.

- HUMIDITY
- TEMPERATURE
- DEW POINT
- MOISTURE IN OIL
- MASS FLOW
- CO_2
- AIR VELOCITY