PRODUCT CATALOG

YOUR PARTNER IN SENSOR TECHNOLOGY

E+E ELEKTRONIK®

E+E ELEKTRONIK®

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AUSTRIA

STAATLICHE AUSZEICHNUNG

CERTIFIED IQNet MANAGEMENT SYSTEM

quality austria SYSTEM CERTIFIED

HUMIDITY AND TEMPERATURE INDUSTRIAL TRANSMITTERGEN

EE310

- Temperature working range -40...180 °C (-40...356 °F)
- Pressure tight probe up to 20 bar (290 PSI)
- Analogue and alarm outputs
- RS485 or Ethernet interface
- Protective sensor coating for dirty and corrosive environment
- USB port for configuration and adjustment
- 3,5” TFT colour display with data-logging function

DIFFERENTIAL PRESSURE SENSOR

EE600

- Multi-range
- Full scale 0...1000 Pa (4 inch WC) or 0...10000 Pa (40 inch WC)
- Zero and span point adjustment
- Voltage and current outputs
- Large graphic display with backlight
- User configurable

CO_2 SENSOR FOR RAILWAY APPLICATIONS

EE8915

- Compliant with railway standards
- Dual wavelength NDIR technology
- Pressure and temperature compensated
- IP65 protection class
- Short response time
- Voltage and current outputs

CO_2 PROBE FOR DEMANDING APPLICATIONS

EE872

- Range up to 50000 ppm
- Dual wavelength NDIR technology
- Modbus RTU or analogue output
- Pressure and temperature compensated
- IP65 protection class
- Interchangeable, heated sensing module

DIGITAL SENSOR MODULE FOR CO_2, TEMPERATURE, HUMIDITY AND AMBIENT PRESSURE

EE894

- Dual wavelength NDIR technology
- Temperature and pressure compensated
- Autocalibration for outstanding long-term stability
- High insensitivity to pollution
- Low power consumption
- Small size

HUMIDITY AND TEMPERATURE MEASUREMENT

High-end Industrial Applications

Demanding Climate Control

Building Automation

Meteorology and Outdoor

OEM Modules and Probes

Hand-helds and Data Loggers

Capacitive Humidity Sensors

DEW POINT MEASUREMENT

Compact In-line Transmitters

MOISTURE IN OIL MEASUREMENT

Transmitters with Remote Probe

Compact In-line Transmitters

Hand-Helds

TEMPERATURE MEASUREMENT

Sensors and Transmitters

PRESSURE MEASUREMENT

AIR VELOCITY MEASUREMENT

Building Automation

Laminar Flow, Clean Rooms

Laminar Flow, Clean Rooms

Hand-Helds

MASS FLOW MEASUREMENT

CO_2-MEASUREMENT

Building Automation

Demanding Climate Control

Modules

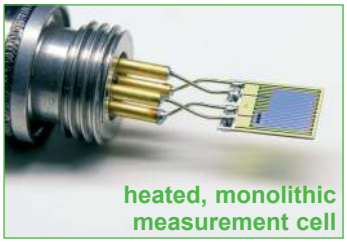
Hand-helds and Data Loggers

CALIBRATION SERVICE

APPENDIX

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

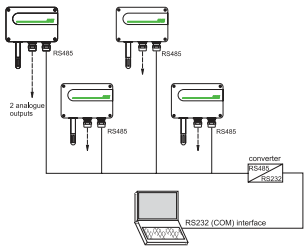
heated, monolithic measurement cell
working range 0...100 % RH / -40...+180 °C (-40...356 °F)
measurement near condensation
fast recovery after condensation
chemical purge after chemical exposure
pressure tight up to 100bar (1450psi)
calculation of additional physical quantities
optional sensor coating

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

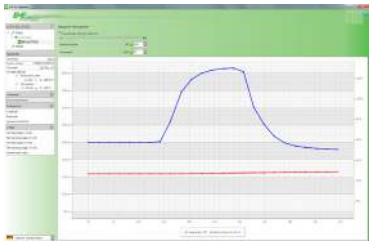
Networkability

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

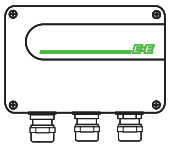
The actual measurement data and the corresponding Min/Max values can be indicated in an optional display (order code D05). The physical quantity to be displayed is selected by the push buttons next to the display.

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.

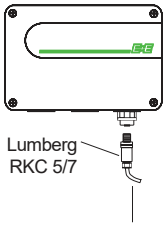
Connection Versions

standard

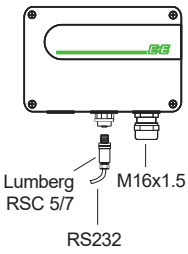


3x M16 x 1.5

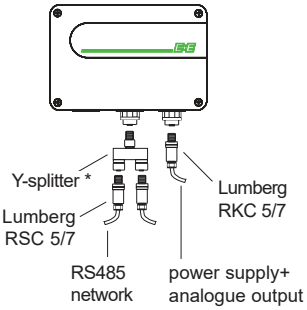
plug option C03



plug option C06



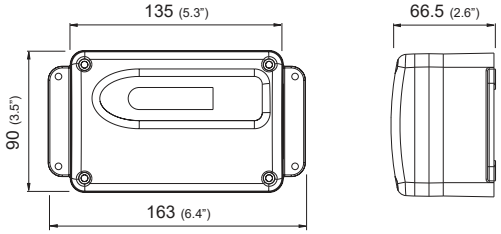
plug option C08



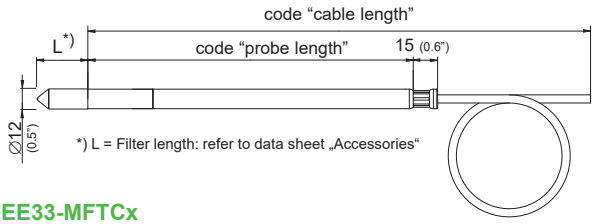
* Siemens 6ES7 194-1KA01-0XA0

Dimensions (mm)

Housing:

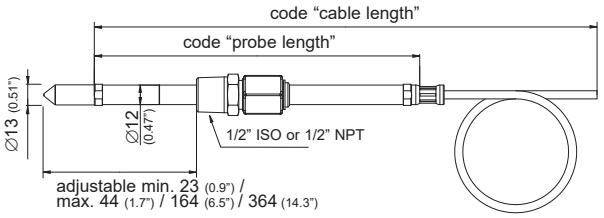


Remote Probe:

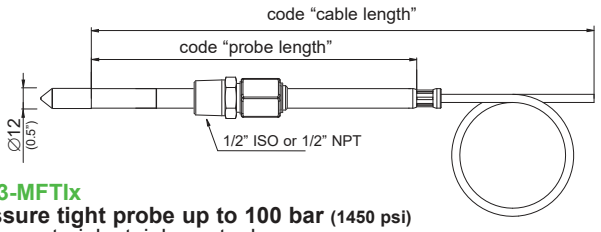


EE33-MFTCx
EE33-MFTDx
Remote sensing probe
Probe material: stainless steel

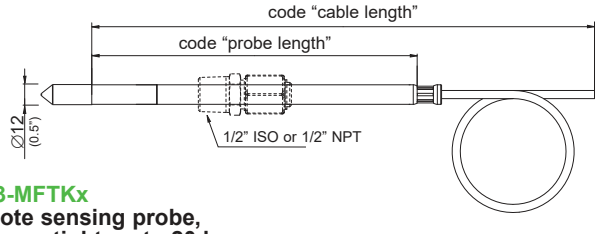
Sensing probes:



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

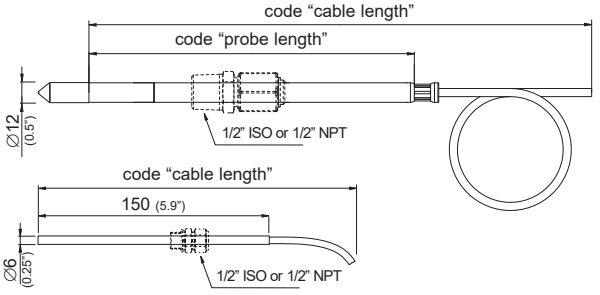


EE33-MFTIx
Pressure tight probe up to 100 bar (1450 psi)
Probe material: stainless steel



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

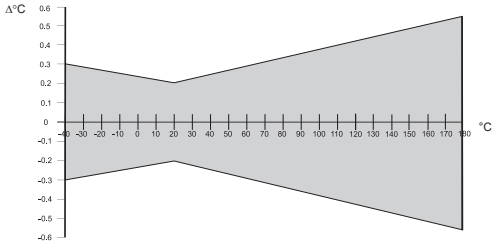
Technical Data

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/ft³)
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

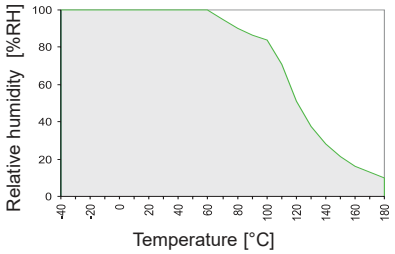
1) Refer to the working range of the humidity sensor.
2) Can be easily changed by software.
3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung)
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).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

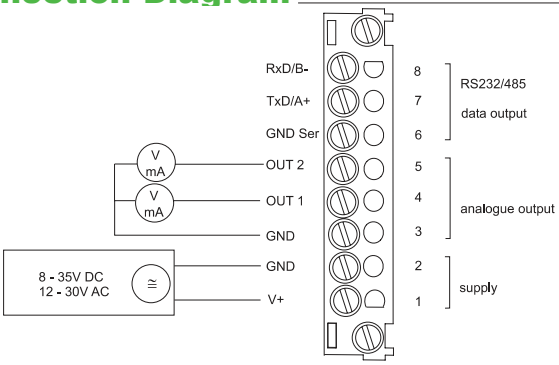
Working Range Humidity Sensor



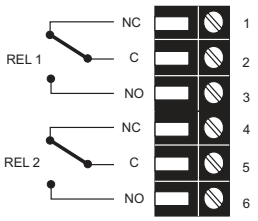
The grey area shows the allowed measurement range for the humidity sensor.

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	C
Physical parameters of outputs	Relative humidity	RH	[%]	(A)	Output 1							(A - J)	
	Temperature	T	[°C]	(B)									
	Dew point temperature	Td	[°C]	(C)	Output 2							Select according to Orderin Guide	D
	Frost point temperature	Tf	[°C]	(D)								(A-J)	
	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
	0-5 V											2	2
	0-10 V											3	3
	0-20 mA											5	5
	4-20 mA											6	6
Measured value units	metric / SI												
	non metric / US											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	
	-40...120 (T12)	-40...180 (T52)		„T-Scalings“	

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 Sensor for Demanding Process Control

The EE310 is optimized for reliable measurement in demanding industrial applications. In addition to highly accurate measurement of relative humidity (RH) and temperature (T), the sensor 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 enclosure facilitates easy mounting and maintenance. The EE310 is available with IP65 polycarbonate or stainless steel enclosure.
The measured data is available on two analogue outputs and on the optional digital interface RS485 with Modbus RTU or Ethernet with Modbus TCP.
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.

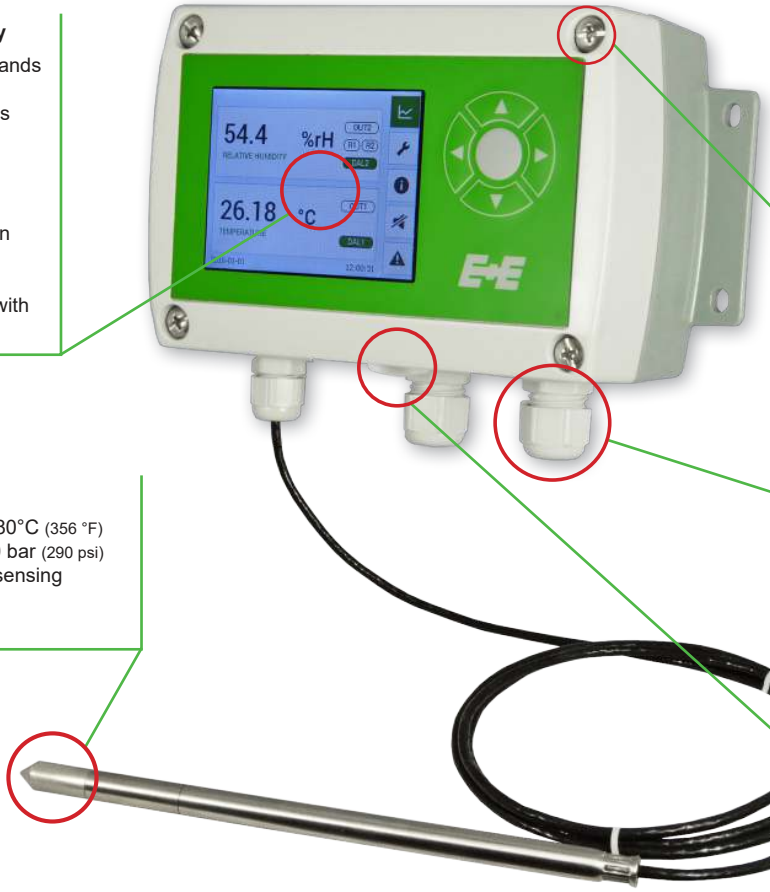
The E+E proprietary coating protects the sensor elements against corrosive and electrically conductive pollution.
The outputs can be freely configured and an adjustment performed directly via display or with the free EE-PCS software using the USB service interface.

Typical applications

- industrial process monitoring and control
- dryers and humidifiers
- 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



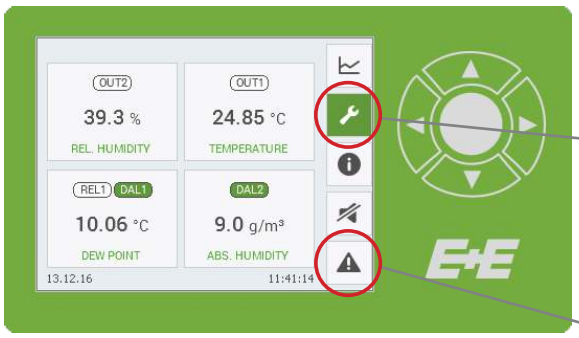
Enclosure
» easy mounting
» two part housing allows easy unit replacement
» IP65 protection class
» polycarbonate UL94-V0 approved or stainless steel
» screws secured in cover

Outputs
» 2 analogue outputs current / voltage
» error indication
» Modbus RTU / Modbus TCP
» 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

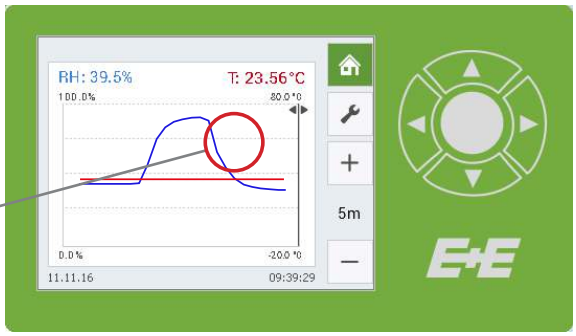
» analogue, digital and alarm outputs setup
» one and two point adjustment for RH and T
» probe replacement (for pluggable probe)
» password protection for all relevant settings

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)

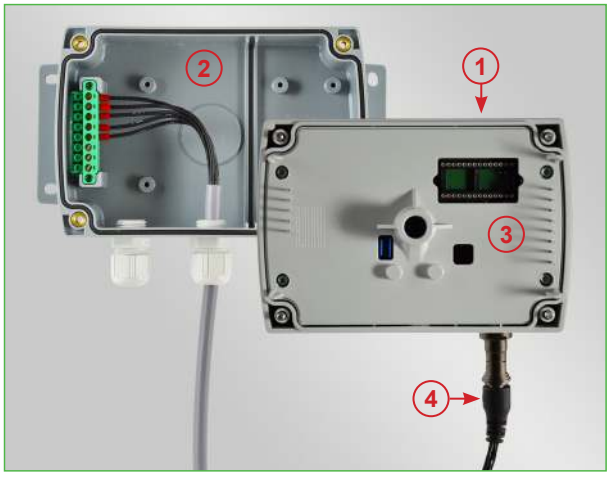
The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing elements. The coating substantially extends the lifetime and the measurement performance of the E+E sensor in corrosive environment (salts, off-shore applications). Additionally, it improves 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 enclosure / 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 cover **(3)** on the inside of the housing protects the electronics during installation or service.

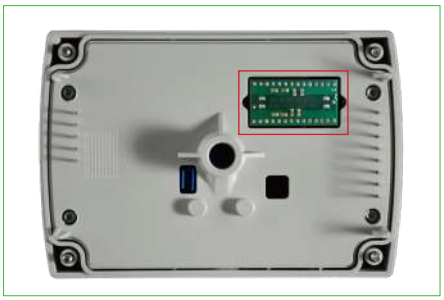
The remote probe models are also available with a pluggable probe **(4)** which can be easily exchanged by a push-pull plug. It is ideal for installation of long probe cables and in applications that might require periodical probe replacements.



Modbus RTU (Option J3) and Modbus TCP (Option J4)

Additional to the analogue outputs, the EE310 offers an optional digital interface, either RS485 with Modbus RTU or Ethernet with Modbus TCP.
The RS485 and Ethernet modules are also available for upgrading existing EE310.

The Ethernet interface features power over Ethernet (PoE) and RJ45 connector with IP65 protection class. It is available for EE310 duct mount and with remote probe (types T2, T5 and T10). Type T5 with 0.5 m (1.6 ft) probe cable can be employed in wall mount applications by fixing the sensing probe onto the wall with the mounting bracket HA010211.



RS485 - Modbus RTU

Ethernet - Modbus TCP

Modbus Map

Register [DEC]	Protocol address [HEX]	Measured value	Unit	Type
Read registers: function code 0x03 / 0x04				
31021	3FC	Relative humidity	%	32-bit float
31003	3EA	Temperature	°C	32-bit float
31005	3EC	Temperature	°F	32-bit float
31105	450	Dew point temperature	°C	32-bit float
31107	452	Dew point temperature	°F	32-bit float
31131	46A	Frost point / Dew point temperature	°C	32-bit float
31133	46C	Frost point / Dew point temperature	°F	32-bit float
31113	458	Absolute humidity	g/m^3	32-bit float
31115	45A	Absolute humidity	gr/ft^3	32-bit float
31121	460	Mixing ratio	g/kg	32-bit float
31123	462	Mixing ratio	gr/lb	32-bit float
31109	454	Wet bulb temperature	°C	32-bit float
31111	456	Wet bulb temperature	°F	32-bit float
31125	464	Specific enthalpy	kJ/kg	32-bit float
31129	468	Specific enthalpy	BTU/lb	32-bit float
31127	466	Specific enthalpy	ft lbf/lb	32-bit float
31101	44C	Water vapour partial pressure	mbar	32-bit float
31103	44E	Water vapour partial pressure	psi	32-bit float
31151	47E	Volume concentration	ppm	32-bit float
35001	1388	Air pressure	mbar	32-bit float
Write registers: function code 0x06 for 16-bit and 0x10 (decimal: 16) for 32-bit				
0001	0	Slave-ID	/	16-bit integer
5001	1388	Air pressure	mbar	32-bit float

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.

100...240 V AC supply module (option AM3)

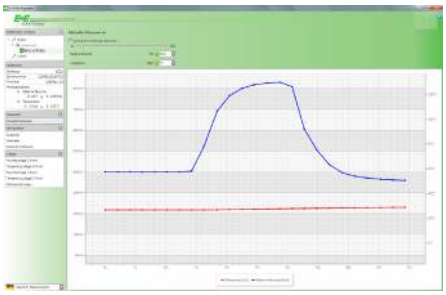
The back cover of EE310 can accommodate the optional supply module for 100…240 V AC (50/60 Hz). With this option, the EE310 features connectors instead of the cable glands for wiring. The matching cable connectors are included in the scope of supply.

E+E Product Configuration Software

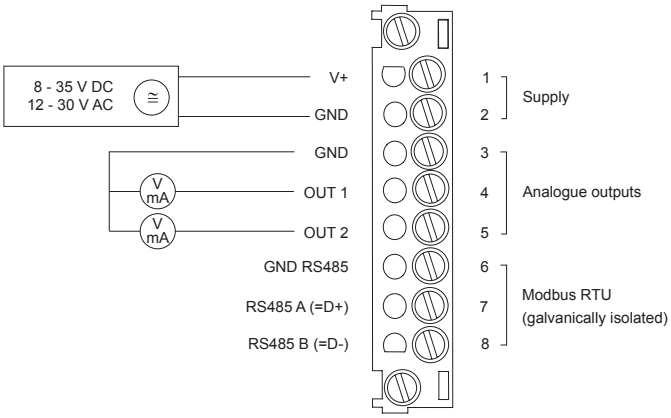
EE-PCS is an intuitive software that allows the user to perform:

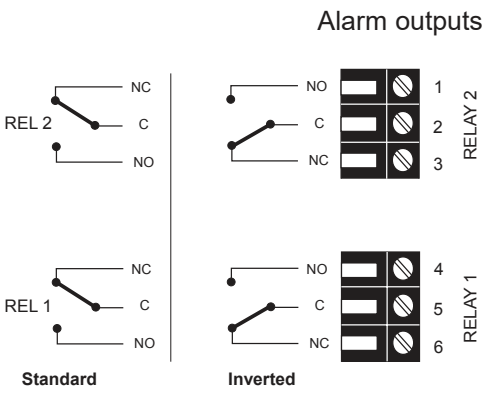
- flexible, easy and fast setup of the analogue and alarm outputs
- 1 or 2 point adjustment of humidity and temperature
- replacement of the pluggable sensing probe
- Modbus RTU communication setup
- setup of the display layout
- download logged data
- view error diagnosis information

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



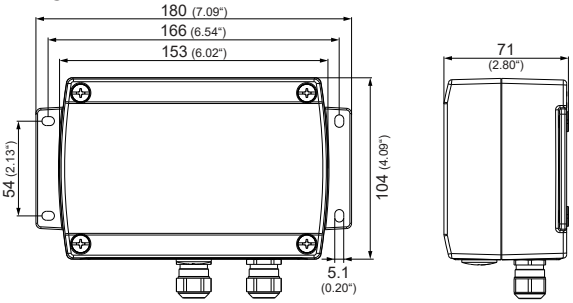
Connection diagram



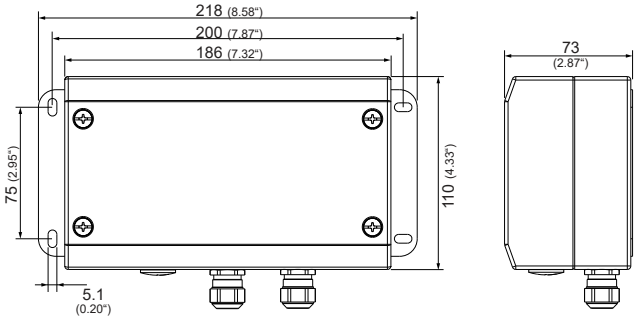


Dimensions (mm/inch)

Polycarbonate enclosure

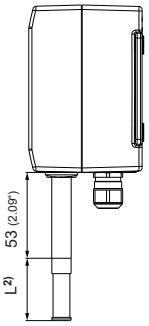


Stainless steel enclosure

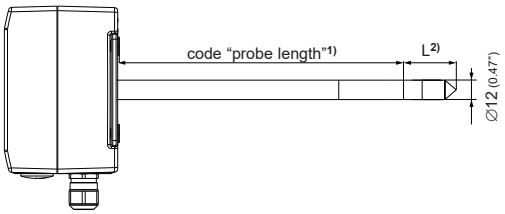


Models:

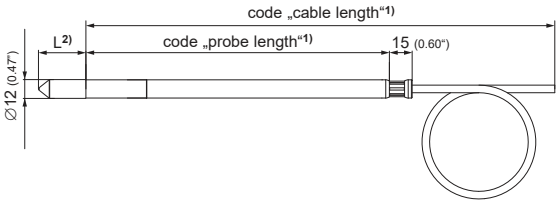
T1: Wall mount



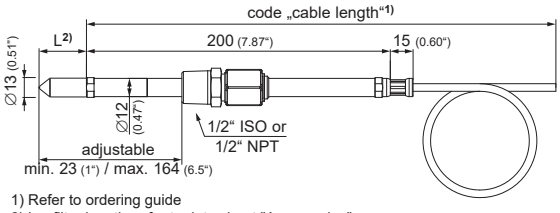
T2: Duct mount



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



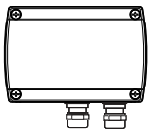
T10: Pressure tight probe up to 20 bar (300 psi)



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

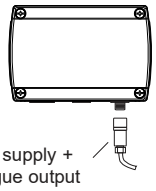
Electrical connection

standard



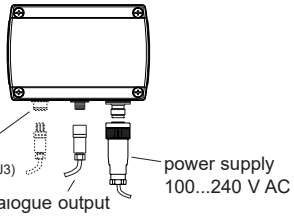
2x M16x1.5

option E4

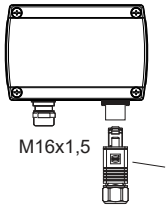


power supply +
analogue output

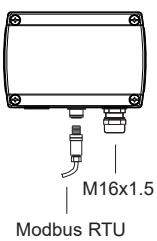
option AM3



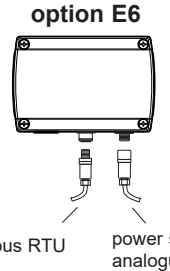
option J4



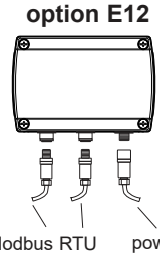
option E5



option E6



option E12



Mating plugs included in the scope of supply

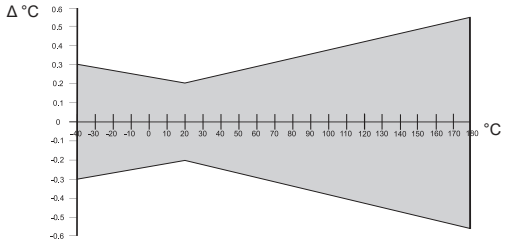
Technical data

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	*mv = measured value*
-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}	

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

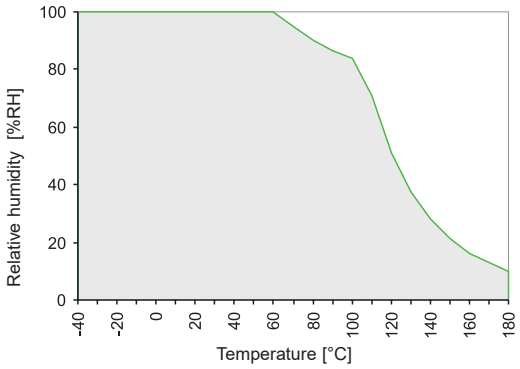
Two analogue outputs	0 - 1 / 5 / 10 V	-1 mA < I_L < 1 mA
freely selectable and scalable	4 - 20 mA 3-wire	R_L < 500 Ohm
	0 - 20 mA 3 wire	R_L < 500 Ohm
Digital interface	option J3: RS485 with Modbus RTU, up to 32 devices on one bus	
	option J4: Ethernet with Modbus TCP	

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 for plastic enclosure	Polycarbonate UL94-V0 approved		
for metal enclosure	Stainless steel 1.4404 / AISI 316 L		
Protection class	IP65		
Cable glands for plastic enclosure	M16 x 1.5, for cable Ø 3 - 7 mm (0.12 - 0.28")		
for metal enclosure	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) with option AM2 [3)]	250 V AC / 6 A		
	28 V DC / 6 A		
System requirements for EE-PCS software	Windows XP or higher; USB port		

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 the scope of supply of:
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
Mating plug HPP V4 RJ45 Cat5	J4

*) 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 for retrofitting	HA010605
- Ethernet Module for retrofitting plastic enclosure	HA010606 for remote probe type T5, T10 HA010607 for duct mounting type T2
- Bracket for installation onto mounting rails[1)]	HA010203
- Mounting bracket for remote probe	HA010211
- Replacement humidity sensor	FE09
- Replacement humidity sensor with coating	FE09-HC01
- Replacement probes[2)]	refer to device manual
- Humidity calibration kit	see data sheet „Humidity calibration kit“
- Stainless steel wall mounting clip Ø12 mm (0.5")	HA010225

1) 2 pieces are necessary for one EE310. For polycarbonate enclosure only.
2) Only for devices with pluggable probe option PC4.

Measurand Code for order code output 1 and 2

		MAxx / MBxx
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

		MAxx / MBxx
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

Ordering Guide

			EE310			
	Type		**T1** wall mounting	**T2** [8] duct mounting	**T5** remote probe up to 180 ° C (356 °F)	**T10** pressure tight probe up to 20 bar (300 psi)
Hardware Configuration	**Enclosure**	polycarbonate	no code	no code	no code	no code
		stainless steel	HS2		HS2	HS2
	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	F9
		H_2O_2	F12	F12	F12	
	Cable length (incl. probe length)	0.5 m (1.64 ft)			K0.5	
		2 m (6.6 ft)			no code	no code
		5 m (16.4 ft)			K5	K5
		10 m (32.8 ft)			K10	K10
		20 m (65.6 ft)			K20	K20
	Probe length	65 mm (2.55")			L65	
		200 mm (7.87")		no code	no code	no code
		400 mm (15.75")		L400	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 [8]	E12	E12	E12	E12
	Optional features	TFT colour display with integrated data logger [2]	D2	D2	D2	D2
		RS485 Module - Modbus RTU [3]	J3	J3	J3	J3
		Ethernet Module - Modbus TCP [5] [8]		J4	J4	J4
		pluggable probe [8]			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] [6]	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[7]	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[7]	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*			

1) Plug options E5 / E6 / E12 only in combination with RS485 Modul - Modbus RTU 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 (AM2), Ethernet Modul (J4) and integrated power supply (AM3) is not possible.
6) Integrated power supply includes 2 plugs for power supply and outputs, other plug options are not possible.
7) Both analogue outputs shall be either voltage or current.
8) Only with polycarbonate enclosure

Order Example

EE310-T5D2J3C1GA3GB3SBL-40SBH180

Type:	T5	remote probe for T up to 180 °C (356 °F)
Enclosure:	no code	polycarbonate
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	RS485 Modul - 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 2:	GB3	0-10 V
Scaling 2 low:	SBL-40	-40
Scaling 2 high:	SBH180	180

EE300Ex-HT

Humidity and Temperature Transmitter for Intrinsically Safe Applications


wall mount


remote probe

The EE300Ex intrinsically safe transmitter measures reliably relative humidity (RH) and temperature (T) in explosion hazard areas. It complies with the classifications for Europe (ATEX), International (IECEx), USA / Canada (FM) and China (NEPSI) for flammable gas and dust applications. The EE300Ex it is also certified for gas applications according Korean (KC) and Japan (TIIS) certifications.

The entire device can be placed in the explosion endangered area. The remote sensing probe allows for classification up to T6.

Measurement performance

The well proven E+E humidity sensors and competence in calibration allow for highly accurate and long term stable measurement over the full range 0…100 % RH and -40…180 °C (-40...356 °F), with pressure rating up to 300 bar (4351 psi).

Besides the RH and T measurement, the EE300Ex calculates all humidity related parameters such as dew point temperature (Td), frost point temperature (Tf), absolute humidity (dv) or mixing ratio (r).

Moisture in oil measurement

The EE300Ex with ATEX, IECEx, NEPSI and KC approval is suitable also for measuring water content (x) in ppm and water activity (aw) in isolation, lubrication and hydraulic oils. Typical applications include oil purifiers and online monitoring of lubrication and hydraulic oils.

Supply and outputs

The device can be powered by any intrinsically safe supply unit or via Zener barriers. The measured or calculated data is available on two 4…20 mA, 2-wire outputs and on the LCD display.

Robust, functional design

The stainless steel enclosure and sensing probe are suitable for harsh environment in challenging industrial applications. The EE300Ex design facilitates the installation as well as the replacement of the measuring section (electronics and probe) without time consuming wiring.

Typical Applications

chemical process control
pharmaceutical applications
explosive / hazardous storage rooms
flour mills
oil purifiers

Features

gas and dust in zone 0 / 20 and Div. 1
stainless steel enclosure and probe
best accuracy up to 180 °C (356 °F)
pressure tight up to 300 bar (4351 psi)
inspection certificate according to DIN EN 10204 – 3.1

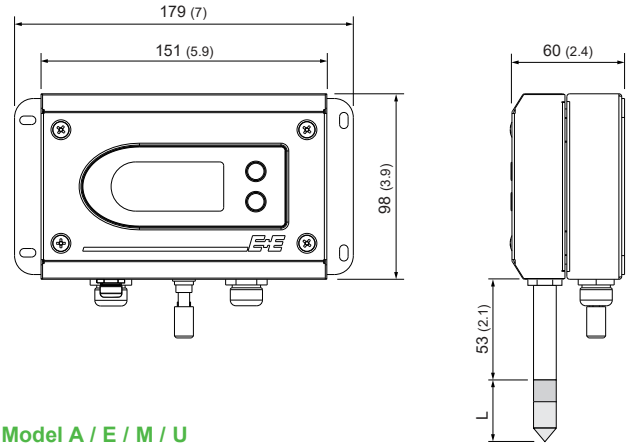
Protective sensor coating

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 long term stability in dusty or dirty applications by preventing stray impedances caused by deposits on the active sensor surface.

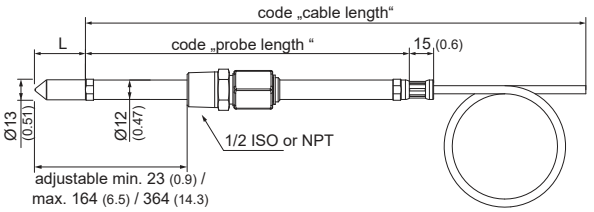
Models

Model		pressure range	working range	Ø-probe mm (inch)
A -	wall mount		-40...60 °C (-40...140°F)	12 (0.47)
E -	remote probe, 20 bar	0.1...20 bar (1.5...300 psi)	-40...180 °C (-40...356°F)	12 (0.47)
	remote probe 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 probe, 300 bar	0.01...300 bar (0.15...4351 psi)	-40...180 °C (-40...356°F)	12 (0.47)
U -	remote probe for sensor retraction tool PN250	0.01...250 bar (0.15...3626 psi)	-40...180 °C (-40...356°F)	12/15 (0.47/0.59)

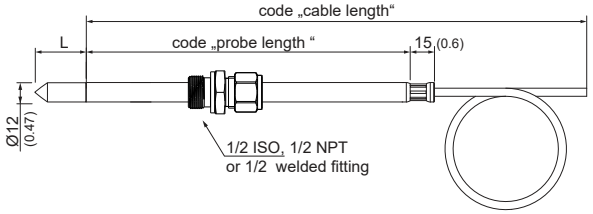
Dimensions in mm (inches)



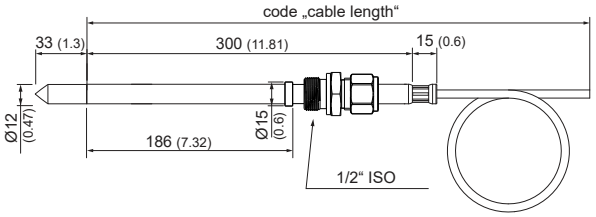
Model A / E / M / U
housing



Model E
remote probe 20 bar (300 psi) with sliding fitting for assembly / disassembly under pressure



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



Model U
remote probe for sensor retraction tool PN250

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

Technical Data EE300Ex

Measurands

Relative humidity

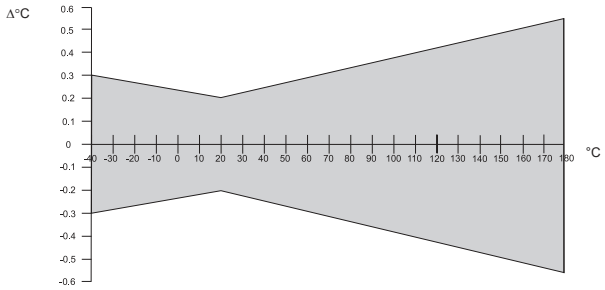
Measuring range	0...100 % RH		
Accuracy[1)]			
(including hysteresis, non-linearity and repeatability,	-15...40 °C (5...104 °F)	≤90 % RH	± (1.3 + 0.3%*mv) % RH
traceable to international standards, administrated by NIST, PTB, BEV...)	-15...40 °C (5...104 °F)	>90 % RH	± 2.3 % RH
	-25...70 °C (-13...158 °F)		± (1.4 + 1%*mv) % RH
mv = measured value	-40...180 °C (-40...356 °F)		± (1.5 + 1.5%*mv) % RH
Temperature dependence electronics	typ. 0.03 % RH/°C		
Response time t_{90}	< 30 sec. with stainless steel filter at 20 °C (68 °F)		

Temperature

Measuring range

wall mount:	-40...60 °C (-40...140 °F)
remote probe:	-40...180 °C (-40...356 °F)
For TIIS (Japan):	
model A, E, M, U:	-40...60 °C (-40...140 °F)

Accuracy



Temperature dependence of electronics	typical 0.005 °C/°C

Calculated parameters

		from	up to wall mount	up to remote probe	units
Dew point temperature	Td	-40 (-40)	60 (140)	100 (212)	°C (°F)
Frost point temperature	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 must be connected!	R_L = (Vcc-9V)/20mA

General

Supply voltage	$V_{cc\ min}$ = (9+R_L*0.02) VDC	$V_{cc\ max}$ = 28 V DC R_L = load resistor
Current consumption	max 20 mA per channel	
Protection class of housing	IP65 / Nema 4	
Cable gland	M16 for cable diameter 5 - 10 mm (0.2" - 0.4") M20 for cable diameter 10 - 14 mm (0.4" - 0.6")	
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Working temperature range	probe electronics without display electronics with display	according measuring range -40...60 °C (-40...140 °F) -20...60 °C (-4...140 °F)
Storage temperature range	electronics and probe	-20...60 °C (22...140 °F)
Electromagnetic compatibility	EN61326-1 Industrial Environment	EN61326-2-3 ICES-003 ClassB FCC Part15 ClassB
Material	enclosure probe cable probe (without filter)	stainless steel 1.4404 PTFE stainless steel 1.4301

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).

Ex - Classifications

Europe (ATEX)

Certificate:	TPS 13 ATEX 38892 003 X by TÜV SÜD Product Service GmbH
Safety factors:	Ui = 28V; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li ≈ 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 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 ≤ Ui ≤ 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 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 probe	Ex ia IIC T6-T1 Ta = -70°C to 200°C Ga / Ex ia IIIC T80°C Da

China (NEPSI)

Certificate:	Cert NO. GYJ16.1417X by NEPSI
Safety factors:	Ui = 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH

Ex-Designation:

Transmitter without display	Ex ia IIC T4 Ga, Ex iaD 20 T131
Transmitter with display	Ex ia IIC T4 Gb, Ex ia IIB T4 Ga
Remote probe	Ex ia IIC T1~T6 Ga, Ex iaD 20 T80

Japan (TIIS)

Certificate:	Nr. TC22061 by TIIS
Safety factors:	Ui = 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH Ta = -40°C to 60°C

Ex-Designation, only for gas:

IIC T4 Gb

Korea (KC)

Remote probe

Certificate:	17-AV4BO-0107X by KCs
Safety factors:	6.4 Vdc ≤ Ui ≤ 28Vdc; Ii ≤ 100mA; Pi ≤ 700mW; Ci ≤ 2.2nF; Li = 0mH

Ex-Designation, only for gas:

Transmitter	Ex ia IIC T4 (Ta = -40°C ~ +60°C)
Remote probe	Ex ia IIC T6~T1 (Ta = -70°C ~ +200°C)

Wall mount

Certificate:	16-AV4BO-0364X by KCs
Safety factors:	6.4 Vdc ≤ Ui ≤ 28Vdc; Ii ≤ 100mA; Pi ≤ 700mW; Ci ≤ 2.2nF; Li = 0mH

Ex-Designation, only for gas:

Ex ia IIC T4 (Ta = -40°C ~ +60°C)

USA (FM)

Certificate: No. FM17US0302X by FM Approvals
Safety factors: 6.4 Vdc ≤ Vmax (or Ui) ≤ 28Vdc; Imax (or Ii) = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH

Ex-Designation:

Equipment Group I: EE300Ex without display

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C
Class I, Zone 0, AEx ia IIC T4 Ta = -40°C to +60°C Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T131°C Ta = -40°C to +60°C Da; Entity – M1_139080; IP65

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Class I, Zone 0, AEx ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T80°C Da; Entity – M1_139080; IP65

Equipment Group II: EE300Ex with display

Class I, Division 1, Groups C, and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Division 2, Groups A, B, C and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Zone 0, AEx ia IIB T4 Ta = -40°C to +60°C Ga; Entity – M1_139080
Class I, Zone 1, AEx ia IIC T4°C Ta = -40°C to +60°C Gb; Entity – M1_139080

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Class I, Zone 0, AEx ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T80°C Da; Entity – M1_139080; IP65

CANADA (FM)

Certificate: No. FM17CA0154X by FM Approvals
Safety factors: 6.4 Vdc ≤ Vmax (or Ui) ≤ 28Vdc; Imax (or Ii) = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH

Ex-Designation:

Equipment Group I: EE300Ex without display

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C
Zone 0, Ex ia IIC T4 Ta = -40°C to +60°C Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T131°C Ta = -40°C to +60°C Da; Entity – M1_139080; IP65

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Zone 0, Ex ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65

Equipment Group II: EE300Ex with display

Class I, Division 1, Groups C, and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Division 2, Groups A, B, C and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Zone 0, Ex ia IIB T4 Ta = -40°C to +60°C Ga; Entity – M1_139080
Zone 1, Ex ia IIB T4 Ta = -40°C to +60°C Gb; Entity – M1_139080

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Zone 0, Ex ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65

The USA and Canada approvals are valid for air and gas measurement only.

Ordering Guide EE300Ex-HT

			EE300Ex-HT6S			
Hardware Configuration	**Model**	wall mount	A			
		remote probe up to 20 bar (290 psi)		E		
		remote probe up to 300 bar (4 351 psi)			M	
		remote probe for sensor retraction tool PN250				U
	Display [1]	without display	x			
		with display	D			
	Electrical Connection	2 x M16 cable gland	B			
		1/2“ NPT conduit adapter	C			
		2 x M20 cable gland	G			
	Probe Cable	wall mount	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 mount	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	
	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	D	D	D	D
		PTFE [3]	E	E	E	
		stainless steel grid	I	I	I	
		H_2O_2 [3]	L	L	L	
		oil	M	M	M	
	Sensor Protection	without coating	x			
		with coating [4]	1			
	Ex-Certification	ATEX (Europe)	AT			
		IECEx (International)	IC			
		NEPSI (China)	CN			
		FM (Canada)	CA			
		FM (USA)	FM			
		KC (Korea)	KC			
		TIIS (Japan)	JP			
Setup - Output	**Units**	metric / SI [°C]	M			
		non metric / US [°F] [5]	N			
	Output 1 [6]	relative humidity	UW			
		other measurand [7]	select according „Measurand Code“ below			
	Scaling Output 1	range	yyy [8] select according data sheet „Scaling Outputs“			
	Output 2	temperature [7]	Tx			
		other measurand	select according „Measurand Code“ below			
	Scaling Output 2	range	yyy [8] select according data sheet „Scaling Outputs“			

1) No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Groups A, B)
2) Not possible with sliding fitting (Code F, H)
3) May not be used in EPL Ga IIC (Gas Groups A, B)
For approval KC (Korea) not allowed in IIC Zone 0
For approval TIIS (Japan) not allowed in models A, E, M and U
4) Not appropriate for moisture in oil measurement
5) Not allowed for approval KC (Korea) models A, E, M and U
6) Assign to ouptut 1 the most relevant measurand
7) For approval TIIS (Japan), models A, E, M and U maximum temperature working range is -40...60 °C (-40...140 °F)
8) Maximum number code allowed for approval TIIS (Japan) is 170.

Measurand Code

relative humidity	UW
temperature	Tx
dew point temperature	TD
frost point temperature	TF
wet bulb temperature	TW
water vapour partial pressure	Ex

mixture ratio	Rx
absolute humidity	DV
specific enthalphy	Hx
water activity [9]	AW
water content in mineral transformer oil [9]	Xm
water content customized oil [9]	Xk

9) For approval KC (Korea) not allowed in model A
For approval FM (USA / Canada) and TIIS (Japan) not allowed.

Order Example

Example 1:

EE300EX-HT6SMDBHFAD1AT/MTx052UW001

Model:	remote probe up to 300 bar (4351 psi)
Display:	with display
Electrical Connection:	2 x M16 cable gland
Probe Cable:	10 m (32.8 ft)
Probe Length:	200 mm (7.9)
Zone feedthrough:	1/2 ISO - cut-in fitting
Filter:	stainless steel sintered
Sensor Protection:	with coating
Ex-Certification:	ATEX
Units:	metric
Output 1:	temperature
Scaling Output 1:	-40...180 °C
Output 2:	relative humidity
Scaling Output 2:	0...100 % RH

Example 2:

EE300EX-HT6SAxBxxxIxFM/NTx083TD083

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

Accessories

Blank cover for housing base	HA011401
Safety barrier, 1-channel, STAHL 9002/13-280-093-001	HA011410
Intrinsically safe supply unit, 1-channel, STAHL 9160/13-11-11	HA011405
Intrinsically safe supply unit , 2-channel, STAHL 9160/23-11-11	HA011406
Sealing plug for unused M16 cable glands	HA011402
Sealing plug for unused M20 cable glands	HA011404
Ball valve with 1/2 ISO female thread, Ex certified	HA011403
Sensor retraction tool PN250	ZM-WA-025-040-EST
Sensor retraction tool PN40	BG-WA-103-045-EST

EE23

Humidity / Temperature Sensor for Industrial Applications

The EE23 is optimized for reliable and cost effective use in industrial applications. In addition to highly accurate measurement of relative humidity (RH) and temperature (T), the sensor also calculates the dew point (Td) and the frost point temperature (Tf).

Model T1

Measurement Performance

The EE23 employs high-end E+E humidity sensing elements manufactured in state-of-the-art thin film technology, which are the prerequisite for outstanding accuracy.

Long Term Stability

The E+E proprietary coating protects the sensing elements against corrosive and electrically conductive pollution, which leads to outstanding long-term stability even in harsh environment. With the appropriate choice of filter cap, the EE23 tackles even challenging industrial applications.

Model T2

Outputs and Power Supply

The measured data is available on two voltage or current outputs as well as on the display. Additional features like alarm (relay) output and integrated supply module 100…240V AC facilitate the use of the EE23 in a wide range of applications.

Model T4/T5

Easy Installation and Service

The modular, three parts design of the IP65 / NEMA 4 enclosure, available in polycarbonate or metal, facilitates easy installation, service and replacement.

The enclosure consists of the back cover with the terminals for wiring, the pluggable active part with the electronics and the probe, and the front cover. Once installed, the active part of EE23 can be plugged on and off without rewiring. The plastic enclosure is appropriate also for mounting onto DIN rails.

Model T6

Remote Probe and Accessories

The remote probe with cable length up to 20m (65.6 ft) together with a wide choice of accessories such as mounting flanges or brackets, drip water protection or radiation shield allow for easy integration of the EE23 into any measurement task.

User Configurable

The user can easily perform a two-point humidity and temperature adjustment. The analogue and alarm outputs can be freely configured.

Features

- **Temperature range -40...180 °C (-40...356 °F)**
- **Outstanding long term stability**
- **Calculation of dew point and frost point temperature**
- **Easy mounting and maintenance**
- **Alarm output**
- **Inspection certificate according to DIN EN 10204 – 3.1**

Protective Sensor Coating

The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing elements. 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.

Technical Data

Measurands

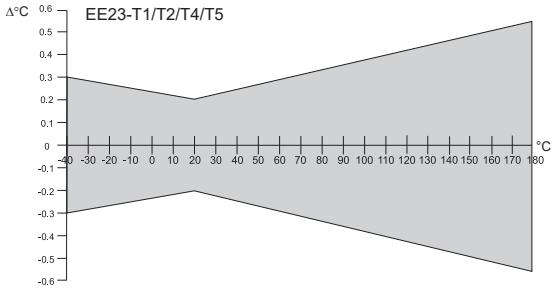
Relative Humidity

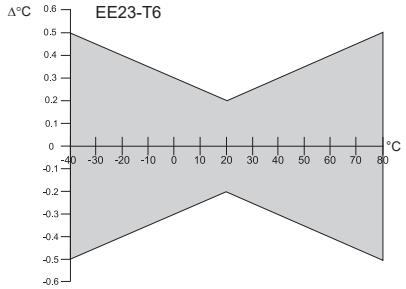
		EE23-T1/T2/T4/T5	EE23-T6
Working range		0...100% RH	
Accuracy[1] (including hysteresis, non-linearity and repeatability, traceable to intern. standards, administrated by NIST, PTB, BEV...)			
-15...40°C (5...104°F)	≤90% RH	± (1.3 + 0.3%*mv) % RH	± (1.8 + 0,3%*mv) % RH
-15...40°C (5...104°F)	>90% RH	± 2.3% RH	± 2.8% RH
-25...70°C (-13...158°F)		± (1.4 + 1%*mv) % RH	± (1.9 + 1%*mv) % RH
-40...180°C (-40...356°F)		± (1.5 + 1.5%*mv) % RH	± (2 + 1.5%*mv) % RH
Temperature dependence electronics		typ. ± 0.015% RH/°C	
Response time t_{90} with metal grid filter at 20 °C (68 °F)		< 15 sec.	

Temperature

Probe working range	EE23-T1	-40...60°C	(-40...140°F)
	EE23-T2/T6	-40...80°C	(-40...176°F)
	EE23-T4	-40...120°C	(-40...248°F)
	EE23-T5	-40...180°C	(-40...356°F)

Accuracy





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

Output Scale Span

		from	up to				units
			EE23-T1	EE23-T2/T6	EE23-T4	EE23-T5	
Humidity	RH	0	100	100	100	100	% RH
Temperature	T	-40 (-40)	60 (140)	80 (176)	120 (248)	180 (356)	°C (°F)
Dew point temperature	Td	-40 (-40)	60 (140)	80 (176)	100 (212)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	0 (32)	0 (32)	0 (32)	°C (°F)

Outputs

0 - 1 V	-0.5 mA < I_L < 0.5 mA
0 - 5 / 0 - 10 V	-1 mA < I_L < 1 mA
0 - 20mA / 4 - 20 mA	R_L < 470 Ohm

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 / 4-20 mA outputs	15.0 - 35V DC or 15 - 28V AC
	100...240V AC, 50/60Hz supply module (optional)
Current consumption for voltage output	
for DC supply	≤ 25 mA (with alarm module ≤ 35 mA)
for AC supply	≤ 45 mA_{eff} (with alarm module ≤ 70 mA_{eff})
Current consumption for current output	
for DC supply	≤ 55 mA (with alarm module ≤ 65 mA)
for AC supply	≤ 100 mA_{eff} (with alarm module ≤ 120 mA_{eff})
Enclosure / protection class	PC or Al Si 9 Cu 3 / IP65; NEMA 4
Cable gland	M16x1.5 cable Ø 4.5 - 10 mm (0.18 - 0.39")
Electrical connection	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)
CE compatibility according	EN61326-1 EN61326-2-3 ICES-003 ClassB Industrial Environment FCC Part15 ClassB

CE

Alarm Module[2]

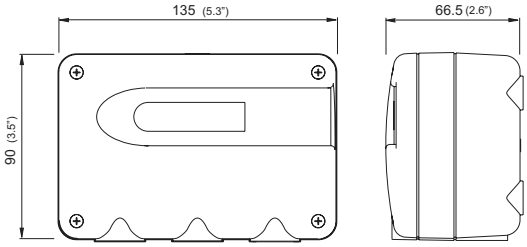
Output	SPDT-Switch max. 250V AC/8A or 28V DC/8A	
	threshold	hysteresis
Setting range	10...95% RH	3...15% RH
Setting accuracy	± 3% RH	

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) only for models T1, T2, T4 and T6.

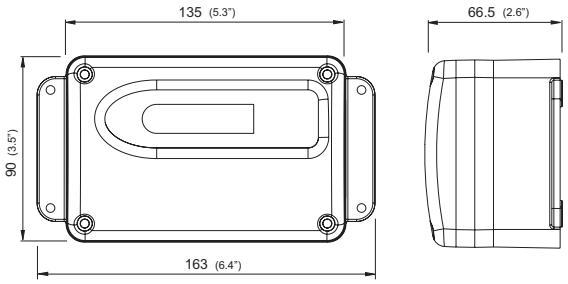
Dimensions in mm (inch)

Enclosure:

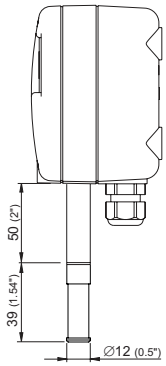
Polycarbonate (PC)



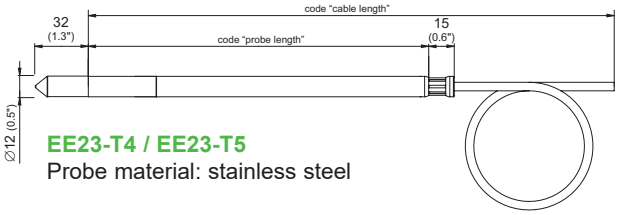
Metal



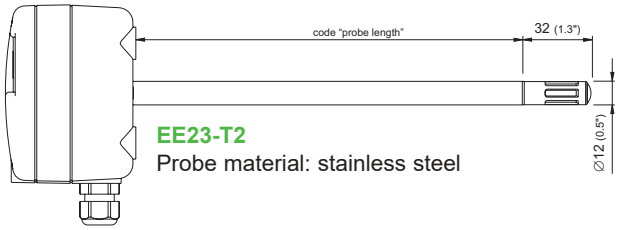
Probes:



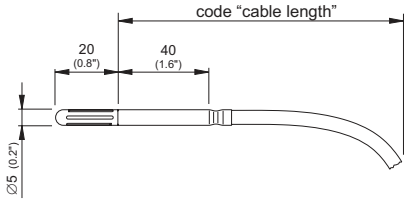
EE23-T1
Probe material: PC



EE23-T4 / EE23-T5
Probe material: stainless steel



EE23-T2
Probe material: stainless steel



EE23-T6
Probe material: stainless steel

Accessories (Additional information see data sheet "Accessories")

- Mounting flange (HA010201)
- Mounting flange 5mm for model T6 only (HA010208)
- Bracket for installation onto mounting rails* (HA010203)
- Drip water protection (HA010503)
- Radiation shield (HA010502)
- Calibration set (see data sheet „Calibration Kit") (HA0104xx)
- Stainless steel wall mounting clip Ø12 mm (0.5") (HA010225)

*Note: Only for plastic enclosure

Ordering Guide

			EE23				
	Model[1]		T1 wall mount	T2 duct mount	T4 remote probe up to 120 °C (248 °F)	T5 remote probe up to 180 °C (356 °F)	T6 miniature probe
Hardware Configuration	Enclosure	polycarbonate			no code		
		metal (Al Si 9 Cu 3)			HS3		
	Filter	plastic - metal grid (up to 120 °C / 248 °F)	F3	F3	F3	F3	
		stainless steel sintered	no code	no code	no code	no code	
		PTFE	F5	F5	F5	F5	
		stainless steel grid (up to 180 °C / 356 °F)				F9	
		H_2O_2	F12	F12	F12	F12	
		stainless steel membrane Ø 5 mm					F17
	Cable length (incl. probe length)	2 m (6.6 ft)			K2	K2	K2
		5 m (16.4 ft)			K5	K5	K5
		10 m (32.8 ft)			K10	K10	K10
		20 m (65.6 ft)			K20		K20
	Probe length	40 mm (1.57")					L40
		65 mm (2.55")		L65	L65	L65	
		200 mm (7.87")		no code	no code	no code	
		400 mm (15.75")		L400	L400	L400	
	Electrical connection	cable glands			no code		
		1 plug for power supply and outputs[2) 3)]			E4		
	Optional features	LC Display	D1	D1	D1	D2[4)]	D1
		E+E sensor coating	C1	C1	C1	C1	
		alarm outputs for RH[2)]	AM2	AM2	AM2		AM2
		integrated power supply 100...240 V AC, 50/60 Hz[3)]	AM3	AM3	AM3	AM3	AM3
Setup - Analogue outputs[1)]	Output Signal	0-1 V			GA1		
		0-5 V			GA2		
		0-10 V			GA3		
		0-20 mA			GA5		
		4-20 mA			GA6		
	Output 1	relative humidity RH [%]			no code		
		other measurand (xx see measurand code below)			MAxx		
	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*		
	Scaling 2 low	value			SBL*value*		
	Scaling 2 high	value			SBH*value*		
	Display mode	measurand output 1+2 alternating	DT2	DT2	DT2		DT2
		measurand output 1	DT3	DT3	DT3		DT3
		measurand output 2	DT4	DT4	DT4		DT4

Measurand Code

		xx
relative humidity	%	10
temperature	°C	1
	°F	2

		xx
dew point Td	°C	52
	°F	53
frost point Tf	°C	65
	°F	66

1) For T1, T2 T4 and T6 adjustment changes on the electronics board- see operation manual
For T5 adjustment and configuration changes by E+E PCS Software only - see operation manual
2) Alarm output only available with cable glands (plug option is not possible) / combination alarm output and integrated power supply is not possible
3) Integrated power supply includes 2 plugs for power supply and outputs / combination alarm output and integrated power supply is not possible
4) Measurand on display can be selected with push buttons

Order Example

EE23-T4HS3F3K2D1GA2SBL0SBH50DT2

Type:	remote probe up to 120 °C (248 °F)
Enclosure:	metal (Al Si 9 Cu 3)
Filter:	plastic - metal grid
Cable length:	2 m (6.6 ft)
Probe length:	200 mm (7.87")
Electrical connection:	cable glands
Optional feature:	LC Display
Output Signal:	0-5 V
Output 1	relative humidity [%]
Scaling 1 low:	0
Scaling 1 high:	100
Output 2:	temperature [°C]
Scaling 2 low:	0
Scaling 2 high:	50
Display mode:	measurand output 1+2 alternating

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).

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

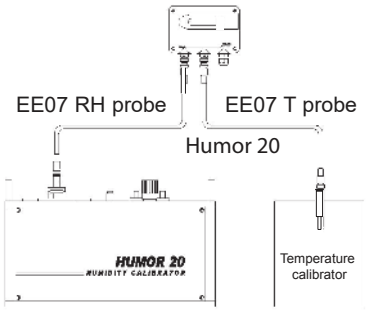
Features

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:

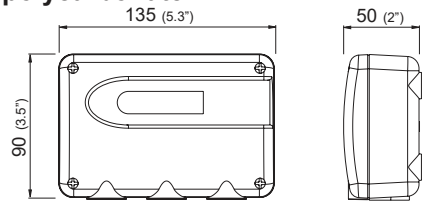
- RH = 10 % and T = 45 °C (113 °F)
- RH = 90 % and T =5 °C (41 °F)

Sensor Protection by E+E Proprietary Coating

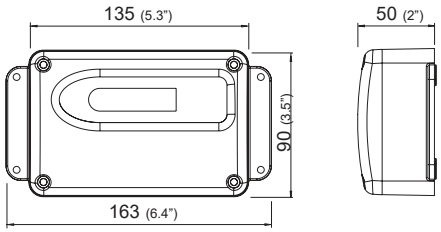
The E+E proprietary sensor coating is a hygroscopic layer applied to the active surface of the RH sensing element. The coating extends substantially the life-time and the measurement performance of the E+E sensor in corrosive environment. Additionally, it improves the sensor's long term stability in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

Dimensions (mm/inch)

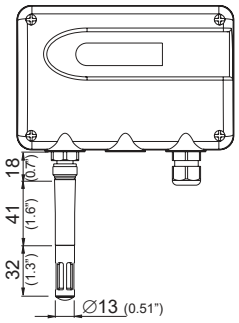
polycarbonate



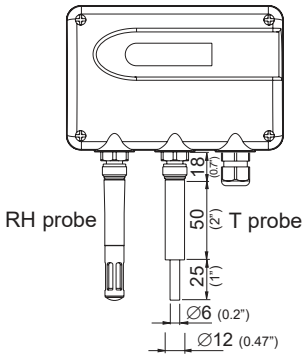
metal



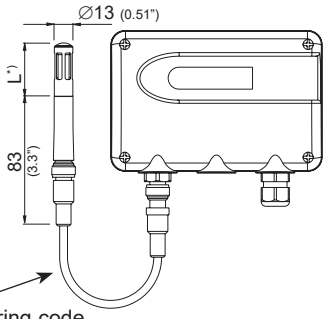
with one RH&T probe
EE220-xxx1x



with two separate probes for RH and T
EE220-xxx2x



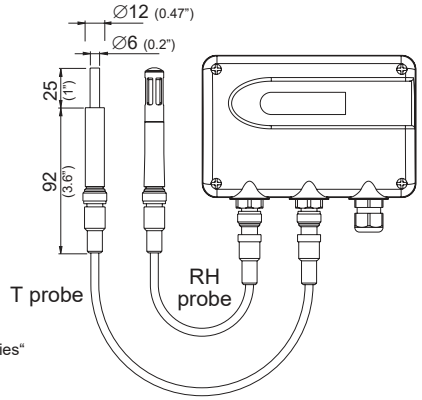
with one remote RH&T probe
EE220-xxx1x
+HAxxxx



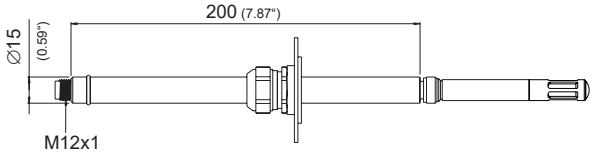
cable length	ordering code
2 m (6.6 ft)	HA010801
5 m (16.4 ft)	HA010802
10 m (32.8 ft)	HA010803

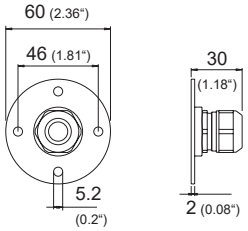
*) L = Filter length see Datasheet „Accessories"

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



duct mounting kit
HA010209





Technical Data

Outputs

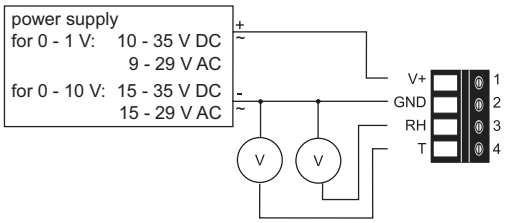
0...100 % RH (T output scale according to ordering code)	0 - 1 V 0 - 10 V 4 - 20 mA (two wire)	-0.5 mA < I_L < 0.5 mA - 1 mA < I_L < 1 mA R_L < 500 Ohm
T dependence of analogue outputs	max. 0.2 mV/°C	resp. 1 µA/°C

General

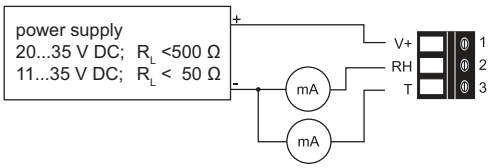
Supply voltage (Class III)			
for 0 - 1 V output	10 - 35 V DC	or	9 - 29 V AC
for 0 - 10 V output	15 - 35 V DC	or	15 - 29 V AC
for 4 - 20 mA output	10 - 35 V DC		
Load resistor for 4 - 20 mA output	$R_L < \frac{U_v - 10V}{0.02\ A}$ [Ω]		
Current consumption	typ. 10 mA for DC supply		typ. 20 mA_{eff} for 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

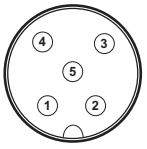
EE220- x1x - x3x



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

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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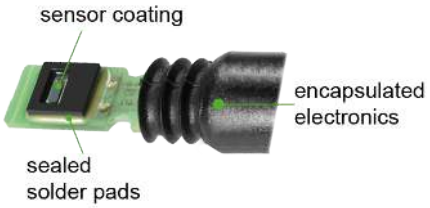
Protective Sensor Coating

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.



Technical Data

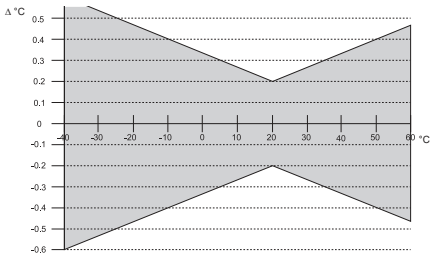
Measured Values

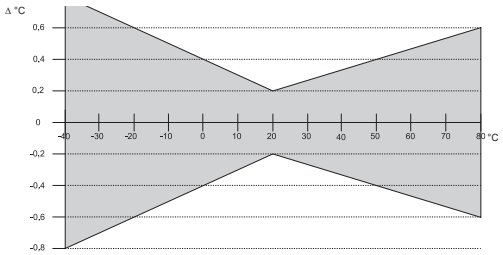
Relative Humidity (RH)

Sensor	E+E Sensor HCT01-00D	
Working range	0...100 % RH	
RH accuracy[1] (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

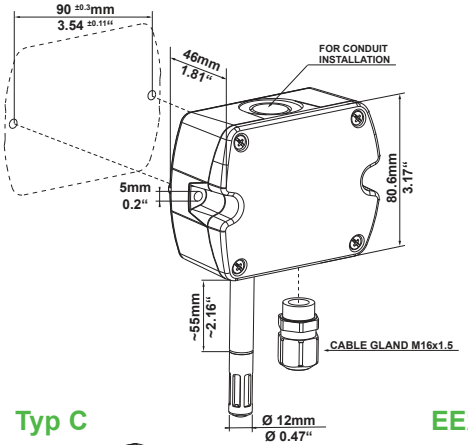
Power supply		
for 4-20 mA, 2-wire	10 V + R_L x 20 mA < V+ < 30 V DC	
for 0-20 mA, 3-wire for 0-5 V / 0-10 V / RS485	15-35 V DC[2] or 24V AC ±20 %	
Current consumption at 24 V		
Voltage output	DC supply max. 12 mA; AC supply max. 34 mA_{rms};	with display max. 23 mA with display max. 49 mA_{rms}
Current 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}

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

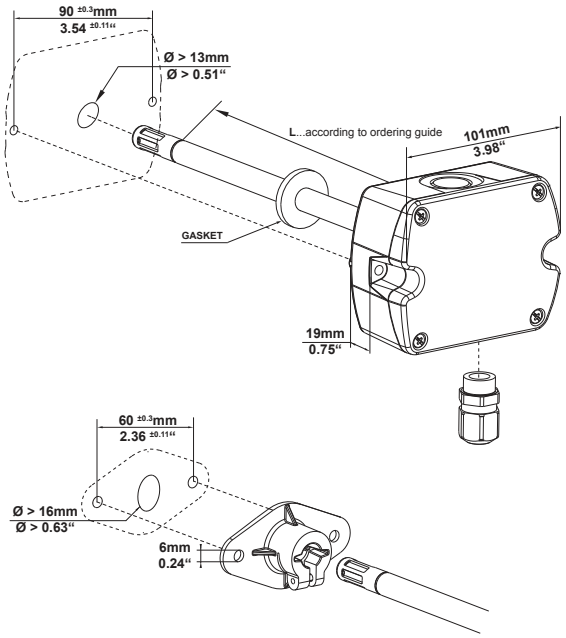
Display	1, 2 or 3 lines, user configurable, optional with backlight
Connection	Screw terminals, max. 1.5 mm²
Housing material	Polycarbonate, UL94V-0 (with Display UL94HB) approved
Protection class	IP65 / NEMA 4
Cable gland	M16 x 1.5
Probe cable (type C)	PVC, Ø 4.3 mm, 4 x 0.25 mm², Length: 1.5 or 3 m (4.9 or 9.8 ft)
Sensor protection	E+E Coating
Electromagnetic compatibility	EN61326-1 EN61326-2-3 Industrial Environment
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)

Dimensions (mm/inch)

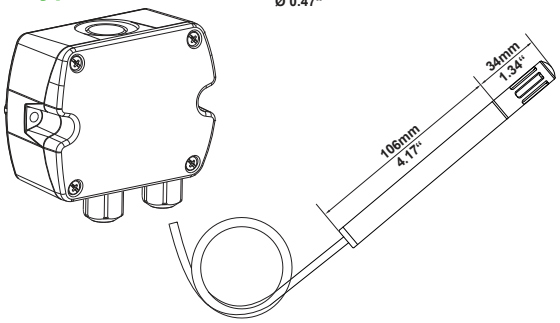
Typ A



Typ B



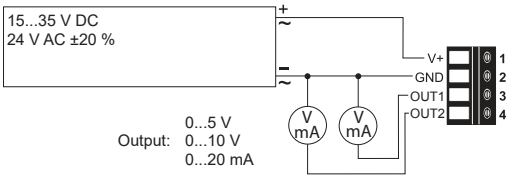
Typ C



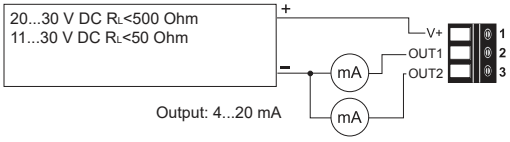
EE210P

Connection Diagram

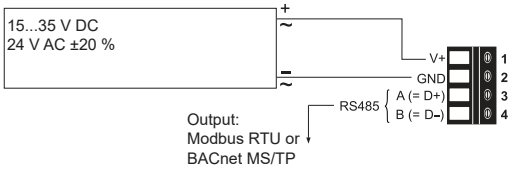
EE210-HT2/3/5



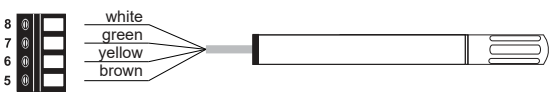
EE210-HT6



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	-50...400 kJ/kg	-10...190 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

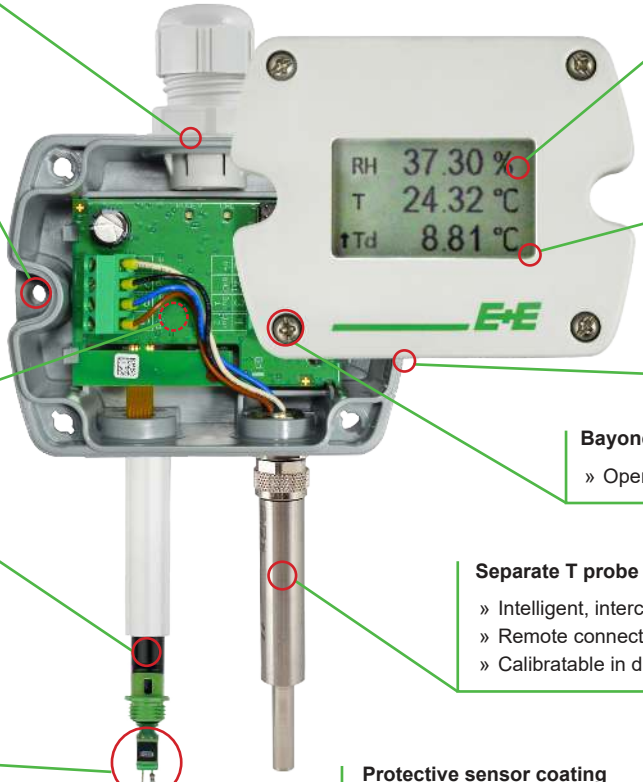
- Mechanical protection
- Condensation-resistant

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

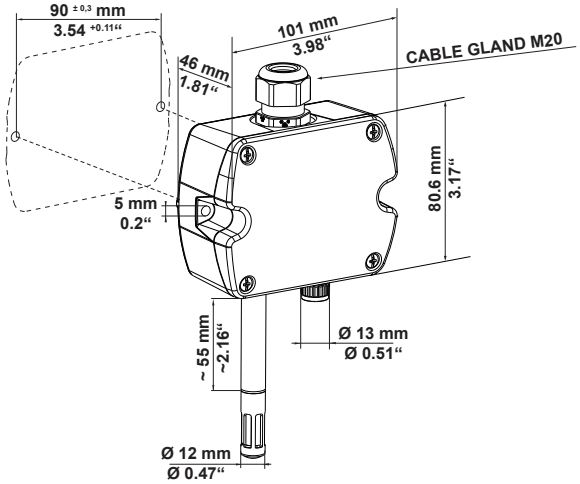
The operation principle of EE211 copes with the causes for poor long-term stability of non-heated sensors at continuously high humidity. The constant over-temperature of the EE211 sensing head (approx. 5 °C = 9 °F) means max. 76 % RH humidity at the sensors and enables following benefits:

- 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.

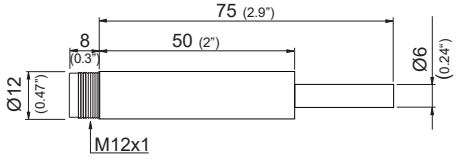
Dimensions (mm/inch)

Basic Device:

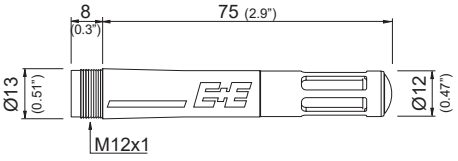


Temperature Probe:

Metal Housing EE07-MT

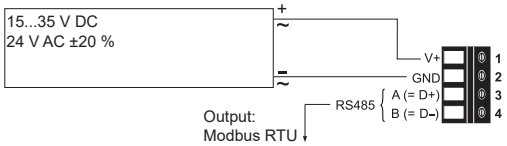


Polycarbonate Housing EE07-PT6

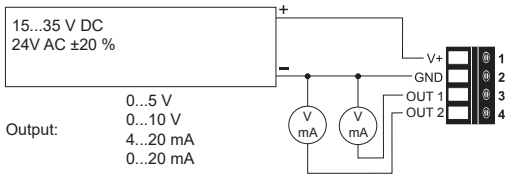


Connection Diagram

EE211-M1J3



EE211-M1A2/3/5/6

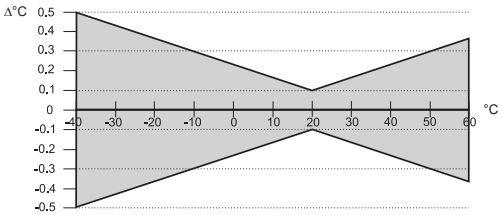


Technical Data

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 high	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
frost point Tf	°C	65
	°F	66
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

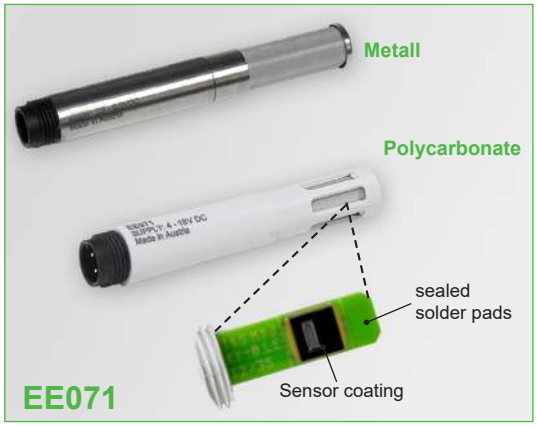
- EE07 according ordering guide
- Test report according according to DIN EN10204 - 3.1

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

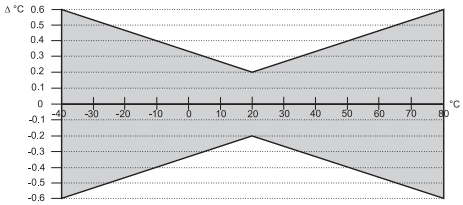
Relative Humidity

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]

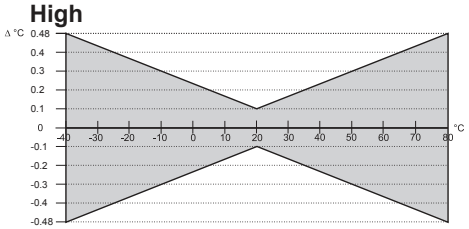
Temperature

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

Standard



High



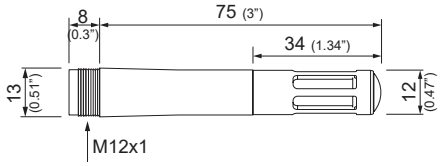
General

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	at UB 7 V:	I_{max} 60 mA; current draw drops below 10 mA within 350 µs
(with serial resistance 100 Ohm)	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)	

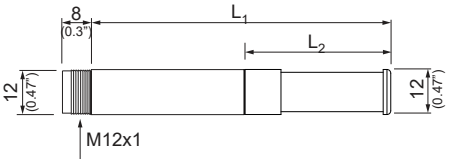
1) For bus operation with terminal resistor (120Ω) min. UB: 4,5V DC
2) No terminal, pull-up or pull-down resistor integrated in the probe
3) EE071 is not protected against voltage spikes (surge)

Dimensions in mm (inch)

polycarbonate housing - EE071-HTPx



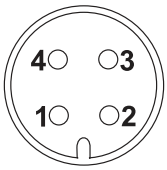
metal housing - EE071-HTMx



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")

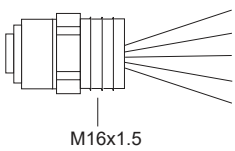
Connection Diagram

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")

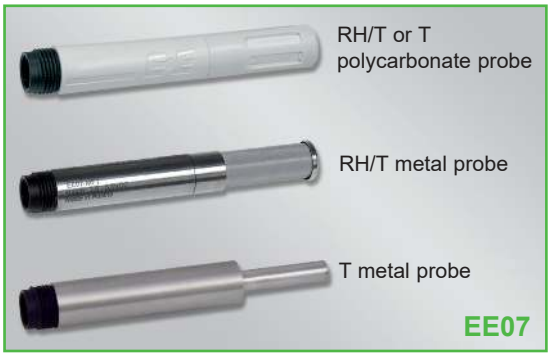
- M12x1 flange coupling with 50mm (2") flying leads	HA010705
- Cable connector for customer assembly M12x1	HA010707
- Filter caps	HA0101xx
- Connecting cable M12 - flying leads (1,5 m (59.1") / 5 m (196.9") / 10 m (393.7"))	HA0108**19/20/21**
- Connecting cable M12 - M12 (2 m (78.7") / 5 m (196.9") / 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

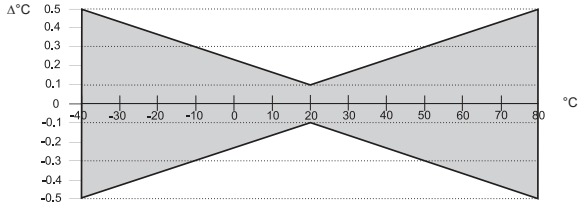
Technical Data

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[2] 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)	

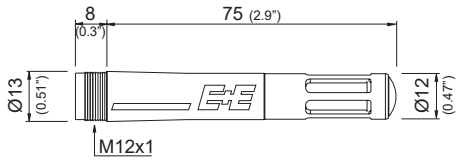
General

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[3]	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[4]	30 m (98.4 ft)

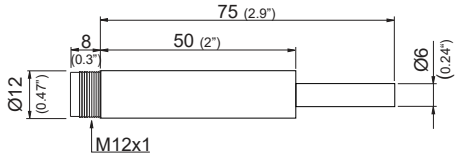
1) For details see support literature at www.epluse.com/EE07.
2) Traceable to intern. standards, administrated by NIST, PTB, BEV,... The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
3) No protection against surge 4) Depends on the bus frequency

Dimensions (mm/inch)

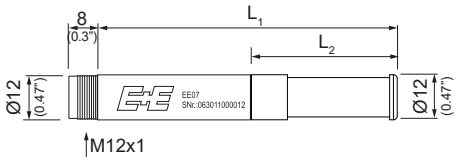
EE07-PFTx, EE07-PT1



EE07-MT



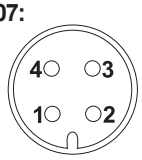
EE07-MFTx



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")

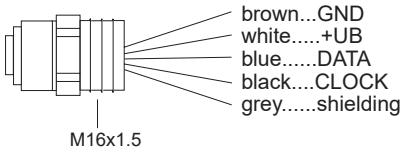
Connection Diagram

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

HVAC Humidity and Temperature Sensor

The EE160 is optimized for cost effective, accurate measurement of relative humidity (RH) and temperature (T) in building automation.

Reliable
Best long-term stability even in polluted or aggressive environment is ensured by the encapsulated measurement electronics inside the probe and E+E proprietary protection of the sensing element.

Versatile
The measured data is available on two voltage or current (2-wire) outputs, or on the RS485 interface with BACnet MS/TP or Modbus RTU protocol. Additionally, the EE160 features a passive T output.

Functional Design
EE160 is available for wall or duct mount. The IP65 / NEMA 4 enclosure minimizes installation costs and provides outstanding protection against contamination and condensation.

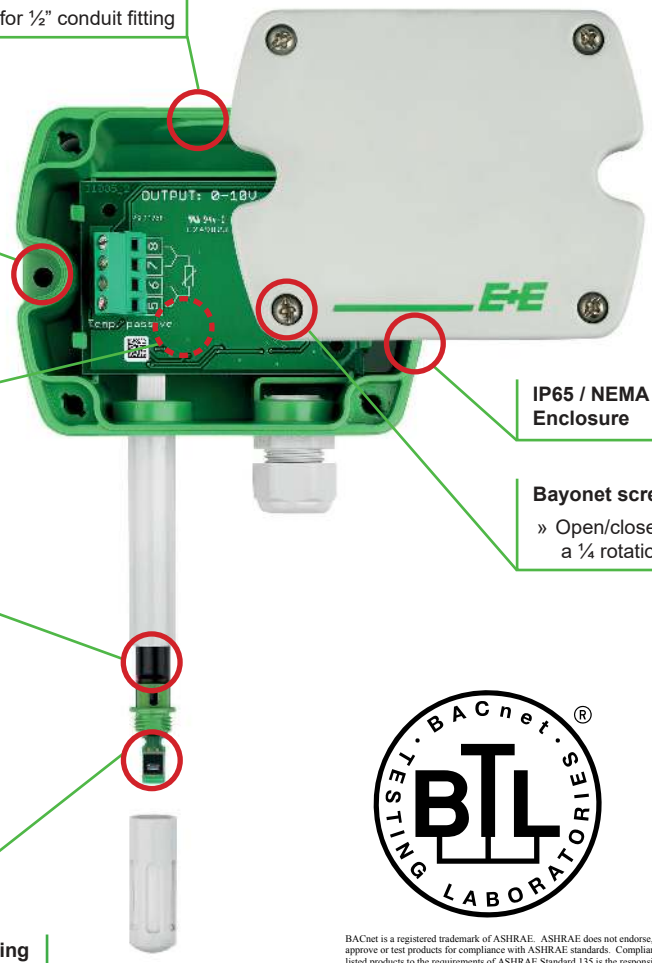
Comfortable Configuration and Adjustment
With an optional configuration adapter and the free EE-PCS Product Configuration Software, the user can set the RS485 interface parameters, the output scaling and perform one or two point adjustment for RH and T.

Features

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

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

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



IP65 / NEMA 4 Enclosure

Bayonet screws
» Open/close with a ¼ rotation

Encapsulated electronics
» Mechanical protection
» Waterproof

E+E humidity sensor HCT01
» Very robust
» Protected sensor surface and solder pads
» Tested according to automotive standard AEC-Q200

Test report according to DIN EN 10204 – 3.1

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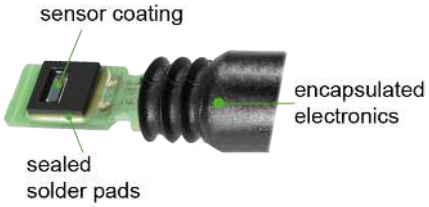
Protective Sensor Coating

The E+E proprietary sensor coating is a permeable 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.



Technical Data

Measurands

Relative humidity	
Sensor	E+E Sensor HCT01-00D
Working range	10...95 % RH
Accuracy[1] 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 interface	RS485 (BACnet MS/TP or Modbus RTU) max. 32 unit load devices in one bus	
Passive T-sensor	4-wire connection, 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

Typical current consumption

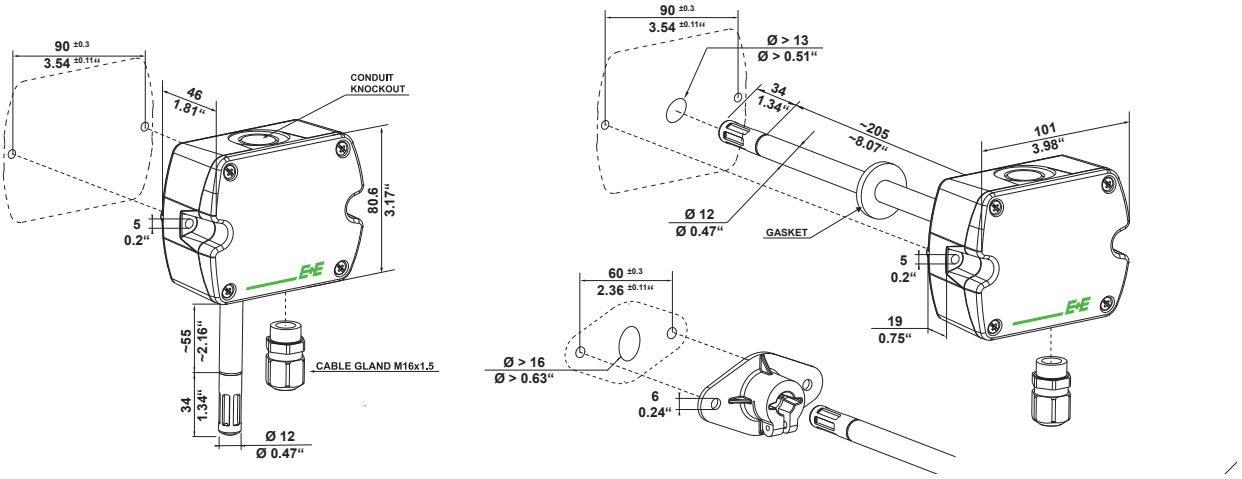
	4 - 20 mA output	0 - 10 V output	RS485
24V DC supply	max. 40 mA	5 mA	5 mA
24V AC supply	-	13 mA_{rms}	15 mA_{rms}

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
Electromagnetic compatibility	EN61326-1 EN61326-2-3
Temperature range	Operation: -40...60 °C (-40...140 °F) Storage: -20...60 °C (-4...140 °F)

CE

1) 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).

Dimensions (mm/inch)



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	(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	
		°C		°F		metric	(M)
temperature	(Tx)	-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 interface 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) available at www.epluse.com/EE160
5) Only for BACnet

Order Examples

EE160-HT6xAPAB-Tx003M

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

EE160-HTx3xPBB-1AE1N

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

Accessories (see data sheet „Accessories“)

Product configuration software	EE-PCS (free download: www.epluse.com/EE160)
Power supply adapter	V03
Protection cap for 12 mm probe	HA010783
USB configuration adapter for EE160-HTx3 (RS485)	HA011066
Product configuration adapter for EE160-HT3x/6x (analogue output)	see data sheet EE-PCA

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

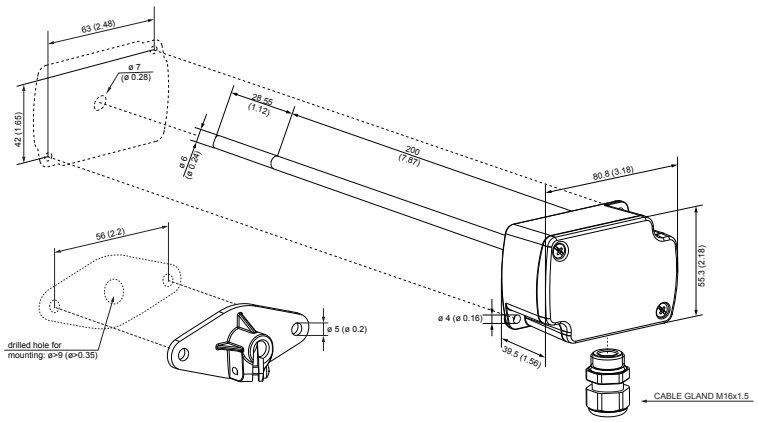
Analog output	0-10 V	R_L ≥ 10 kOhm
(0...100 % RH; T: see ordering guide)	4-20 mA (two-wire)	R_L ≤ 500 Ohm
Passive T-sensor		
2-wire	see ordering guide	
Wires resistance (terminal - sensor)	typ. 0.5 Ohm	

General

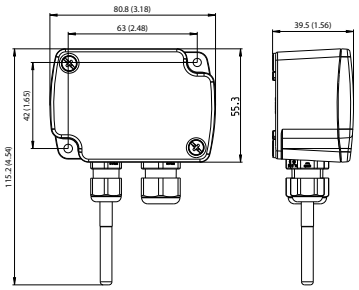
Power supply (Class III) ⧫		
for 0 - 10 V	15 - 35 V DC or 24 V AC ±20 %	
for 4 - 20 mA	10 V + R_L x 20 mA < U_V < 35 V DC	
Current consumption	with DC power supply typ. 5 mA	
	with AC power supply typ. 13 mA_{eff}	
Connection	Screw terminals, max. 1.5 mm^2	
Housing material	Polycarbonate, UL94V-0 approved	
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

Dimensions (mm/inch)

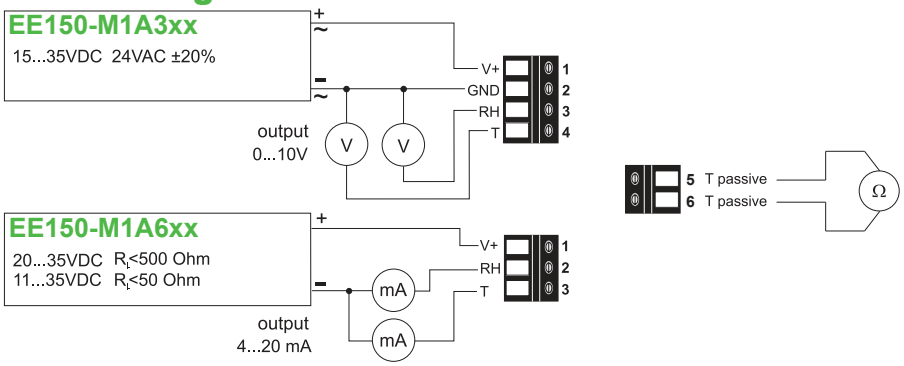
Duct mount



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

Humidity and Temperature Room Sensors

EE10 is dedicated for accurate relative humidity (RH) and temperature (T) measurement in residential and commercial HVAC.
The RH and T measured data is available either on two analogue outputs, or on a BACnet or Modbus RTU interface. A version with analogue RH and passive T output is also available. The measured data corresponding to the active outputs can be read locally on the optional display.
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 stylish enclosure is available in several colors and in two sizes according to regional standards.
The back cover, which contains only the screw terminals, can be mounted and wired first. The front cover containing the electronics can be simply snapped onto the back cover right before commissioning. Thus the active part of the device is not exposed to construction site pollution and can be replaced without tools within seconds.

Typical Applications

Building automation
Indoor climate control

Features

High accuracy and long term stability
Fast and easy installation
Modbus, BACnet or analogue outputs

Technical Data

Measured values

Relative Humidity

Working range	0...95 % RH	
Accuracy[1] at 20 °C (68 °F) and U_v=24 V DC		
Analogue (0-10 V, 4-20 mA)	±2 % RH (40...60 % RH)	±3 % RH (10...90 % RH)
Digital (RS485)	±3 % RH (30...70 % RH)	±5 % RH (10...90 % RH)
Temperature dependence	typical 0.06 % RH /°C (0.03 % RH / °F)	

Temperature

Accuracy[1] at 20 °C (68 °F) and U_v=24 V DC	output A3: ±0.25 °C (±0.45 °F) output J3: ±0.3 °C (±0.54 °F)	output A6: ±0.4 °C (±0.72 °F)

Output

Analogue	0-10 V	-1 mA < I_L < 1 mA
(RH: 0...100 % RH / T: see ordering guide)	4-20 mA (two wires)	R_L < (U_v-10)/0.02 < 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	

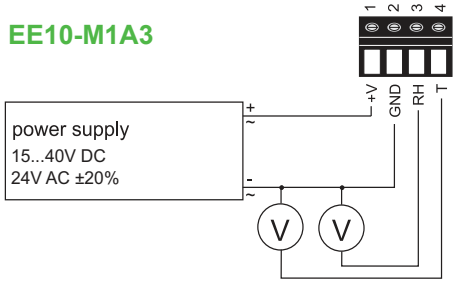
General

Voltage supply (U_v)		
0 - 10 V	15 - 40 V DC or 24 V AC ±20%	
4 - 20 mA	10 + 0.02 x R_L < U_v < 28 V DC	(R_L < 500 Ohm)
RS485	15 - 35 V DC or 24 V AC ±20%	
Current consumption		
Analogue (0-10 V, 4-20 mA)	for DC supply: typ. 4 mA / for AC supply: typ. 15 mA_{eff}	
Digital (RS485)	for DC supply: typ. 9 mA / for AC supply: typ. 20 mA_{eff}	
Electrical connection	screw terminals max. 1.5 mm^2 (AWG 16)	
Housing (polycarbonate)	US Version: UL94V-0 approved / EU Version: UL94HB approved	
Protection class	IP30	
Display	for EE10-M1	Humidity / Temperature alternating
	for EE10-M6	Humidity
CE compatibility according	EN61326-1 EN61326-2-3	CE
Temperature working range	-5...55 °C (23...131 °F)	
Temperature storage range	-25...60 °C (-13...140 °F)	

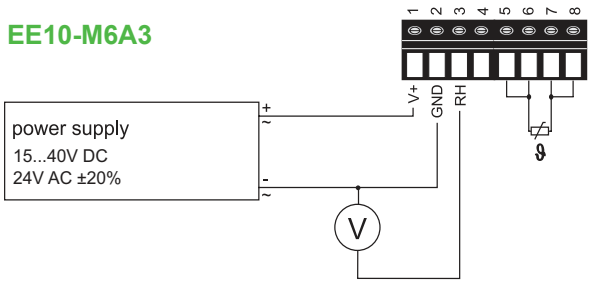
1) Traceable to intern. standards, administrated by NIST, PTB, BEV...
The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Connection Diagram

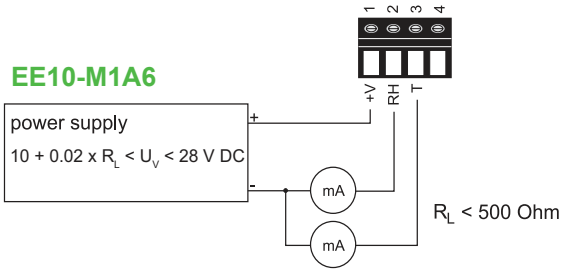
EE10-M1A3



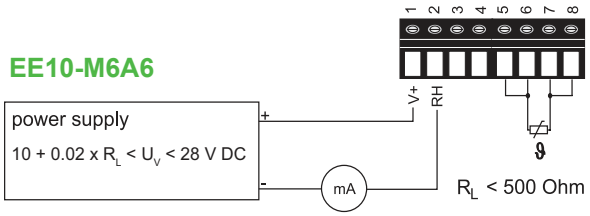
EE10-M6A3



EE10-M1A6

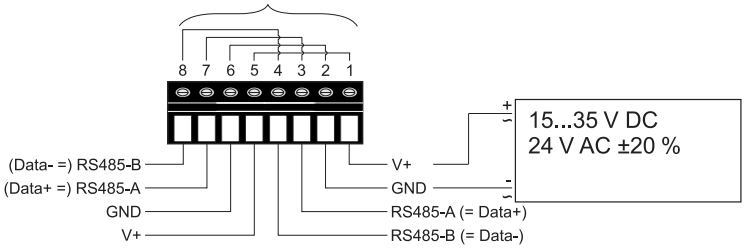


EE10-M6A6



EE10-M1J3

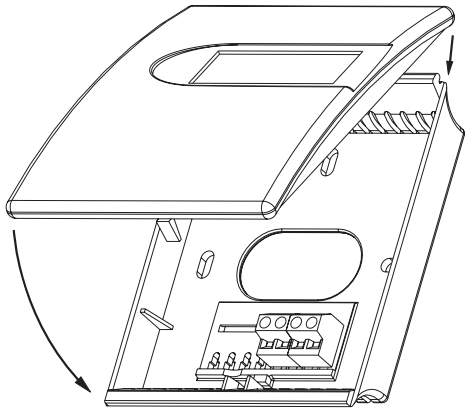
Connected on the electronics board.



The bus address can be set with DIP-Switches on the electronics board.

Screw terminals appropriate for daisy-chain wiring

Enclosure



Dimensions:

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")

Colour:

EU-Standard, US:
Front cover: signal white RAL9003
Back cover: light grey RAL7035

EU-Grey:
Front and back cover: anthracite grey RAL7016

EU-Silver:
Front and back cover: white aluminum RAL9006

Scope of Supply

- EE10 Sensor according to ordering guide
- Mounting materials
- Test report according to DIN EN10204 - 2.2
- Quick user guide (for digital output only)

Ordering Guide

			EE10-
	Model	Humidity + Temperature	M1
		Humidity + Temperature passive	M6
	Output	0-10 V	A3
		4-20 mA	A6
		RS485	J3
	T-sensor passive[1]	none	no code
		Pt 100 DIN A	TP1
		Pt 1000 DIN A	TP3
		NTC 10k ±1%, $B_{25/100}$ = 3950K	TP5
		NTC 1.8k	TP7
		Ni1000, TK6180	TP9
		NTC 10k ±0.5%, $B_{25/50}$ = 3950K	TP11
		NTC 10k ±1%, $B_{25/85}$ = 3435K	TP14
	Display	without display	no code
		with display	D1
	Enclosure	EU-Standard (RAL9003 / RAL7035)	no code
		EU-Grey (RAL7016)	CH74
		EU-Silver (RAL9006)	CH93
		US (RAL9003 / RAL7035)	RG2
Output Setup	**Temperature Unit**	T [°C]	no code
Analogue M1A3, M1A6		T [°F]	MB2
	Scale T low	0	no code
		value[2]	SBL value
	Scale T high	50	no code
		value[2]	SBH value
Digital J3	**Protocol**	Modbus RTU[3]	P1
		BACnet MS/TP[4]	P3
	Unit	metric-SI	no code
		non-metric	U2
	Baud rate	9600 (usual for Modbus)	BD5
		19200	BD6
		38400 (usual for BACnet)	BD7
		57600[5]	BD8
		76800[5]	BD9

1) Only with output A3 and A6. T sensor details at www.epluse.com/R-T_Characteristics. For other passive T sensors please contact E+E.
2) -5 °C (23 °F) < Scale T low < 20 °C (68 °F). 25 °C (77 °F) < Scale T high < 55 °C (131 °F). Scale T high – Scale T low > 20 °C (68 °F).
3) Factory setting: Even Parity, Stopbits 1. Modbus Map see User Guide at www.epluse.com/ee10
4) Factory setting: No Parity, Stopbits 1. Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee10
5) Only for BACnet MS/TP

Order Examples

EE10-M1A3D1

Model:	Humidity + Temperature
Output:	0-10 V
T-sensor passive:	none
Display:	with display
Enclosure:	EU-Standard (RAL9003 / RAL7035)
Temperature Unit:	°C
Scale T low:	0 °C
Scale T high:	50 °C

EE10-M1J3P3BD7

Model:	Humidity + Temperature
Output:	RS485
T-sensor passive:	none
Display:	without display
Enclosure:	EU-Standard (RAL9003 / RAL7035)
Protocol:	BACnet MS/TP
Unit:	metric-SI
Baud rate:	38400

EE10-M6A6TP3

Model:	Humidity + Temp. passive
Output:	4-20 mA
T-sensor passive:	Pt 1000 DIN A
Display:	without display
Enclosure:	EU-Standard (RAL9003 / RAL7035)

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.

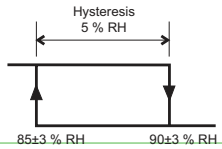
Typical Applications

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

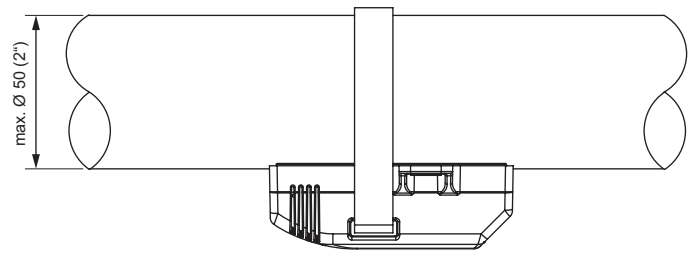
Technical Data

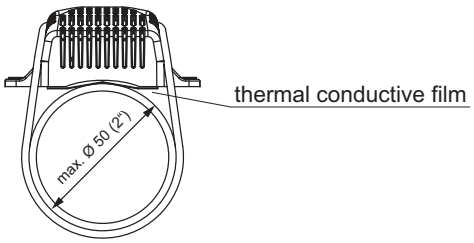
Humidity sensor	E+E HC105
Working range	10...100 % RH
Threshold at 20 °C (68°F), 24 V AC/DC	90±3 % RH
Hysteresis	
Response time at change of the surface temperature	t_{90} < 3 min.
Response time at change of the relative humidity	t_{90} < 25 sec.
Electrical output	potential free relay with changeover 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)
Temperature range storage	-20...70 °C (-4...158 °F)
Weight	approx. 60 g

Dimensions (mm/inch)

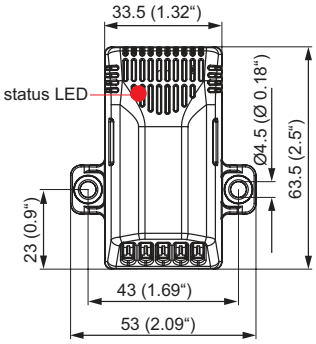
Installation

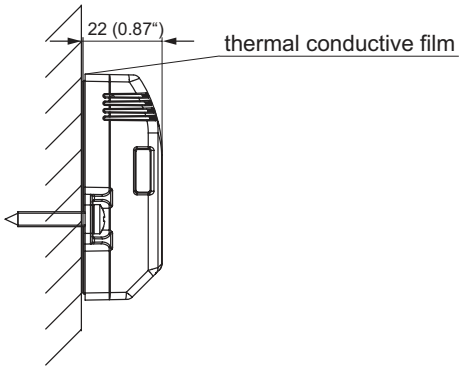
Pipe mount



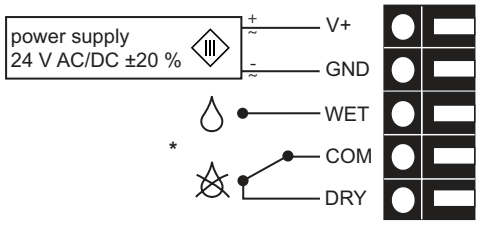


Wall mount





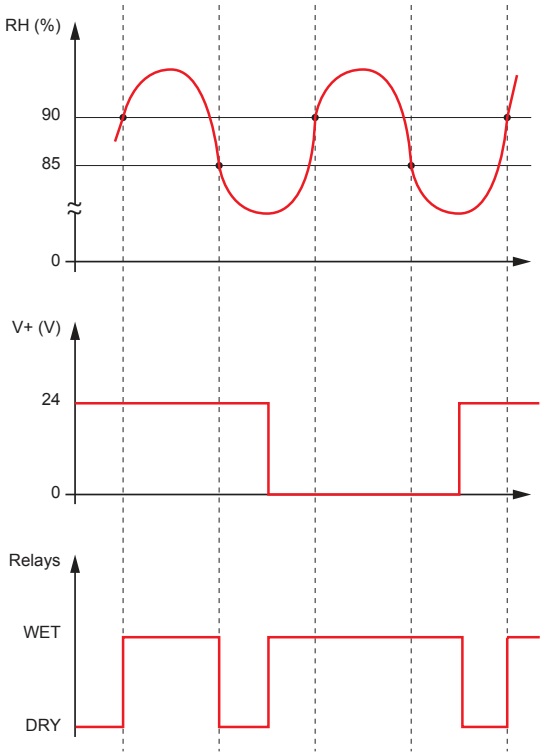
Connection Diagram / Status Indication



* 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

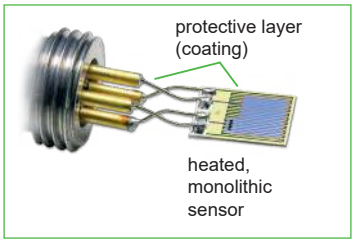
meteorology
wind turbine generators
road icing warning
off-shore measurements

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.



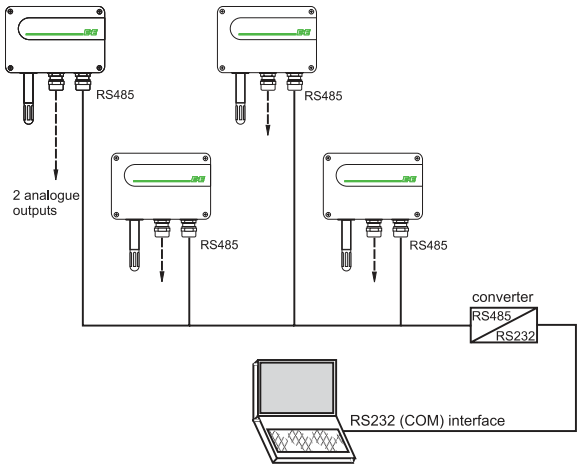
Radiation Shield

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).

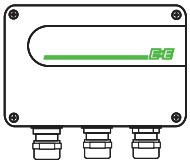
Network Compatibility / Ethernet Interface

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.



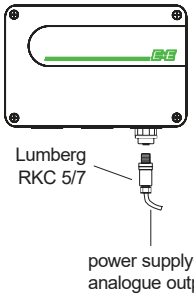
Connection Types

standard

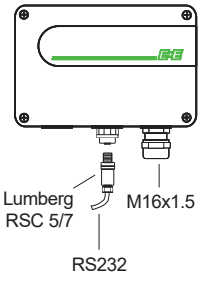


3x M16 x 1.5

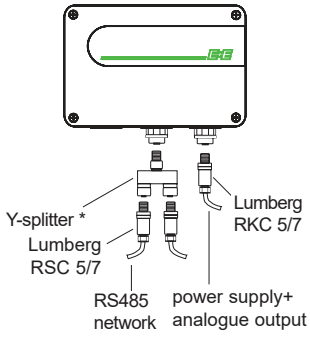
plug option C03



plug option C06



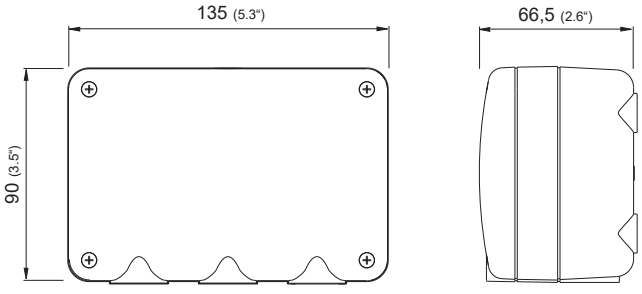
plug option C08



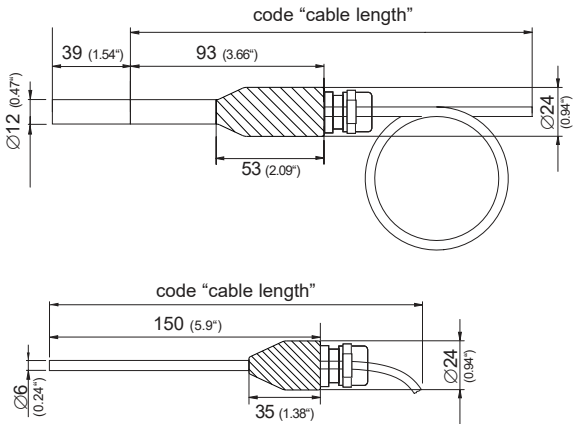
* Siemens 6ES7 194-1KA01-0XA0

Dimensions (mm)

Housing



Humidity probe



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

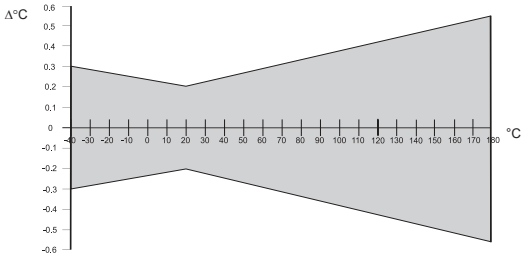
Technical Data

Measurement values

Relative humidity

Humidity sensor[1]		heated, monolithic HMC01
Working range[1]		0...100 % RH
Accuracy*) (including hysteresis, non-linearity and repeatability)		
-15...40 °C (5...104 °F)	≤90 % RH	± (1.3 + 0.3 %*mv) % RH
-15...40 °C (5...104 °F)	>90 % RH	± 2.3 % RH
-25...70 °C (-13...158 °F)		± (1.4 + 1 %*mv) % RH
-40...180 °C (-40...356 °F)		± (1.5 + 1.5 %*mv) % RH
Temperature dependence of electronics		typ. ± 0.01% RH/°C (0.0055% RH/°F)
Response time t_{90} at 20 °C (68 °F)		< 15 s

Temperature

Temperature sensor	Pt1000 DIN A
Working range sensing head	-40...180 °C (-40...248°F)
Accuracy	
Temperature dependence of electronics	typ. ± 0.005 °C/°C
External temperature probe	Pt1000 (DIN A)

Outputs[2]

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

Max. adjustable measurement range[2)3)]

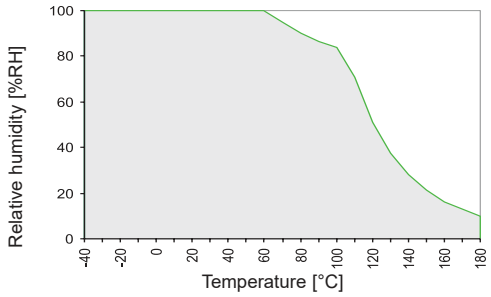
		min.	max.	Unit
Humidity	RH	0	100	% RH
Temperature	T	-40 (-40)	180 (248)	°C (°F)
Dew point temperature	Td	-40 (-40)	100 (212)	°C (°F)
Frost point temperature	Tf	-40 (-40)	0 (32)	°C (°F)
Wet bulb temperature	Tw	0 (32)	100 (212)	°C (°F)
Water vapour partial pressure	e	0	1100 (15)	mbar (psi)
Mixture ratio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

General

Supply voltage	8...35 V DC 12...30 V AC	
Current consumption - 2x voltage output	for 24 V DC/AC: typ. 40 mA / 80 mA	
- 2x current output	typ. 80 mA / 160 mA	
System requirements for software	WINDOWS 2000 or later; serial interface	
Housing / protection class	Polycarbonate / IP65	
Cable gland	M16 x 1.5	
Electrical connection	screw terminals up to max. 1.5 mm² (AWG 16)	
Working and storage temperature range of electronics	-40...60 °C (-40...140 °F)	
Electromagnetic compatibility according to	EN61326-1 Industrial Environment	EN61326-2-3 ICES-003 ClassA FCC Part15 ClassA

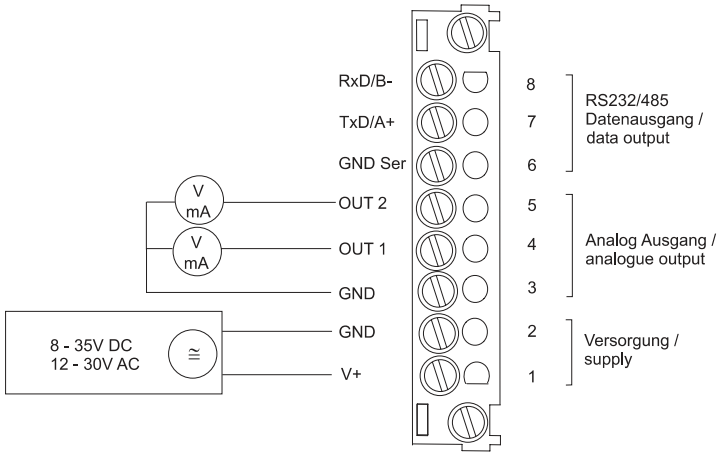
1) Refer to the working range of the humidity sensor.
2) Can be easily changed by software.
3) Refer to accuracies of calculated values (www.epluse.com/feuchtemessung).
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).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

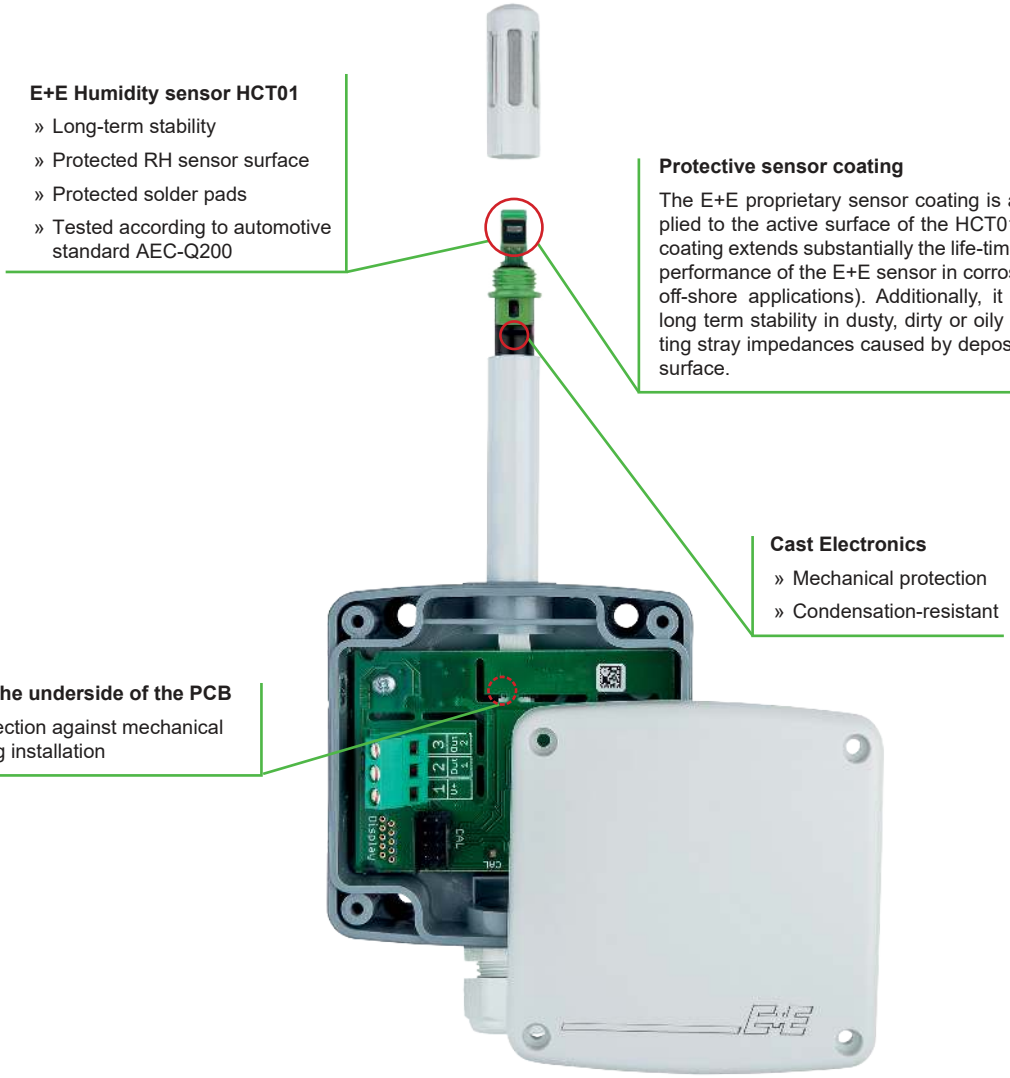
Excellent performance of EE210 Outdoor in polluted environment is ensured by the combination of completely encapsulated measurement electronics inside the sensing probe and long-term stable HCT01 sensor with the E+E proprietary protective coating.

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

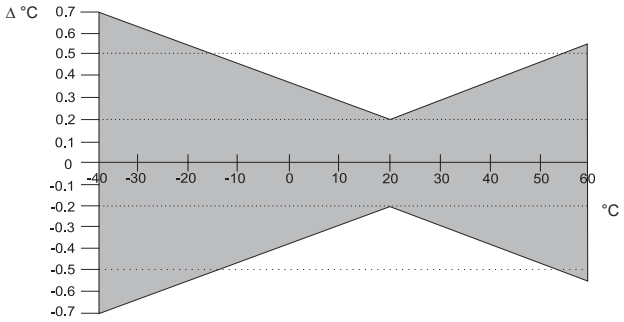
Measured Values

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

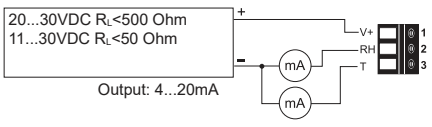
Radiation Shield

Material	Polystyrene

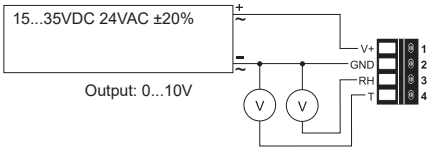
1) At 24V and 250 Ohm incl. hysteresis, non-linearity and repeatability
2) USA & Canada: class 2 supply required, max. supply voltage 30V

Connection Diagram

EE210-HT6x

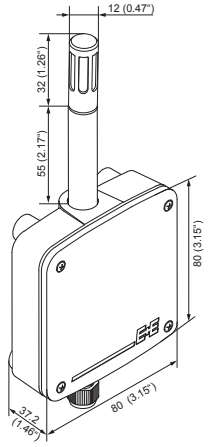


EE210-HT3x

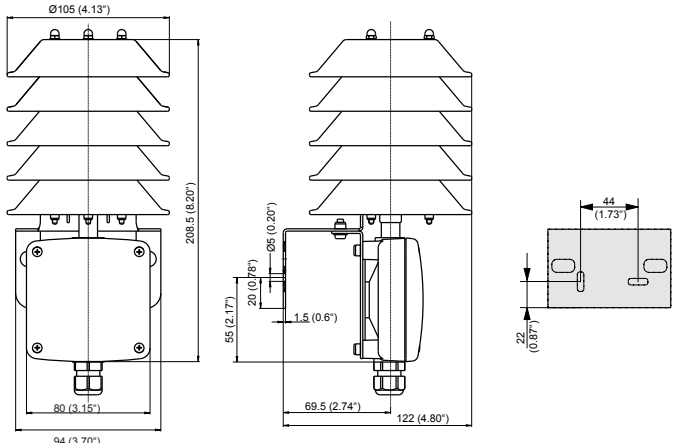


Dimensions (mm/inch)

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...400g/kg	0...2800gr/lb
absolute humidity	0...150g/m³	0...60gr/ft³
specific enthalpy	-50...400kJ/kg	-10...190BTU/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

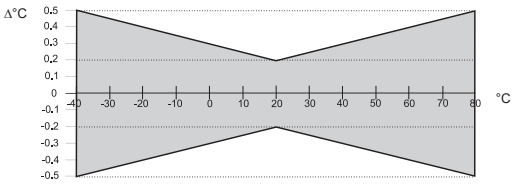
Measuring values

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	



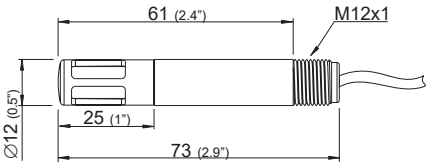
General

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)	

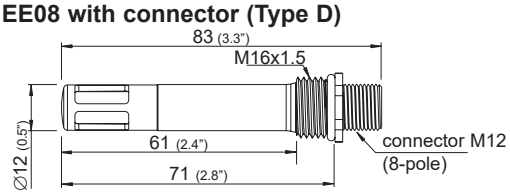
1) refer to the working range of the humidtiy sensor HC101
2) serial protocol refer to www.epluse.com
*) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with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

Dimensions (mm)

EE08 with cable (Type E)



EE08 with connector (Type D)



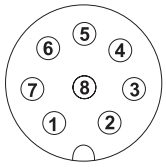
Connection Diagram

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	CABLELENGTH (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

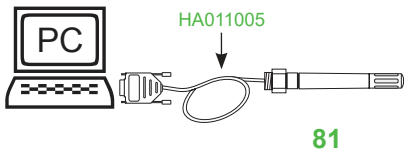
- EE08 Transmitter according to ordering guide
- Inspection certificate according to DIN EN10204 - 3.1

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



EE1950

Dew Point Measurement Module for High Humidity Applications

The EE1950 dew point (Td) measurement module is dedicated for demanding OEM applications such as climate and test chambers. It is optimized for best performance even in harsh, polluted and condensing environment.

Outstanding Accuracy and Long Term Stability

The innovative, heated E+E sensing element HMC01, together with a sophisticated electronic circuitry and a precise factory calibration procedure, allows for excellent accuracy and long-term stability of the EE1950 even under continuous high humidity conditions.

Relative Humidity Calculation

Together with an additional temperature sensor, the dew point module is the perfect solution for precise calculation of the relative humidity (RH) for climate chambers monitoring and control.

High Resistance to Chemicals, Dust and Corrosion

In contaminated environment, the Automatic Sensor ReCovery (ARC) function outgases the chemicals from the sensing element. Furthermore, the E+E proprietary coating protects the sensing element of EE1950 against dust and dirt deposits as well as against corrosive agents.

These features improve relevantly the long term performance and the service time of the device.

User Configurable and Adjustable

The dew point measured data is available on the analogue output, which can be set to current or voltage with a slide switch. The service interface and the free EE-PCS configuration software allow for easy output scaling and adjustment.

Easy Installation

The choice of two board sizes together with the high quality, flexible cable of the stainless steel sensing probe facilitate the design-in of the EE1950.

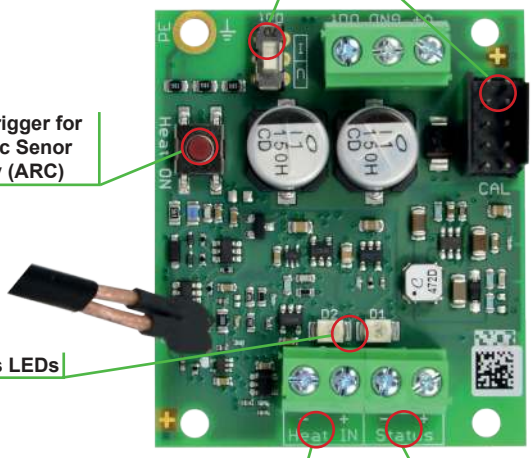
Features

HMC01 Sensor

» Heated sensing element for best performance and long term stability under continuous high RH and condensing conditions
» Automatic Sensor Recovery
» Protected by E+E proprietary coating

Inspection certificate

» According DIN EN 10204 - 3.1



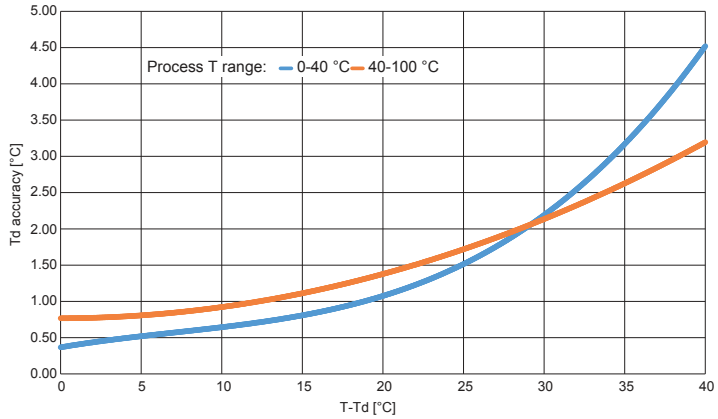
Protective sensor coating

The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing element. The coating substantially extends the lifetime and the measurement performance of the EE1950 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.

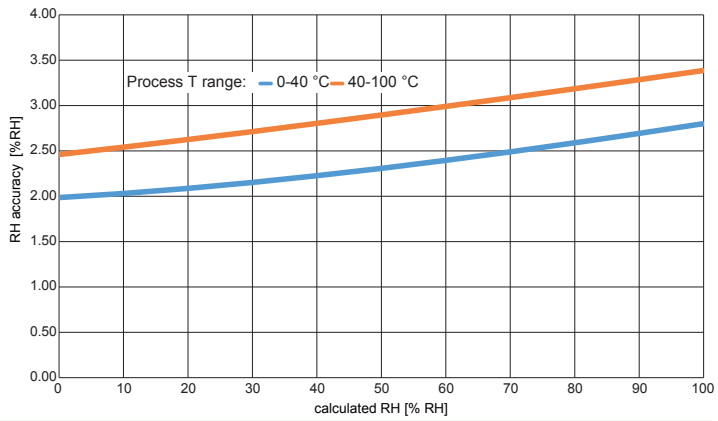
Technical Data

Measurands

Dew point (Td)

Working range	-20...100 °C Td (-4...212 °F Td)
Accuracy [1] for Td < 90 °C	

Accuracy of the **calculated relative humidity (RH)** out of the measured Td and the reading of an additional T-sensor with ±0.2 °C (3.6 °F) uncertainty.



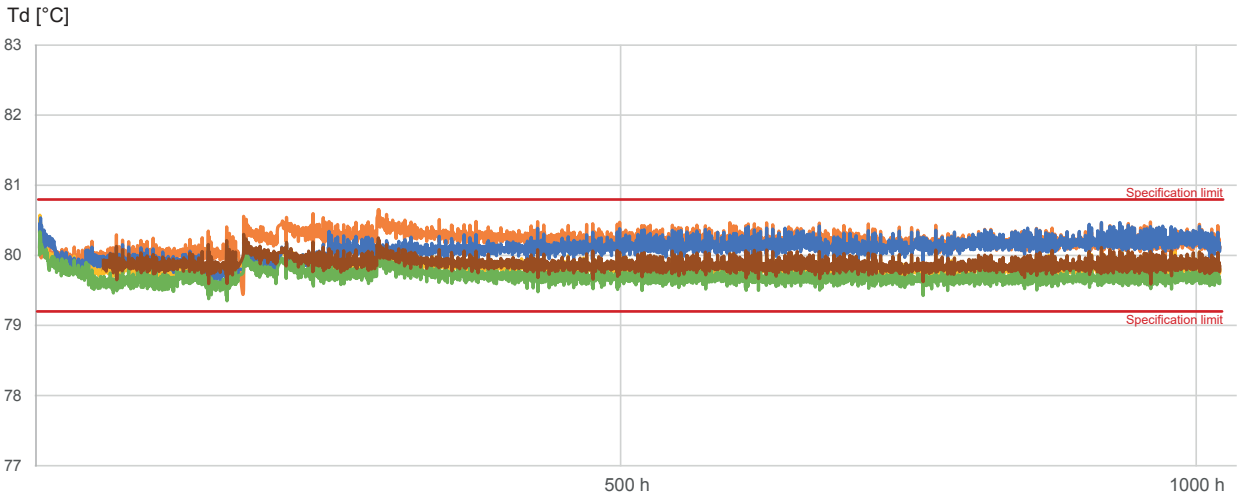
General

Response time RH $t_{10/90}$ at 20 °C (68 °F)	typ. 15 sec with stainless steel grid filter [2]
Supply voltage	15 - 35 V DC or 17 - 29 AC
Current consumption at 20 °C (68 °F)	see table below
Output signal	0-1 / 5 / 10 V -1 mA < I_L < 1 mA 0 / 4-20 mA (3 wire) R_L < 500 Ω
ARC status signal	optocoupler, open/closed
Working range electronics	-40…60 °C (-40...140 °F) / 0...90 % RH non-condensing
Working range probe	-70...180 °C (-94...356 °F) / 0...100 % RH
Storage conditions	-40…60 °C (-40...140 °F) / 0...90 % RH non-condensing
Electrical connection	screw terminals up to max. 1.5 mm² (AWG 16)
Electromagnetic compatibility	EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, Industrial Enviroment and EN55011

Supply	24 V DC	24 V AC
Measuring mode	< 35 mA	< 70 mA_{eff}
ARC mode	max. 80 mA	max .160 mA_{eff}

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) Other filters see data sheet "Accessories".

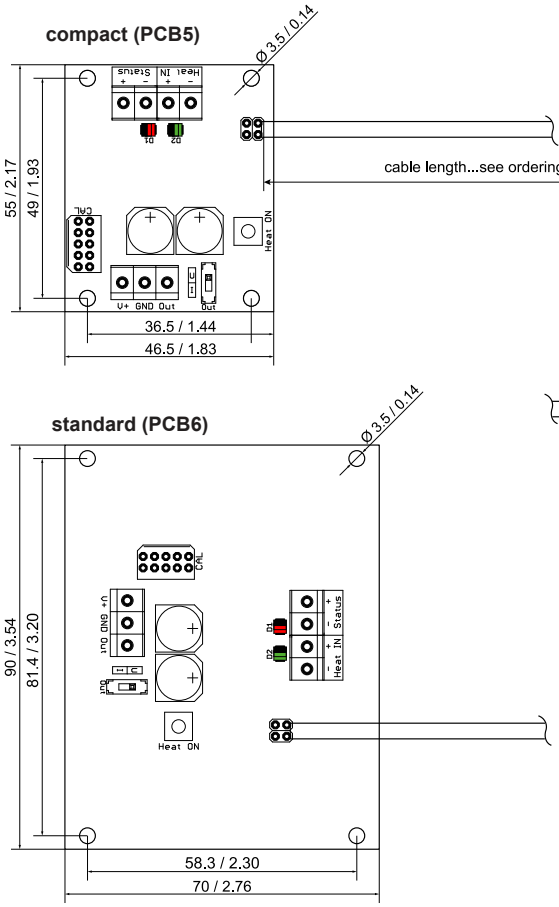
Long-term test 85 °C (185 °F) / 85 %RH



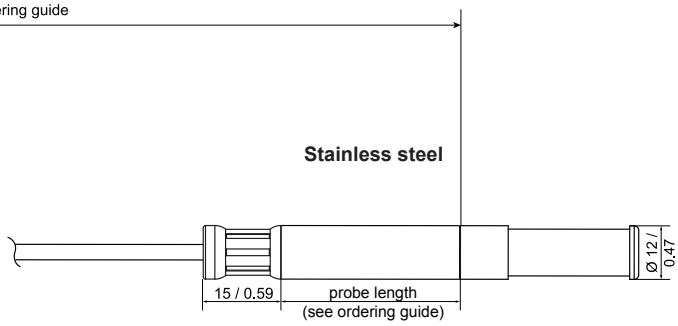
Stability of five EE1950 dew point measuring modules during an 85 °C (185 °F) / 85 %RH long-term test over 1000 hours.

Dimensions (mm/inch)

Electronics boards



Sensing probe



Ordering Guide

		EE1950
PCB size	standard (90 x 70 mm (3.54 x 2.76 "))	PCB6
	compact (55 x 46.5 mm (2.17 x 1.83 "))	PCB5
Probe material	stainless steel	PM2
Probe length	65 mm (2.56 ")	L65
	200 mm (7.84 ")	L200
Cable length	0.5 m (1.64 ft)	no code
	1.5 m (4.92 ft)	K1.5
	3 m (9.84 ft)	K3
E+E sensor coating	without coating	no code
	with coating	C1
Filter	stainless steel grid filter	F9
	stainless steel sintered filter	F4
	PTFE Filter	no code
	H_2O_2 Filter	F12
Output	dew point temperature (°C)	MA52
	dew point temperature (°F)	MA53
Output signal	0-1 V	GA1
	0-5 V	GA2
	0-10 V	no code
	0-20 mA	GA5
	4-20 mA	GA6
Output scale low	0	no code
	value	SAL *value*
Output scale high	100	no code
	value	SAH *value*

Order Example

EE1950-PCB6PM2L65K3C1F3MA52SAL-20SAH40

PCB size:	90 x 70 mm (3.54 x 2.76 ")
Probe material:	stainless steel
Probe length:	65 mm (2.56 ")
Cable length:	3 m (9.84 ")
E+E Sensor coating:	with coating
Filter:	stainless steel sintered filter
Output:	dew point temperature (°C)
Output signal:	0-10 V
Scaling 1 low:	-20
Scaling 1 high:	40

EE1950-PCB5PM2L200M52

PCB size:	55 x 46.5 mm (2.17 x 1.83 ")
Probe material:	stainless steel
Probe length:	200 mm (7.84 ")
Cable length:	0.5 m (1.64 ft)
E+E Sensor coating:	without coating
Filter:	PTFE Filter
Output:	dew point temperature (°C)
Output signal:	0-10 V
Scaling 1 low:	0
Scaling 1 high:	100

Accessories (see datasheet „Accessories“)

- Mounting flange 12 mm	HA010201
- Configuration cable with USB adapter	HA011017
- Stainless steel wall mounting clip Ø12 mm	HA010225

EE1900

Humidity Measurement Module for OEM Applications

The EE1900 humidity module is optimised for the measurement of relative humidity (RH) or dew point temperature (Td) in climate chambers. With outstanding temperature compensation across the working range from -70 °C to 180 °C (-94 °F to 356 °F) and the choice of stainless steel and plastic (PPS) probes, the module is suitable for a wide range of applications.

The excellent measuring accuracy of the EE1900 rests on the innovative E+E humidity and temperature sensing element HMC01.
The proprietary E+E coating protects the sensor from dust, dirt and corrosive agents. Therefore, the EE1900 module features excellent long term stability even in harsh environment.

In applications with chemical contamination, the EE1900 stands out by the **A**utomatic Sensor **R**e**C**overy (ARC) function. The controlled, strong heating outgases the chemicals from the sensing element to ensure reliable and stable measurements.

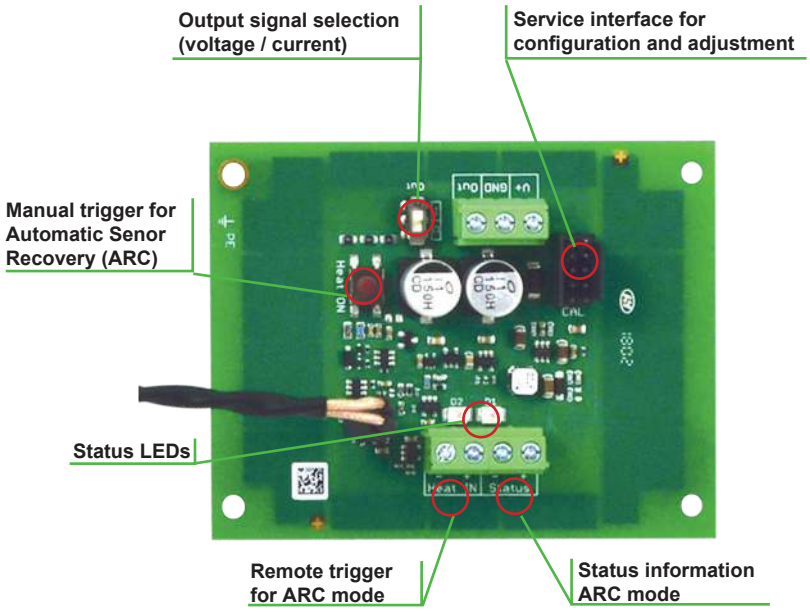
The analogue output of the EE1900 can be set to current or voltage with a slide switch. The service interface and the free EE-PCS configuration software allow for output scaling and adjustment of the humidity measurement.

The high-quality, flexible probe cable up to 3 m facilitates mounting of the EE1900. The electronics board is available in two sizes, for easy integration into existing climate chambers and other machines.

Features

HMC01 Sensor

» Automatic Sensor Recovery
» Protected by E+E proprietary coating



Protective sensor coating

The E+E proprietary sensor coating is a protective layer applied to the active surface and leads of the sensing element. The coating substantially extends the lifetime and the measurement performance of the EE1900 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.

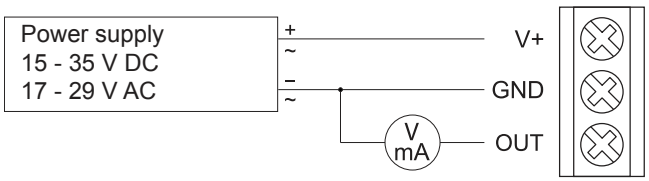
Technical Data

Sensor	HMC01
Measured values	
Relative humidity (RH)	
Working range	0…100 % RH
Accuracy[1] (incl. hysteresis, non-linearity and repeatability)	
-20...40 °C (-4...104 °F)	± 2 % RH (≤90 % RH) / ± 2.5 % RH (>90 % RH)
-40...180 °C (-40...356 °F)	± 2.5 % RH (≤90 % RH) / ± 3.5 % RH (>90 % RH)
Dew point (Td)	
Working range	-20...80 °C Td (-4...176 °F Td)
Accuracy	± 2 °C (± 3.6 °F) for | $T_{ambient}$ - Td | < 20 °C (36 °F)
General	
Response time RH $t_{10/90}$ at 20°C (68 °F)	typ. 15 sec with stainless steel grid filter[2]
Supply voltage	15 - 35 V DC and 17 - 29 AC
Current consumption	
for DC supply	< 32 mA
for AC supply	< 60 mA_{eff}
Output signal	0-1 / 5 /10 V -1 mA < I_L < 1 mA 0 / 4-20 mA (3 wire) R_L < 500 Ω
ARC status signal	optocoupler, open/closed
Working range electronics	-40…60 °C (-40...140 °F) / 0...90% RH non-condensing
Working range probe	-70...180 °C (-94...356 °F) / 0...100 % RH
Storage conditions	-40…60°C (-40...140 °F) / 0...90% RH non-condensing
Electrical connection	screw terminals up to max. 1.5 mm² (AWG 16)
Electromagnetic compatibility	Component for OEM equipment tested according to EN61000-4-3 and EN61000-4-6

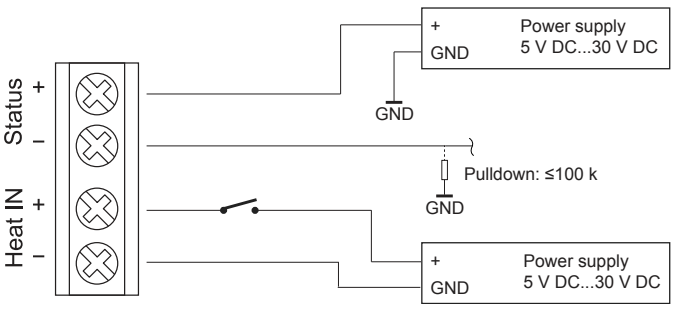
1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
2) Other filters see data sheet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

Connection Diagramm

Supply



ARC - Automatic Sensor ReCovery



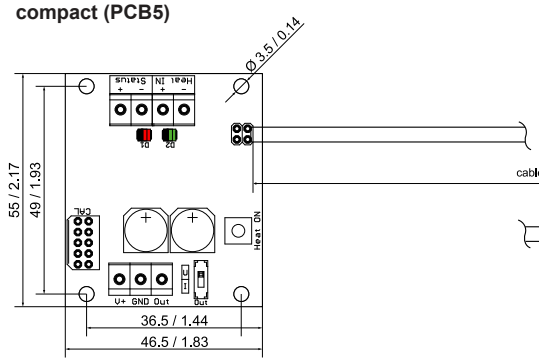
Current consumption in ARC mode

Supply	Consumption
15 V DC	~120 mA (max.)
24 V DC	~80 mA (max.)
35 V DC	~55 mA (max.)
17 V AC	~210 mA_{eff} (max.)
24 V AC	~160 mA_{eff} (max.)
29 V AC	~140 mA_{eff} (max.)

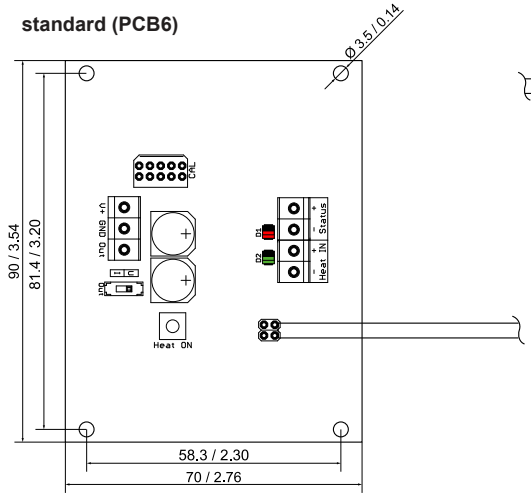
Dimensions (mm/inch)

Electronics boards

compact (PCB5)

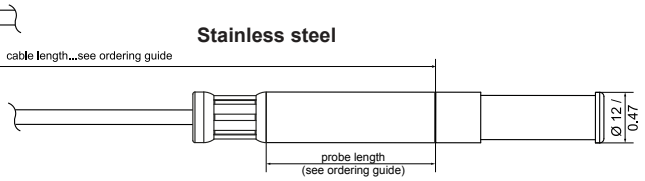


standard (PCB6)

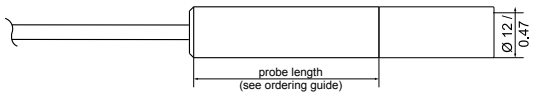


Sensing probes

Stainless steel



Plastic (PPS)



Ordering Guide

		EE1900
PCB size	standard (90 x 70 mm (3.54 x 2.76 ")) compact (55 x 46.5 mm (2.17 x 1.83 "))	PCB6 PCB5
Probe material	Plastic (PPS) Stainless steel	no code PM2
Probe length	45 mm (1.77") (only for plastic probe) 65 mm (2.56") (only for stainless steel probe) 200 mm (7.84")	no code L65 L200
Cable length	0.5 m (1.64 ft) 1.5 m (4.92 ft) 3 m (9.84 ft)	no code K1.5 K3
E+E sensor coating	without coating with coating	no code C1
Filter	Stainless steel grid filter Stainless steel sintered filter PTFE Filter H2O2 Filter	F9 F4 no code F12
Output	Relative humidity (% RH) Dew point temperature (°C) Dew point temperature (°F)	no code MA52 MA53
Output signal	0-1 V 0-5 V 0-10 V 0-20 mA 4-20 mA	GA1 GA2 no code GA5 GA6
Output scale low	0 *Value*	no code SAL *Value*
Output scale high	100 *Value*	no Code SAH *Value*

Order Example

EE1900-PCB5

PCB size:	55 x 46.5 mm (2.17 x 1.83 ")
Probe material:	platstic (PPS)
Probe length:	45 mm
Cable length:	0.5 m
E+E Sensor coating	without coating
Filter:	PTFE Filter
Output:	relative humidity (% RH)
Output signal:	0-10 V
Scaling 1 low:	0
Scaling 1 high:	100

Scope of supply

- EE1900 according to ordering guide
- Inspection certificate according to DIN EN 10204 – 3.1

Accessories (see datasheet „Accessories“)

- Mounting flange 12 mm	HA010201
- Configuration cable with USB adapter	HA011017
- Stainless steel wall mounting clip Ø12 mm	HA010225

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

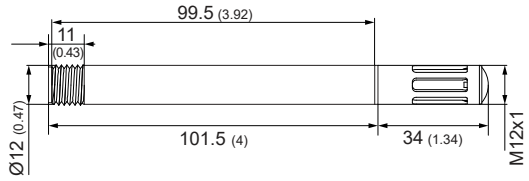
Supply voltage	HT1: 3.6...30 V DC / HT2: 10...30 V DC / HT3: 15...30 V DC
Current consumption	typ. 1.5 mA
Electrical connection	M12 connector or cable (PVC, Ø 4.3 mm, 4 x 25 mm²)
Housing	polycarbonate / IP65
Electromagnetic compatibility [2]	EN61326-1
(industrial environment)	EN61326-2-3
Working and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

CE

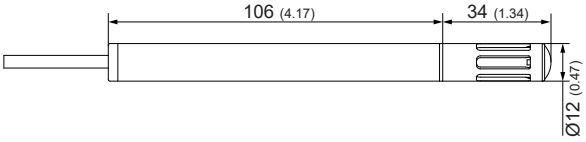
1) Analogue output 0-1 V is not protected against surge!

Dimensions in mm (inch)

connector version



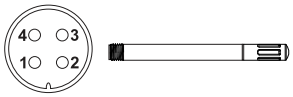
cable version



Connection Diagram

connector version

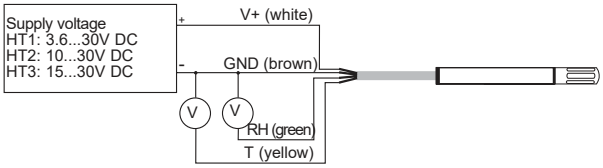
Connector 4-pole (M)
1...V+
2...RH-out
3...GND
4...T-out



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

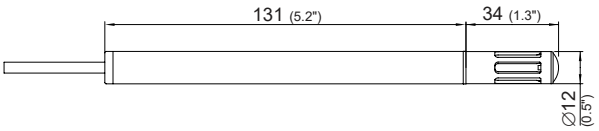
General

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

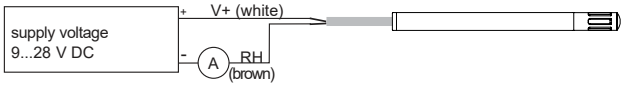
1) Refer to the working range of the humidity sensor

Dimensions (mm)

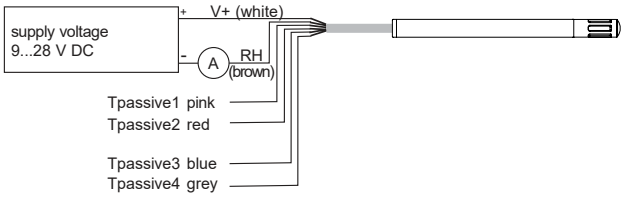


Connection Diagram

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"

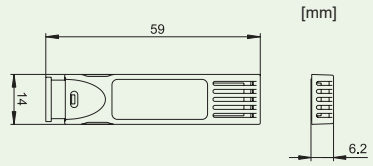
Scope of Supply

- EE061 Transmitter according to ordering guide

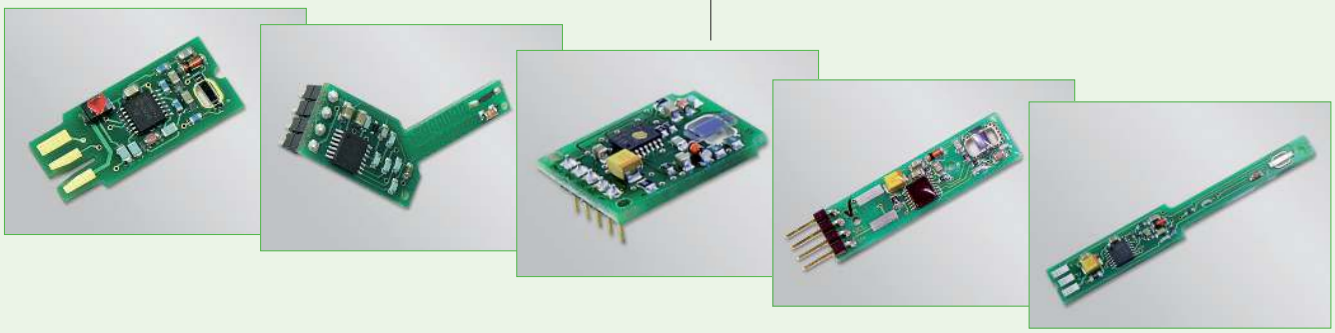
OEM Products

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.

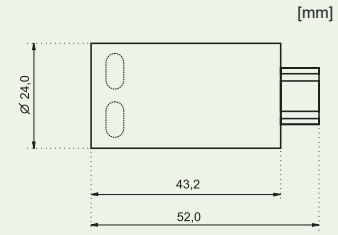
EE03 Series



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

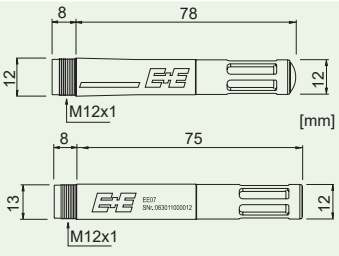


EE04 Series



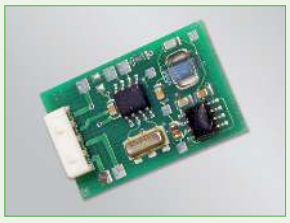
Measuring range:	0...100% RH / -40...85°C (-40...185°F)
Accuracy at 20°C (70°F):	±3% RH (40...60% RH) / ±0.3°C (±0.54°F)
Humidity output:	linear analogue output: 0...100% RH ≙ 0.1xU_V...0.9x U_V
Temperature output:	voltage divider: NTC with pull down resistor
Supply:	5.5V DC ±10%

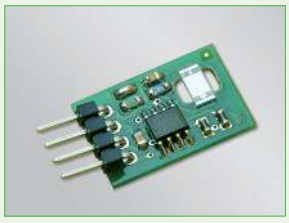
EE07 Series

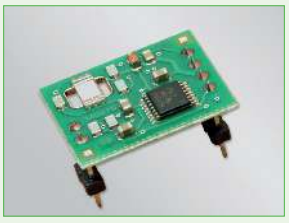


Measuring range:	0...100% RH / -40...80°C (-40...176°F)
Accuracy at 20°C (70°F):	±2% RH (0...90% RH) / ±0.3°C (±0.54°F)
Output:	digital (2-wires)
Supply:	3.8...5.5V DC
Housing:	polycarbonate or stainless steel

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:

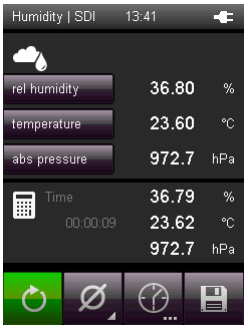
- relative humidity RH
- temperature T
- dew point temperature Td
- absolute humidity dv
- mixing ratio r
- air velocity v
- volumetric flow $\dot{v}$
- air pressure p
- CO_2 ppm

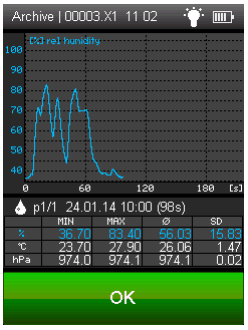
Store measurement values in the internal memory of the device and use the free SmartGraph3 software to manage data on your PC. The optional carrying case accommodates the hand-held and probes, as well as accessories.

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

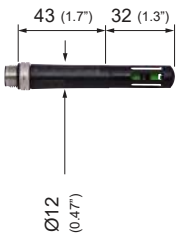
Power supply	4 x Alkaline LR6 AA batteries, 1.5 V **(not in the scope of supply)**
Optional power supply	5V DC via USB (cable included)
Temperature range	operating: handheld and handle of sensing probe: 0...50°C (32...122°F) storage: -20...60°C (-4...140°F)
Internal memory	for approx. 2 million measured 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

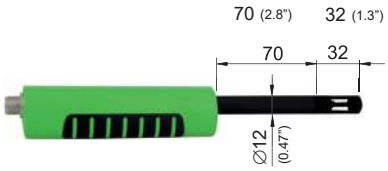
LOGPROBE 20 - compact, pluggable HVAC probe



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

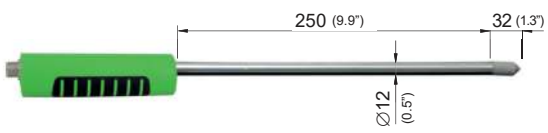
Order code: **LOGPROBE20-HTPA**
Response time τ_{90} ≤ 10 sec.
Filter: Plastic grid filter

LOGPROBE 16 - HVAC probe



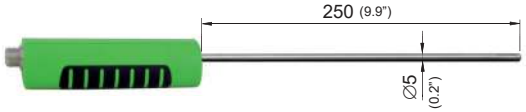
Working range: 0...100% RH / -20...70°C (-4...158°F)
Accuracy: ±2% RH (0...90% RH), ±3% RH (90...100% RH) @20°C / 68°F
±0.2°C / ±0.36°F @20°C / 68°F
max. ±0.5°C / ±0.9°F (-20...70°C / -4...158°F)
Response time τ_{90}: ≤ 7 sec.
Order code: **LOGPROBE16**

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**

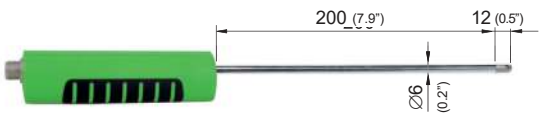
LOGPROBE 30 - confined space probe



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**

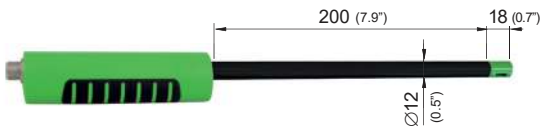
AIR VELOCITY PROBES

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**

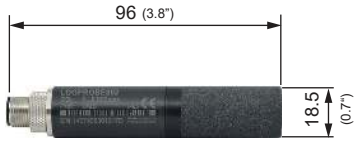
LOGPROBE 65 - polycarbonate probe



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

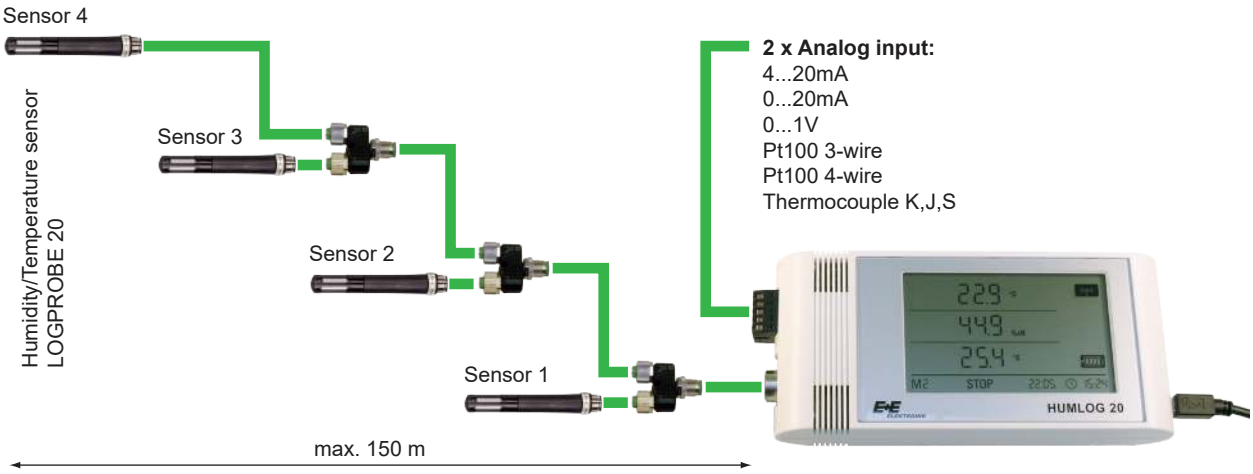
museums and exhibition spaces
clean rooms
warehouses
electronic-data-processing centres
calibration laboratories

Features

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

HUMLOG20 E Configurations Examples

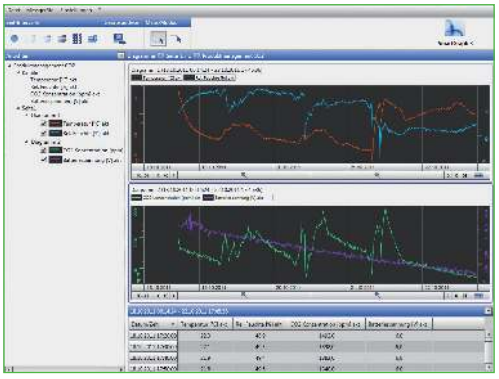
The HUMLOG20 E is equipped with an digital input, which allows the connection of up to four external humidity/temperature sensors.
Two additional analog inputs for sensors with voltage or current output, Pt100 temperature sensors in 3 and 4 wire technology or Thermocouple J, K and S offers highest flexibility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

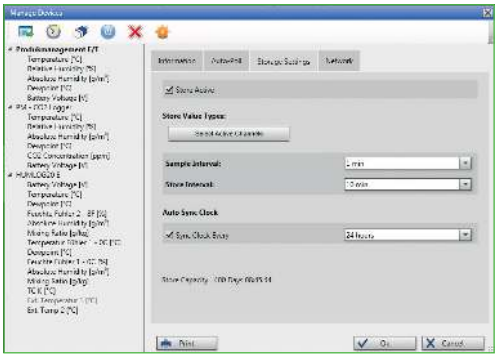


Software SmartGraph3

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

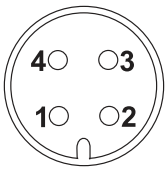
Sensor	capacitive	
Measurement range	relative humidity	0...100%RH
	absolute humidity	0...290 g/m³
	mixing ratio	0...550 g/kg
	dew point temperature	-40...80°C (-40...176°F)
Accuracy at 20°C	±2%RH (0...90%RH) ±3%RH (90...100%RH)	

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)

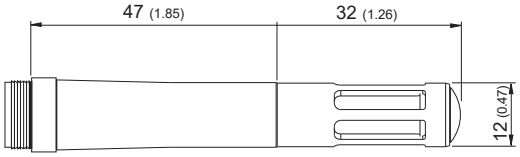
1) is not protected against surge

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)

Humidity Sensor Elements

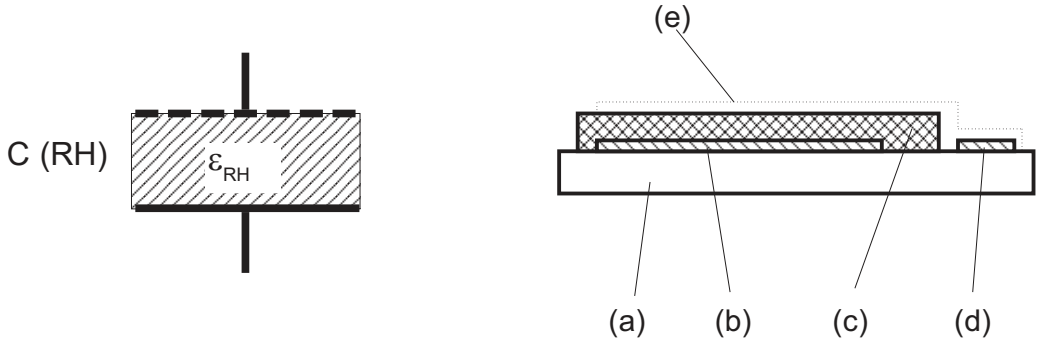
HCT01
HC109
HC103M2
HC201

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

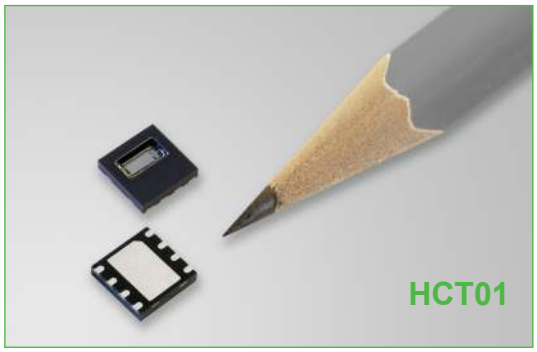
It is given as peak to peak voltage. DC voltage components on the sensing element are not allowed.

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

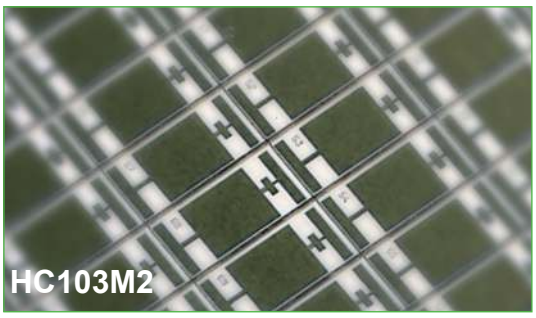


HC109 - SMD Version

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.

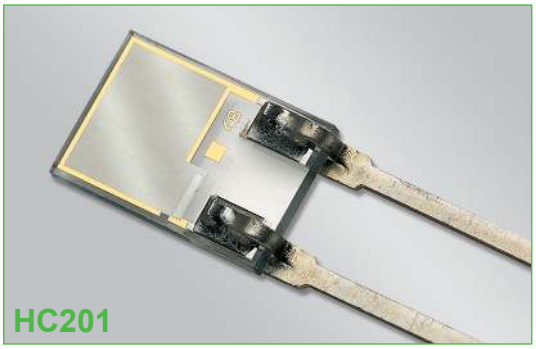
HC103M2

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.



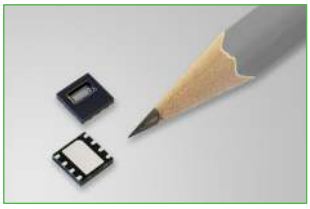
HC201 - For Cost-Effective Applications

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.

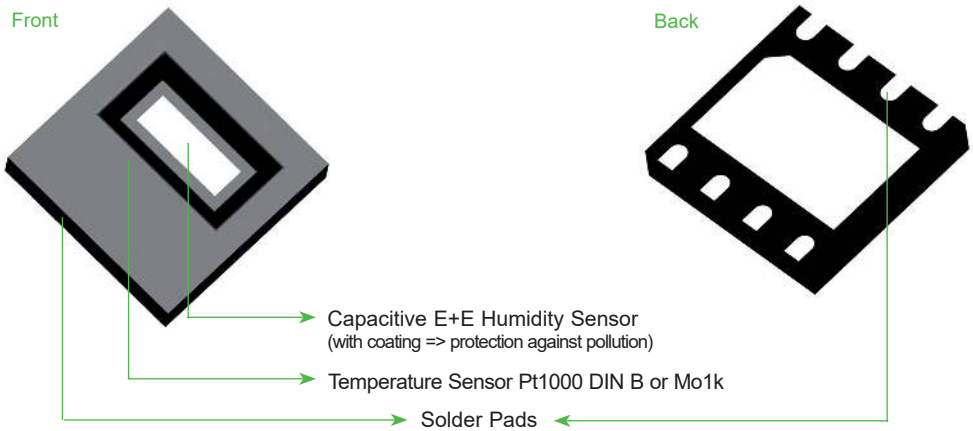
The pre-adjusted capacitive E+E humidity sensorelement saves complicated and time-consuming humidity adjustment. Highly accurate thin-film elements are used for the temperature measurement – a must for precise dew point determination. The DFN packaging guarantees maximum mechanical sensor protection 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.

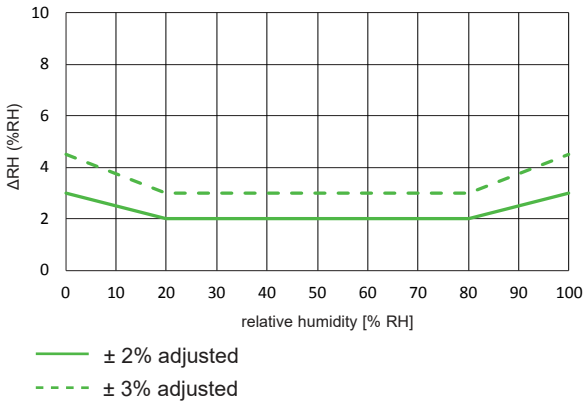
Features

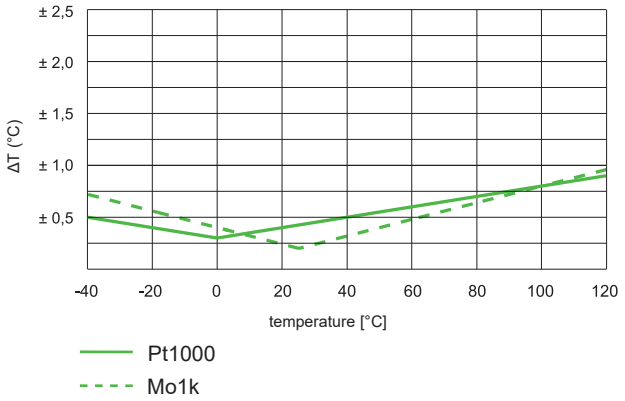
RH and T sensor in one package
RH adjusted
mature humidity sensor technology
high temperature accuracy
reflow solderable
integrated dust filter
standardized DFN package

Basic Design



Accuracy for rH and T

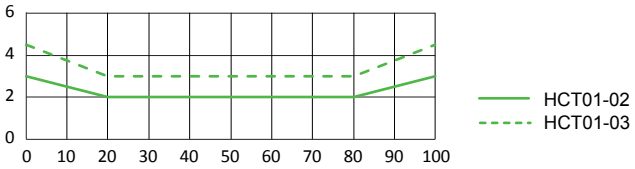




Technical Data

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

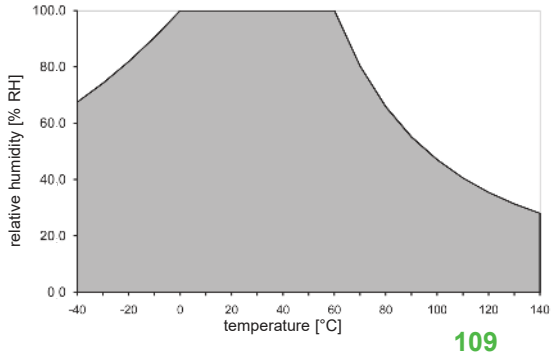
Temperature Element	Mo1k	Pt1000
Nominal resistance (at 25°C / 77°F)	R_{25} = 1000 Ohm	R_0 = 1000 Ohm
Accuracy	dt = ±[0.2+0.008 * (t-25)] K	DINB
Respons time	$t_{63} \leq 6$s	
Characteristics	$R = R_0 * (1+A*t+B*t^2)$ R_0 = 928.73 Ohm A = 0.0030659 $B = 3.41*10^{-7}$	acc. EN60751
Maximum continuous current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

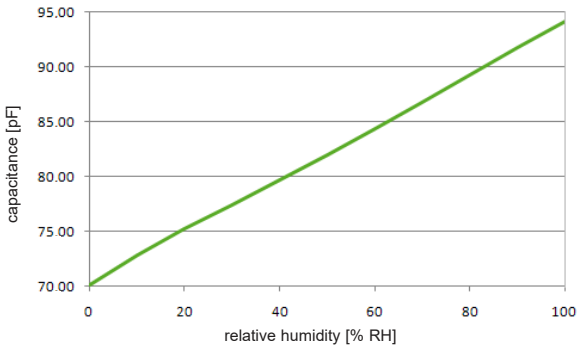
The working range is shown with regard to the humidity / temperature limits.

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:

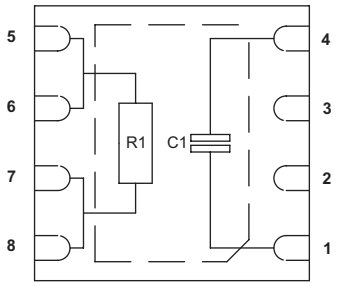
$$C(U_w) = C_0 * [1 + HC_0 * U_w + k(U_w)]$$

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:

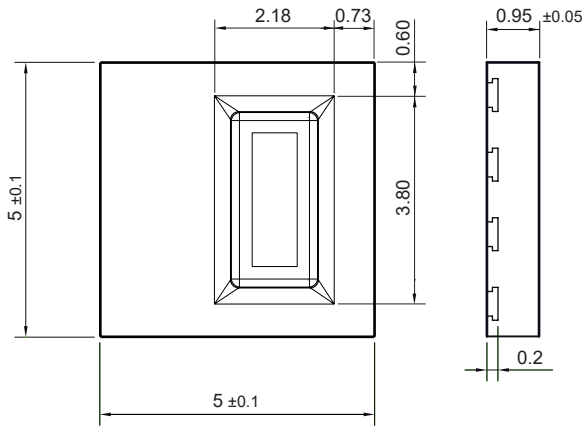


1	H1	Humidity +
2	NC	not connected
3	NC	not connected
4	H2	Humidity -
5	T1	Temperature
6	T1	Temperature
7	T2	Temperature
8	T2	Temperature

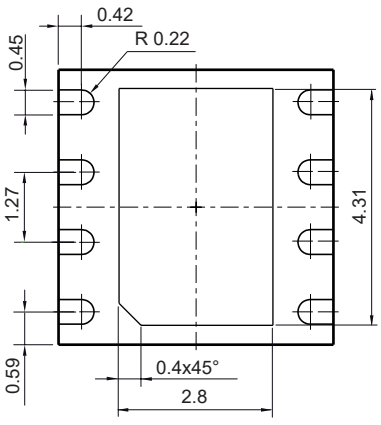
Dimensions in mm

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

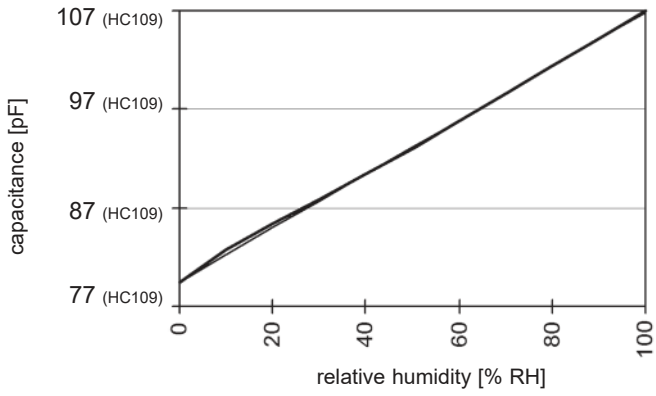
1) In environments with high concentrations of volatile organic compounds, the value may be higher.

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:

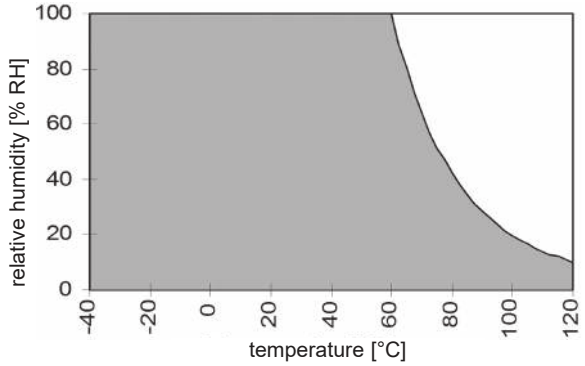
$$K(RH) = A_1*RH+A_2*RH^{1.5}+A_3*RH^2+A_4*RH^{2.5}$$

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

Working Range

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

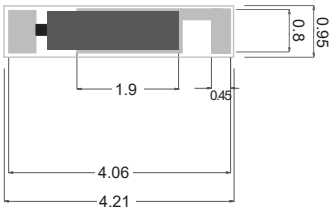
Although the sensors would not fail beyond the limits, the specification is guaranteed only within the working range.
In applications with high humidity at high temperatures the time factor shall be considered.

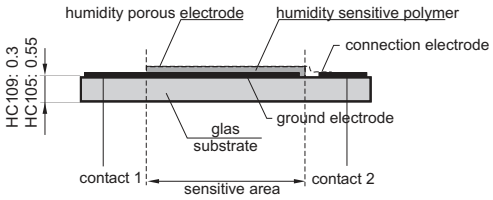


Dimensions (mm)

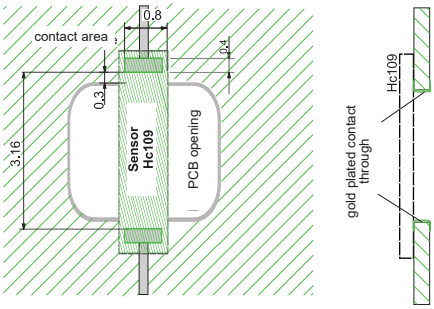
1 mm = 0.03937" / 1" = 25.4 mm

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

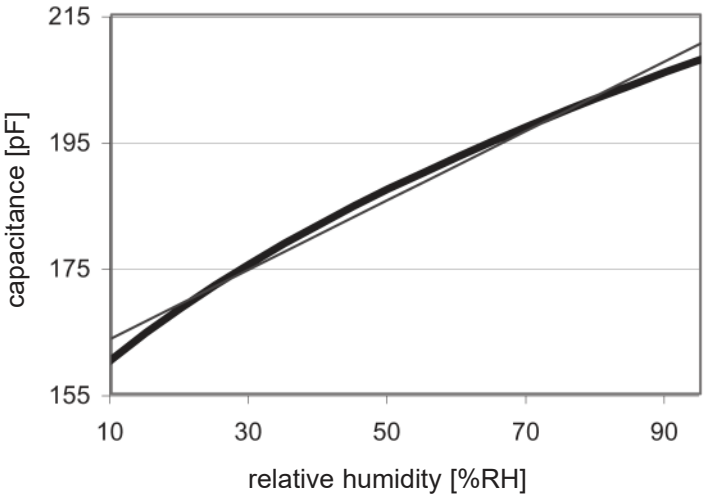
HC201	taped
HC201/H	in tube (80 pcs packing unit)
HC201/G	taped

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:

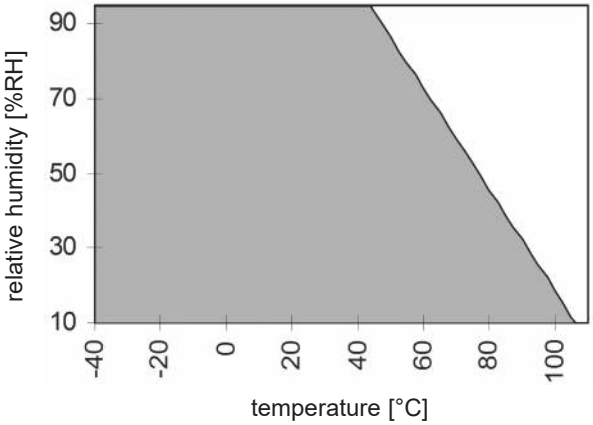
$C(RH) = C_{76} * [1 + HK * (RH – 76)]$
with HK = 2700 ± 250 ppm /% RH



Working Range

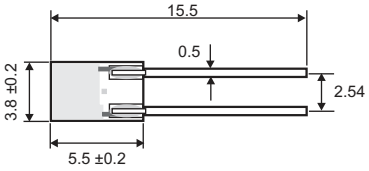
The working range for the humidity sensor HC201 is shown with regard to the humidity / temperature limits.

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.

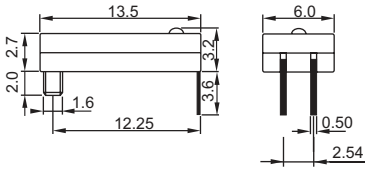


Dimensions (mm)

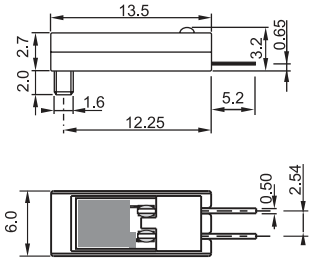
1 mm = 0.03937” / 1” = 25.4 mm



HC201



HC201/H



HC201/G

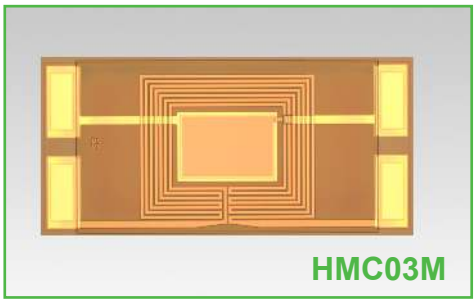
Ordering Guide

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.

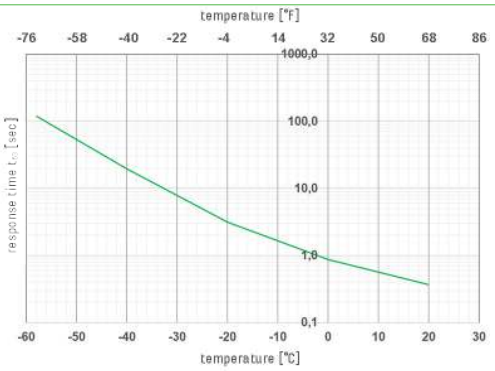

HMC03M

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)

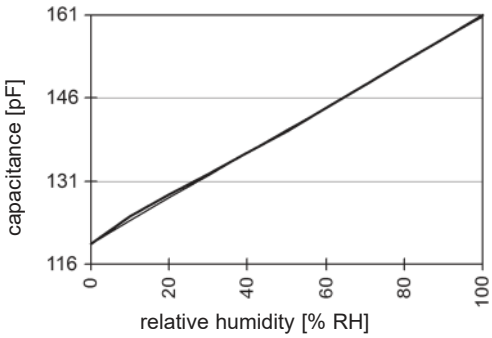
Nominal resistance R_0	100 ± 20 Ohm
Temperature coefficient	3500 ± 150 ppm/K
Self heating coefficient (SHC), typical (at 980 hPa)	
5 m/s	0.09 K/mW
1 m/s	0.17 K/mW
0.1 m/s	0.31 K/mW
Max. power	100 mW

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:

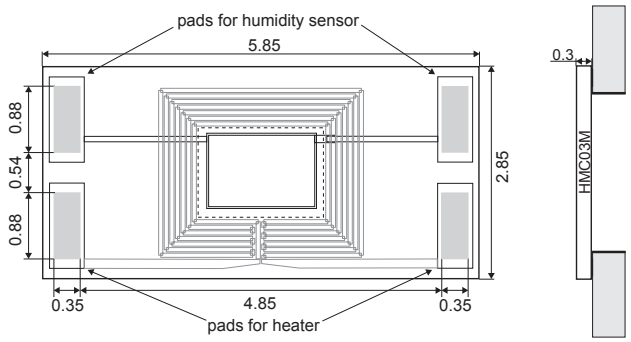
$R(t) = R_0 * (1 + A * t + B * t^2 + C * (t - 100) * t^3)$, where

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

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)

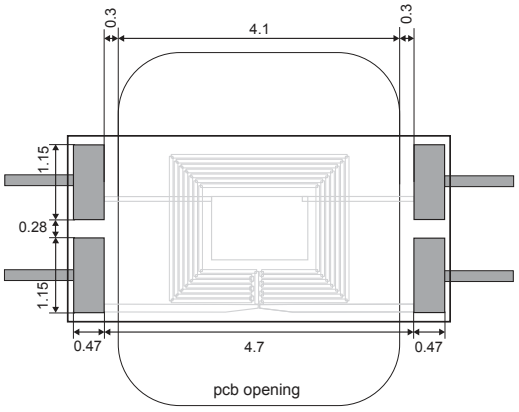
Dimensions (mm)



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

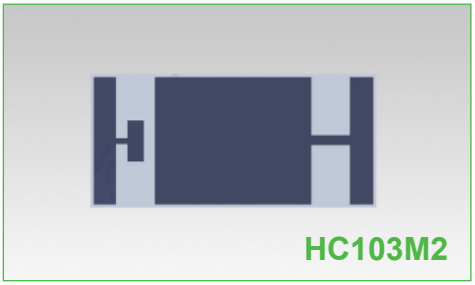
Type: HMC03M
Packaging: 1000 sensors per reel

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.

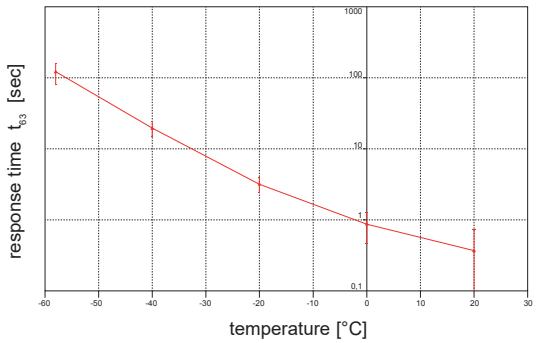
Typical Applications

Radiosondes
Weather observation

Features

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

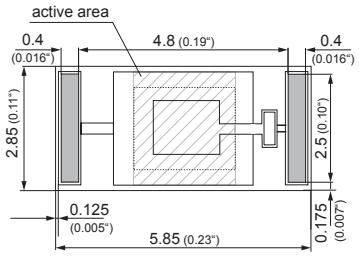
Technical Data

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}	

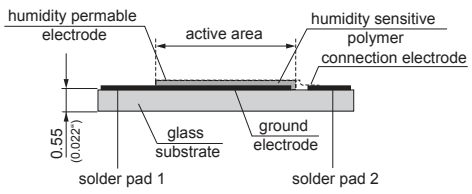
Temperature dependence[1)]	dC = -0.0019*RH*(T-30 °C) [pF]
Loss tangent	< 0.05
Maximum supply voltage	5 V max (UPP)
Maximum DC voltage	< 5 mV
Operating frequency	10...100 kHz, recommended 20 kHz

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

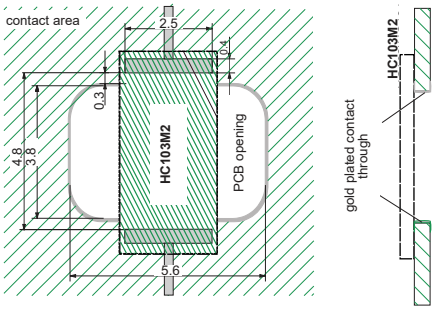
Dimensions (mm/inch)



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.

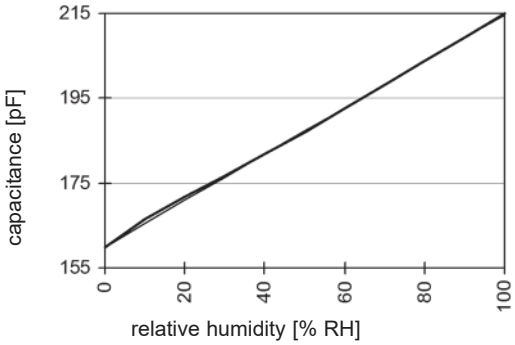
Please refer to the HC103M2 Handling Instructions at www.epluse.com.

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

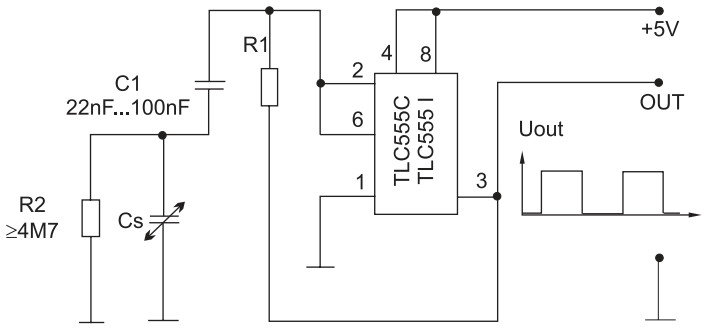
If necessary, the HC sensors can be cleaned by shaking them in pure isopropylalcohol, industrial grade. Do not touch or rub the sensor surface. After cleaning with isopropylalcohol, immerse them in water and let them dry.

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“)

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.

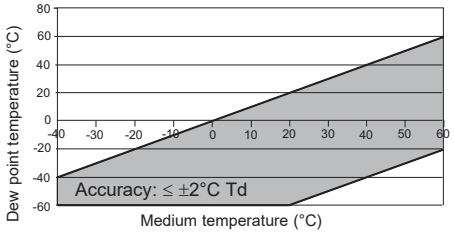
The measured values for dew point, frost point or ppm volume concentration are available on an analog 4-20 mA and a digital Modbus RTU output. Integration into the measurement task is simplified by the compact design and the exceptionally robust stainless steel housing.

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

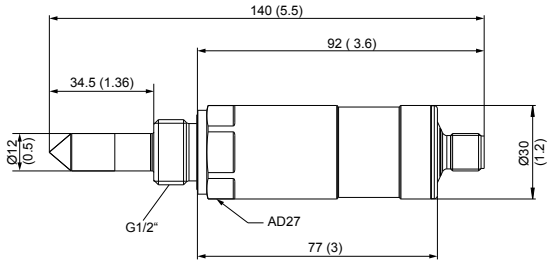
Supply voltage	18...28 V DC
Current consumption at 24V DC	<20 mA + load current / with autocalibration: 100 mA + load current
Pressure range of use	0...80 bar
Housing / protection class	Stainless steel 1.4404 (AISI 316L) / IP65
Electrical connection [2]	M12x1 5-pin plug
Sensor protection	Stainless steel 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

CE

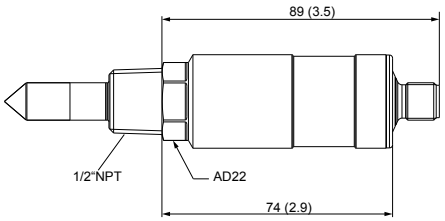
1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
2) Field-attachable mating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

Dimensions in mm (inch)

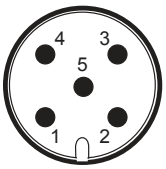
ISO



NPT



Connection Diagram

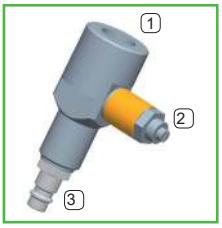


Plug

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.


EE354

Typical Applications

Compressed air monitoring
Refrigeration dryer

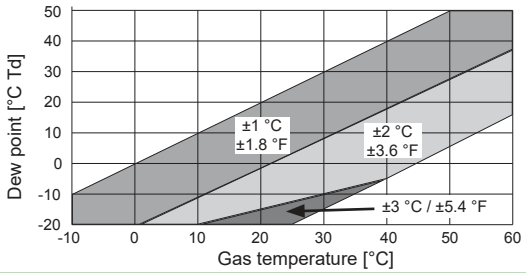
Features

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	

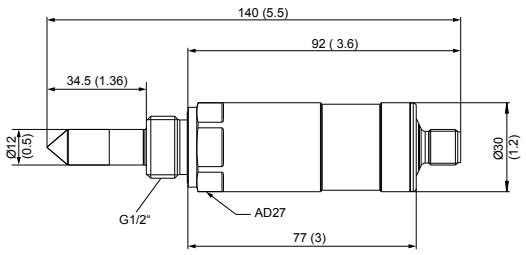
General

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

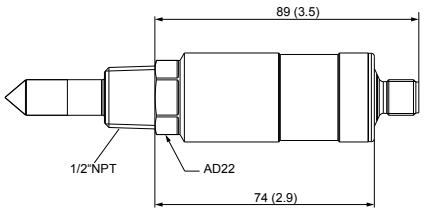
1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2 x standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).
2) Flange receptacle for self assembly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

Dimensions in mm (inch)

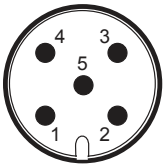
ISO



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]			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 Sensor

The EE371 is dedicated for accurate and reliable monitoring of the dew point temperature (Td) in the range -60...60 °C Td (-76...140 °F Td), with pressure rating up to 100 bar (1 450 psi). It is ideal for compressed air systems and industrial process control. Besides Td, the device measures also frost point temperature (Tf) or volume concentration (Wv).

High Accuracy

The innovative, monolithic E+E HMC01 humidity and temperature sensing element together with a sophisticated auto-calibration procedure leads to accuracy better than ±2°C Td (±3.6 °F Td) and to excellent long term stability.

Analog Outputs and Display

The measured data is available on two freely configurable voltage or current outputs as well as on the LCD display.

Functional Design

The compact, robust metal enclosure, the swirling front-end and various process connections and sampling options allow for easy and comfortable design-in, mounting and operation.

Easy Configuration

An optional adapter and the free EE-PCS Product Configuration Software facilitate easy configuration and adjustment of the EE371.

Features

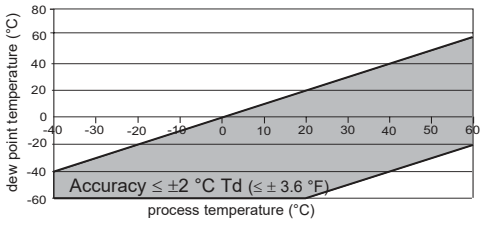
- **Measuring range -60...60 °C Td (-76...140 °F Td)**
- **Accuracy of measurement ±2 °C Td (±3.6 °F Td)**
- **Autocalibration**
- **Pressure tight up to 100 bar (1 450 psi)**
- **360° axial rotable enclosure**
- **Inspection certificate according to DIN EN 10204 – 3.1**

Technical Data

Measurands

Dew point (Td)

Dew point sensor	HMC01
Measuring range	-60...60 °C Td (-76...140 °F Td)
Accuracy [1]	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...20 000 ppm
Accuracy at 20 °C (68 °F) and 1 013 mbar (14.7 psi)	±(5 ppm + 9 % from measured value)

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).

Outputs

Two freely selectable and scaleable analogue outputs for Td, Tf, Wv	0-1 V / 0-5 V / 0-10 V [1]	-1 mA < I_L < 1 mA
	4-20 mA / 0-20 mA, 3-wire	R_L < 500 Ohm[1] R_L = load resistance

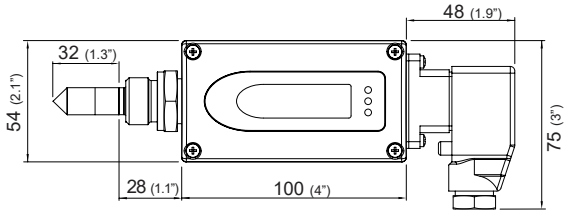
General

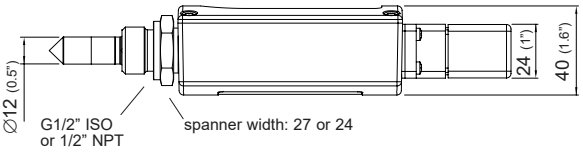
Supply voltage		10...30 V DC
Current consumption (typ.) at 24 V DC	voltage output	40 mA / during autocalibration: 100 mA
	current output	80 mA / during autocalibration: 140 mA
Pressure range		0...20 bar (0...290 psi) / 0...100 bar (0...1450 psi)
Enclosure material		Al Si 9 Cu 3
Protection class		IP65
Electrical connection		7-pole industrial plug: DIN VDE 0627 / IEC 61984 wire cross-section: 0.25 - 1 mm² cable outlet: PG 11
Sensor protection		stainless steel sintered filter
Working temperature range		medium (air): -40...70 °C (-40...158 °F) electronics: -40...60 °C (-40...140 °F) with display: -20...50 °C (-4...122 °F)
Storage temperature range		-40...60 °C (-40...140 °F)
Electromagnetic compatibility		EN61326-1 EN61326-2-3 ICES-003 ClassB Industrial Environment FCC Part15 ClassB

CE

1) minimum supply voltage 15V DC

Dimensions in mm (inch)





Sampling Cells

Basic Sampling Cell

The basic sampling cell is suitable for the pressure range 0...64 bar (0...928 psi). It allows a simple installation of the dew point sensor into an existing or self-constructed sampling system.

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

HA050103 ISO
HA050105 NPT

Sampling Cell with Quick Connector and Bleed Screw

The sampling cell is optimized for the pressure range 0...10 bar (0...145 psi). The air flow can be adjusted with the bleed screw. The G ½” ISO version features a quick connector suitable forstandard DN7.2 connection, which allows for the sampling cell to be mounted and removed without process interruption.

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

HA050102

1 = 1/2“ NPT
2 = Bleed screw
3 = 1/4” NPT

HA050107

Sampling Cell for Atmospheric Dew Point

The sampling cell is optimized for measuring the athmoperic dew point temperature of compressed air with pressure range 0...10 bar (0...145 psi). It features a quick connector suitable for standard DN7.2 air connection, which allows for the sampling cell to be mounted and removed without process interruption. The pressure in the sampling cell can be set with by the needle valve.

1 = G 1/2“ ISO
2 = Quick connector

HA050106

Ordering Guide

					EE371-
Hardware	**Pressure rating**	20 bar (290 psi)			TE
		100 bar (1450 psi)			TI
	Process connection	G1/2“ male thread			HA03
		1/2” NPT thread			HA07
	Display	without display			no code
		with display			D08
Software	**Output 1**	dew point temperature	Td	[°C/°F]	C
		frost point temperature	Tf	[°C/°F]	D
		volume concentration	Wv	[ppm]	P
	Output 2	dew point temperature	Td	[°C/°F]	C
		frost point temperature	Tf	[°C/°F]	D
		volume concentration	Wv	[ppm]	P
	Output signal	0-1 V			1
		0-5 V			2
		0-10 V			3
		0-20 mA			5
		4-20 mA			6
	Units for Td / Tf	metric / SI			no code
		non metric / US			E01
	Scaling range for Td output 1) in °C or °F	-40...60			Td02
		-10...50			Td03
		-60...20			Td65
	Scaling range for Tf output 1) in °C or °F	-40...60			Tf02
		-10...50			Tf03
		-60...20			Tf65
	Scaling range for Wv 2) output	0...100 ppm			X01
		0...500 ppm			X02
		0...1000 ppm			X03

1) Other Td/Tf scaling refer to data sheet „Scaling of the outputs“ at www.epluse.com/EE371
2) Other scaling upon request

Order Example

EE371-TEHA07D08CC3-Td02-Td02

Pressure rating:	20 bar (290 psi)
Pressure tight feedthrough:	1/2” NPT thread
Display:	with display
Output 1:	dew point temperature [Td]
Output 2:	dew point temperature [Td]
Output signal:	0-10 V
Units:	metric
Scaling range output 1:	-40...60 °C
Scaling range output 2:	-40...60 °C

Accessories

- Basic sampling cell ISO	HA050103
- Basic sampling cell NPT	HA050105
- Sampling cell with quick connector	HA050102
- Sampling cell with 1/4“ NPT	HA050107
- Sampling cell for atmospheric dew point	HA050106
- 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 design of the enclosure facilitates easy mounting and maintenance. EE360 is available with IP65 polycarbonate or stainless steel enclosure.

The measured data is available on two analogue outputs and on the optional digital interface RS485 with Modbus RTU or Ethernet with Modbus TCP. 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.

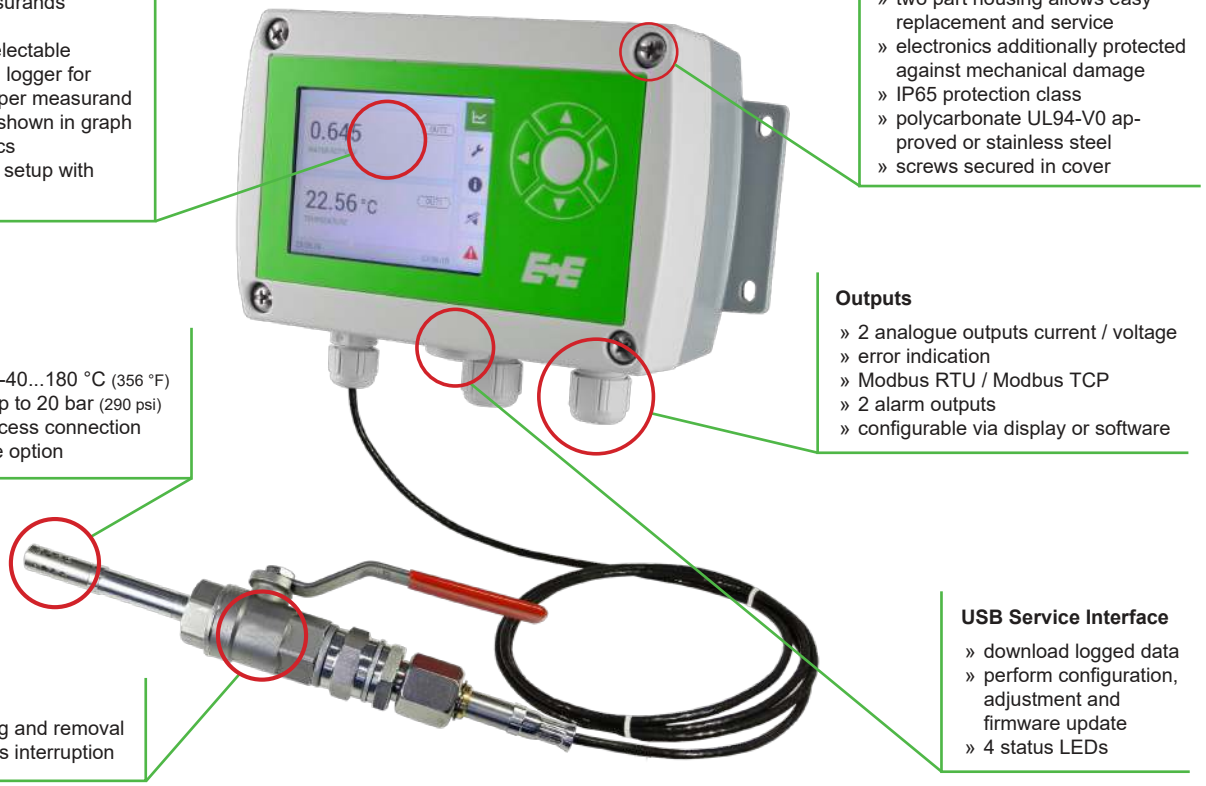
Features

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
- » polycarbonate UL94-V0 approved or stainless steel
- » screws secured in cover



Outputs

- » 2 analogue outputs current / voltage
- » error indication
- » Modbus RTU / Modbus TCP
- » 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

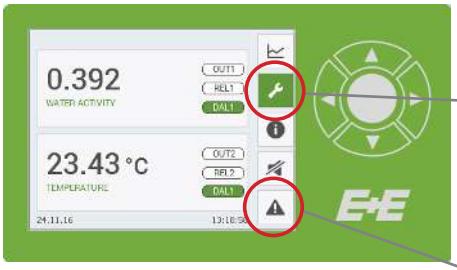
USB Service Interface

- » 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

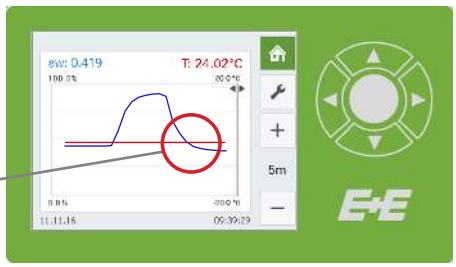
» analogue, digital and alarm output setup
» one and two point adjustment for RH and T
» probe replacement (for pluggable probe)
» password protection for all relevant settings

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

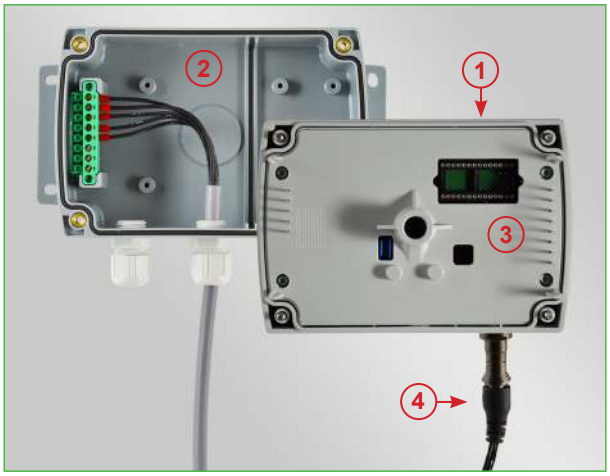


Modular Housing / Pluggable Probe

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.

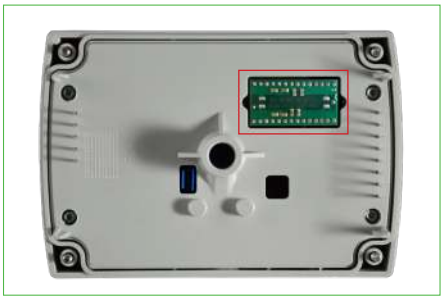
  aw=0 indicates completely dry oil, while aw=1 fully saturated oil.
  EE360 measures directly the water activity.

- 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.

Modbus RTU (Option J3) and Modbus TCP (Option J4)

Additional to the analogue outputs, EE360 offers optionally a digital interface, either RS485 with Modbus RTU or Ethernet with Modbus TCP.
The RS485 and Ethernet modules are available also for upgrading existing EE360.

The Ethernet interface features power over Ethernet (PoE) and RJ45 connector with IP65 protection class.



RS485 - Modbus RTU

Ethernet - Modbus TCP

Modbus Map

Register [DEC]	Protocol address [HEX]	Measured value	Unit	Type
Read registers: function code 0x03 / 0x04				
31021	3FC	Relative humidity 1)	%	
31003	3EA	Temperature	°C	32-bit float
31005	3EC	Temperature	°F	32-bit float
31009	3F0	Temperature	K	32-bit float
31135	46E	Water activity	aw	32-bit float
31141	474	Water content	x	32-bit float
Write registers: function code 0x06 for 16-bit and 0x10 (decimal: 16) for 32-bit				
0001	0	Slave-ID	/	16-bit integer
5001	1388	Air pressure	mbar	32-bit float

1) Use for adjustment and calibration.

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)

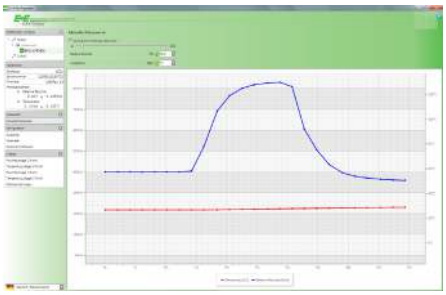
The module allows the device to be powered with 100…240 V AC (50/60 Hz).

E+E Product Configuration Software

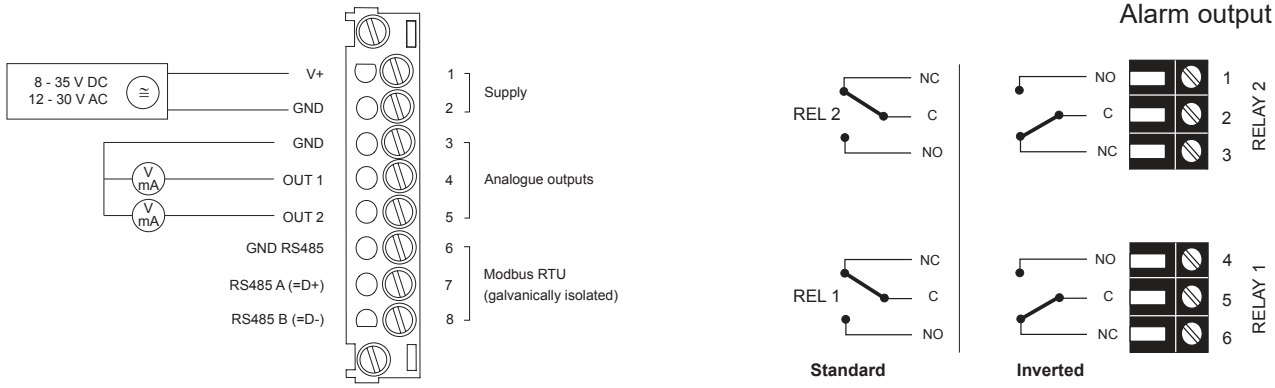
EE-PCS is an intuitive software that allows the user to perform:

- 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

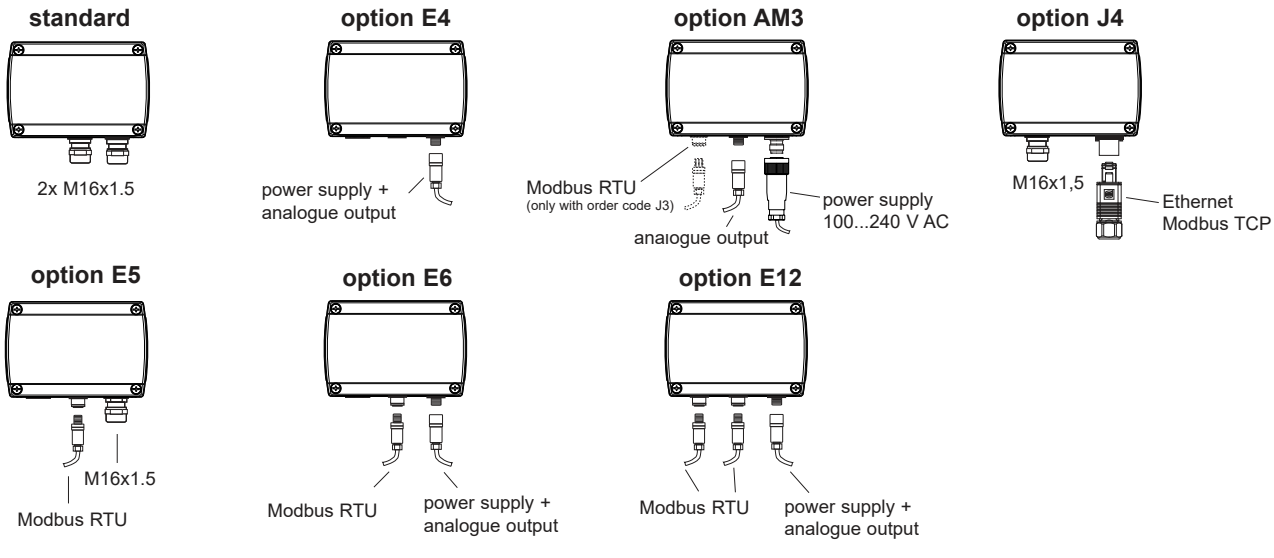
EE-PCS is available free of charge at: *http://www.epluse.com/configurator*



Connection diagram



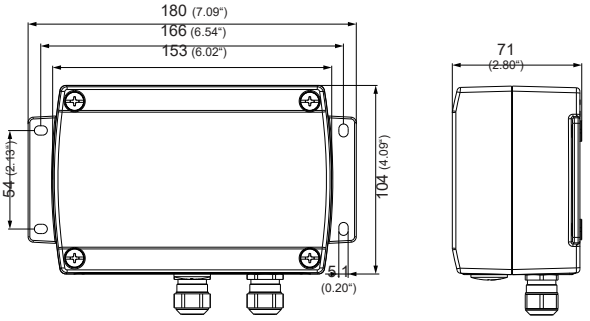
Electrical connection



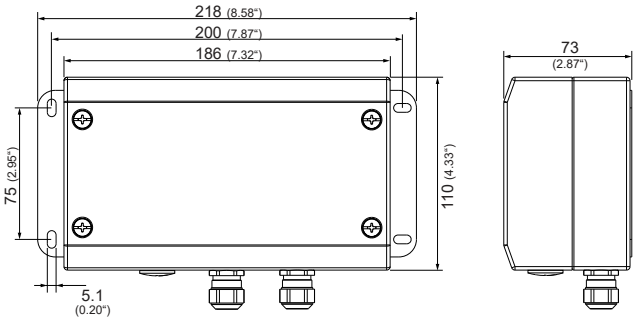
Mating plugs included in the scope of supply

Dimensions (mm/inch)

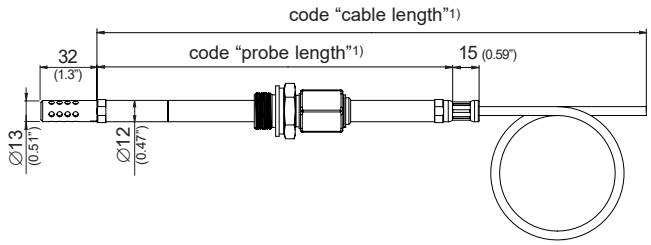
Polycarbonate enclosure



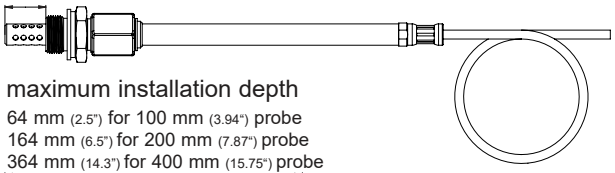
Stainless steel enclosure



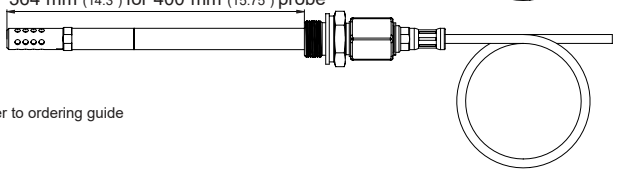
Probe:



minimum installation depth
23 (1")



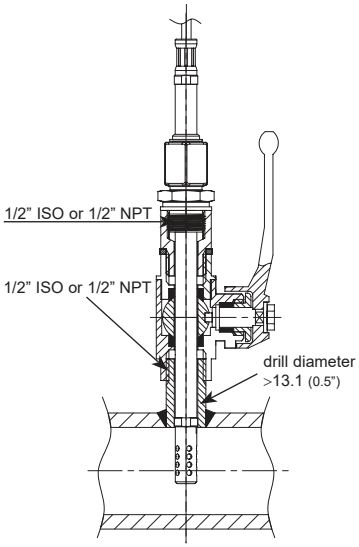
maximum installation depth
64 mm (2.5") for 100 mm (3.94") probe
164 mm (6.5") for 200 mm (7.87") probe
364 mm (14.3") for 400 mm (15.75") probe



1) Refer to ordering guide

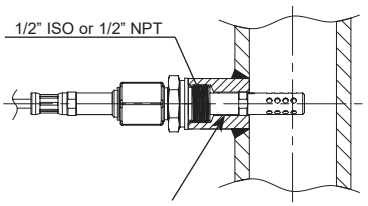
Ball valve installation

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)



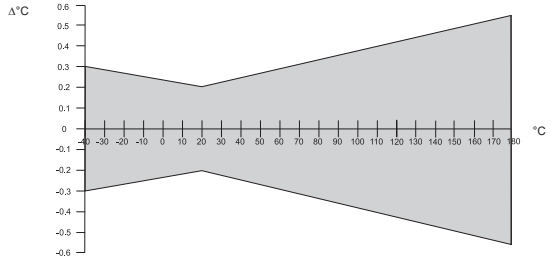
Technical data

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
		mv = measured value
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

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 Ethernet with Modbus TCP		

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 for plastic enclosure	Polycarbonate UL94-V0 approved	
for metal enclosure	Stainless steel 1.4404 / AISI 316L	
Protection class	IP65	
Cable glands for plastic enclosure	M16 x 1.5, for cable Ø 3 - 7 mm (0.12 - 0.28")	
for metal enclosure	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).

Ordering Guide

				EE360
Hardware Configuration	**Enclosure**	polycarbonate		no code
		stainless steel		HS2
	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
		400 mm (15.75)		L400
	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 [8]		E12
	Optional features	TFT colour display with integrated data logger [2]		D2
		RS485 - Modbus RTU [3]		J3
		Ethernet - Modbus TCP [5] [8]		J4
		pluggable probe [8]		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 [7]	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 [7]	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, Ethernet module - Modbus TCP 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) Both analogue outputs are either voltage or current.
8) Only with polycarbonate enclosure

Order Example

EE360-D2J3GA3GB3SBL-40SBH180

Enclosure:	no code	polycarbonate
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

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
Mating plug HPP V4 RJ45 Cat 5	J4

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

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
- Ethernet Module for retrofitting plastic enclosure	HA010606 for remote probe type T5, T10 HA010607 for duct monting type T2

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:

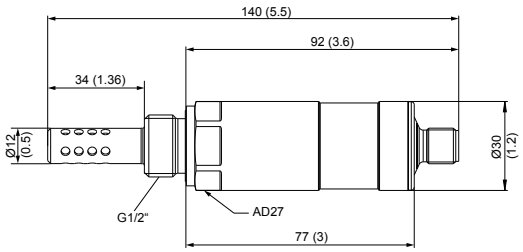
Register address	*Protocol address*	*Parameter name*
30052	0x33	Water activity Aw
30054	0x35	Water content Xm or Xk
30026	0x19	Temperature Tx
60101	0x64	Parameter A (write)
60103	0x66	Parameter B (write)

16Bit:

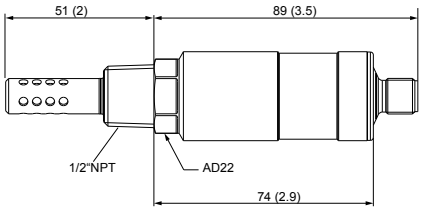
Register address	*Protocol address*	*Parameter name*
60001	0x00	Slave-ID
60002	0x01	RS485 Setting

Dimensions in mm (inch)

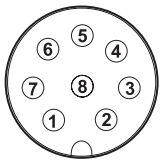
ISO



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

Moisture in Oil Sensor

The EE381 is dedicated for the reliable measurement of the moisture in transformer, lubrication or hydraulic oil as well as in diesel fuel. It is ideal for the preventive maintenance of plant and machinery. In addition to the accurate measurement of water activity (aw) and temperature (T), EE381 calculates the absolute water content of the oil (x) in ppm.

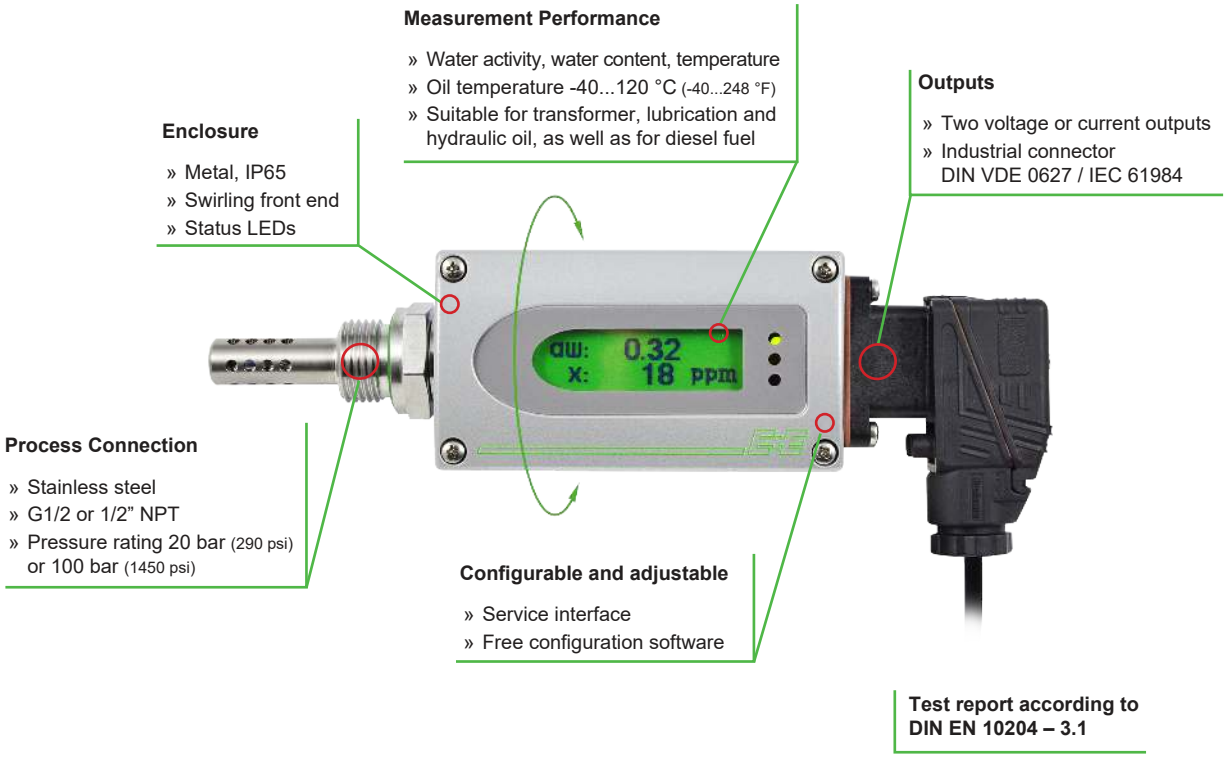
Measurement Performance
The device features the high end E+E humidity sensing elements of the HC series, which stand for long term stability and high resistance to pollution.

Display and Outputs
The measured data is available on two freely configurable voltage or current outputs, as well as on the optional LCD display.

Functional Design
The compact, robust metal enclosure, the swirling front-end and various process connections allow for easy and comfortable design-in, mounting and operation.

Configuration and Adjustment
An optional adapter and the free EE-PCS Product Configuration Software facilitate easy configuration and adjustment of the EE381.

Features



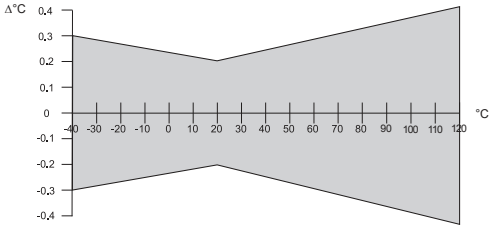
Technical Data

Measurands

Water activity

Humidity sensor	HC1000-400K
Measuring range	0...1 a_w
Accuracy incl. hysteresis and non linearity[1]	±0.02 a_w (0...0.9 a_w) ±0.03 a_w (0.9...1 a_w)
Temperature dependence	a_w: ±(0.00022 + 0.0002 x a_w) x ΔT [°C] ΔT = T - 20 °C T: ±0.0003 °C/°C
Response time t_{90} in still oil at 20 °C (68 °F)	typ. 10 min

Temperature

Temperature sensor element	Pt 100 DIN A
Oil temperature	-40...120 °C (-40...248 °F)
Accuracy	

Outputs

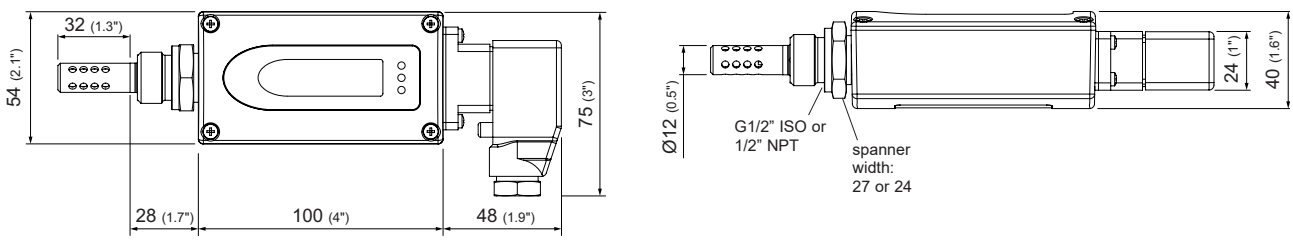
Two freely selectable and scaleable analogue outputs for a_w, T or x [ppm]	0-1 V / 0-5 V / 0-10 V [2]	-1 mA < I_L < 1 mA
	4-20 mA / 0-20 mA, 3-wire	R_L < 500 Ohm [2] R_L = load resistance

General

Supply voltage		10...30 V DC
Current consumption (typ.) at 24 V DC	voltage output	40 mA
	current output	80 mA
Pressure range		0...20 bar (0...290 psi) 0...100 bar (0...1450 psi)
Enclosure material		Al Si 9 Cu 3
Protection class		IP65
Electrical connection		7-pole industrial plug: DIN VDE 0627 / IEC 61984 wire cross-section: 0.25 - 1 mm² cable outlet: PG 11
Sensor protection		stainless steel filter
Working temperature range		probe: -40...120 °C (-40...248 °F) electronics: -40...80 °C (-40...176 °F) 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) 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) minimum supply voltage 15V DC

Dimensions in mm (inch)



Ordering Guide

					EE381-
Hardware	**Pressure rating**	20 bar (290 psi)			TE
		100 bar (1450 psi)			TI
	Process connection	G1/2“ male thread			HA03
		1/2” NPT thread			HA07
	Display	without display			no code
		with display			D08
Software	**Measurand output 1**	temperature	T	[°C/°F]	B
		water activity	a_w	[ ]	K
		water content in mineral transformer oil	x	[ppm]	L
		water content in other oil[1)]	x	[ppm]	M
	Measurand output 2	temperature	T	[°C/°F]	B
		water activity	a_w	[ ]	K
		water content in mineral transformer oil	x	[ppm]	L
		water content in other oil[1)]	x	[ppm]	M
	Output signal	0-1 V			1
		0-5 V			2
		0-10 V			3
		0-20 mA			5
		4-20 mA			6
	T unit	metric / SI			no code
		non metric / US			E01
	T output scale in °C or °F	select according table „T output scale“ below			Txx
	x output scale (other upon request)	0...100 ppm			X01
		0...500 ppm			X02
		0...1000 ppm			X03

1) Input of oil specific parameters necessary. Contact E+E sales representative.

T Output Scale (other scaling upon request)

Txx - Temperature [°C or °F]									
T02	-40...60	T10	-20...120	T21	0...80	T83	-40...140	T94	32...250
T04	0...50	T12	-40...120	T24	-20...80	T88	0...250	T96	32...132
T05	0...100	T14	-20...100	T33	-40...160	T90	32...120		
T08	-30...70	T16	0...120	T81	-40...250	T91	32...140		

Order Example

EE381-TEHA03D08/BL2-T05-X01

Pressure rating:	20 bar (290 psi)	Output 1:	T
Process connection:	G1/2“ male thread	Output 2:	x
Display:	with display	Output signal:	0-5 V
		T unit:	°C
		T output scale:	0...100 °C
		x output scale:	0...100 ppm

Accessories

Product Configuration Adapter	see datasheet EE-PCA
Product Configuration Software	EE-PCS (Free download: www.epluse.com/Configurator)

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

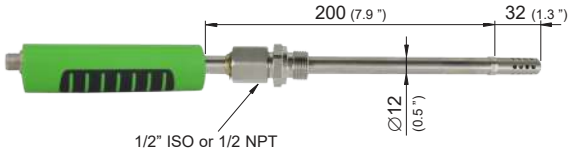
Technical Data

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

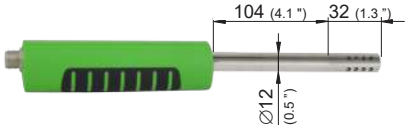
CE

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 and Immersion Temperature Sensor

The EE431 duct and immersion sensor measures reliably the temperature (T) in air and liquids and is optimized for building automation, HVAC and process control.

EE431 + mounting flange

EE431 + immersion well

Analogue, Digital and Passive Outputs
The T measured data is available on the voltage or current output, as well as on the RS485 interface with Modbus RTU or BACnet MS/TP protocol. In addition, EE431 features a wide choice of sensing elements for passive T measurement.

Easy Installation
The device can be mounted either with the plastic mounting flange or via external mounting holes at the enclosure. The innovative immersion well is dedicated for measurement in liquids and allows for fast and safe replacement of the sensor. The EE431 with RS485 interface is appropriate for daisy-chain wiring.

Configurable and Adjustable
An optional adapter and the free EE-PCS Product Configuration Software facilitate the setup and adjustment of the EE431.

Features

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

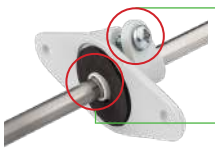
Bayonet screws
» Open/closed with a ¼ rotation

IP65 / NEMA 4

CE RoHS compliant

Test report according to DIN EN 10204 – 2.2

Mounting flange



Clamp ring
» 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

Technical Data

Active Output

Operating temperature	probe duct sensor:	-40…+110 °C (-40...+230 °F)	
	probe immersion sensor:	-40…+150 °C (-40...+302 °F)	
	electronics:	-40…+70 °C (-40...+158 °F)	
Sensing element	Pt1000 class A, DIN EN60751		
Analogue output	0-10 V	-1 mA < I_L < 1 mA	
	4-20 mA (two-wire)	R_L < 500 Ω	R_L= load resistance
Digital interface	RS485 with max. 32 unit load devices on one bus		
Protocol	Modbus RTU or BACnet MS/TP		
Accuracy	±0.3 °C (±0.54 °F) at 20 °C (68 °F)		
	±0.2 °C (±0.36 °F) at 20 °C (68 °F) (optional only for analogue output)		
Supply voltage (Class III)	15-35 V DC or 24 V AC ±20%		for RS485 and 0-10 V output
	10 V DC + R_L x 20 mA < V+ < 35 V DC		for 4-20 mA output

Current demand (typ.)	analogue	5 mA (DC) / 12 mA_{eff} (AC)
	RS485	3.5 mA (DC) / 12 mA_{eff} (AC)
Electromagnetic compatibility		EN61326-1, EN61326-2-3 industrial environment

Passive Output

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

T sensing elements

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 (according technical data of the specific T-sensing element)
T-sensor connection	two-wire

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 material	stainless steel (1.4571 / 316Ti)
Enclosure material	polycarbonate, UL94-V0 approved, T-range: -40...+110 °C (-40...+230 °F)
Protection class	IP65 / NEMA 4
Cable gland	M16x1.5, M12x1.5 , UL94-V2
Electrical connection	screw terminals, max. 2.5 mm² (0.004 in²)
Storage temperature	-30...+70 °C (-22...+158 °F)
Working and storage humidity	5...95 % RH, non condensing

Immersion well

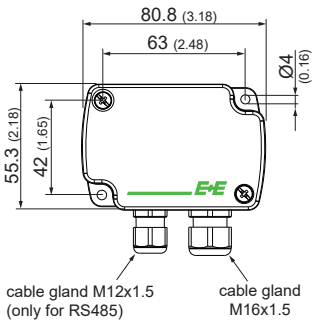
Material: brass nickel-plated
stainless steel (tube: 1.4571 / 316Ti, mounting thread: 1.4404 / 316L)

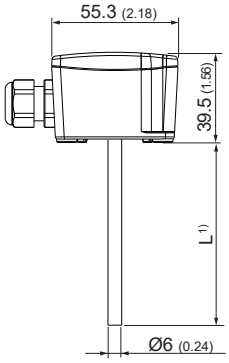
Pressure rating: 15 bar (218 psi), brass
25 bar (363 psi), stainless steel

Max. flow speed

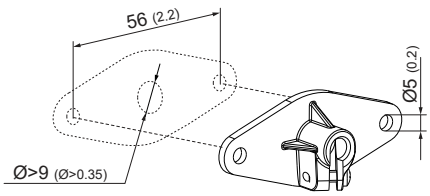
	50 mm (1.97")	100 mm (3.94")	135 mm (5.31")	285 mm (11.22")
brass	26 m/s (5118 ft/min)	12 m/s (2362 ft/min)	6 m/s (1181 ft/min)	1 m/s (197 ft/min)
stainless steel	29 m/s (5708 ft/min)	15 m/s (2953 ft/min)	9 m/s (1771 ft/min)	2 m/s (394 ft/min)

Dimensions mm (inch)

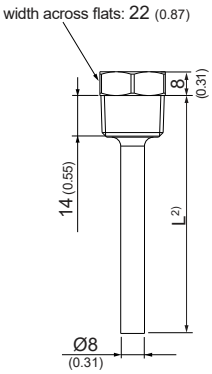




Plastic mounting flange



Immersion well



[1] According to ordering guide „Probe length"
[2] According to ordering guide „Immersion well"

Ordering Guide

Position 1 - Temperature Sensor

			EE431-		
Hardware Configuration	**Model**	active	M3		
		passive			M7
	Output	0-10 V	A3		
		4-20 mA	A6		
		RS485		J3	
	T-sensor passive (see www.epluse.com/R-T_Characteristics)	Pt100 DIN B			TP2
		Pt1000 DIN B			TP4
		NTC 1.8k			TP7
		Ni1000, TK6180 DIN B			TP9
		NTC 10k, B3950			TP11
		KTY81-210			TP13
		NTC 10k, B3435			TP14
		Ni1000, TK5000 DIN B			TP19
		NTC 2.2k			TP21
	Probe length	65 mm (2.56“)		L65	
		115 mm (4.53“)		L115	
		150 mm (5.91“)		L150	
		300 mm (11.81“)		L300	
	Accuracy	±0.3 °C	no code		
		±0.2 °C	TT2		
Setup Outputs	**Unit**	°C	no code		
		°F	MA2		
	Scale T low	0	no code		
		value (within working range)	SAL value		
	Scale T high	50	no code		
		value (within working range)	SAH value		
	Protocol	Modbus RTU[1)]		P1	
		BACnet MS/TP[2)]		P3	
	Baud rate	9.600		BD5	
		19.200		BD6	
		38.400		BD7	
		57.600[3)]		BD8	
		76.800[3)]		BD9	

1) Factory setting: Even parity, Stopbits 1. Modbus Map and communication setting: see User Guide and Modbus Application Note at www.epluse.com/ee431
2) Factory setting: No parity, Stopbits 1. Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee431
3) Only for BACnet MS/TP

Position 2 - Mounting Accessories

Plastic mounting flange HA401101

Immersion well: R½” ISO:

length (L)	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: ½” NPT:

length (L)	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

Position 1:

EE431-M3J3L300P3BD7

Model:	active
Output:	RS485
Probe length:	300 mm
Protocol:	BACnet MS/TP
Baud rate:	38.400

Position 2:

HA400113

Immersion well: ½'' NPT, brass, 285 mm (11.22“)

Position 1:

EE431-M7TP11L65

Model:	passive
T-sensor passive:	NTC 10k, B3950
Probe length:	65 mm (2.56 “)

Position 2:

HA400201

Immersion well: R½'' ISO, stainless steel, 50 mm (1.97 “)

Accessories

Product configuration adapter	
- for analogue output	see data sheet EE-PCA
- for digital output - USB configuration adapter	HA011066
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

EE441

Strap-on Temperature Sensor

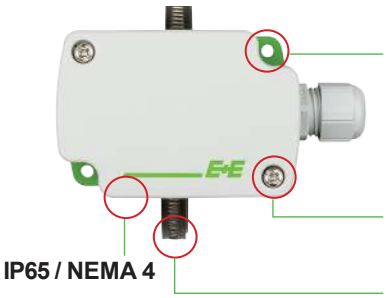
The EE441 strap-on sensor measures reliably the temperature (T) on round ducts and pipes and is optimized for heating systems (warm and cold water pipes) or solar collectors.

Analogue, Digital and Passive Outputs
The T measured data, is available on the voltage or current output, as well as on the RS485 interface with Modbus RTU or BACnet MS/TP protocol. In addition, EE441 features a wide choice of sensing elements for passive T measurement.

Easy Installation
The compact enclosure and the stainless steel hose clamp allow for easy and fast installation on pipes with diameter from 25 to 175 mm (0.98"…6.89").

Configurable and Adjustable
An optional adapter and the free EE-PC Product Configuration Software facilitate the setup and adjustment of the EE441.

Features

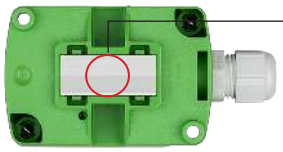


IP65 / NEMA 4

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

Test report according to DIN EN 10204 – 2.2

CE RoHS compliant

Technical Data

Active Output

Operating temperature	-40…+70 °C (-40...+158 °F)	
Sensing element	Pt1000 class A, DIN EN60751	
Analogue output	0-10 V 4-20 mA (two-wire)	-1 mA < I_L < 1 mA R_L < 500 Ω R_L= load resistance
Digital interface	RS485 with max. 32 unit load devices on one bus	
Protocol	Modbus RTU or BACnet MS/TP	
Accuracy	±0.3 °C (±0.54 °F) at 20 °C (68 °F)	
Supply voltage (Class III)	15-35 V DC or 24 V AC ±20% 10 V DC + R_L x 20 mA < V+ < 35 V DC	for RS485 and 0-10 V output for 4-20 mA output
Current demand (typ.) analogue	5 mA (DC) / 12 mA_{eff} (AC)	
RS485	3.5 mA (DC) / 12 mA_{eff} (AC)	
Electromagnetic compatibility	EN61326-1, EN61326-2-3 industrial environment	

Passive Output

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

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

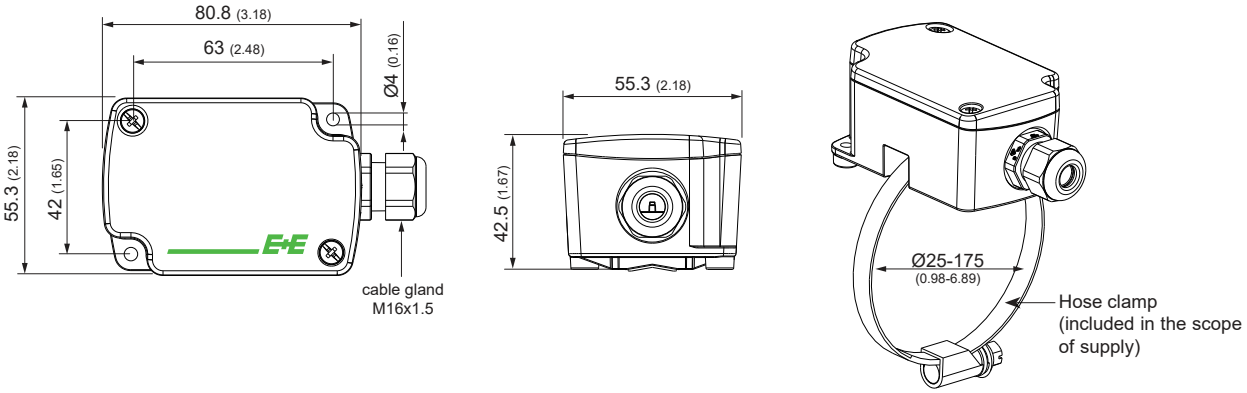
Measurement current typ.	< 1 mA (according technical data of the specific T-sensing element)

T-sensor connection	two-wire

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...+110 °C (-40...+230 °F)
Protection class	IP65 / NEMA 4
Cable gland	M16x1.5, UL94-V2
Electrical connection	screw terminal, max. 2.5 mm² (0.004 in²)
Hose clamp material	stainless steel (corr. 1.4301 / 304)
Storage temperature	-30…+70 °C (-22...+158 °F)
Working and storage humidity	5...95 % RH, non condensing

Dimensions mm (inch)



Ordering Guide

			EE441-		
Hardware Configuration	**Model**	active	M3		
		passive			M7
	Output	0-10 V	A3		
		4-20 mA	A6		
		RS485		J3	
	T-sensor passive (see www.epluse.com/R-T_Characteristics)	Pt100 DIN B			TP2
		Pt1000 DIN B			TP4
		NTC 1.8k			TP7
		Ni1000, TK6180 DIN B			TP9
		NTC 10k, B3950			TP11
		KTY81-210			TP13
		NTC 10k, B3435			TP14
		Ni1000, TK5000 DIN B			TP19
		NTC 2.2k			TP21
Setup Outputs	**Unit**	°C	no code		
		°F	MA2		
	Scale T low	0	no code		
		value (within working range)	SAL value		
	Scale T high	50	no code		
		value (within working range)	SAH value		
	Protocol	Modbus RTU[1)]		P1	
		BACnet MS/TP[2)]		P3	
	Baud rate	9.600		BD5	
		19.200		BD6	
		38.400		BD7	
		57.600[3)]		BD8	
		76.800[3)]		BD9	

1) Factory setting: Even parity, Stopbits 1. Modbus Map and communication setting: see User Guide and Modbus Application Note at www.epluse.com/ee441
2) Factory setting: No parity, Stopbits 1. Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee441
3) Only for BACnet MS/TP

Order Example

EE441-M3J3P3BD7

Model:	active
Output:	RS485
Protocol:	BACnet MS/TP
Baud rate:	38.400

EE441-M7TP11

Model:	passive
T-sensor passive:	NTC 10K, B3950

Accessories

Product configuration adapter	
- for analogue output	see data sheet EE-PCA
- for digital output - USB configuration adapter	HA011066
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

EE451

Wall Mounted Temperature Sensor for Indoor and Outdoor

The EE451 wall mounted sensor measures reliably the temperature (T) indoors and outdoors, is optimized for building automation, HVAC, process control and enables weather-dependent temperature regulation.

Active Type Passive Type

Analogue, Digital and Passive Outputs
The T measured data is available on the voltage or current output, as well as on the RS485 interface with Modbus RTU or BACnet MS/TP protocol. In addition, EE451 features a wide choice of sensing elements for passive T measurement.

Easy Installation
The compact and robust enclosure allows for easy and fast installation and unbiased detection of ambient temperature.

Configurable and Adjustable
An optional adapter and the free EE-PC Product Configuration Software facilitate the setup and adjustment of the EE451.

Features

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

Bayonet screws
» Open/closed with a ¼ rotation

IP65 / NEMA 4

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

Test report according to DIN EN 10204 – 2.2

CE RoHS compliant

Technical Data

Active Output

Sensing element	Pt1000 class A, DIN EN60751		
Analogue output	0-10 V	-1 mA < I_L < 1 mA	
	4-20 mA (two-wire)	R_L < 500 Ω	R_L= load resistance
Digital interface	RS485 with max. 32 unit load devices on one bus		
Protocol	Modbus RTU or BACnet MS/TP		
Accuracy	±0.3 °C (±0.54 °F) at 20 °C (68 °F)		
Supply voltage (Class III)	15-35 V DC or 24 V AC ±20%		for RS485 and 0-10 V output
	10 V DC + R_L x 20 mA < V+ < 35 V DC		for 4-20 mA output
Current demand (typ.) analogue	5 mA (DC) / 12 mA_{eff} (AC)		
RS485	3.5 mA (DC) / 12 mA_{eff} (AC)		
Electromagnetic compatibility	EN61326-1, EN61326-2-3 industrial environment		

Passive Output

T sensing elements

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

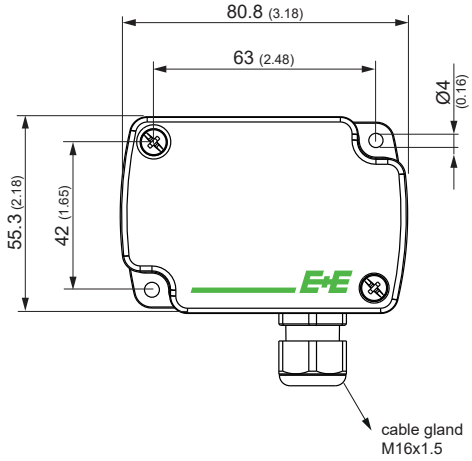
Measurement current	typ. < 1 mA (according technical data of the specific T-sensing element)
T-Sensor connection	two-wire

General

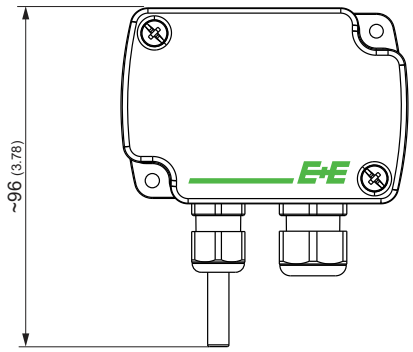
Operating temperature	-40…+70 °C (-40...+158 °F)
Enclosure material	polycarbonate, UL94-V0 approved
Protection class	IP65 / NEMA 4
Cable gland	M16x1.5, UL94-V2
Electrical connection	screw terminal, max. 2.5 mm² (0.004 in²)
Mounting bracket material	stainless steel (corr. 1.4301 / 304)
Storage temperature	-30…+70 °C (-22...+158 °F)
Working and storage humidity	5...95 % RH, non condensing

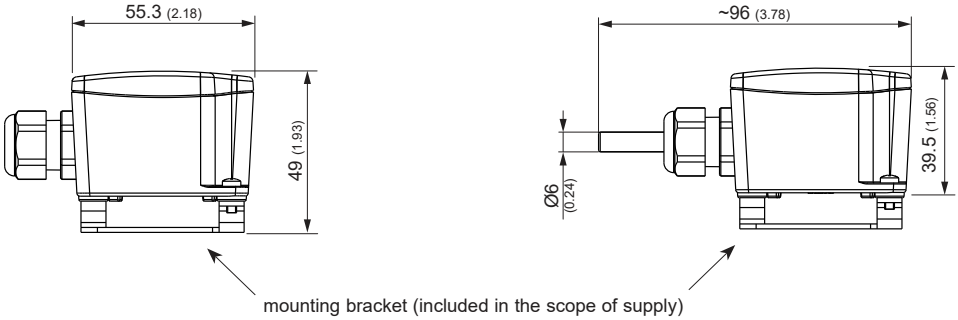
Dimensions mm (inch)

Passive output

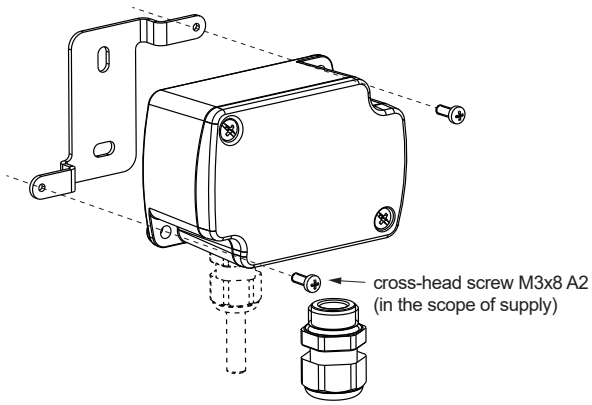


Active output

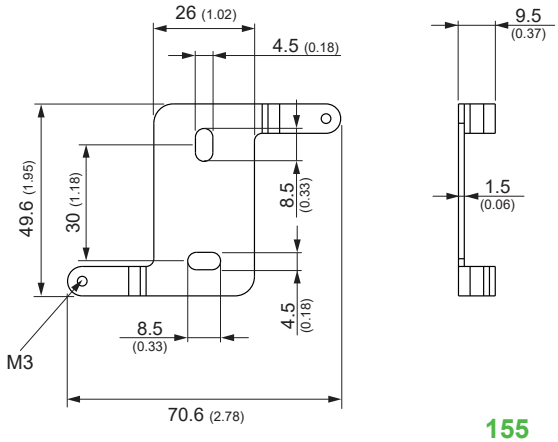




Mounting



Mounting Bracket



Ordering Guide

			EE451-		
Hardware Configuration	**Model**	active	M3		
		passive			M7
	Output	0-10 V	A3		
		4-20 mA	A6		
		RS485		J3	
	T-sensor passive (see www.epluse.com/R-T_Characteristics)	Pt100 DIN B			TP2
		Pt1000 DIN B			TP4
		NTC 1.8k			TP7
		Ni1000, TK6180 DIN B			TP9
		NTC 10k, B3950			TP11
		KTY81-210			TP13
		NTC 10k, B3435			TP14
		Ni1000, TK5000 DIN B			TP19
		NTC 2.2k			TP21
Setup Outputs	**Unit**	°C	no code		
		°F	MA2		
	Scale T low	0	no code		
		value (within working range)	SAL value		
	Scale T high	50	no code		
		value (within working range)	SAH value		
	Protocol	Modbus RTU[1]		P1	
		BACnet MS/TP[2]		P3	
	Baud rate	9.600		BD5	
		19.200		BD6	
		38.400		BD7	
		57.600[3]		BD8	
		76.800[3]		BD9	

1) Factory setting: Even parity, Stopbits 1. Modbus Map and communication setting: see User Guide and Modbus Application Note at www.epluse.com/ee451
2) Factory setting: No parity, Stopbits 1. Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee451
3) Only for BACnet MS/TP

Order Example

EE451-M3J3P3BD7

Model:	active
Output:	RS485
Protocol:	BACnet MS/TP
Baud rate:	38.400

EE451-M7TP11

Model:	passive
T-sensor passive:	NTC 10K, B3950

Accessories

Product configuration adapter	
- for analogue output	see data sheet EE-PCA
- for digital output - USB configuration adapter	HA011066
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

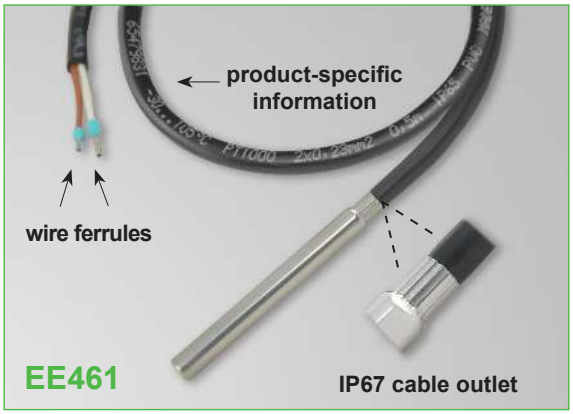
Temperature Cable Sensor

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

For temperature measurement in liquids, the EE461 cable sensor is mounted with an immersion well.
Several types of sensing elements are available, such as Pt100, Pt1000, Ni1000 and NTC.

The IP67 / NEMA 4 protection class is made possible by the innovative star pressing of the sensor sleeve.

The EE461 is available with 2-wire and 4 wire connection. Product specific information printed all along the cable allows for easy identification of the sensing element type.



Typical Applications

Building automation
Process and climate control

Features

Protection class IP67 / NEMA 4
2- and 4-wire connection

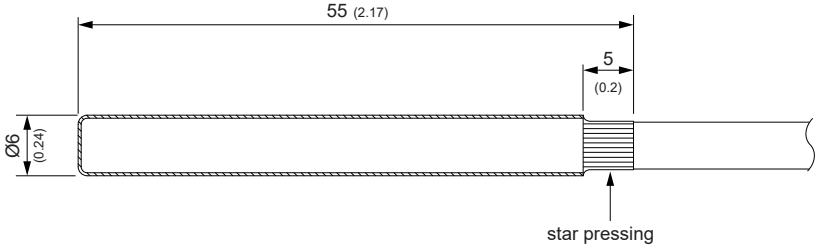
Technical Data

Operating temperature	-30...+105 °C (-22...+221 °F)
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	$B_{25/85}$: 3500 K ± 1.0 %	-
NTC2.2k	R_{25}: 2.252 kΩ ± 1%	$B_{25/85}$: 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
T-Sensor connection	2-wire, 2x 0.22 mm², wire resistance 0.172 Ω/m (0.052 Ω/ft) 4-wire, 4x 0.22 mm²
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
Protection class	IP67 / NEMA 4
Storage temperature	-30…+70 °C (-22...+158 °F)
Working and storage humidity range	5...95 % RH, no condensation

Dimensions in mm (inch)



CE RoHS compliant

Ordering Guide

WIRING		T-SENSOR[1]		CABLE LENGTH	
2-wire connection	(no code)	Pt100 DIN B	(TP2)	0.5 m (1.6 ft)	(K0.5)
		Pt1000 DIN B	(TP4)	2 m (6.6 ft)	(K2)
		NTC1.8k	(TP7)	3 m (9.8 ft)	(K3)
		NTC2.2k	(TP21)	5 m (16.4 ft) [2]	(K5)
		NTC10k B3950	(TP11)	6 m (19.7 ft) [3]	(K6)
		NTC10k B3435	(TP14)	10 m (32.8 ft) [2]	(K10)
		KTY81-210	(TP13)		
		Ni1000 TK6180 DIN B	(TP9)		
		Ni1000 TK5000 DIN B	(TP19)		
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-TP4K2

Wire: 2-wire connection
T-Sensor Pt1000 DIN B
Cable Length: 2 m (6.6 ft)

WIRE		T-SENSOR		CABLELENGTH	
4-wire connection	(W4)	Pt100 DIN A	(TP1)	2 m (6.6 ft)	(K2)
		Pt100 DIN B	(TP2)	5 m (16.4 ft)	(K5)
		Pt100 1/3 DIN B	(TP8)	10 m (32.8 ft)	(K10)
EE461-					

EE461-W4TP1K5

Wire: 4-wire connection
T-Sensor: Pt100 DIN A
Cable Length: 5 m

Mounting Accessories (For further information please see datasheet EE441)

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.

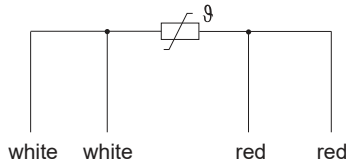
Mounting with immersion well:

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...+100 °C / -40... +212 °F, UL94-V0) HA403101
Hose clamp (for pipe mounting) HA402101

Connection Diagram (for 4-wire connection)



EE432

Cable Temperature Sensor with flange

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

Several types of sensing elements are available, such as Pt100, Pt1000 and Ni1000.
The IP67 / NEMA 4 protection class is made possible by the innovative star pressing of the sensor sleeve.

The mounting flange included in the scope of supply facilitates the installation of the EE432.

Product specific information printed all along the cable allows for easy identification of the sensing element type.

Typical Applications

Building automation
Process and climate control

Features

Protection class IP67 / NEMA 4
Easy mounting

Technical Data

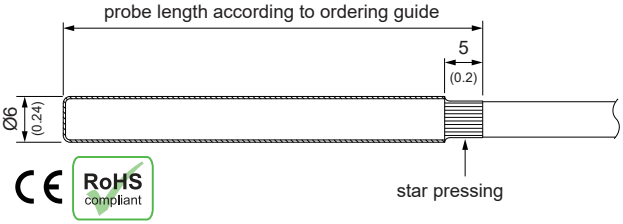
Operating temperature	-30...+105 °C (-22...+221 °F)
T-Sensors	

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

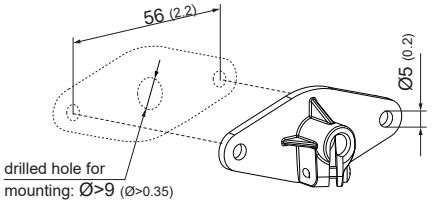
Measurement current	typ. < 1 mA
T-Sensor connection	2-wire, 2x 0.22 mm², wire resistance 0.172 Ω/m (0.052 Ω/ft)
Insulation resistance	> 100 MΩ at 20 °C (68 °F)
Response time τ_{63}	< 1 min, at 3 m/s (590 ft/min) air velocity < 30 s, with immersion well in liquid water bath
Sensor sleeve material	stainless steel (1.4571 / 316Ti)
Cable material	PVC
Protection class	IP67 / NEMA 4
Storage temperature	-30...+70 °C (-22...+158 °F)
Working and storage humidity range	5...95 % RH, no condensation

Dimensions in mm (inch)

Probe



Mounting flange



Ordering Guide

T-SENSOR[1]		CABLE LENGTH		PROBE LENGTH	
Pt100 DIN B	(TP2)	1 m (3.3 ft)	(K1)	160 mm (6.3“)	(L160)
Pt1000 DIN B	(TP4)	5 m (16.4 ft)	(K5)	310 mm (12.2“)	(L310)
Ni1000 TK5000 DIN B	(TP19)				
EE432-					

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

Order example

EE432-TP4K5L160

T-Sensor: Pt1000 DIN B
Cable length: 5 m (16.4 ft)
Probe length: 160 mm (6.3“)

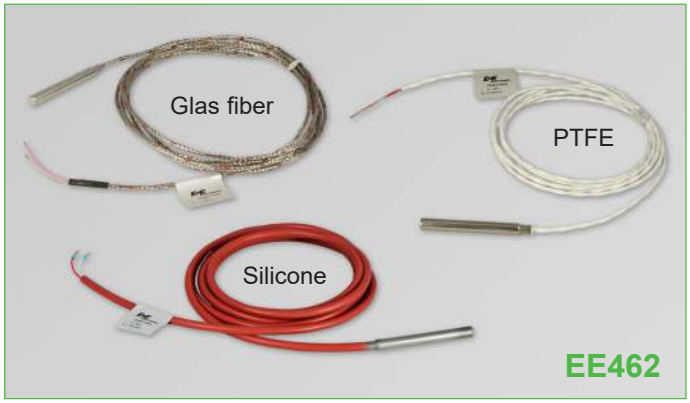
EE462

High-Temperature Cable Sensor

Cable sensors for passive measurement of high temperature in air and technical gases are used in process control.

For temperature measurement in liquids, the EE462 is mounted with an immersion well.
Several types of sensing elements are available, such as Pt100, Pt1000, NTC or Ni1000.

The operation temperature of EE462 depends on the choice of the cable material.
The IP67 protection class is made possible by the innovative star pressing of the sensor sleeve.



Typical Applications

Exhaust gas
Process control

Features

Protection class IP67
High chemical and mechanical resistance

Technical Data

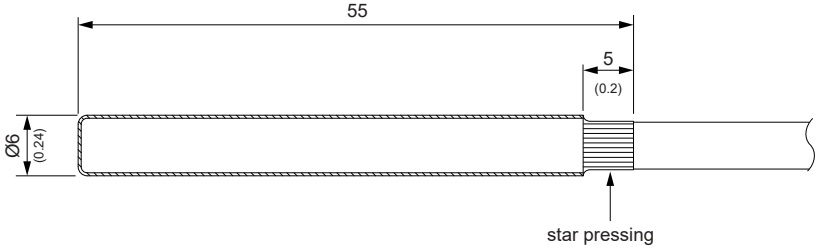
Operating temperature / Cable material	0...+350 °C (32...+662 °F)	Glass fiber
	-20...+260 °C (-4...+500 °F)	PTFE
	-60...+180 °C (-76...+356 °F)	Silicone

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	$B_{25/85}$: 3500 K ± 1.0 %	-	125
NTC2.2k	R_{25}: 2.252 kΩ ±1 %	$B_{25/85}$: 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
T-Sensor connection	2-wire, 2x 0.22 mm², wire resistance 0.172 Ω/m (0.052 Ω/ft)
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)
Protection class	IP67
Storage temperature	-30…+70 °C (-22...+158 °F) (packaging)
Working and storage humidity range	5...95 % rh, no condensation

Dimensions in mm (inch)



CE RoHS compliant

Ordering Guide

T-SENSOR[1]		CABLE MATERIAL		CABLE LENGTH	
Pt100 DIN B	(TP2)	Glass fibre [2]	(KM2)	2 m (6.6 ft)	(K2)
Pt1000 DIN B	(TP4)	PTFE [2]	(KM4)	3 m (9.8 ft)	(K3)
NTC1,8k	(TP7)	Silicone	(KM3)		
NTC2,2k	(TP21)				
NTC10k B3950	(TP11)				
Ni1000 TK6180 DIN B	(TP9)				
Ni1000 TK5000 DIN B	(TP19)				
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-TP4KM4K2

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...+100 °C / -40... +212 °F, UL94-V0) HA403101

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

EE471

Temperature Sensor with Remote Probe

The EE471 temperature sensor with remote probe measures reliably the temperature (T) in applications with space restrictions and is optimized for building automation, HVAC and process control.

Analogue, Digital and Passive Outputs
The T measured data is available on the voltage or current output, as well as on the RS485 interface with Modbus RTU or BACnet MS/TP protocol. In addition, EE471 features a wide choice of sensing elements for passive T measurement.

Easy Installation
The design with remote probe is appropriate for installations where electronic shall be protected against high temperature or strong vibrations. Product specific information for the remote probe is printed all along the cable. The innovative immersion well is dedicated for measurement in liquids and allow for fast and safety replacement of the sensor.

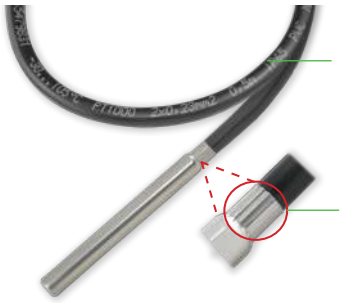
Configurable and Adjustable
An optional adapter and the free EE-PCS Product Configuration Software facilitate the setup and adjustment of the EE471.

Features

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

Bayonet screws
» Open/closed with a ¼ rotation

IP65 / NEMA 4



Product-specific information

IP67 cable outlet
(star pressing of the sensor sleeve)

Test report according to DIN EN 10204 – 2.2

CE RoHS compliant

Technical Data

Active Output

Operating temperature		remote probe: -30…+105 °C (-22...+221 °F) electronics: -30....+70 °C (-22...+158 °F)	
Sensing element		Pt1000 class A, DIN EN60751	
Analogue output		0-10 V -1 mA < I_L < 1 mA 4-20 mA (two-wire) R_L < 500 Ω	R_L= load resistance
Digital interface Protocol		RS485 with max. 32 unit load devices on one bus Modbus RTU or BACnet MS/TP	
Accuracy		±0.3 °C (±0.54 °F) at 20 °C (68 °F)	
Supply voltage (Class III)		15-35 V DC or 24 V AC ±20% 10 V DC + R_L x 20 mA < V+ < 35 V DC	for RS485 and 0-10 V output for 4-20 mA output
Current demand (typ.)	analogue RS485	5 mA (DC) / 12 mA_{eff} (AC) 3.5 mA (DC) / 12 mA_{eff} (AC)	
Electromagnetic compatibility		EN61326-1, EN61326-2-3 industrial environment	

Passive Output

Operating temperature	-30…+105 °C (-22...+221 °F)
T sensing elements	see table below

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 (according technical data of the specific T-sensing element)
T-Sensor connection	two-wire, wire resistance see additional information below

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
Electrical connection	screw terminal, 2x max. 2.5 mm² (0.004 in²)
Enclosure material	polycarbonate, UL94-V0 approved
Protection class	IP65 / NEMA 4 (enclosure), IP67 / NEMA 4 (remote probe)
Cable gland	M16x1.5, M12x1.5 , UL94-V2
Storage temperature	-30…+70 °C (-22...+158 °F)
Working and storage humidity	5...95 % RH, non condensing

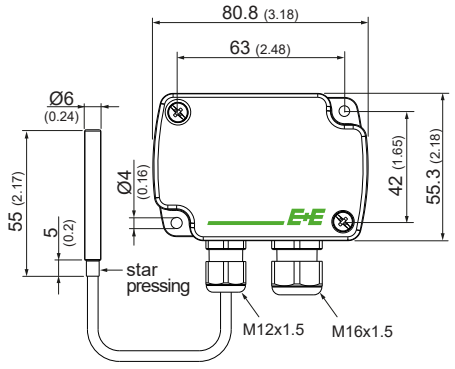
Additional Information

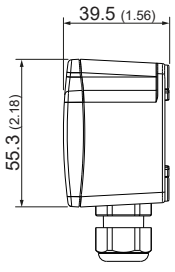
Wire Resistance / Temperature Offset (relevant only for passive output EE471-M7)

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 (3.960 °F)
10 m (32.8 ft)	1.72 Ω	4.4 °C (7.920 °F)

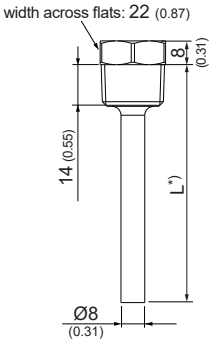
*) For high-resistance T-sensors (R ≥ 1000 Ω) the temperature offset is negligible.

Dimensions mm (inch)





Immersion well



*) According to ordering guide

Ordering Guide

Position 1 - Temperature Sensor

			EE471-		
Hardware Configuration	**Model**	active	M3		
		passive			M7
	Output	0-10 V	A3		
		4-20 mA	A6		
		RS485		J3	
	T-sensor passive (see www.epluse.com/R-T_Characteristics)	Pt100 DIN B			TP2
		Pt1000 DIN B			TP4
		NTC 1.8k			TP7
		Ni1000, TK6180 DIN B			TP9
		NTC 10k, B3950			TP11
		KTY81-210			TP13
		NTC 10k, B3435			TP14
		Ni1000, TK5000 DIN B			TP19
		NTC 2.2k			TP21
	Cable length	0.5 m (1.6 ft)	K0.5		
		2 m (6.6 ft)	K2		
		3 m (9.8 ft)	K3		
		5 m (16.4 ft)	K5		
		10 m (32.8 ft)	K10		
Setup Outputs	**Unit**	°C	no code		
		°F	MA2		
	Scale T low	0	no code		
		value (within working range)	SAL value		
	Scale T high	50	no code		
		value (within working range)	SAH value		
	Protocol	Modbus RTU[1)]		P1	
		BACnet MS/TP[2)]		P3	
	Baud rate	9.600		BD5	
		19.200		BD6	
		38.400		BD7	
		57.600[3)]		BD8	
		76.800[3)]		BD9	

1) Factory setting: Even parity, Stopbits 1. Modbus Map and communication setting: see User Guide and Modbus Application Note at www.epluse.com/ee471
2) Factory setting: No parity, Stopbits 1. Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee471
3) Only for BACnet MS/TP

Position 2 - Mounting Accessories

Plastic mounting flange HA401101

Immersion well: R½" ISO:

length (L)	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: ½" NPT:

length (L)	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

EE471-M3J3K3P3BD7

Model:	active
Output:	RS485
Cable length:	3 m (9.8 ft)
Protocol:	BACnet MS/TP
Baud rate:	38.400

EE471-M7TP11K5

Model:	passive
T-sensor passive:	NTC 10k, B3950
Cable length:	5 m (16.4 ft)

Accessories

Product configuration adapter	
- for analogue output	see data sheet EE-PCA
- for digital output - USB configuration adapter	HA011066
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
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.

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!

EE10-T

Room Temperature Sensors

EE10 is dedicated for accurate room temperature (T) measurement in residential and commercial HVAC.

For model EE10-M3, the measured data is available either on the analogue output or on the BACnet MS/TP or Modbus RTU interface, as well as on the optional display.

The EE10-M7 features a passive output and can be fitted with a wide choice of temperature sensors.

The stylish enclosure is available in several colors and in two sizes according to regional standards.

The back cover, which contains only the screw terminals, can be mounted and wired first. The front cover containing the electronics can be simply snapped onto the back cover right before commissioning. Thus the active part of the device is not exposed to construction site pollution and can be replaced without tools within seconds.

Typical Applications

Building automation
Indoor climate control

Features

High accuracy and long term stability
Fast and easy installation
Modbus, BACnet, analogue or passive outputs

Technical Data

Measured values

Temperature	
Accuracy[1] at 20 °C (68 °F) and U_v=24 V DC	±0.3 °C (±0.54 °F)

Output

Analogue	0-10 V	-1 mA < I_L < 1 mA
	4-20 mA (two wires)	R_L < (U_v-10)/0.02 < 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	

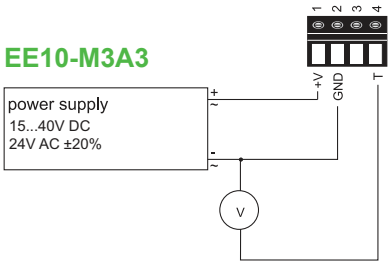
General

Voltage supply (U_v)	
0 - 10 V	15 - 40 V DC or 24 V AC ±20%
4 - 20 mA	10 + 0.02 x R_L < U_v < 28 V DC (R_L < 500 Ohm)
RS485	15 - 35 V DC or 24 V AC ±20%
Current consumption	
Analogue	for DC supply: typ. 4 mA / for AC supply: typ. 15 mA_{eff}
Digital	for DC supply typ. 11 mA / for AC supply: typ. 30 mA_{eff}
Electrical connection	screw terminals max. 1.5 mm^2 (AWG 16)
Housing (polycarbonate)	US Version: UL94V-0 approved / EU Version: UL94HB approved
Protection class	IP30
CE compatibility according	EN61326-1 EN61326-2-3
Temperature working range	-5...55 °C (23...131 °F)
Temperature storage range	-25...60 °C (-13...140 °F)

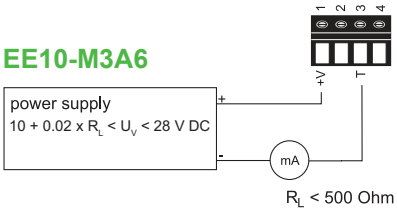
1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Connection Diagram

EE10-M3A3

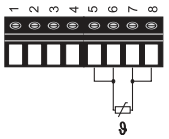


EE10-M3A6



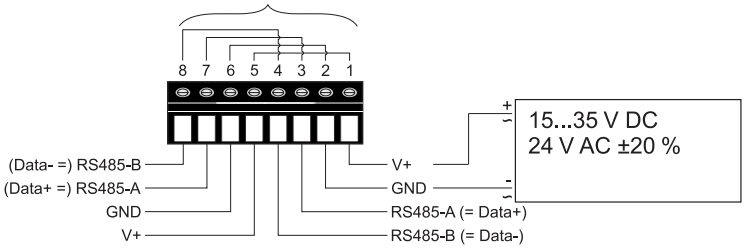
R_L < 500 Ohm

EE10-M7



EE10-M3J3

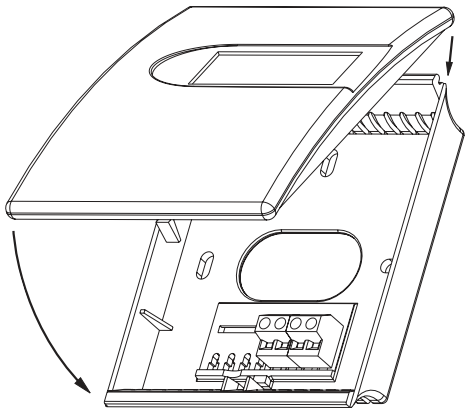
Connected on the electronics board.



The bus address can be set with DIP-Switches on the electronics board.

Screw terminals appropriate for daisy-chain wiring

Enclosure



Dimensions:

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")

Colour:

EU-Standard, US:
Front cover: signal white RAL9003
Back cover: light grey RAL7035

EU-Grey:
Front and back cover: anthracite grey RAL7016

EU-Silver:
Front and back cover: white aluminum RAL9006

Scope of Supply

- EE10 sensor according ordering guide
- Mounting material
- Test report according DIN EN10204 - 2.2 (for EE10-T)
- Quick user guide (for digital output only)

Ordering Guide

			EE10-	
	Model	Temperature active	M3	
		Temperature passive		M7
	Output	0-10 V	A3	
		4-20 mA	A6	
		RS485	J3	
	T-sensor passive[1]	Pt 100 DIN A		TP1
		Pt 1000 DIN A		TP3
		NTC 10k ±1%, $B_{25/100}$ = 3950K		TP5
		NTC 1.8k		TP7
		Ni1000, TK6180		TP9
		NTC 10k ±0.5%, $B_{25/50}$ = 3950K		TP11
		NTC 10k ±1%, $B_{25/85}$ = 3435K		TP14
	Display	without display	no code	
		with display	D1	
	Enclosure	EU-Standard (RAL9003 / RAL7035)	no code	no code
		EU-Grey (RAL7016)	CH74	CH74
		EU-Silver (RAL9006)	CH93	CH93
		US (RAL9003 / RAL7035)	RG2	RG2
Output Setup	**Temperature Unit**	T [°C]	no code	
Analogue A3, A6		T [°F]	MB2	
	Scale T low	0	no code	
		value[2]	SBL value	
	Scale T high	50	no code	
		value[2]	SBH value	
Digital J3	**Protocol**	Modbus RTU[3]	P1	
		BACnet MS/TP[4]	P3	
	Unit	metric-SI	no code	
		non-metric	U2	
	Baud rate	9600 (usual for Modbus)	BD5	
		19200	BD6	
		38400 (usual for BACnet)	BD7	
		57600[5]	BD8	
		76800[5]	BD9	

1) T sensor details at www.epluse.com/R-T_Characteristics. For other passive T sensors please contact E+E.
2) -5 °C (23 °F) < Scale T low < 20 °C (68 °F). 25 °C (77 °F) < Scale T high < 55 °C (131 °F). Scale T high – Scale T low > 20 °C (68 °F).
3) Factory setting: Even Parity, Stopbits 1. Modbus Map see User Guide at www.epluse.com/ee10
4) Factory setting: No parity, Stopbits 1. Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee10
5) Only for BACnet MS/TP

Order Example

EE10-M3A3D1

Model:	Temperature active
Output:	0-10 V
Display:	with display
Enclosure:	EU-Standard (RAL9003 / RAL7035)
Temperature Unit:	°C
Scale T low:	0 °C
Scale T high:	50 °C

EE10-M3J3P3BD7

Model:	Temperature active
Output:	RS485
Display:	without display
Enclosure:	EU-Standard (RAL9003 / RAL7035)
Protocol:	BACnet MS/TP
Unit:	metric-SI
Baud rate:	38400

EE10-M7TP1

Model:	Temperature passive
T-sensor passive:	Pt 100 DIN A
Enclosure:	EU-Standard (RAL9003 / RAL7035)

EE300Ex-xT

Temperature Transmitter for Intrinsically Safe Applications

The EE300Ex-xT intrinsically safe transmitter measures reliably temperature (T) in explosion hazard areas. It complies with the classifications for Europe (ATEX), International (IECEx), USA / Canada (FM) and China (NEPSI) for flammable gas and dust applications.

The entire device can be placed in the explosion endangered area. The remote sensing probe allows for classification up to T6.

Measurement performance
EE300Ex-xT stands for highly accurate and long term stable measurement over the full range -70…200 °C (-94...392 °F), with pressure rating up to 20 bar (300 psi).

Supply and outputs
The device can be powered by any intrinsically safe supply unit or via Zener barriers. The measured data is available on a 4…20 mA, 2-wire output and on the LCD display.

Robust, functional design

EE300Ex-xT is available for wall mount and with remote probe up to 10 m (32.8 ft) The stainless steel enclosure and probe are suitable for harsh environment in challenging industrial applications. The EE300Ex-xT design facilitates the installation as well as the replacement of the measuring section (electronics and probe) without time consuming wiring for both models.

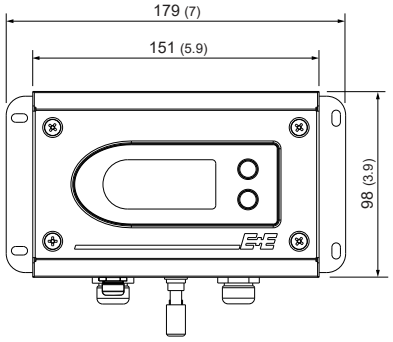
Typical Applications

process control
chemical and pharmaceutical industry
hazardous storage rooms
oil and gas industry

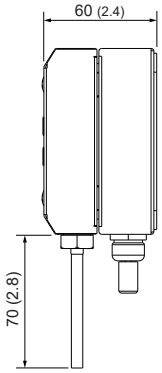
Features

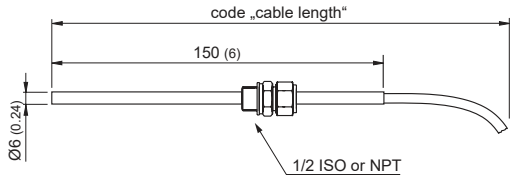
approved for gas and dust
installation in zone 0 / 20 and Div. 1
stainless steel enclosure and probe
highest accuracy up to 200°C (392°F)
pressure rating 20bar (300psi)

Dimensions in mm (inches)



Enclosure



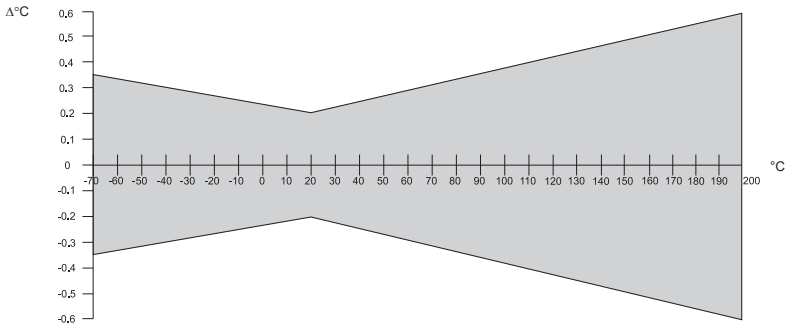


remote probe 0.1...20bar (1.5...300psi) with cut-in fitting

Technical Data

Measurand

Temperature

Temperature sensor	Pt1000 (Tolerance class A, DIN EN 60751)
Measuring range	wall mount: -40...60 °C (-40...140 °F) remote probe:-70...200 °C (-94...392 °F)
Accuracy[1)]	

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

Outputs

Scalable analogue output	4-20 mA (2-wire) R_L=(Vcc-9 V)/20 mA

General

Supply voltage	$V_{cc\ min}$=(9+RL*0.02) VDC $V_{cc\ max}$ = 28 VDC R_L load resistor	
Current consumption	max 20 mA	
Temperature range	probe	according measuring range
	electronics	-40...60 °C (-40...140 °F)
	electronics with display	-20...60 °C (-4...140 °F)
Material	enclosure	stainless steel 1.4404
	probe cable	PTFE
	probe	stainless steel 1.4541
Protection class of housing	IP65 / Nema 4	
Cable gland	M16 for cable diameter 5 - 10 mm (0.2 - 0.4″) M20 for cable diameter 10 - 14 mm (0.4“ - 0.6“)	
Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Electromagnetic compatibility according	EN61326-1 EN61326-2-3 ICES-003 ClassB Industrial Environment FCC Part15 ClassB	CE
Storage temperature range	electronics and probe	-20...60 °C (22...140 °F)

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).

Ex - Classifications

Europe (ATEX)

Certificate:	TPS 13 ATEX 38892 003 X by TÜV SÜD Product Service GmbH
Safety factors:	Ui = 28V; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li ≈ 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 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 ≤ Ui ≤ 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 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 probe	Ex ia IIC T6-T1 Ta = -70°C to 200°C Ga / Ex ia IIIC T80°C Da

China (NEPSI)

Certificate:	Cert NO. GYJ16.1417X by NEPSI
Safety factors:	Ui = 28Vdc; Ii = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH
Ex-Designation:	
Transmitter without display	Ex ia IIC T4 Ga, Ex iaD 20 T131
Transmitter with display	Ex ia IIC T4 Gb, Ex ia IIB T4 Ga
Remote probe	Ex ia IIC T1~T6 Ga, Ex iaD 20 T80

USA (FM)

Certificate:	No. FM17US0302X by FM Approvals
Safety factors:	6.4 Vdc ≤ Vmax (or Ui) ≤ 28Vdc; Imax (or Ii) = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH

Ex-Designation:

Equipment Group I: EE300Ex without display

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C
Class I, Zone 0, AEx ia IIC T4 Ta = -40°C to +60°C Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T131°C Ta = -40°C to +60°C Da; Entity – M1_139080; IP65

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Class I, Zone 0, AEx ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T80°C Da; Entity – M1_139080; IP65

Equipment Group II: EE300Ex with display

Class I, Division 1, Groups C, and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Division 2, Groups A, B, C and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Zone 0, AEx ia IIB T4 Ta = -40°C to +60°C Ga; Entity – M1_139080
Class I, Zone 1, AEx ia IIC T4°C Ta = -40°C to +60°C Gb; Entity – M1_139080

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Class I, Zone 0, AEx ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, AEx ia IIIC T80°C Da; Entity – M1_139080; IP65

CANADA (FM)

Certificate:	No. FM17CA0154X by FM Approvals
Safety factors:	6.4 Vdc ≤ Vmax (or Ui) ≤ 28Vdc; Imax (or Ii) = 100mA; Pi = 700mW; Ci = 2.2nF; Li = 0mH

Ex-Designation:

Equipment Group I: EE300Ex without display

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T4 Ta = -40°C to +60°C
Zone 0, Ex ia IIC T4 Ta = -40°C to +60°C Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T131°C Ta = -40°C to +60°C Da; Entity – M1_139080; IP65

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Zone 0, Ex ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65

Equipment Group II: EE300Ex with display

Class I, Division 1, Groups C, and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Class I, Division 2, Groups A, B, C and D; T4 Ta = -40°C to +60°C; Entity – M1_139080
Zone 0, Ex ia IIB T4 Ta = -40°C to +60°C Ga; Entity – M1_139080
Zone 1, Ex ia IIB T4 Ta = -40°C to +60°C Gb; Entity – M1_139080

Remote Probe:

Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; T6…T1; Entity – M1_139080; IP65
Class I, II, III, Division 2, Groups A, B, C, D, E, F and G; T6…T1
Zone 0, Ex ia IIC T6…T1 Ga; Entity – M1_139080; IP65
Zone 20, Ex ia IIIC T80°C Da; Entity – M1_139080; IP65

The USA and Canada approvals are valid for air and gas measurement only.

Ordering Guide

			EE300Ex-xT6S	EE300Ex-xT6S
Hardware Configuration	**Model**	wall mount	A	
		remote probe		H
	Display	without display	x	
		with display [1]	D	
	Electrical Connection	2 x M16 cable gland	B	
		1/2″ NPT conduit adapter	C	
		2 x M20 cable gland	G	
	Probe Cable	wall mount	x	
		1 m (3.3 ft)		C
		2 m (6.6 ft)		E
		5 m (16.4 ft)		G
		10 m (32.8 ft)		H
	Probe Length	wall mount	x	
		150 mm (5.9″)		E
	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	ATEX (Europe)	AT	
		IECEx (International)	IC	
		NEPSI (China)	CN	
		FM (Canada)	CA	
		FM (USA)	FM	
Setup	**Units**	metric [°C]	M	
		non-metric [°F]	N	
	Output	temperature	Tx	
	Scaling Output	range	yyy select according data sheet „Scaling Outputs“	

[1] No display possible for environments with combustible dust, fibers and flyings and in gases with EPL Ga IIC (Groups A, B)

Order Examples

EE300Ex-xT6SHDBHEIAT/MTx005

Model:	remote probe
Display:	with display
Electrical Connection:	2 x M16 cable gland
Probe Cable:	10 m (32.8 ft)
Probe Length:	150 mm (5.9″)
Feedthrough:	1/2“ ISO - cut-in fitting
Ex-Certification:	ATEX (Europe)
Units:	metric
Output:	temperature
Scaling Output:	0...100 °C

EE300EX-xT6SAxBxxxFM/NTx083

Model:	wall mount
Display:	without display
Electrical Connection:	2 x M16 cable gland
Probe Cable:	wall mount
Probe Length:	wall mount
Feedthrough:	without probe fitting
Ex-Certification:	FM (USA)
Units:	non metric
Output:	temperature
Scaling Output:	-40...140 °F

Accessories

Blank cover	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 M16 cable glands	HA011402
Sealing plug for unused M20 cable glands	HA011404

EE600

Differential Pressure Sensor

The EE600 is dedicated for accurate and reliable measurement of differential pressure in HVAC, building automation and filter monitoring applications. It is available as multi-range device with full scale 1,000 Pa (4 inch Water Column) and 10,000 Pa (40 inch WC). It can be employed for air as well as all non-flammable and non-aggressive gases. The piezo-resistive pressure sensing element provides outstanding long term stability.

The measured data is available on the analogue output, whereby both voltage and current signals are available simultaneously at the spring terminals.

The IP65 / NEMA 4 enclosure minimizes installation costs. External mounting holes allow installation with closed cover, the electronics are thus protected against construction site pollution.

EE600 stands for full flexibility. Using DIP-switches on the electronics board, the user can select the pressure range, the output signal, the time constant as well as the units and the backlight of the large, graphic display. The user can easily perform a zero and span point adjustment with push buttons on the electronics board.

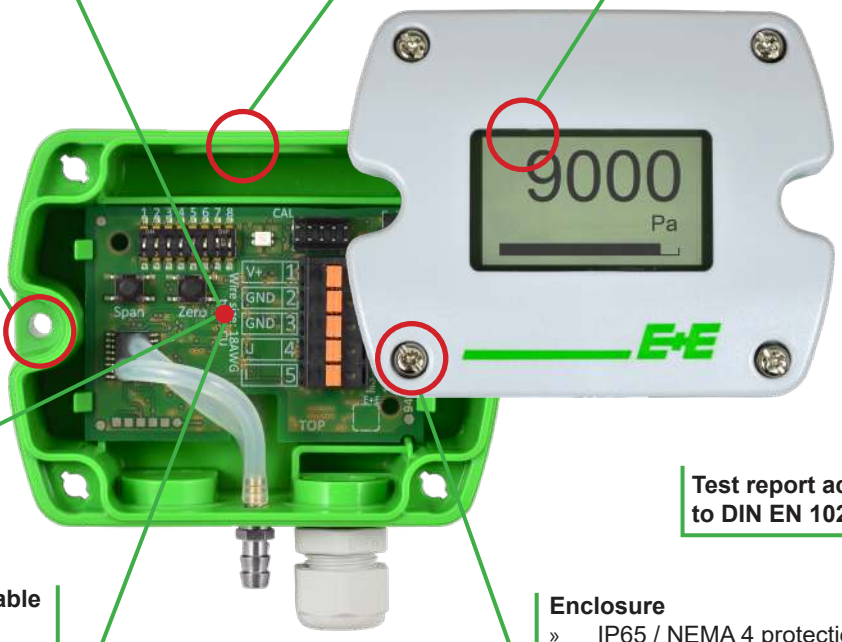
Features

Multi-range
- » 0 … 250 / 500 / 750 / 1000 Pa
- » 0 … 2500 / 5000 / 7500 / 10000 Pa

Knockout for ½" conduit fitting (US)

Graphic display with backlight

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



Status LED
Spring terminals

Test report according to DIN EN 10204 – 2.2

User configurable and adjustable
- » Pressure range
- » Output signal
- » Response time
- » Display units and backlight
- » Zero and span point adjustment

Enclosure
- » IP65 / NEMA 4 protection class
- » Bayonet screws - open/closed with a ¼ rotation

Technical Data

Measured Value

Differential Pressure (Δp)

Measurement principle	Piezoresistive, no flow-through	
Measurement range	I: 0...250 / 500 / 750 / 1000 Pa	(0...1 / 2 / 3 / 4 inch WC[2])
selectable with DIP switches[1]	II: 0...2500 / 5000 / 7500 / 10000 Pa	(0...10 / 20 / 30 / 40 inch WC[2])
Accuracy (incl. hysteresis, non-linearity and repeatability) at 20 °C		
0...1000 Pa (4 inch WC[2])	±2 % FS[3]	
0...10000 Pa (40 inch WC[2])	±1 % FS[3]	
Response time t_{90}	50 ms / 500 ms / 2 s / 4s selectable with DIP switches[1]	
Temperature dependency	typ. < 0.03 % from FS[3]/K	
Long-term stability	< 0.5 % from FS[3]/year	
Overload limits		
0...1000 Pa (4 inch WC)	± 10000 Pa (± 40 inch WC)	
0...10000 Pa (40 inch WC)	± 80000 Pa (± 320 inch WC)	

Outputs

Analogue outputs	0-5 V or 0-10 V	-1 mA < I_L < 1 mA
selectable with	and[4]	
DIP switches[1]	0-20 mA or 4-20 mA (3-wire)	R_L ≤ 500 Ohm

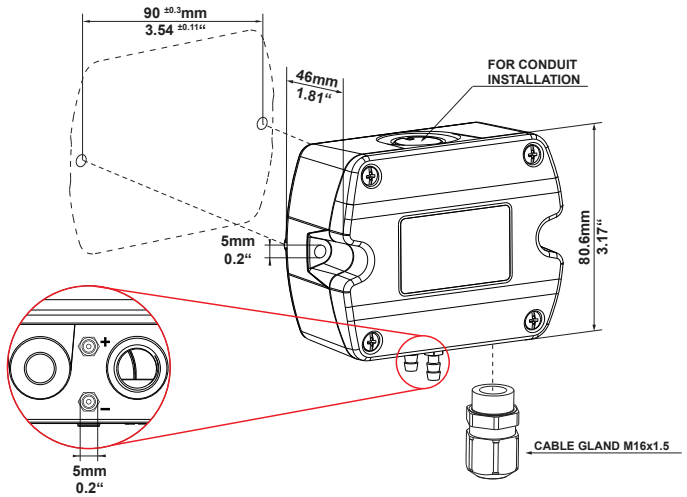
General

Power supply	15-35 V DC or 24 V AC ±20 %
Current consumption	typ. 18 mA (without Display)
at 0 Pa / 24 V DC	typ. 43 mA (with Display and Backlight)
Display	Graphic, with backlight
Display units	Pa, mbar, inch WC[2], kPa selectable with DIP switches[1]
Connection	Spring terminals, max. 1.5 mm²
Housing material	Polycarbonate, UL94V-0 (with Display UL94HB) approved
Protection class	IP65 / NEMA 4
Cable gland	M16 x 1.5
Electromagnetic compatibility	EN61326-1 EN61326-2-3
Humidity range	0...95 % RH (non condensing)
Temperature ranges	Operation: -20...60 °C (-4...140 °F) Storage: -40...70 °C (-40...158 °F)

1) Factory setup: Measurement range 0...100%; Response time t_{90}:50 ms; Display unit: Pa; Display backlight: on; Analogue outputs: 0-10 V and 4-20 mA
2) WC = Water Column 3) FS = full scale (1000 Pa or 10000 Pa) 4) Voltage and current output signals available simultaneously at the spring terminals, see connection diagram

Dimensions (mm/inch)

Pressure fittings Ø 5mm
+ : High pressure
- : Low pressure



Accessories (included in the scope of supply)

Pressure connection set:
2 m (6.6 ft) PVC hose with two ABS pressure connection nipples.
For details see operation manual and data sheet "Accessories".

HA011304

Ordering Guide

			EE600
	Measuring range	0...1000 Pa (0...4 inch WC, 0-10 mbar, 0-1 kPa) 0...10000 Pa (0...40 inch WC, 0-100 mbar, 0-10 kPa)	HV52 HV53
	Display	without display with display	no code D2

Order Examples

EE600-HV52
Measuring range: 0...1000 Pa (0...4 inch WC, 0-10 mbar, 0-1 kPa)
Display: without display

EE600-HV53D2
Measuring range: 0...10000 Pa (0...40 inch WC, 0-100 mbar, 0-10 kPa)
Display: with display

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)	

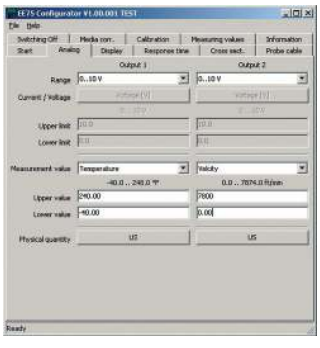
General

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		

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.

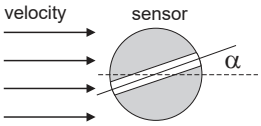
Configuration Software

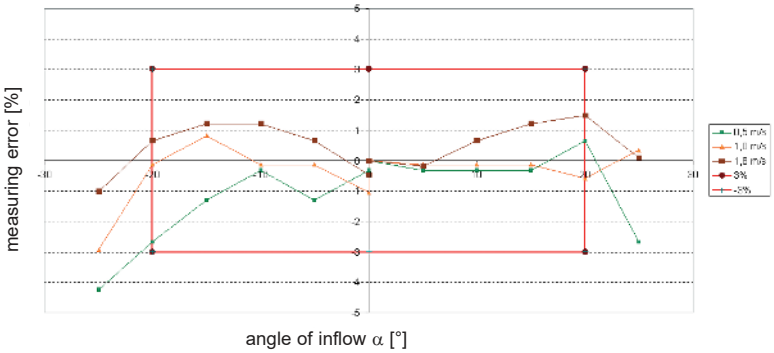
An easy setup of the EE75 can be made via standard USB interface and the software included in the scope of supply.
The user can easily set the response time, correct for the gas (air) pressure, perform an one or two point adjustment and define the duct cross section for the volumetric flow rate.



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

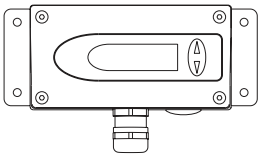
Small temperature differences in shut-off pipes and ducts can cause minimal flows. Even these would be detected and measured by the EE75. The resulting fluctuations in the output signal can be suppressed by the low flow cut-off. Cut-off point and switching hysteresis can be specified using the configuration software.

Calculation of volumetric flow

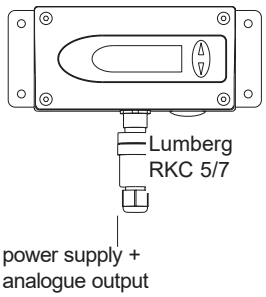
The EE75 measures air velocity in m/s or ft/min. The configuration software can be used to enter the cross-section. This enables the transmitter to calculate the volumetric flow rate in m³/min or ft³/min. The data can be displayed and directed to one of the analogue outputs.

Connection versions

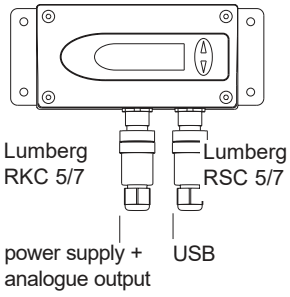
standard



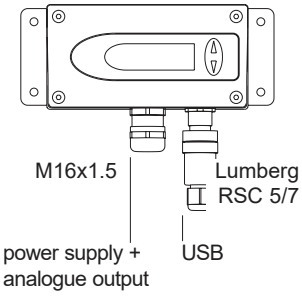
plug option C12



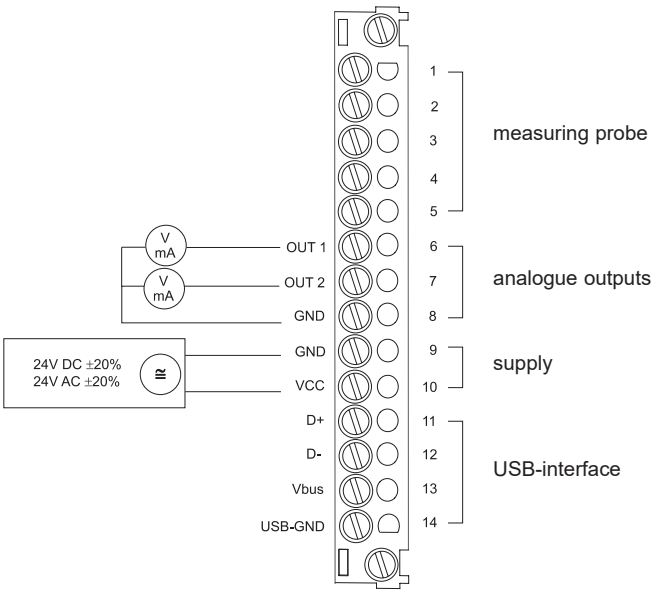
plug option C13



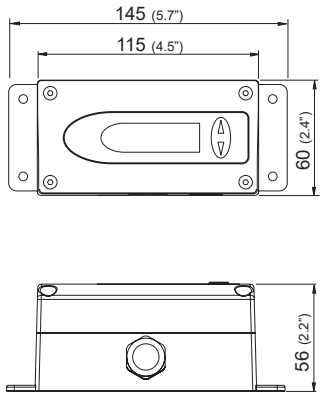
plug option C14

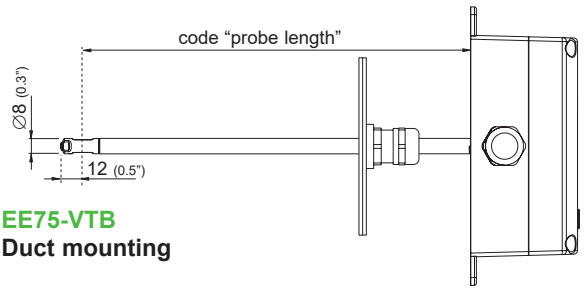


Connection Diagram

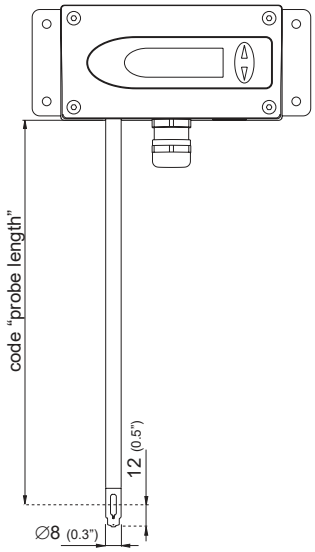


Dimensions in mm

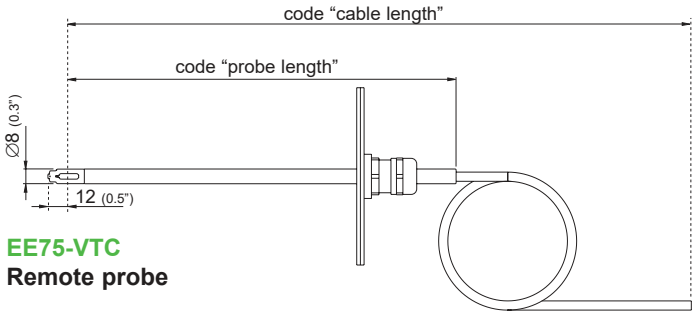




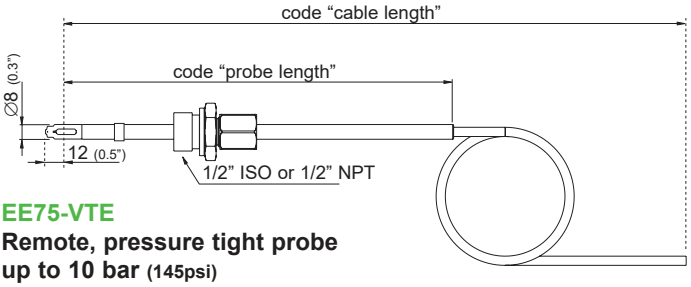
EE75-VTB
Duct mounting



EE75-VTA
Wall mounting

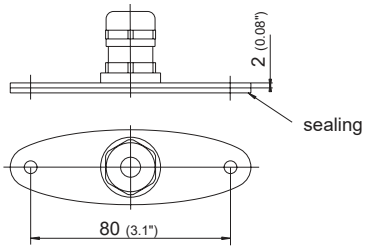


EE75-VTC
Remote probe



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) Other T Scaling refer to data sheet „T-Scalings"		
	-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)				
	-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.

The device employs an innovative air velocity sensing 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 sensing element is very robust and highly insensitive to pollution, which leads to outstanding long-term performance.

For the EE650 with analogue output, 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.

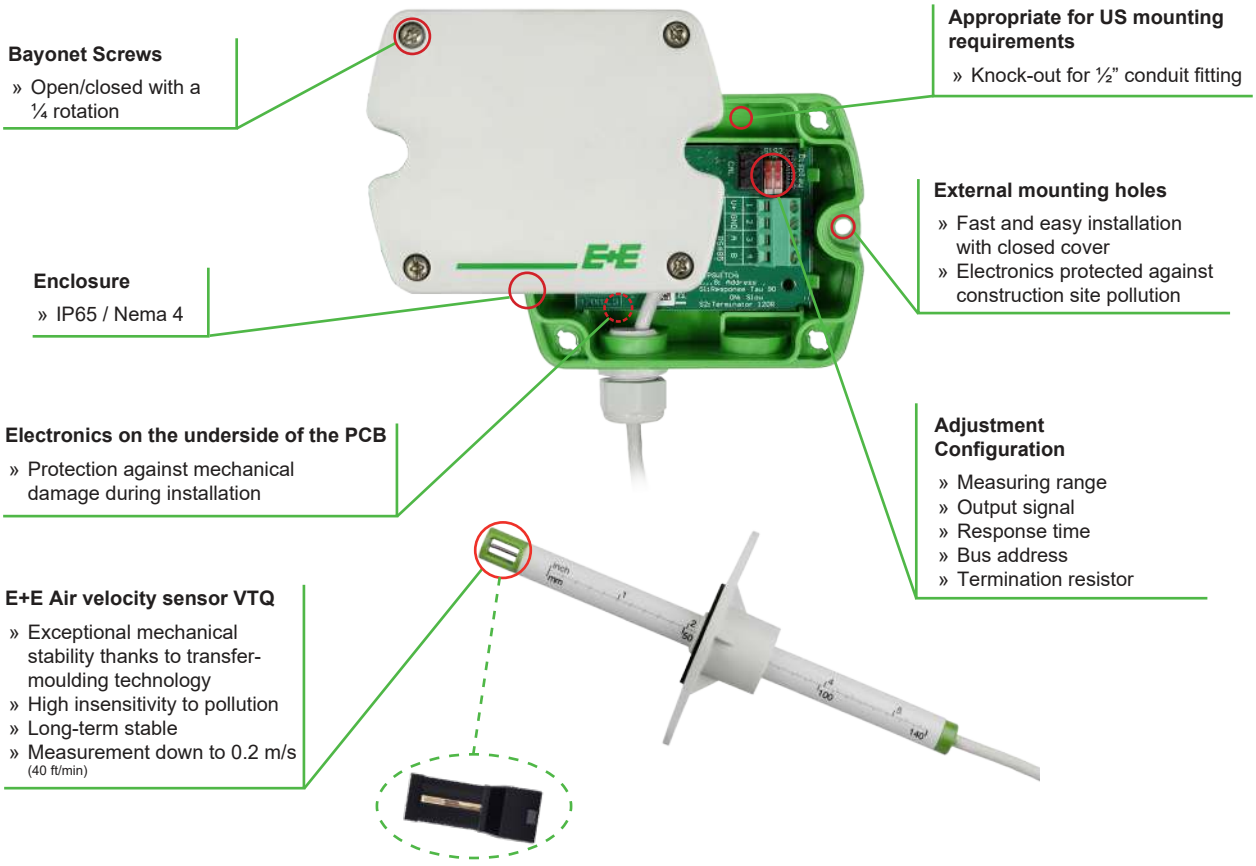
The bus address, the termination resistor and the response time of the Modbus RTU and BACnet MS/TP versions can also be easily set on the electronics board.

The enclosure design and the mounting flange included in the scope of supply allow for fast and easy installation.
With an optional adapter cable and the free EE-PCS product configuration software, the user can adjust the EE650, set the output scale and select the interface parameters.

EE650 - Duct mounting

EE650 - Remote sensor probe

Features



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)	
Accuracy at 20 °C [2] (68 °F), 45 % RH, 1013 hPa	0.2...10 m/s (40...2000 ft/min) 0.2...15 m/s (40...3000 ft/min) 0.2...20 m/s (40...4000 ft/min)	± (0.2 m/s (40 ft/min) + 3 % of m. v.) ± (0.2 m/s (40 ft/min) + 3 % of m. v.) ± (0.2 m/s (40 ft/min) + 3 % of m. v.)
Response time τ_{90} [1]	typ. 4 sec. (factory setting) or	typ. 1 sec. at constant temperature

Output

Analogue [1] 0...10 m/s / 0...15 m/s / 0...20 m/s	0 - 10 V 4 - 20 mA (factory setting)	-1 mA < I_L < 1 mA R_L < 500 Ω (linear, 3-wires)
Digital interface Protocol	RS485 with max. 32 devices on one bus Modbus RTU or BACnet MS/TP	

General

Power supply (Class III)	24 V AC/DC ± 20 %	
Current consumption		

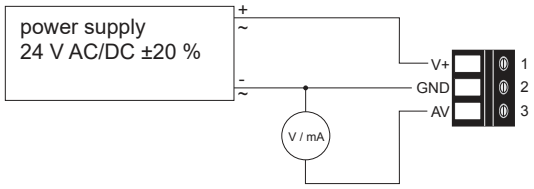
	AC supply	DC supply
Analogue ouput	max. 170 mA	max. 70 mA
RS485	max. 120 mA	max. 50 mA

Electrical connection	screw terminals max. 1.5 mm² (AWG 16)	
Cable gland	M16x1.5	
Electromagnetic compatibility	EN61326-1 Industrial Environment	EN61326-2-3
Enclosure material	Polycarbonate, UL94V-0 approved	
Protection class	Enclosure IP65 / NEMA 4, remote probe IP20	
Temperature range	working temperature probe working temperature electronic storage temperature	-25 ... 50 °C (-13...122 °F) -10 ... 50 °C (14...122 °F) -30 ... 60 °C (-22...140 °F)
Working range humidity	5...95 % RH (non-condensing)	

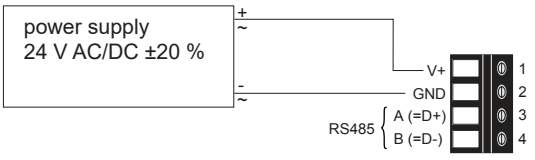
1) Selectable by jumper, only for analogue output
2) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty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

Connection Diagram

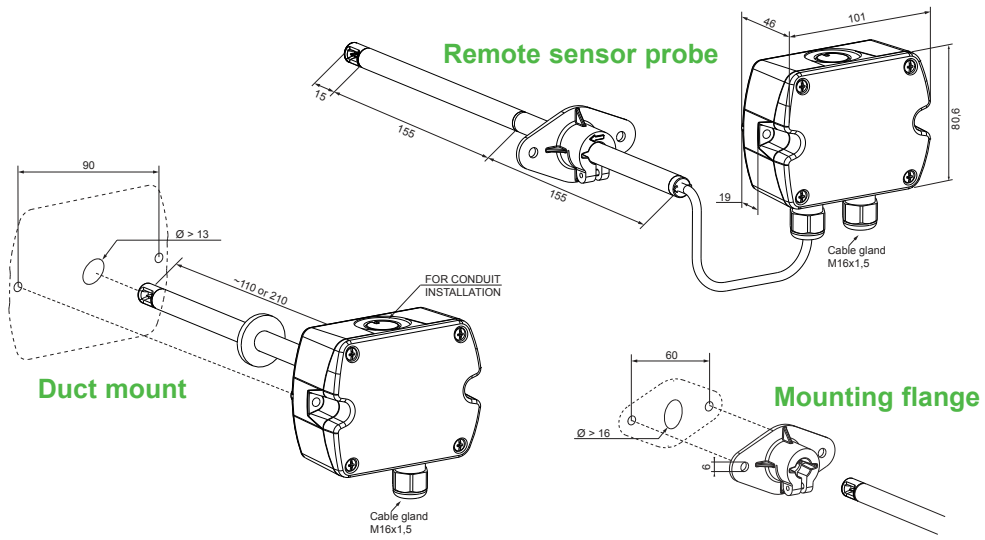
Analogue output



Digital interface



Dimensions (mm)



Ordering Guide

			EE650-	
Hardware Configuration	**Type**	Duct mounting	T2	
		Remote sensor probe		T3
	Output	4-20 mA (selectable by jumper to 0-10 V)	A6	A6
		RS485	J3	J3
	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
Setup RS485	**Protocol**	Modbus RTU [1]	P1	
		BACnet MS/TP [2]	P3	
	Baud rate	9600	BD5	
		19200	BD6	
		38400	BD7	
		57600 [3]	BD8	
		76800 [3]	BD9	

1) Factory setting: Even Parity, Stopbits 1
2) Factory setting: No Parity, Stopbits 1
3) Only for BACnet MS/TP

Modbus Map see User Guide at www.epluse.com/ee650
Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee650

Order Example

EE650-T2A6L200
Type: duct mounting
Output: 4-20 mA
Probe length: 200 mm

EE650-T3A6L300K2
Type: remote sensor probe
Output: 4-20 mA
Probe length: 300 mm
Cable length: 2 m

EE650-T2J3L200P1BD5
Type: duct mounting
Output: RS485
Probe length: 200 mm
Protocol: Modbus RTU
Baud rate: 9600

Scope of Supply

- EE650 Transmitter according to ordering guide
- Cable gland (two pieces at output RS485 for daisy chain wiring)
- Mounting flange
- Mounting materials
- Protection cap
- Quick guide
- Two self-adhesive labels for configuration changes (see user guide at www.epluse.com/relabeling)
- Test report according to DIN EN10204 - 2.2

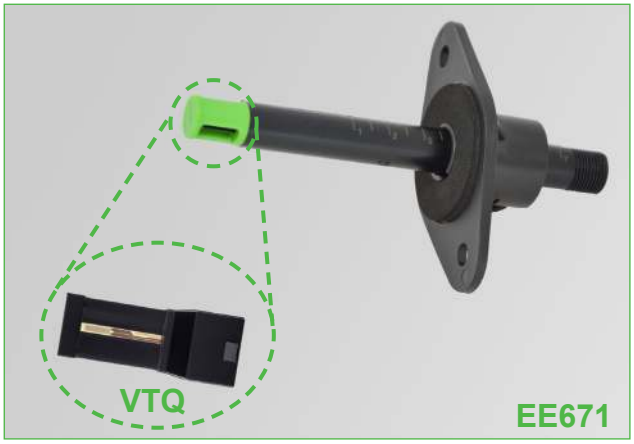
Accessories

USB configuration adapter	HA011066
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

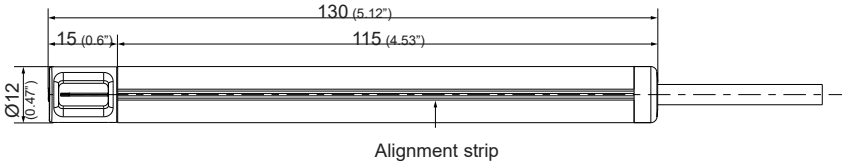
General

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)

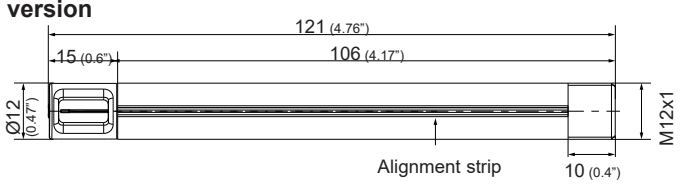
1) See ordering information
2) Only at supply voltage V+ ≥ 15 V
3) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-fold standard deviation). The tolerance was calculated in accordance with EA-4/02 following the GUM (Guide to the Expression of Uncertainty in Measurement).
4) The EE671 is not short-circuit-proof and not surge-proof (ESD-sensitive device).

Dimensions (mm/inch)

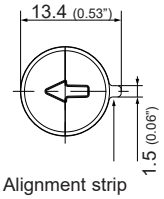
Cable version



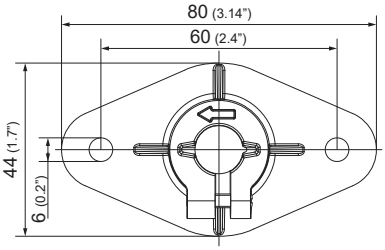
Plug version

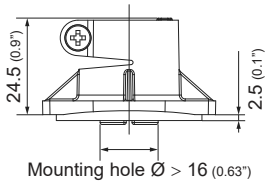


Front view Measurement head:



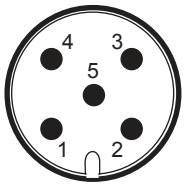
Flange (within the scope of supply):





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).

The factory setting for the Slave-ID is 238 as an integer 16Bit value. This ID can be customised in the register 0x00 (value margin 1 - 247 permitted).

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 10	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

Low Air Velocity Sensor

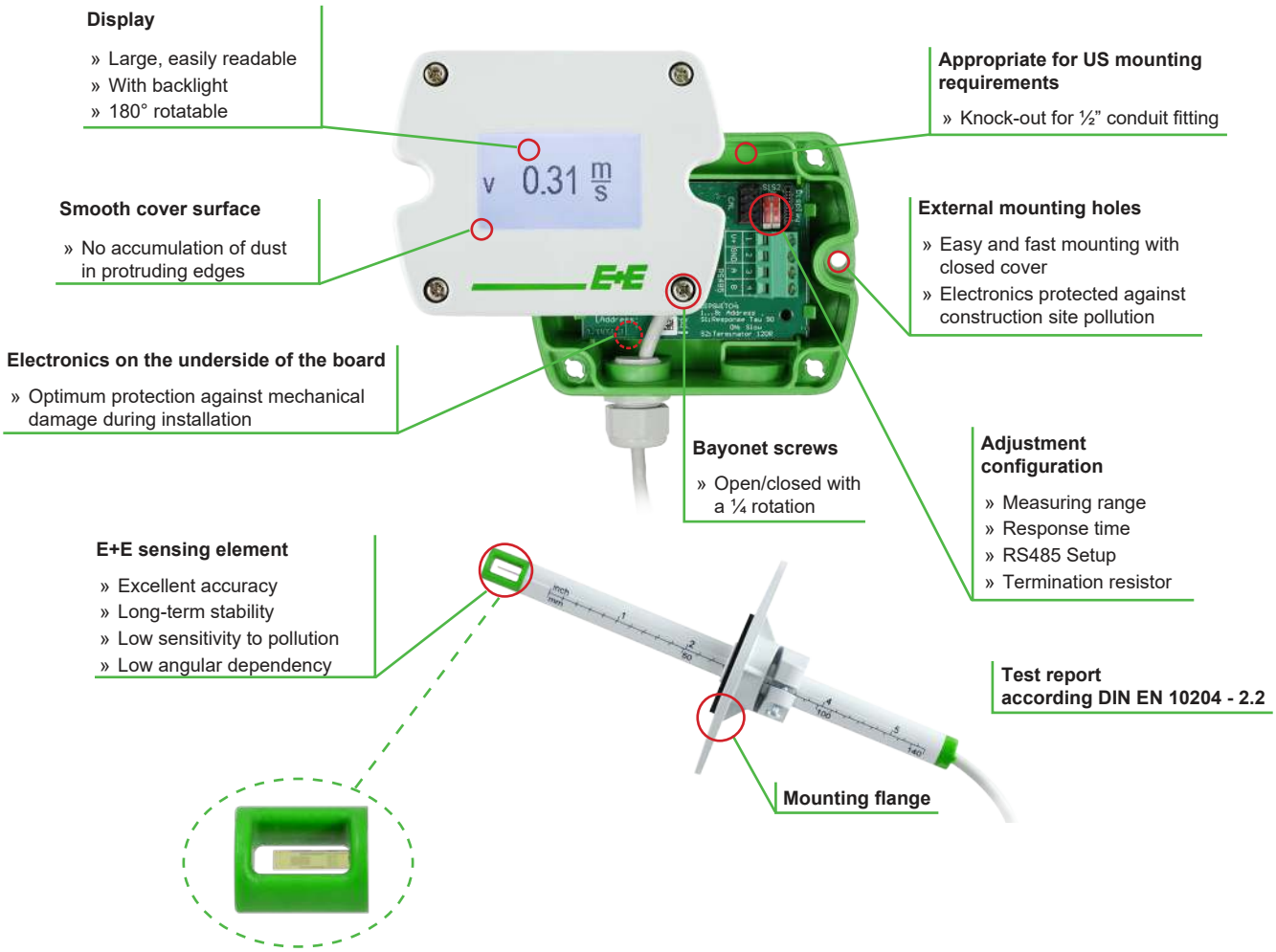
The EE660 is optimized for highly accurate measurement of very low air velocity in laminar flow control and special ventilation applications, for instance in clean rooms.

Excellent Measurement Performance
The E+E thin film sensing element employed in EE660 operates on the hot film anemometer principle, which stands for excellent accuracy down to 0.15 m/s (30 ft/min), high insensitivity to pollution and low angular dependency.

Analogue and Digital Outputs
The air velocity measured data is available as current and voltage outputs, on the RS485 interface with Modbus RTU or BACnet protocol, as well as on the optional display.

Easy Configuration and Adjustment
The EE660 is user configurable with jumpers on the electronics board or via software. An optional configuration adapter and the free EE-PCS Product Configuration Software facilitate the adjustment of EE660 and the display setup.

Features



Technical Data

Measurand

Working range [1]	0...1 m/s	(0...200 ft/min)		
	0...1.5 m/s	(0...300 ft/min)		
	0...2 m/s	(0...400 ft/min)		
Accuracy at 20 °C [2] (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} [3]	typ. 4 sec or typ. 1 sec (at constant temperature)			

Output

Analogue	0 - 10 V	and	4 - 20 mA
0...1 m/s / 0...1.5 m/s / 0...2 m/s [1]	-1 mA < I_L < 1 mA		R_L< 450 Ω (linear, 3-wires)
Digital interface	RS485 with max. 32 devices on one bus		
Protocol	Modbus RTU or BACnet MS/TP		

General

Power supply (Class III) ⧫ 24 V AC/DC ± 20 %

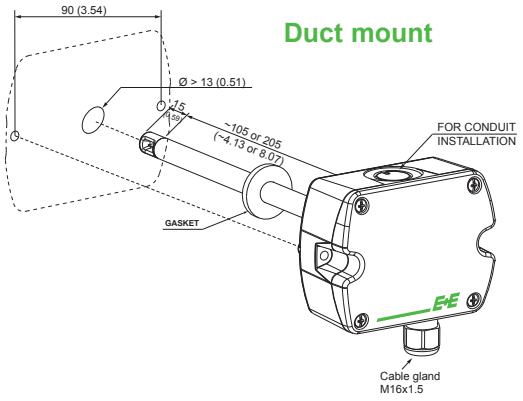
Current consumption (max.)

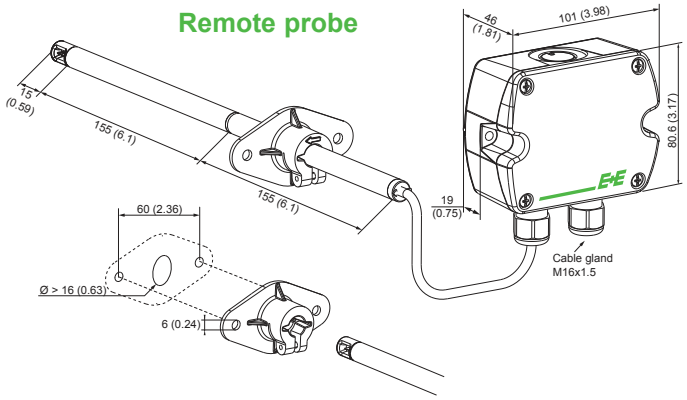
	AC supply - no display	DC supply - no display	AC supply - with display	DC supply - with display
Analogue ouput	74 mA rms	41 mA	180 mA rms	85 mA
Digital output	120 mA rms	50 mA	-	-

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 CE
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, only for analogue output
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) Selectable by jumper (analogue) and slide switch (digital)

Dimensions mm (inch)





Ordering Guide

			EE660-	
Configuration	**Model**	duct mount	T2	
		remote probe		T3
	Output	0-10 V and 4-20 mA	A7	
		RS485	J3	
	Probe length	100 mm (3.94“)	L100	
		200 mm (7.88“)	L200	
		300 mm (11.82“)		L300
	Cable length	1 m (3.3 ft)		K1
		2 m (6.6 ft)		K2
		5 m (16.4 ft)		K5
		10 m (32.8 ft)		K10
	Display	no display	no code	
		with display (only for analogue ouput A7)	D2	
	Display unit	m/s	no code	
		ft/min	DA21	
Setup RS485	**Protocol**	Modbus RTU [1]	P1	
		BACnet MS/TP [2]	P3	
	Baud rate	9600	BD5	
		19200	BD6	
		38400	BD7	
		57600 [3]	BD8	
		76800 [3]	BD9	

1) Factory setting: Even Parity, Stopbits 1
2) Factory setting: No Parity, Stopbits 1
3) Only for BACnet MS/TP

Modbus Map see User Guide at www.epluse.com/ee660
Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee660

Order Examples

EE660-T3J3L300K1P1BD5

Model:	remote probe
Output:	RS485
Probe length:	300 mm (11.82“)
Cable length:	1 m (3.3 ft)
Display:	no display
Protocol:	Modbus RTU
Baud rate:	9600

EE660-T2A7L200

Model:	duct mount
Output:	0-10 V and 4-20 mA
Probe length:	200 mm (7.88“)

Accessories

USB configuration adapter	HA011066
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.	

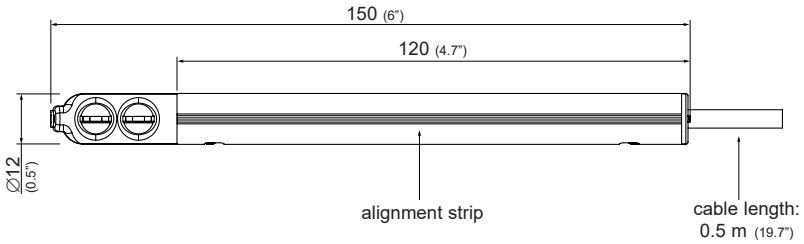
General

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)	

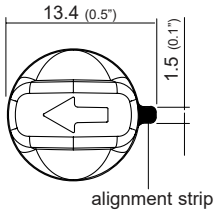
1) refer to ordering guide
2) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation).
The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Dimensions (mm)

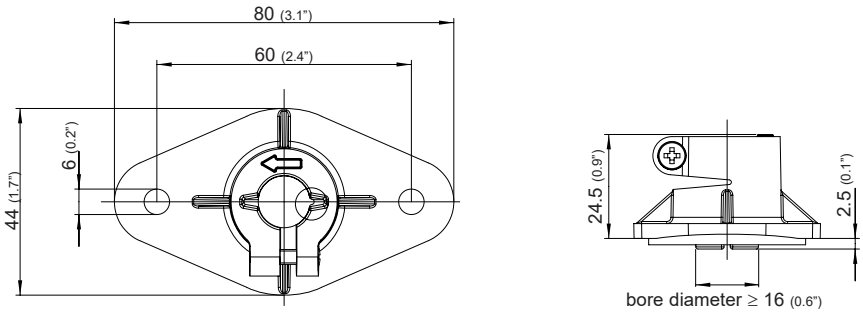
Probe:



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 in DN15 to DN50 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 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 setup can be set using either display and push buttons or the free product configuration software EE-PCS.

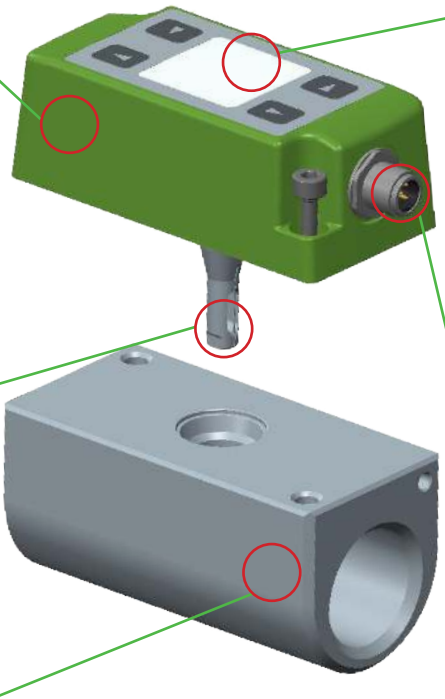
Typical applications

- Compressed air consumption measurement
- Monitoring of technical gases O_2, N_2, Ar, CO_2 and other
- Nitrogen generators
- Leak detection

Features

Transmitter
» For each three pipe diameters
» Installation and removal without disassembling the pipework facilitates regular calibration
» Application-specific adjustment under pressure for best accuracy

Display
» 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 short 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 PC
» 0-20 / 4-20 mA output
» Two 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 positioning of the transmitter for best accuracy
» Aluminum or stainless steel
» Can be operated with sealing plug also without transmitter

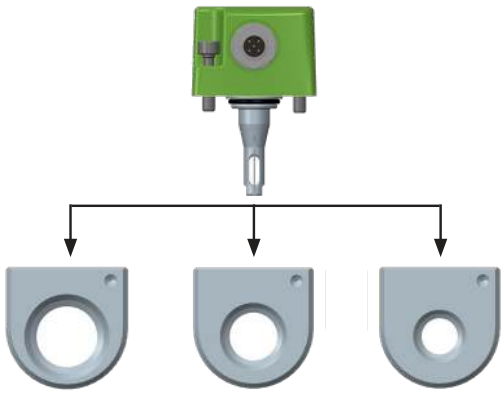
Modular design

One and the same transmitter can be used for each of three pipe diameters:

EE741: DN15 (1/2“) / DN20 (3/4“) / DN25 (1“)
EE741-N50: DN32 (1-1/4“) / DN40 (1-1/2“) / DN50 (2“)

The pipe diameter is easily changed via the display menu or the Configurator 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 measurement at serveral mounting blocks. The sealing plug included in the scope of supply enable the normal operation of the compressed air system when the transmitter is removed.



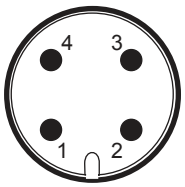
Display (optional)

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.

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

Output 1: Analogue [mA] or switch
Output 2: Pulse or switch
The output signal is freely selectable and configurable.

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 in air [1]	DN15 (1/2"): 0.2...76.3 Nm^3/h (0.12...44.88 SCFM) DN20 (3/4"): 0.4...135.7 Nm^3/h (0.24...79.77 SCFM) DN25 (1"): 0.6...212 Nm^3/h (0.36...124.71 SCFM) DN32 (1-1/4"): 0.9...347.4 Nm^3/h (0.52...202.06 SCFM) DN40 (1-1/2"): 1.4...542.8 Nm^3/h (0.81...315.71 SCFM) DN50 (2"): 2.2...848.2 Nm^3/h (1.22...493.35 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

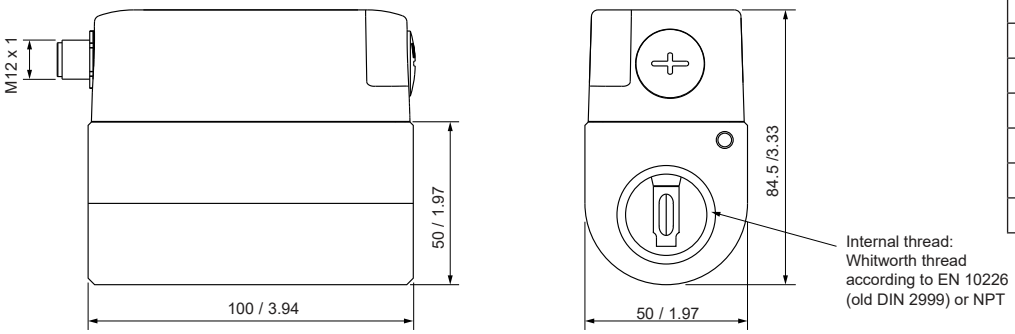
General

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 or none corrosive gases
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.

Dimensions (mm/inch)

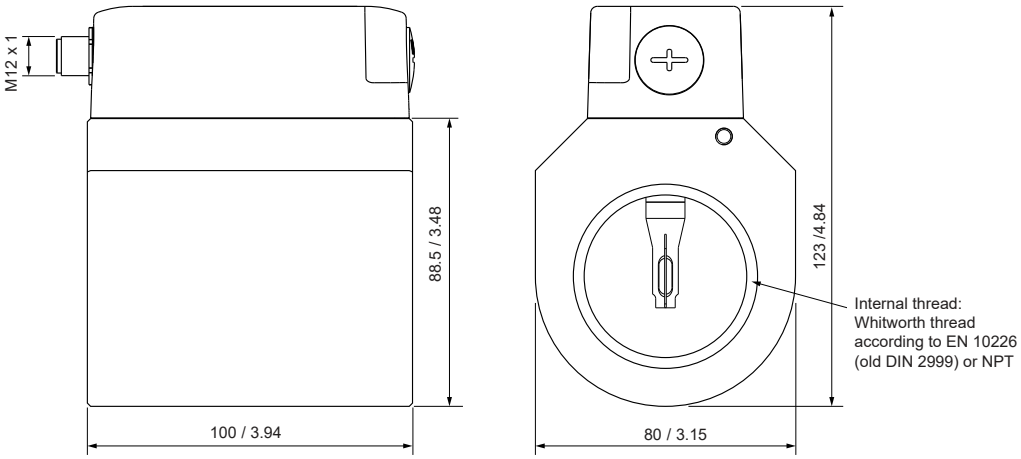
EE741:



Mounting block	Thread R_p or NPT
DN15	1/2"
DN20	3/4"
DN25	1"
DN32[1)]	1-1/4"
DN40	1-1/2"
DN50	2"

1) only R_p thread

EE741-N50:



Modbus Map[1)]

The flow meter can be operated in a Modbus RTU network with max. 32 devices. Writing 0 into the corresponding register will reset the MIN/MAX values and the consumption meter.
For Modbus protocol settings see Application Note Modbus AN0103 (www.epluse.com/EE741).

Read Registers (Function Code 0x03 / 0x04)

Register [DEC]	Protocol address [HEX]	Muasured value	Unit	Type
30501	1F4	Temperature	°C	32-bit float
30503	1F6	Temperature	°F	32-bit float
30507	1FA	Standard flow	Nm/s	32-bit float
30509	1FC	Standard flow	SFPM	32-bit float
30511	1FE	Mass flow	kg/h	32-bit float
30513	200	Mass flow	kg/min	32-bit float
30517	204	Standard volume flow	Nm^3/h	32-bit float
30519	206	Standard volume flow	Nm^3/min	32-bit float
30521	208	Standard volume flow	l/min	32-bit float
30523	20A	Standard volume flow	l/s	32-bit float
30525	20C	Standard volume flow	SCFM	32-bit float
30529	210	Consumption meter status	m^3	64-bit-double
30533	214	Consumption meter status	ft^3	64-bit-double

1) Complete Modbus Map see operating instructions.

Data transmission

	Factory setting	Adjustable values
Baud rate	9600	9600, 19200, 38400
Data bits	8	8
Parity	EVEN	None, Odd, Even
Stop bits	1	1 oder 2
Slave addresse	240	1...247

Ordering information

A complete flow meter consists of a transmitter (Item 1) and a gauge mounting block (Item 2).

Item 1 - Transmitter				EE741-
Hardware	Pipe diameter / Type	for DN15, DN20, DN25		no code
		for DN32, DN40, DN50		N50
	Output	Analogue/switch/pulse output		A6
		RS485 Modbus RTU		J3P1
		M-Bus		J5P4
	Display	Without display		no code
		With display		D2
	Cleaning	without		no code
		degreased for oxygen measurement [1]		AF2
Software configuration	Factory setting pipe diameter (selectable)	DN15 (1/2“)		DN15
		DN20 (3/4“)		DN20
		DN25 (1“)		DN25
		DN32 (1-1/4“) only for N50		DN32
		DN40 (1-1/2“) only for N50		DN40
		DN50 (2“) only for N50		DN50
	Output 1 [2]	Analogue output	4-20 mA	no code
			0-20 mA	GA5
		Switch output		GA9
	Output 2 [2]	Pulse output	(Only with Measurand output 2 = Consumption)	no code
		Switch output		GB9
	Measurand output 1 [2]	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	vn [Nm/s]	MA22
			vn [SFPM]	MA23
		Temperature	T [°C]	MA1
			T [°F]	MA2
	Measurand output 2 [2]	Consumption	Qn [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	vn [Nm/s]	MB22
			vn [SFPM]	MB23
		Temperature	T [°C]	MB1
			T [°F]	MB2
	Unit for process parameters	SI units [mbar, °C]		no code
		US units [psi, °F]		U2
	Medium [3]	Air		no code
		Nitrogen		FU2
		CO_2		FU3
		Oxygen		FU4
		Argon		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
	DN32 (1-1/4“)	HA079032	
	DN40 (1-1/2“)	HA079040	HA179040
	DN50 (2“)	HA079050	HA179050
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. Only for DN15, DN20 and DN25.
2) Only for analogue/switch and pulse output
3) Other gases upon request

Order Example

Item 1 - Transmitter

EE741-A6D2DN15

Pipe diameter/type	for DN15, DN20, DN25
Output:	Analogue/switch/pulse output
Display:	With display
Pipe diameter (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“)

Accessories

- Inlet and outlet path BSP thread, stainless steel, for mounting block	DN15 (1/2“)	HA070215
	DN20 (3/4“)	HA070220
	DN25 (1“)	HA070225
	DN32 (1-1/4“)	HA070232
	DN40 (1-1/2“)	HA070240
	DN50 (2“)	HA070250

Scope of supply

Item 1: EE741:

- EE741 according to ordering guide
- 1 x Allen key
- 1 x USB cable
- M12x1 straight socket, can be assembled
- 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

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, argon 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

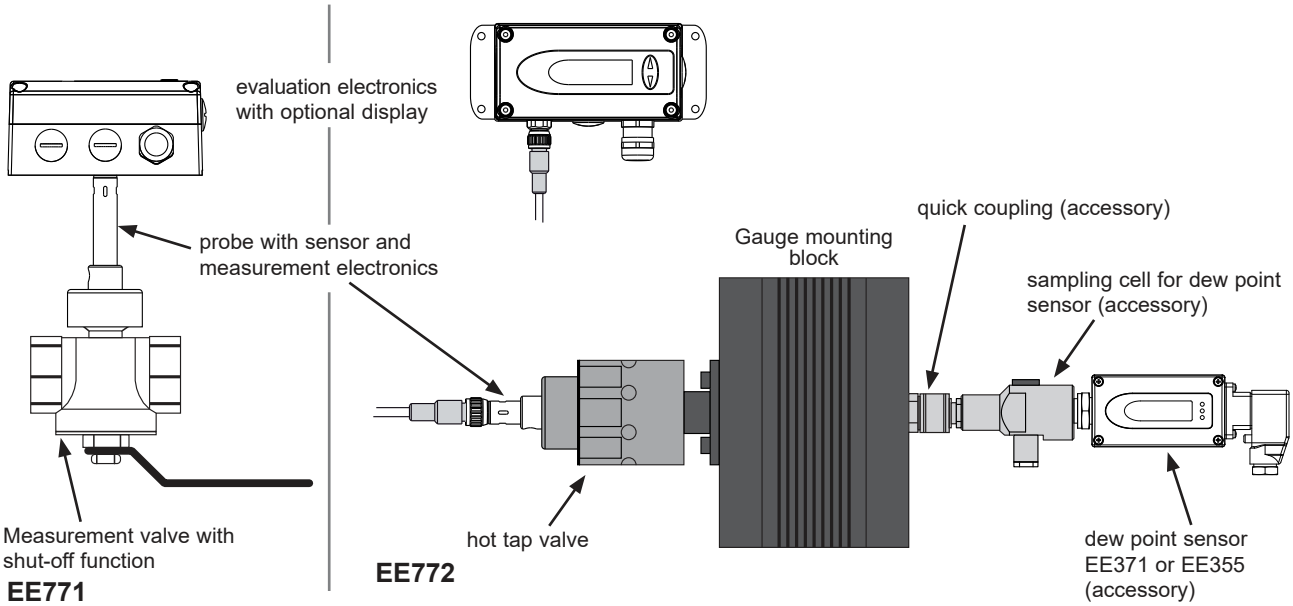
The measurement valve with shut-off function allows the exact alignment of the sensing head within seconds during instalment and removal, with only interrupting the process flow for a short moment.
The measurement valve is suitable for pressures up to 16 bar (232 PSI) and available for pipe diameters 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

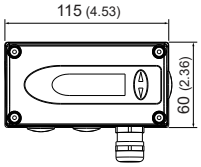
The flow meter consist of the transmitter and the mounting valve. The transmitter is modular and consist of the probe and the evaluation electronics. The measurement probe contains the sensor element and the measurement electronics, in which the data of the factory calibration is stored. The enclosure 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).

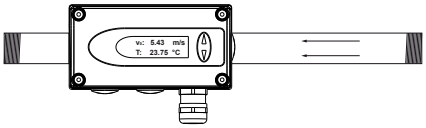


Measurement of consumption (totalizer)

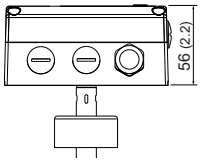
The EE771/EE772 holds an integrated counter for the usage. The amount is indicated in the display and stored; the data will not be lost due to a power outage. The availability of the consumption amount as a free configurable pulse output is another helpful feature.

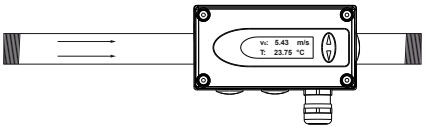
Dimensions in mm (inch)



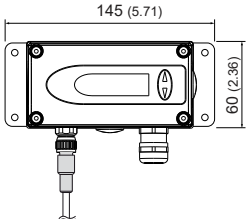


EE77x-A direction of flow is right to left





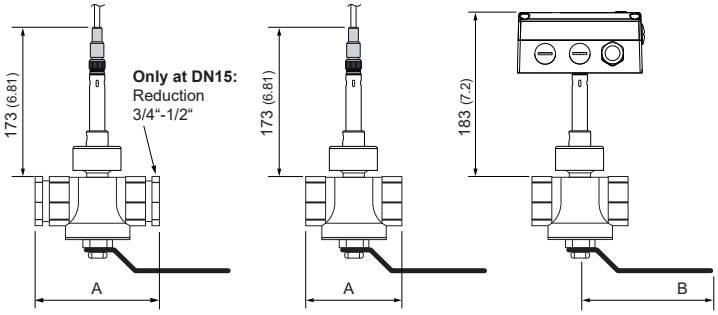
EE77x-B direction of flow is left to right



EE77x-A / EE77x-B
Compact

EE77x-B direction of flow is left to right

EE77x-C
Remote probe

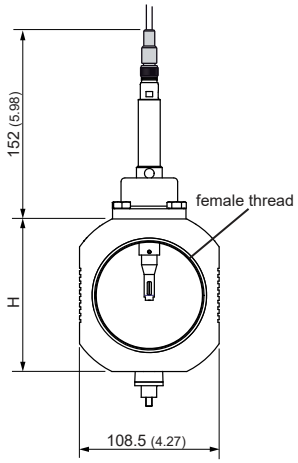


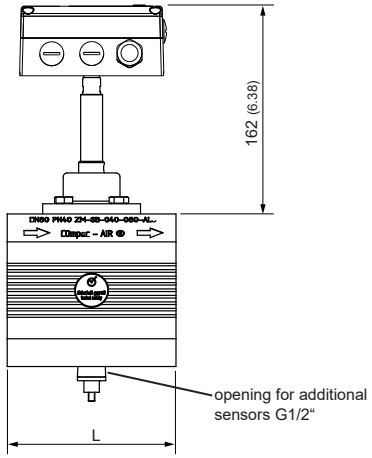
Measure-ment valve	Thread	A	B
DN15	R_p1/2"	100±8 (3.94±0.32)	92 (3.62)
DN20	R_p or NPT 3/4”	72 (2.83)	92 (3.62)
DN25	R_p or NPT 1”	83 (3.27)	124 (4.88)
DN32	R_p1 1/4"	100 (3.94)	124 (4.88)
DN40	R_p or NPT 1 1/2"	110 (4.33)	147 (5.79)
DN50	R_p or NPT 2”	131 (5.16)	147 (5.79)

dimensions in mm (inch)

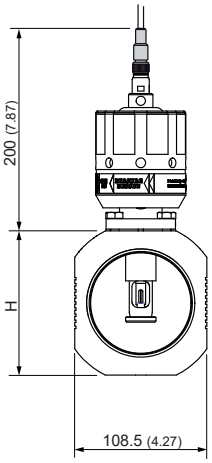
Female thread:
BSP thread acc. EN 10226 (old DIN 2999) or NPT

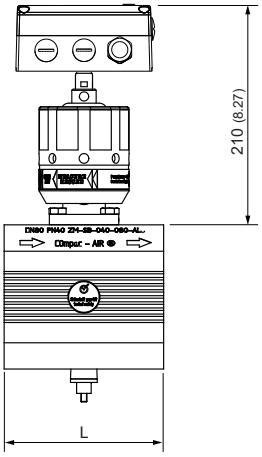
HA075xxx
Measurement valve with shut-off function





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
	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

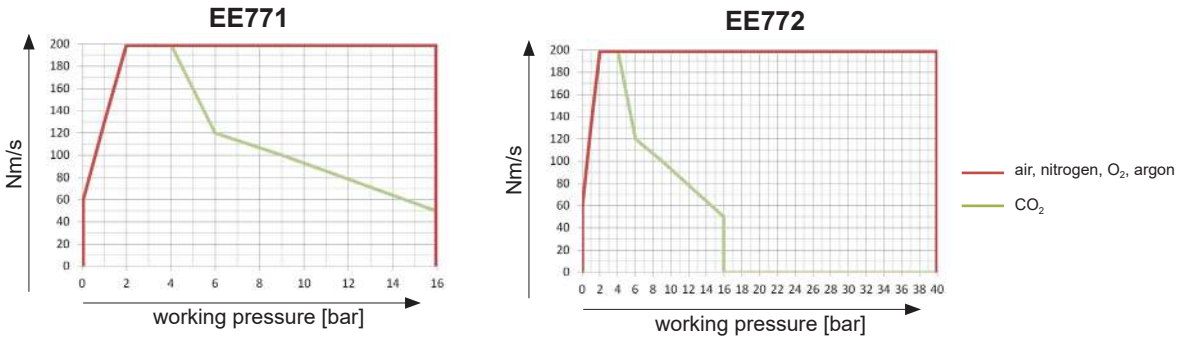
Supply voltage		18 - 30 V AC/DC	
Current consumption		max. 200 mA (with display)	
Temperature range		ambient temperature:	-20...60 °C (-4...140 °F)
		medium temperature:	-20...80 °C (-4...176 °F)
		storage temperature:	-20...60 °C (-4...140 °F)
Nominal pressure		EE771 up to 16 bar (232 Psi) EE772 up 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	EN61326-2-3 Industrial Environment
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	

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 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

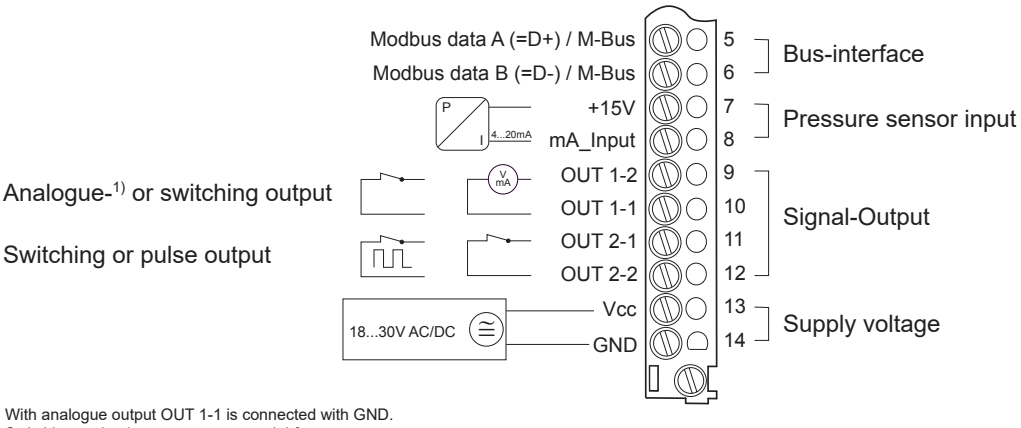


Formula for calculating the standardized volumetric flow:

$V'_n = v_n * id^2 * \pi/4 * 3600$

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 EE371 or EE355	see datasheet EE371 or EE355
- 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	
		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”)

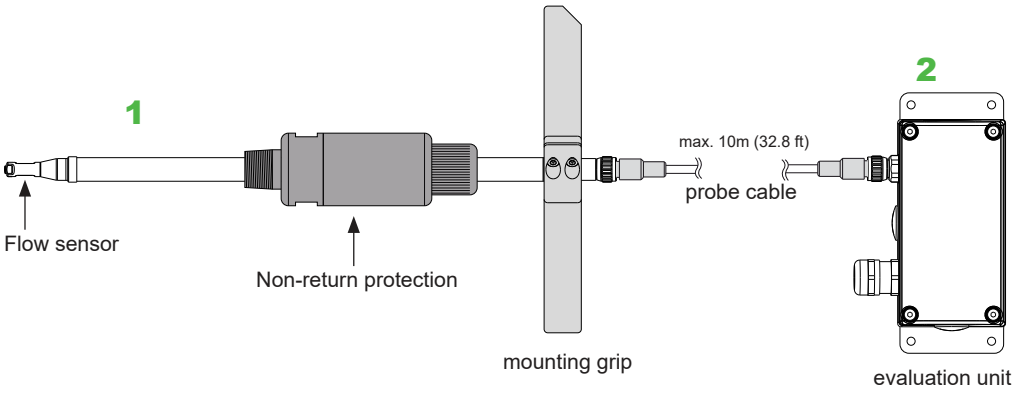
Pressure range up to 16 bar (232 PSI)

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.

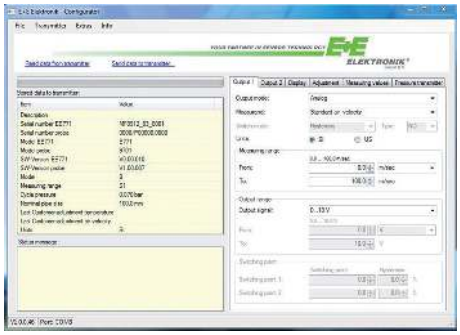

Tapping sleeve

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

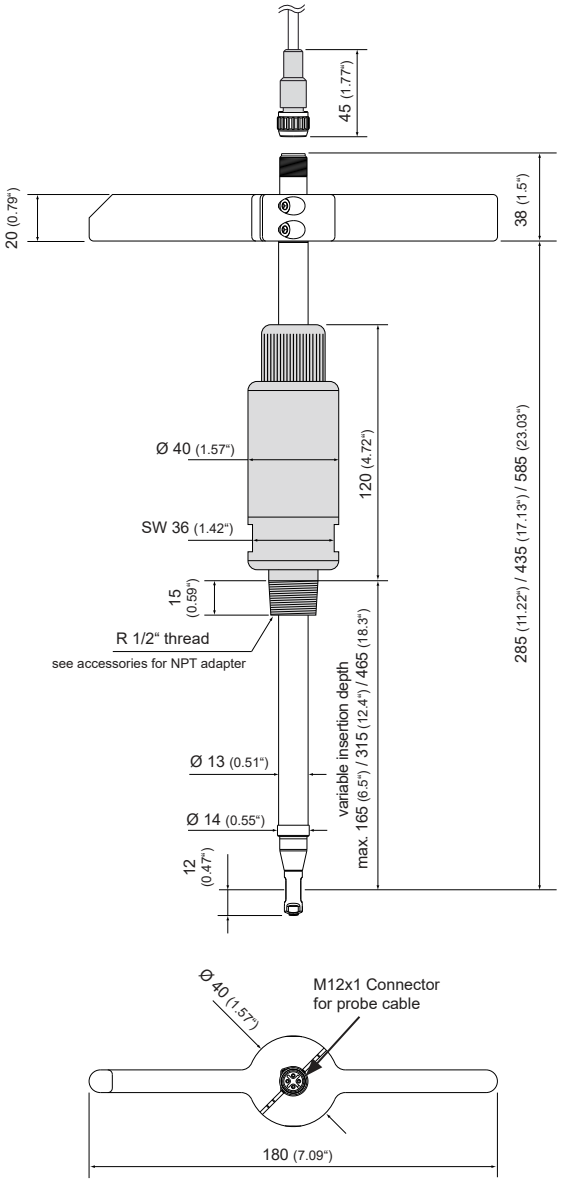
The EE776 flowmeter can be configured conveniently, to meet the requirements of the application with the standard configuration software and the integrated USB interface.



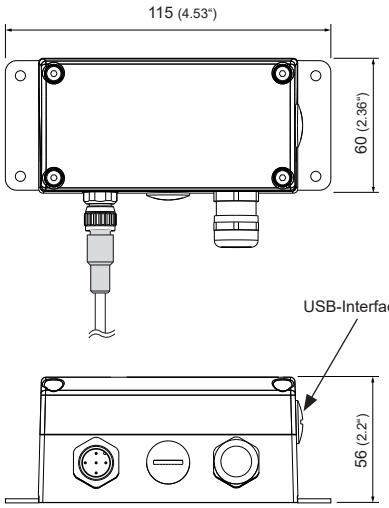
Functionality:

- 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

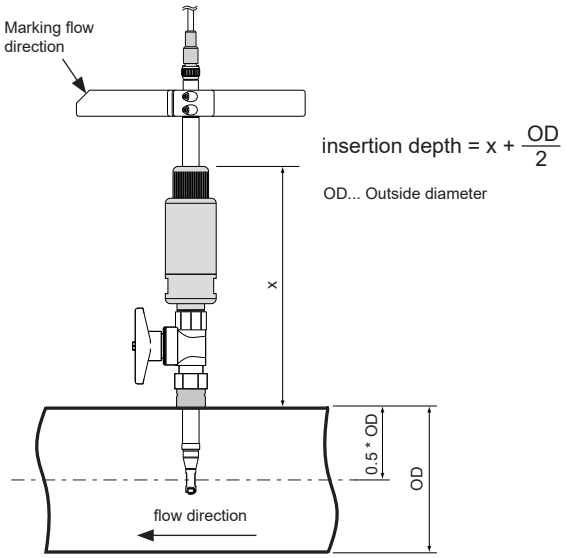
Dimensions in mm (inch)



EE776
Sensor probe

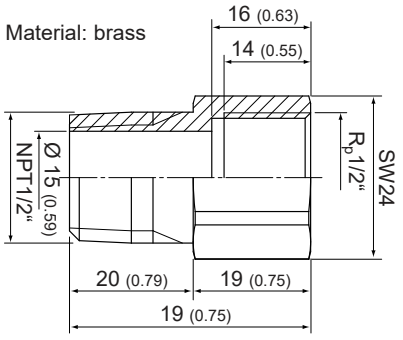


EE776
Enclosure - signal conditioning unit

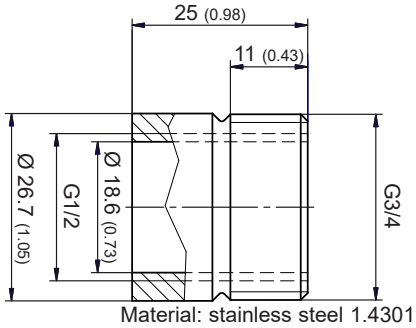


EE776
Assembly - insertion depth

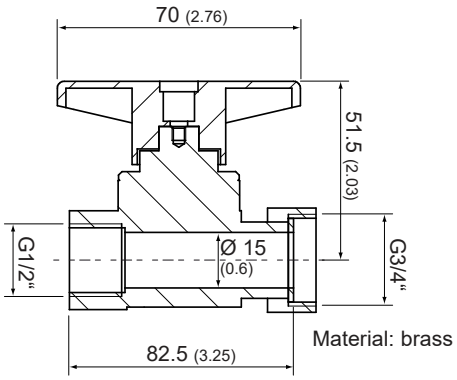
Dimensions accessories in mm (inch)



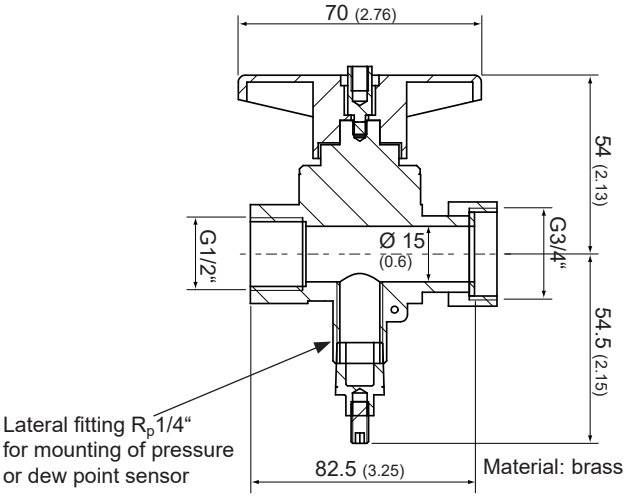
HA074004
Adapter BSP - NPT



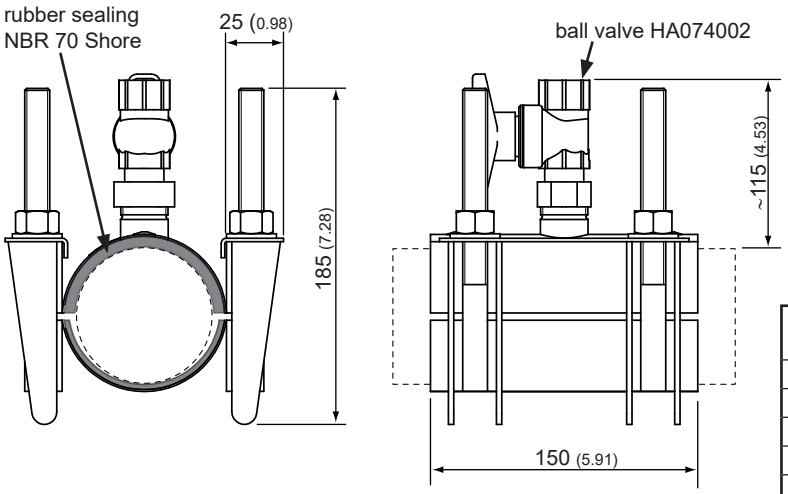
HA074001
Welding nipple



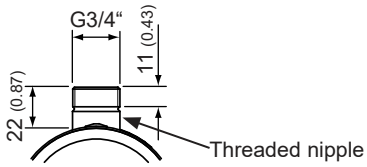
HA074002
Ball valve 1/2“



HA074003
Ball valve 1/2“ for parallel measurement



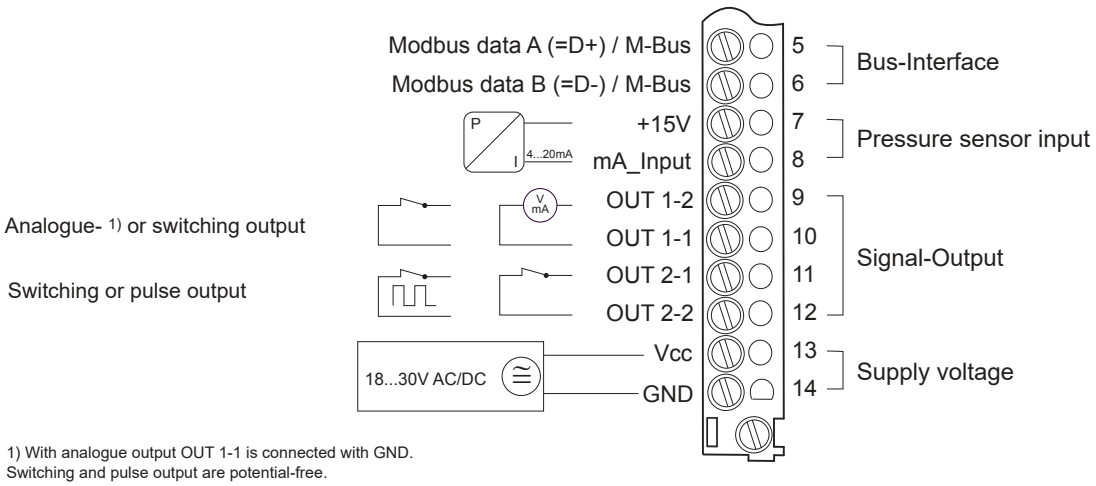
Material: stainless steel 1.4301



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

Position 1 - Flow meter

				EE776-
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		0-5 V	**2**
			0-10 V	**3**
		analogue output	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**
		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

Room Sensor for CO_2, Temperature and Relative Humidity

The EE800 is optimized for demand controlled ventilation and building automation in residential and commercial applications.

Versatile
The EE800 combines CO_2, temperature (T) and relative humidity (RH) measurement in one device with modern design. Additionally, it calculates the dew point temperature (Td).

Outstanding Measurement Performance
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.

Analogue and Passive Outputs, Digital interface, Display
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.

Easy Installation and Maintenance
The EE800 enclosure is available in several colours and in two sizes according to regional standards.
The snap-on design facilitates the replacement of the active front part within seconds while the wiring remains intact. Furthermore, it makes possible to wire the device without exposing the electronics to construction site pollution.

Configurable and Adjustable
An optional USB configuration adapter and the free EE-PCS Product Configuration Software facilitate easy setup and adjustment of EE800.

Technical Data

Measurands

CO_2	
Measurement principle	Dual Wavelength Non-Dispersive Infrared Technology (NDIR)
Working range	0...2000 / 5000 ppm
Accuracy at 25 °C (77 °F) and 1013 mbar	0...2000 ppm: < ± (50 ppm +2 % of measuring value) 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 interface or 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)
Dew point 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)

1) Under normal operating conditions.
2) For supply voltage 24 V DC. Load resistor 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.

Outputs

Analogue

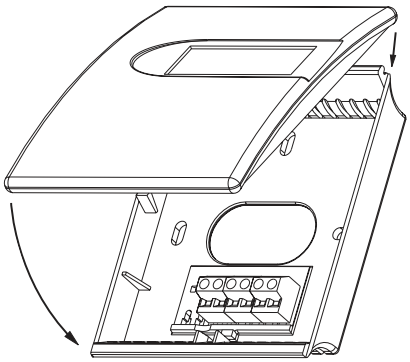
0...2000 / 5000 ppm	0-5 V / 0-10 V	-1 mA < IL < 1 mA
	4-20 mA	R_L < 500 Ohm
Digital interface	RS485 with max. 32 unit load devices on one bus	
Protocol	Modbus RTU or BACnet MS/TP	
Temperature passive	according to ordering guide	

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 %
Enclosure (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
Test report	according to DIN EN10204 - 2.2	
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

Enclosure



Dimensions:

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")

Colours:

EU-Standard, US:
Front cover: signal white RAL9003
Back cover: light grey RAL7035

EU-Grey:
Front and back cover: anthracite grey RAL7016

EU-Silver:
Front and back cover: white aluminum RAL9006

Ordering Guide

			EE800-			
Hardware Configuration	**Model**	CO_2 + T CO_2 + T + RH	M11		M12	
	CO_2 range	0 - 2000 ppm 0 - 5000 ppm	HV1 HV2			
	Output	0-5 V 0-10 V 4-20 mA RS485	A2 A3 A6	 J3	A2 A3	 J3
	T-Sensor passive (see www.epluse.com/R-T_Characteristics)	none Pt100A Pt1000A NTC 10k Ni1000 Tk6180	no code TP1 TP3 TP5 TP9		no code TP1 TP3 TP5 TP9	
	Enclosure design & colour	EU - Standard (RAL 9003 / RAL 7035) EU - Grey (RAL 7016) EU - Silver (RAL 9006) US (RAL 9003 / RAL 7035)	no code CH74 CH93 RG2			
	Display	none yes	no code D1			
Setup - Analogue Outputs	**Output 1**	CO_2 scaling according to selected "CO_2 range" as above				
	Output 2	temperature (°C) temperature (°F)	no code MB2		no code MB2	
	Scale 2 low	0 *value*[1)]	no code SBL *value*		no code SBL *value*	
	Scale 2 high	50 *value*[1)]	no code SBH *value*		no code SBH *value*	
	Output 3	relative humidity (% RH) dew point (°C) dew point (°F) none	MC10 MC52 MC53 no code		MC10 MC52 MC53 no code	
	Scale 3 low	0 *value*[1)]	no code SCL *value*		no code SCL *value*	
	Scale 3 high	100 *value*[1)]	no code SCH *value*		no code SCH *value*	
Setup - RS485	**Protocol**	Modbus RTU[2)] BACnet MS/TP[3)]		no code P3		no code P3
	Baud rate	9600 19200 38400 57600 (for BACnet only) 76800 (for BACnet only)		no code BD6 BD7 BD8 BD9		no code BD6 BD7 BD8 BD9
	Unit	metric-SI non-metric		no code U2		no code U2

1) Within working range. For scaling beyond working range limits please contact the E+E sales representative.
2) Factory setting: Even Parity, Stopbits 1; Modbus Map and communication setting: See User Guide and Modbus Application Note at www.epluse.com/ee800.
3) Factory setting: No Parity, Stopbits 1; Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee800.

Order Examples

EE800-M11HV1A3CH74

Model:	CO_2 + T
CO_2 Range:	0 - 2000 ppm
Output:	0-10 V
Enclosure design & colour:	EU - Grey RAL7016
Output 2:	T (°C)
Temperature Scale:	0...50

EE800-M12HV1A3MC52SCL-10SCH10

Model:	CO_2 + T + RH
CO_2 Range:	0 - 2000 ppm
Output:	0-10 V
Enclosure design & colour:	EU - Standard RAL9003 / RAL7035
Output 2:	T (°C)
Temperature Scale:	0...50
Output 3:	Dew Point (°C)
Dew Point Scale:	-10...10

EE800-M12HV2J3RG2D1P3BD8U2

Model:	CO_2 + T + RH
CO_2 Range:	0 - 5000 ppm
Digital output:	RS485
Enclosure design & colour:	US RAL9003 / RAL7035
Display:	yes
Protocol:	BACnet
Baud rate:	57600
Unit:	non-metric

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, Humidity and Temperature Duct Sensor

The EE850 combines CO_2, relative humidity (RH) and temperature (T) measurement in an innovative enclosure. It is ideal for demand controlled ventilation and building automation. Due to the CO_2 measuring range up to 10 000 ppm and T working range -20...60 °C (-4...140 °F), the EE850 can be employed also in demanding climate and process control.

Long Term Stability

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. The RH sensing element is protected against dust, dirt and corrosion by the E+E proprietary coating.

High Measurement Accuracy

A multiple point CO_2 and T factory adjustment procedure leads to excellent CO_2 measurement accuracy over the entire T working range.

Functional Design

Installed into a duct, a small amount of air flows through the divided probe to the CO_2 sensing cell located inside the transmitter enclosure and back into the duct. The RH and T sensing elements are placed inside the probe. The functional enclosure facilitates easy and fast mounting of the transmitter with closed cover.

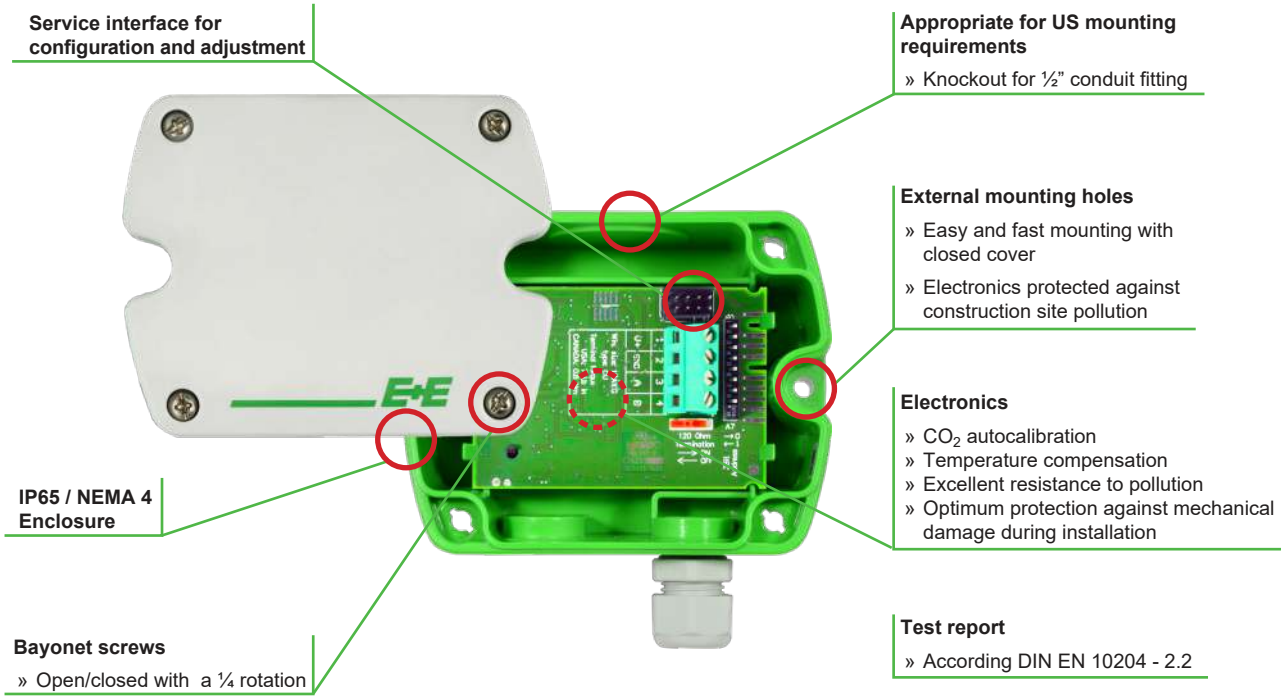
Analogue, Digital and Passive T Outputs

The CO_2, RH and T measured data as well as the calculated dew point temperature (Td) are available on various analogue outputs. Additionally, the RS485 interface with Modbus RTU or BACnet MS/TP protocol supplies also other parameters such as absolute humidity (dv), mixing ratio (r), water vapor partial pressure (e) or enthalpy (h).

Easy configuration and Adjustment

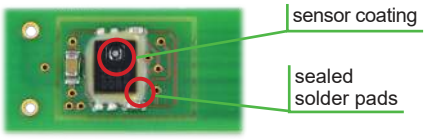
An optional adapter and the free EE-PCS configuration software facilitate the configuration and adjustment of the EE850.

Features



Protective Sensor 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 performance of the E+E sensor in corrosive environment.
Additionally, it improves the long term stability in dusty and dirty applications by preventing stray impedances caused by deposits on the active sensor surface.



EEH210 RH and T digital sensor, located inside the sensing probe.

Technical Data

Measurands

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 t_{63}	< 100 seconds at 3 m/s (590 ft/min) air speed in the duct	
Temperature dependency, typ.	± (1 + CO_2 concentration [ppm] / 1000) ppm/°C, for -20...45 °C (-4...113 °F)	
Calibration interval [1]	> 5 years	
Measuring interval	approx. 15 seconds	
Temperature		
Working range	-20...60 °C (-4...140 °F)	
Accuracy at 20 °C (68 °F)	±0.3 °C (±0.54 °F)	
Response time t_{63}	< 50 seconds	
Relative Humidity		
Working range	0...95 % RH	
Accuracy at 20 °C (68 °F)	± 3 % RH (20...80 % RH)	
Response time t_{63}	< 10 seconds	

Outputs

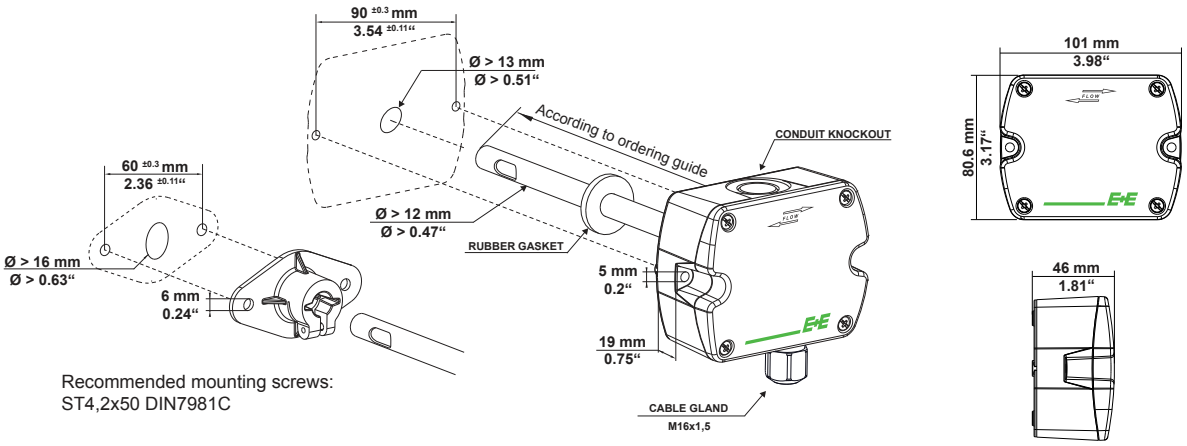
Analogue		
CO_2: 0...2000 / 5000 / 10000 ppm	0-5 V / 0-10 V	-1 mA < I_L < 1 mA
	4-20 mA	R_L < 500 Ohm
T scale: according ordering guide **RH** scale: 0...100 % RH	0 - 5 V / 0 - 10 V	-1 mA < I_L < 1 mA
Digital Interface Protocol	RS485 with max. 32 devices on one bus Modbus RTU or BACnet MS/TP	
Passive temperature, 2-wire	T sensor type according ordering guide	
Wire resistance (terminal - sensor), typ.	0.4 Ohm	

General

Power supply class III	24 V AC/DC ± 20 % 15-35 V DC	
Current consumption, typ.	typ. 15 mA + output current	
Current peak, max.	350 mA for 0.3 seconds (analogue output) 150 mA for 0.3 seconds (RS485 interface)	
Minimum air speed in the duct	1 m/s (196 ft/min)	
Enclosure 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	CE
Working and storage conditions	-20...60 °C (-4...140 °F) 0...95 % RH (non-condensing)	

1) under normal operating conditions

Dimensions (mm/inch)



Recommended mounting screws:
ST4,2x50 DIN7981C

Ordering Guide

			EE850-		
Hardware configuration	**Model**	CO_2	M10		
		CO_2 + T		M11	
		CO_2 + T + RH			M12
	CO_2 range	0...2000 ppm		HV1	
		0...5000 ppm		HV2	
		0...10000 ppm		HV3	
	Output	0-5 V	A2	A2	A2
		0-10 V	A3	A3	A3
		4-20 mA	A6		
		RS 485	J3	J3	J3
	T sensor passive [1]	none		no code	
		Pt1000A		TP3	
		NTC10k		TP5	
		Ni1000, TK6180		TP9	
	Probe length	50 mm	L50		
		200 mm	no code	no code	no code
Setup analgoue outputs [1]	**Temperature**	T [°C]		no code	no code
		T [°F]		MB2	MB2
	Scale T low	0		no code	no code
		value - within the range -20...60 °C (-4...140 °F)		SBL value	SBL value
	Scale T high	50		no code	no code
		value - within the range -20...60 °C (-4...140 °F)		SBH value	SBH value
	Relative humidity / dew point	RH [%]			no code
		Td [°C]			MC52
		Td [°F]			MC53
	Scale RH/Td low	0			no code
		value - for Td: within the range -20...60 °C (-4...140 °F)			SCL value
	Scale RH/Td high	100			no code
		value - for Td: within the range -20...60 °C (-4...140 °F)			SCH value
Setup RS485 [5]	**Protocol**	Modbus RTU [2]		P1	
		BACnet MS/TP [3]		P3	
	Baud rate	9600		BD5	
		19200		BD6	
		38400		BD7	
		57600 [4]		BD8	
		76800 [4]		BD9	

1) Not with RS485 output (J3) / T-Sensor details see www.epluse.com/R-T_Characteristics.
2) Factory setting: Even Parity, Stopbits 1; Modbus Map and communication setting: See User Guide and Modbus Application Note at www.epluse.com/ee850.
3) Factory setting: No Parity, Stopbits 1; Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee850.
4) Only for BACnet MS/TP.
5) Not with analogue output A2, A3 and A6.

Ordering Examples

EE850-M12HV2A3MB2SBL32SBH140

Model:	CO_2 + T + RH
CO_2 range:	0...5000 ppm
Output:	0-10 V
Probe length:	200 mm
Temperature:	T [°F]
Scale T low:	32 °F
Scale T high:	140 °F
RH/Td:	RH [%]
Scale RH low:	0 %
Scale RH high:	100 %

EE850-M10HV1A6L50

Model:	CO_2
CO_2 range:	0...2000 ppm
Output:	4-20 mA
Probe length:	50 mm

EE850-M12HV3J3P1BD6

Model:	CO_2 + T + RH
CO_2 range:	0...10000 ppm
Output:	RS485
Probe length:	200 mm
Protocol:	Modbus RTU
Baud rate:	19200
Unit:	metric-SI

Accessories (see data sheet „Accessories“)

Configuration adapter cable	HA011066
E+E Product configuration software	EE-PCS (free download: www.epluse.com/ee850)
Power supply adapter	V03

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	

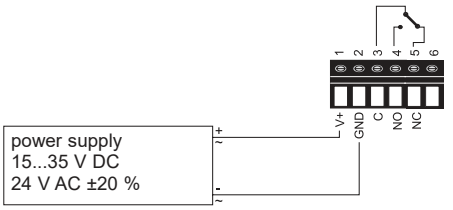
General

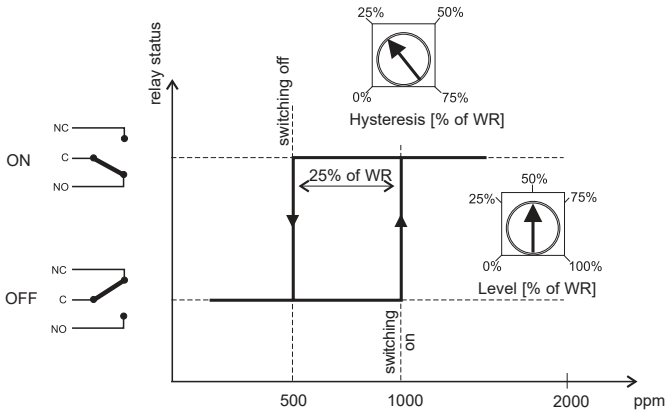
Supply voltage	24 V AC ±20 %	15 - 35 V DC
Current consumption	typ. 10 mA	
	max. 0.5 A for 0.3 s	
Warm up time[1)]	< 5 min	
Housing material	Polycarbonate	
	US Version: UL94V-0 approved / EU Version: UL94HB approved	
Protection class	IP30	
Display	LC display	
Electrical connection	screw terminals max. 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

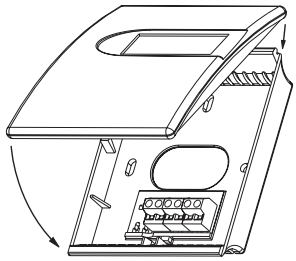
Connection Diagram





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	

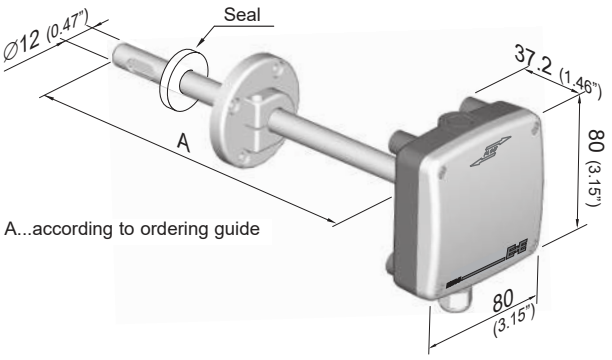
General

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)

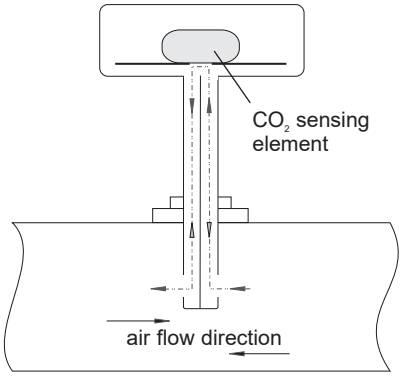
CE

1) minimum flow speed 1m/s (200ft/min)
2) warm up time for performance according to specification

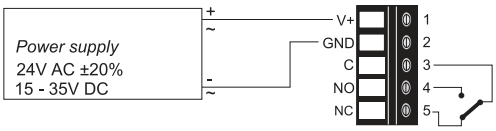
Dimensions (mm)



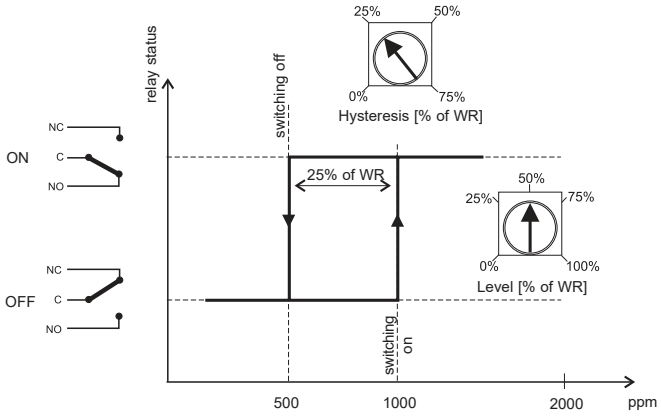
Operation Principle



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.

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.

EE245 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.

EE244 Transmitter

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 EE242
The EE242 base station is the central component of a wireless network with up to 500 transmitters or up to 2000 measured parameters. With the base station and the integrated web server one can easily perform the setup of the entire wireless network.
EE242 allows for easy remote access and diagnosis of the network.
The measured data is available at the EE242 base station via Ethernet / Modbus TCP and RS485 / Modbus RTU. Four measured parameters can be selected to the analogue outputs (0 - 5 / 10 V or 4 - 20 mA). Measured data and status information are available also on the optional display.

EE242 Base Station

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.

Router EE244-R

Typical Applications

Pharma and Food Industry
Warehouses and Cooling Chambers
Control Rooms
HVAC Systems and Museums

Features

Interchangeable Sensing Probes
Remote Probes up to 10 m (33 ft)
Battery Operating Life up to 1 Years
Ethernet and Webserver

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 60 m (197 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.

Parallel Operation

Parallel operation of several EE240 wireless networks (i.e. several base stations) is also possible. For this each transmitter and router may be within the transmission range of the routers and basis station of one network only.

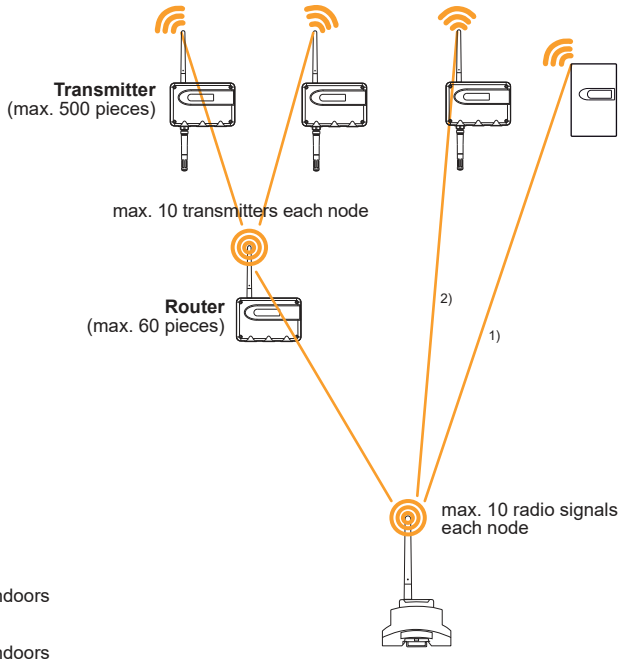
Digital Bus Connection

For bus integration, Modbus is supported. Communication is implemented via Ethernet or RS485 interface.

Installation / Remote Access / Maintenance via Webserver

The integrated Webserver allows platform-independent installation, remote access and easy maintenance with any commercially available browser (Chrome, Internet Explorer, Firefox,...) on a computer without additional software.

Wireless Networks



1) Radio ranges:
- up to 60m (197 ft) indoors

2) Radio ranges:
- up to 60m (197 ft) indoors
- up to 1000m (3300 ft) in open field

Technical Data Transmitter EE244 & EE245

General

Transmission frequency	2.4 GHz	
Transmission system	IEEE 802.15.4	
Transmission power	6.3mW	
Radio range	up to 60m (197 ft) indoors, up to 1000m (3300 ft) in open field	
Approval	ETSI / FCC Part 15.247 / IC	
Electromagnetic compatibility	EN61326-1 Industry	FCC Part 15 Class A
	EN61326-2-3 Industry	ICES-003 Class A

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:	refer to respective data sheet of sensing probe
	working temperature range:	-40...+50°C (-40...122°F) (with display: -20...+50°C / -4...122°F)
	storage temperature range:	-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)

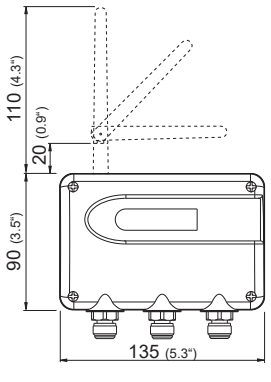
Power Supply	battery 4x1.5V AA (not in the scope of supply)
Battery lifetime	> 1 year with a measuring data transmission every 5 min. (for T / %RH)
Radio Range	up to 60m (197 ft) indoors
Antenna	internal
External supply transmitter (EE245)	DC 8-28V SELV / AC 12V (±20%)
Housing material	polycarbonate (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.

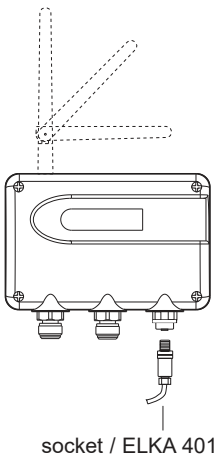
Dimensions (mm/inch)

EE244-Ax3:



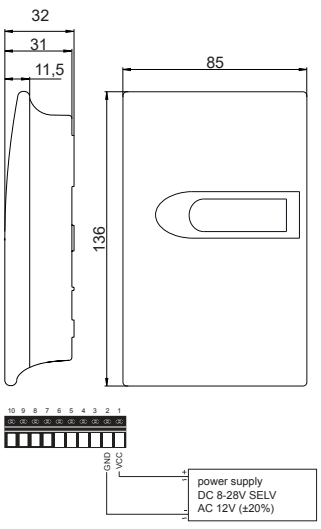
depth: 50 (2")

EE244-Bx2:



socket / ELKA 4012 PG7[1)]

EE245

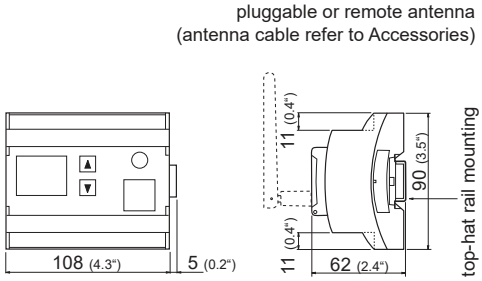


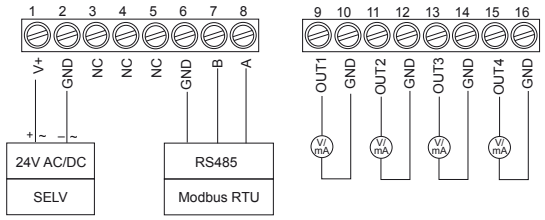
1) included in the scope of supply

Technical Data Base Station EE242

Supply voltage SELV	24V AC/DC ±20%
Digital interface	• Ethernet (Modbus TCP or JSON) • RS485 (Modbus RTU / ASCII)
Current consumption	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 (mm/inch) - Connection Diagram EE242





Overview of EE244 Sensing Probes

Humidity/Temperature Probes	Measuring Range	Accuracy	Order Code
	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
	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
	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			
	-40...80°C (-40...176°F)	±0.1°C (±0.18°F) at 20°C (68°F)	EE07-PT1
	-40...80°C (-40...176°F)	±0.1°C (±0.18°F) at 20°C (68°F)	EE07-MT
CO_2 Probes			
	0…2000ppm 0…5000ppm 0…10000ppm	±(50ppm+2% of m.v.) ±(50ppm+3% of m.v.) ±(100ppm+5% of m.v.)	EE871-HR2000J2 EE871-HR5000J2 EE871-HR1J2

Ordering Guide

BASE STATION EE242

Hardware Configuration						EE242-
Frequency	2,4 GHz (transmission power 6,3 mW)					A
Output signal	0-5 V					2
	0-10 V					3
	0-20 mA					5
	4-20 mA					6
Display	with					D
	without					-
Software Configuration						
Physical parameters of outputs	relative humidity	RH	[%]	(A)	Output 1	A / B / C / R
	temperature	T	[°C]	(B)	Output 2	A / B / C / R
	dew point temperature	Td	[°C]	(C)	Output 3	A / B / C / R
	CO_2	CO_2	[ppm]	(R)	Output 4	A / B / C / R
Unit	metric / SI (°C)					-
	non metric / US (°F)					E01
T-Scaling (Output T - °C or °F)	-40...60 (T02)					Select Txx code
	0...50 (T04)					
Td-Scaling (Output Td - °C or °F)	-20...50 (T48)					Select Tdxx code
	further scalings on request					
CO_2-Scaling (in ppm)	0...2.000 (C20)					Select Cxx code
	0...5.000 (C21)					
	0...10.000 (C22)					

TRANSMITTER EE245

Hardware Configuration		EE245-
Type	RH + T + CO_2	FTC
	RH + T	FTx
	T + CO_2	xTC
	T	xTx
CO_2 (only for TC and FTC)	0...2.000 ppm	2
	0...5.000 ppm	5
	without CO_2 measurement	x
Frequency	2,4 GHz (transmission power 6,3 mW)	A
Display	with	D
	without	-
Software Configuration		
Unit	metric / SI (°C)	-
	non metric / US (°F)	E01

TRANSMITTER / ROUTER EE244

Hardware Configuration		EE244-
Type	transmitter	A
	transmitter with external supply[1)]	B
	Router	R
Frequency	2,4 GHz (transmission power 6,3 mW)	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 and Temperature	polycarbonate	EE07-PFT1
	metal	EE07-MFT9
	module	EE03-FT9
Temperature	polycarbonate	EE07-PT1
	metal	EE07-MT
CO_2	0...2000 ppm	EE871-HR2000J2
	0...5000 ppm	EE871-HR5000J2
	0...10000 ppm	EE871-HR1J2

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	(✓)	(✓)

Order Examples

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:	Industrial transmitter with external supply
Frequency:	2,4GHz
Probe:	1
Display:	yes

Position 3 - Sensing Probes:
EE07-PFT1, EE07-MT

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

EE8915

CO_2 Sensor for Railway Applications

EE8915 measures reliably CO_2 concentration in harsh environment and complies with the relevant railway standards.

Outstanding Accuracy
A multiple point CO_2 and temperature (T) adjustment procedure leads to excellent CO_2 measurement accuracy over the entire T working range -40…+60 °C (-40…+140 °F).

Long Term Stability
The E+E dual wavelength non-dispersive infrared (NDIR) measurement principle compensates automatically for ageing effects and is highly insensitive to pollution.

Pressure and Temperature Compensation
The active compensation with on-board sensors leads to best CO_2 measurement accuracy independent of temperature, altitude or weather conditions.

Versatility
EE8915 is available for wall and duct mounting. The innovative design enables the combination of short response time and high protection class. The CO_2 measured data is available simultaneously as voltage and current output signal.

Suitable for Demanding Applications
Due to the compliance with tough railway standards, the EE8915 stands for excellent performance even under challenging conditions, in any process and climate control application.

User Configurable and Adjustable
The free EE-PCS Product Configuration Software facilitates the configuration and adjustment of the EE8915.

Features

Enclosure
» IP65 protection class
» UL94V-0 approved material
» M12 connector or fix installed cable
» Easy mounting without opening the device

Output configuration
» Voltage and current output
» User configurable and adjustable
» USB service interface

Test report according DIN EN 10204 - 2.2

Measurement performance
» E+E dual wavelength NDIR, auto calibration
» T and p compensation with on-board sensors
» CO_2 range 0...2000/5000/10000 ppm
» T range -40...+60 °C (-40...+140 °F)
» Short response time

Compliance with railway standards

» EN50155:2007	Electronic equipment used on rolling stock
» EN50125-1:1999	Environmental conditions for equipment - rolling stock and on-board equipment
» EN50121-3-2:2006	Electromagnetic compatibility – rolling stock
» EN50121-1:2006	Electromagnetic compatibility – general
» EN61373:2011	Rolling stock equipment - shock and vibration tests
» EN45545-2	Fire protection on railway vehicles
» EN50306	Railway rolling stock cables having special fire performance

Technical Data

Measurands

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 mv) 0...5000 ppm: < ± (50 ppm +3% of mv) 0...10000 ppm: < ± (100 ppm +5% of mv) mv=measured value
Response time t_{63} (typ.)	duct: < 100 s at 3 m/s (590 ft/min) air speed wall: < 160 s
Temperature dependency (typ.)	± (1 + CO_2 concentration [ppm] / 1000) ppm/°C, for -20...+45 °C (-4...+113 °F)
Residual pressure dependency[1)]	0.014% of mv / mbar (ref. to 1013 mbar), for -20...+45 °C (-4...+113 °F)
Measuring interval	approx. 15 s

Outputs

CO_2	0-5 V / 0-10 V	-1 mA < I_L < 1 mA
	0-20 mA / 4-20 mA	R_L < 500 Ohm

General

Power supply class III	10-35 V DC
Current consumption (typ.)	average: 10 mA + output current peak: 105 mA for 0.3 s
Minimum air speed in the duct	1 m/s (196 ft/min)
Enclosure material	polycarbonate, UL94V-0 approved
Protection class enclosure	IP65 / NEMA 4
Service interface	USB, Micro B
Electrical connection	connector M12x1 or cable with flying leads, max. 3 m (9.85 ft)
Electromagnetic compatibility	railway standard: EN50121-3-2:2006 EN50121-1:2006 CE EN61326-1 EN61326-2-3 Industrial Environment FCC Part 15 ICES-003 ClassB
Working and storage conditions	-40...+60 °C (-40...+140 °F) 0...95 % RH (non-condensing)

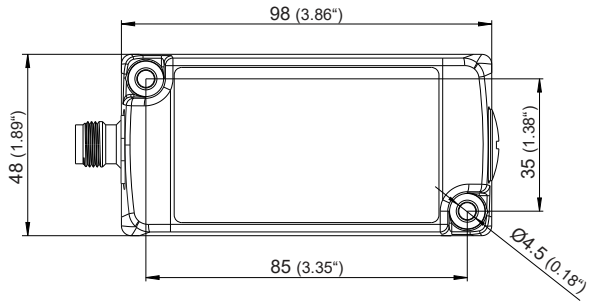
1) The pressure dependency of a non-compensated CO_2 sensor is 0.14% of mv / mbar

Compliance with Railway Standards

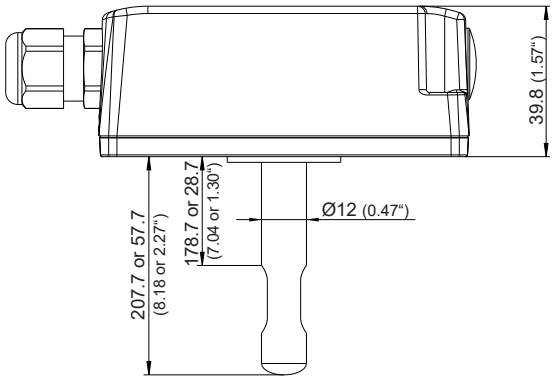
- » **EN50155:2007** Electronic equipment used on rolling stock
- » **EN50125-1:1999** Environmental conditions for equipment - rolling stock and on-board equipment
- » **EN50121-3-2:2006** Electromagnetic compatibility – rolling stock
- » **EN50121-1:2006** Electromagnetic compatibility – general
- » **EN61373:2011** Rolling stock equipment - shock and vibration tests
- » **EN45545-2** Fire protection on railway vehicles
- » **EN50306** Railway rolling stock cables having special fire performance

Dimensions in mm (inch)

Wall mount



Duct mount



Ordering Guide

				EE8915-
Hardware configuration	**Model**	wall mount		T1
		duct mount		T2
	CO_2 measuring range	0...2000 ppm		HV1
		0...5000 ppm		HV2
		0...10000 ppm		HV3
	Connection	M12 plug		E4
		cable		E8
	Probe length (only for duct mount T2)	50 mm (1.97")		L50
		200 mm (7.87")		L200
	Cable length (only for cable version E8)	0.5 m (1.64 ft)		KL50
		1 m (3.28 ft)		KL100
		2 m (6.56 ft)		KL200
		3 m (9.84 ft)		KL300
SW-Setup	**Output** [1]	output 1: 0-10 V,	output 2: 4-20 mA	GA7
		output 1: 0-5 V,	output 2: 0-20 mA	GA11

1) EE8915 features simultaneously a voltage and current output

Order Example

EE8915-T1HV2E8KL100GA7

Model:	wall mount
CO_2 measuring range:	0...5000 ppm
Connection:	cable
Cable length:	1 m (3.28 ft)
Output:	output 1: 0-10 V
	output 2: 4-20 mA

Accessories

Plastic mounting flange Ø12mm (0.47")		HA010202
M12 cable connector for self assembly, 5 pin		HA010708
Connection cable, 5 pin M12 socket - flying leads	1.5 m (3.3 ft)	HA010819
	5 m (16.4 ft)	HA010820
	10 m (32.8 ft)	HA010821
Protection cap for M12 female connector		HA010781
Protection cap for M12 male connector		HA010782

EE820

CO_2 Sensor for Demanding Applications

The EE820 CO_2 sensor is optimized for use in harsh, demanding applications, such as hatchers, incubators, life stock barns or greenhouses.

Outstanding Accuracy

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.

Long-term Stability

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.

High Resistance to Pollution

With its robust, functional IP54 enclosure with a special filter the EE820 can be employed even in harsh environment.

Fast Response Time

The fast response time version of EE820 is fitted with a forced air circulation module installed behind the filter.

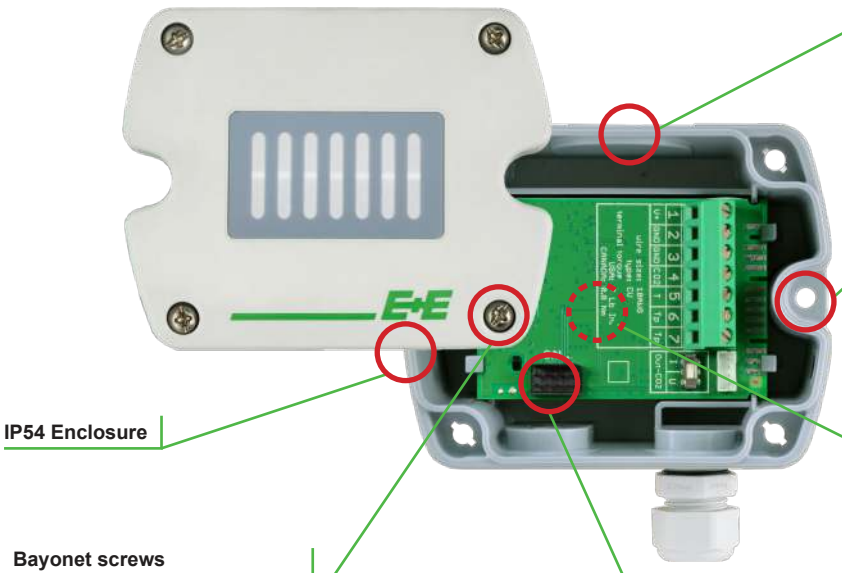
Analogue and Digital Outputs

The CO_2 measured data range up to 10 000 ppm is available on the analogue output (voltage / current) or on the RS485 interface with Modbus RTU or BACnet MS/TP protocol.

Easy Configuration and Adjustment

An optional adapter and the free EE-PCS Product Configuration Software facilitate the configuration and adjustment of the EE820.

Features



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

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

Electronics
» Optimum protection against mechanical damage during installation
» CO_2 autocalibration
» Temperature compensation
» Excellent resistance to pollution

Test report
» According DIN EN 10204 - 2.2

IP54 Enclosure

Bayonet screws
» Open/closed with a ¼ rotation

Service interface for configuration and adjustment

Technical Data

Measured values

Measuring principle	dual wavelength non-dispersive infrared technology (NDIR)		
Measurement 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 mv)	mv = measured value
	0...5000 ppm:	< ± (50 ppm +3 % of mv)	
	0...10000 ppm:	< ± (100 ppm +5 % of mv)	
Response time t_{63}, typ.	300 s (standard)		
	140 s (fast, with 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

Analogue

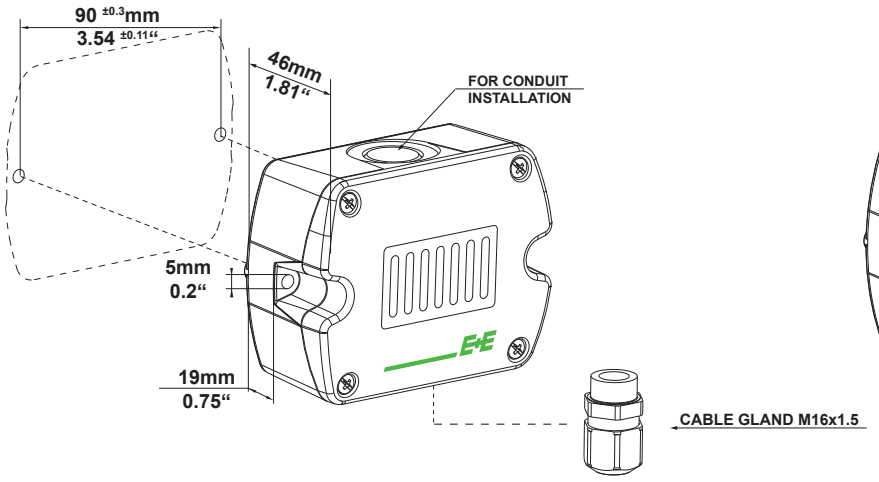
0...2000 / 5000 / 10000 ppm	0-5 / 0-10 V	-1mA < I_L < 1 mA	
	4-20 mA	R_L < 500 Ohm	R_L= load resistance
Digital Interface	RS485 with max. 32 unit load devices on one bus		
Protocol	Modbus RTU or BACnet MS/TP		

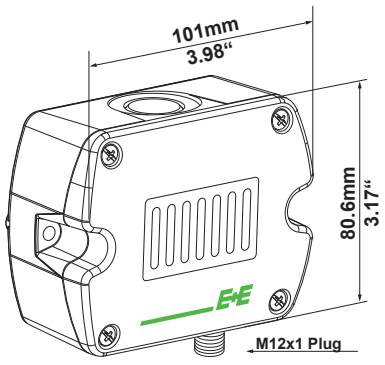
General

Supply voltage	24 V AC ±20%	15 - 35 V DC	
Current consumption, typ.	15 mA + output current, for standard response time		
	60 mA + output current, for fast response time		
Current peak, max.	350 mA for 0.3 s (analogue output)		
	150 mA for 0.3 s (RS-485 interface)		
Warm up time [1]	< 5 min		
Enclosure 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)





Mating M12x1 connector for self assembly is included in the scope of supply

Ordering Guide

			EE820-	
Hardware configuration	CO_2 range	0...2000 ppm	HV1	
		0...5000 ppm	HV2	
		0...10000 ppm	HV3	
	Output	0-5 V	A2	
		0-10 V	A3	
		4-20 mA	A6	
		RS485		J3
	Electrical connection	M16 cable gland	E1	E1
		M12 plug	E9	
	Response time	standard	no code	
		fast (with forced air circulation)	AM4	
Setup RS485	Protocol	Modbus RTU 1)		P1
		BACnet MS/TP 2)		P3
	Baud rate	9600		BD5
		19200		BD6
		38400		BD7
		57600 3)		BD8
		76800 3)		BD9

1) Factory setting: Even Parity, Stopbits 1; Modbus Map and communication setting: See User Guide and Modbus Application Note at www.epluse.com/ee820.
2) Factory setting: No Parity, Stopbits 1; Product Implementation Conformance Statement (PICS) available at www.epluse.com/ee820.
3) Only for BACnet MS/TP.

Order Example

EE820-H1A3E9

CO_2 range:	0...2000 ppm
Output:	0-10 V
Electrical connection:	M12 plug
Response time:	standard

EE820-HV2J3E1AM4P1BD6

CO_2 range:	0...5000 ppm
Output:	RS485
Electrical connection:	M16 cable gland
Respnse time:	fast
Protocol:	Modbus RTU
Baud rate:	19200

Accessories (see data sheet „Accessories“)

USB configuration adapter	HA011066
Product configuration software	EE-PCS (free download: www.epluse.com/EE820)
Mating M12x1 connector for self assembly	HA010707
Connection cable M12x1 socket - flying leads	
- 1.5 m (3.3ft)	HA010819
- 5 m (16.4 ft)	HA010820
- 10 m (32.8 ft)	HA010821
Protective cap for female M12 connectors	HA010781
Protective cap for male M12 connectors	HA010782
Power supply adapter	V03

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	

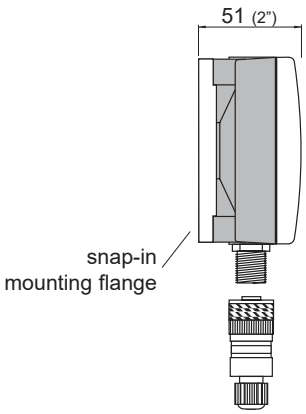
General

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)

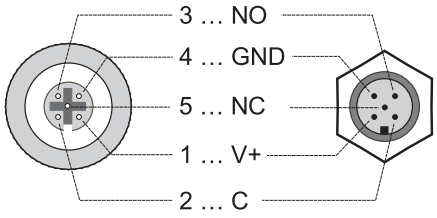
CE

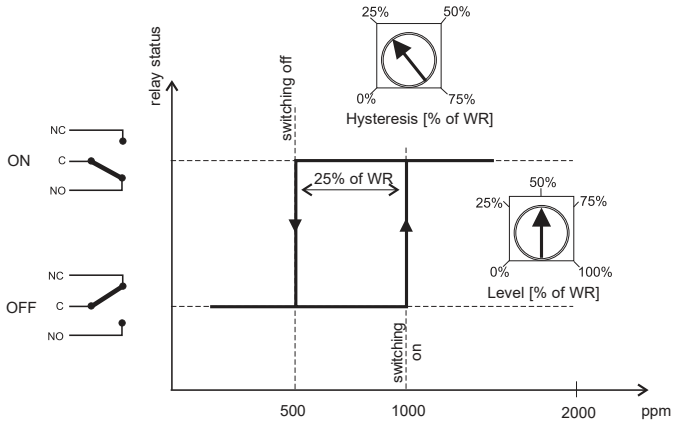
1) warm up time for performance according specification

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

EE872

Modular CO_2 Probe for Demanding Applications

The EE872 probe, with a measurement range up to 5 % CO_2 (50 000 ppm), is suitable for use even in harsh and demanding environment as in agriculture, life stock barns, hatchers, incubators or green houses.

Outstanding Accuracy

A multi-point CO_2 and temperature (T) adjustment procedure leads to excellent CO_2 measurement accuracy over the entire T working range of -40…60 °C (-40…140 °F), which is ideal for agriculture or outdoor use.

Long Term Stability

EE872 incorporates the E+E dual wavelength NDIR CO_2 sensor, which automatically compensates for ageing effects and is highly insensitive to pollution.

Pressure and Temperature Compensation

The active compensation with on-board sensors leads to best CO_2 measurement accuracy independently of temperature, altitude or weather conditions.

Interchangeable CO_2 Sensing Module

The modular design of the EE872 allows for easy replacement of the pluggable digital sensing unit.

Reliable in Harsh and Condensing Environment

Due to its heated sensing module, the EE872 is suitable for high humidity and condensing environment. The IP65 enclosure and the replaceable filter offer excellent protection in polluted environment. With a special filter cap, the EE872 is also appropriate for applications with periodical H_2O_2 sterilization.

Analogue Output or RS485 Interface

The CO_2 measured data is available simultaneously on the analogue voltage and current outputs or on the RS485 interface with Modbus RTU protocol.

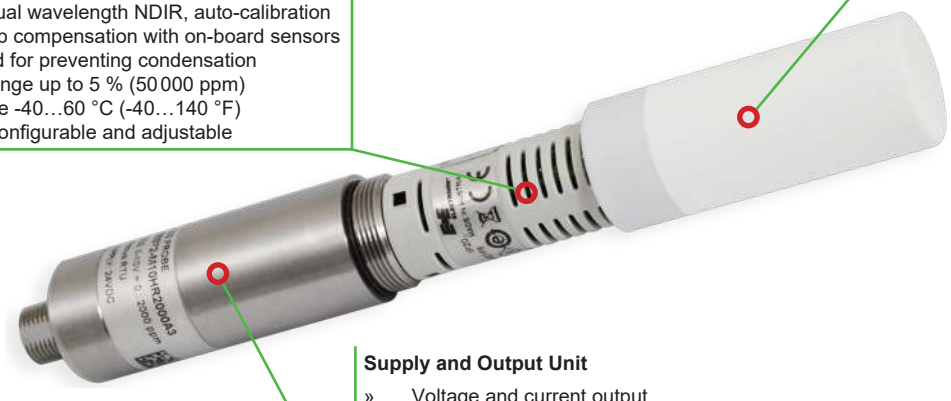
User Configurable and Adjustable

The free EE-PCS Product Configuration Software together with an optional adapter cable facilitates the configuration and adjustment of the EE872.

Features

CO_2 Sensing Module (replaceable)
- » Pluggable and interchangeable
- » E+E dual wavelength NDIR, auto-calibration
- » T and p compensation with on-board sensors
- » Heated for preventing condensation
- » CO_2 range up to 5 % (50 000 ppm)
- » T range -40…60 °C (-40…140 °F)
- » User configurable and adjustable

Filter Cap
- » PTFE
- » Catalytic for H_2O_2 sterilisation
- » Replaceable



Supply and Output Unit
- » Voltage and current output
- » Modbus RTU
- » IP65 protection class
- » Stainless steel or plastic enclosure
- » M12 stainless steel connector
- » User configurable

Test Report
- » According DIN EN 10204 - 2.2

Technical Data

Measurand

CO_2 measurement principle	Dual wavelength non dispersive infrared (NDIR)	
Measurement range Accuracy at 25 °C (77 °F) and 1013 mbar (14,69 psi)	0...2000 ppm: < ± (50 ppm + 2 % mv) 0...5000 ppm: < ± (50 ppm + 3 % mv) 0...10000 ppm: < ± (100 ppm + 5 % mv)	*mv = of the measured value*
	0...3 %: 0...5 %: < ± (1.5 % from full scale + 2 % mv)	
Response time t_{63} [1)]	90 s	
T dependency, typ. (-20...45 °C) (-4...113 °F)	± (1 + CO_2 concentration [ppm] / 1000) ppm/°C, for CO_2 <10000 ppm -0.3 % mv / °C, for CO_2 > 10000 ppm	
Residual pressure dependency[2)] (-20...45 °C) (-4...113 °F)	0.014 % mv / mbar (ref. to 1013 mbar)	
Measurement interval	15 s (user adjustable from 15 s to 1 h)	
Long term stability, typ. at 0 ppm CO_2	20 ppm / year	

Outputs

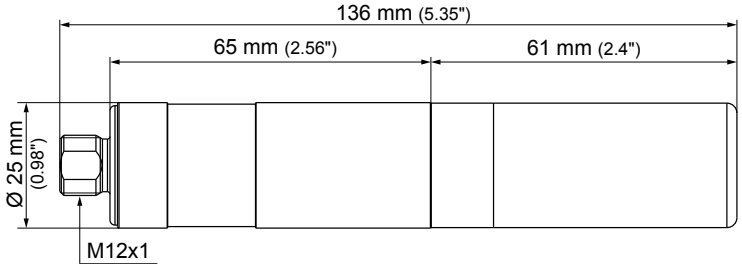
Analogue	0 - 5 V / 0 - 10 V 0 - 20 mA / 4 - 20 mA (3-wire)	-1 mA < I_L < 1 mA R_L ≤ 500 Ohm R_L = load resistance
Digital interface	RS485, max. 32 unit load devices on one bus (EE872 = 1/10 unit load)	
Protocol	Modbus RTU	

General

Supply voltage	15 - 35 V DC for current output 12 - 30 V DC for voltage output and RS485 interface
Average current consumption at 12 V DC and 15 s measurement inverval	45 mA for 20 mA output current 25 mA for voltage output and RS485 interface
Peak current	max. 200 mA
Enclosure material	plastic (PET), UL94HB approved or stainless steel 1.4404
Filter cap material	PTFE, UL94V-0 approved
Protection class	IP65
Electrical connection	M12 x 1, stainless steel 1.4404
Electromagnetic compatibility (Industrial enviroment)	EN61326-1 EN61326-2-3
Operating and storage conditions	-40...60 °C (-40...140 °F) 700...1100 mbar (10.15...15.95 psi) 0...100 % RH (operation, with enabled heating) 0...95 % RH non condensing (storage)

1) With data averaging algorithm for smooth output signal. Faster response time available upon request.
2) The pressure dependency of a device without pressure compansation: 0.14 % mv / mbar.

Dimensions (mm/inch)



Ordering Guide

			EE872-
Hardware Configuration	**Model**	CO_2	M10
	CO_2 range	0...2000 ppm	HV1
		0...5000 ppm	HV2
		0...1 % (10000 ppm)	HV3
		0...3 % (30000 ppm)	HV5
		0...5 % (50000 ppm)	HV6
	Probe material	plastic	no code
		stainless steel	PM2
	Filter	PTFE	no code
		H_2O_2	F12
Software Setup	**Output**[1]	output 1: 0-10 V, output 2: 4-20 mA	GA7
		output 1: 0-5 V, output 2: 0-20 mA	GA11
		Modbus RTU[2]	P1

1) EE872 features simultaneously a voltage and a current output or RS485 interface with Modbus RTU protocol.
2) Factory setting: baud rate 9600, even parity, 1 stop bit Modbus map see User Guide at www.epluse.com/ee872

Ordering Examples

EE872-M10HV1GA7

Model:	CO_2
CO_2 range:	2000 ppm
Probe material:	plastic
Filter:	PTFE
Output:	output 1: 0-10 V, output 2: 4-20 mA

EE872-M10HV6PM2F12P1

Model:	CO_2
CO_2 range:	0...5 %
Probe material:	stainless steel
Filter:	H_2O_2
Output:	Modbus RTU
Baud rate:	9600
Parity:	even
Stop bits:	1

Ordering Guide EE872S Sensing Module (Spare Part)

		EE872S-
Model	CO_2	M10
CO_2 range[1]	0...2000 ppm	HV1
	0...5000 ppm	HV2
	0...1 % (10000 ppm)	HV3
	0...3 % (30000 ppm)	HV5
	0...5 % (50000 ppm)	HV6

1) The CO_2 range of the EE872S must be the same as of the original EE872 probe.

Ordering Example Sensing Module

EE872S-M10HV1

Model:	CO_2
CO_2 range:	2000 ppm

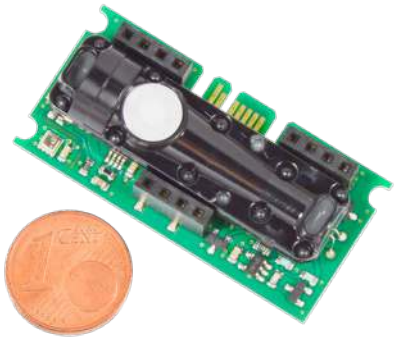
Accessories (For further information see data sheet "Accessories")

Mounting flange	HA010226
Wall mounting clip Ø 25 mm	HA010227
M12x1 flanged coupling with 50 mm (1.97") stranded wire	HA010705
Modbus configuration adapter	HA011018
E+E Product Configuration Software (Download: www.epluse.com/Configurator)	EE-PCS
Connection cable M12 - flying leads (1.5 m (59.06") / 5 m (196.85") / 10 m (393.70"))	HA010819/20/21
T-coupler M12 - M12	HA030204
M12 cable connector for self assembly	HA010707
Protection cap / calibration adapter	HA010785
Protection cap for the M12 cable socket	HA010781
Protection cap for the M12 plug of EE872	HA010782

EE894

Digital Sensor Module for CO_2, Temperature, Humidity and Ambient Pressure

The EE894 module is ideal for demand controlled ventilation and building automation. It 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. Beside CO_2, the module measures also relative humidity (RH), temperature (T) and ambient pressure (p).



A multiple point CO_2 and T factory adjustment procedure leads to excellent CO_2 measurement accuracy over the entire T working range. The pressure compensation minimizes the impact of altitude and ambient pressure variations onto the CO_2 measured data.

The measured data, with a range of up to 1% CO_2, is available on the I²C or the E2 digital interface.

An optional kit for the E2 interface facilitates easy configuration of the module and the adjustment of the CO_2, RH, T and p measurement. The CO_2 measurement interval can be set according to the application requirements; by this the average current consumption can be reduced to 420 µA, ideal for battery-operated devices.

Typical Applications

Demand controlled ventilation
Building automation
Data loggers and hand helds
Wireless transmitters

Key features

Autocalibration
Outstanding long-term stability
Temperature and pressure compensated
Low power consumption
Small size

Technical Data

Measured values

CO_2

Measurement principle	Dual wavelength NDIR (non-dispersive infrared technology)
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 the measured value) 0...5000 ppm: < ± (50 ppm +3% of the measured value) 0...1% (0...10000 ppm): < ± (100 ppm +5% of the measured value)
Response time t_{90}	105 s with measured data averaging (smooth output) 60 s without measured data averaging [2]
Temperature dependency	typ. ± (1 + CO_2 concentration [ppm] / 1000) ppm/°C (-20...45 °C) (-4...113 °F)
Pressure dependency	0.014 % of the measured value / mbar (ref. to 1013 mbar)
Calibration interval [3]	>5 years
Sampling interval	from 15 s (factory setup) up to 1 h; user selectable

Relative humidity

Working range	0…95 % RH (non condensing)
Accuracy at 25 °C (77 °F) and 20...80% RH, incl. hysteresis [4]	typ. ± 3 % RH (min. - 9% RH, max. + 9% RH)

Pressure

Working range	700…1100 mbar (10.15...15.95 psi)
Accuracy at 25 °C (77 °F)	typ. ± 2 mbar (20…80 % RH)
Temperature dependency	± 0.015 mbar/K

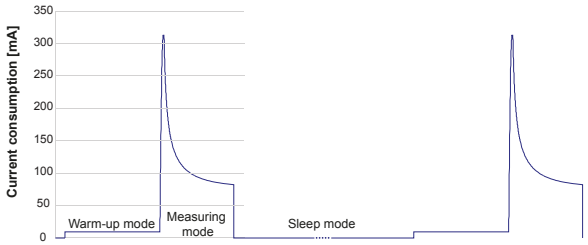
Temperature

Working range	-40…60 °C (-40...140 °F)
Accuracy at 25 °C (77 °F)	typ. ± 0.5 °C (± 0.9 °F)

1) With data averaging (smooth output) for averaging output.
2) Available only for I²C.
3) Recommended under normal operating conditions in building automation.
4) Higher accuracy upon request.

General

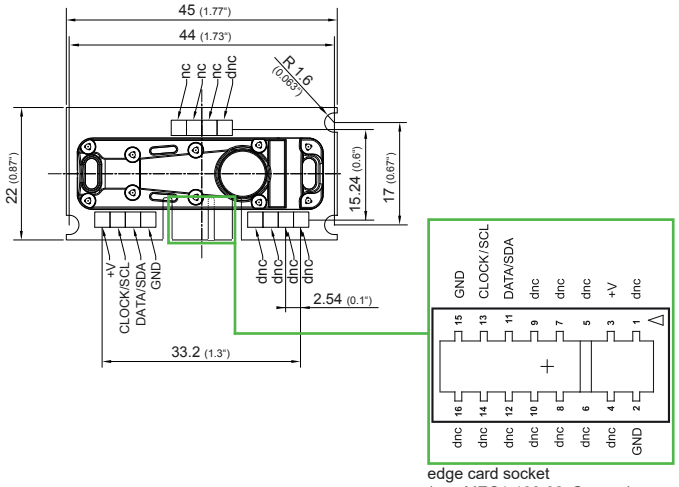
Digital interface	I²C or E2
Supply voltage	4.75 - 7.5 V DC
Average current [4]	420 µA (at 1 h sampling interval)
at 25 °C (77 °F) and 5 V supply	3.2 mA (at 15 s sampling interval)
Peak Current	



Electrical connection	contact pins and edge card socket
Working and storage conditions	-40...60 °C (-40...140 °F) 0...95 % RH (not condensating) 700...1100 mbar (10.15...15.95 psi)

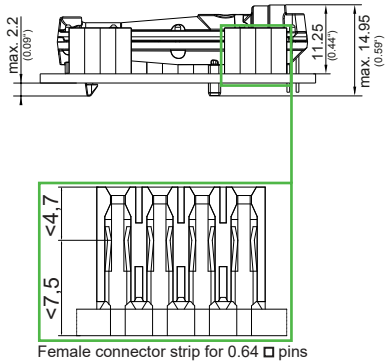
4) The average current depends on the CO_2 sampling interval.

Connection Diagram / Dimensions in mm (inch)



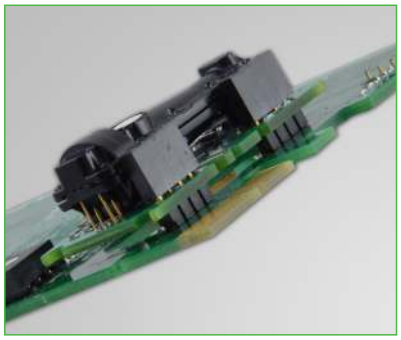
edge card socket
(e.g. MEC1-108-02, Samtec)

nc..... not connected
dnc.... do not connect



Female connector strip for 0.64 □ pins
contact spacing 2.54 mm (0.1")

Mounting Examples



Top mount

Connection with edge card socket

Space saving assembly

Accessories (see also data sheet “Accessories”)

E2 Test and Configuration Adapter	HA011010
E+E Product Configuration Software	EE-PCS (Download: www.epluse.com/Configurator)

Ordering Guide

		EE894
CO_2 measuring range	0...2000 ppm	HV1
	0...5000 ppm	HV2
	0...1% (0...10000 ppm)	HV3
Interface	I^2C	no code
	E2	J2

Order Example

EE894-HV1J2

CO_2 measuring range: 0...2000 ppm
Interface: E2

Support Literature

www.epluse.com/EE894

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

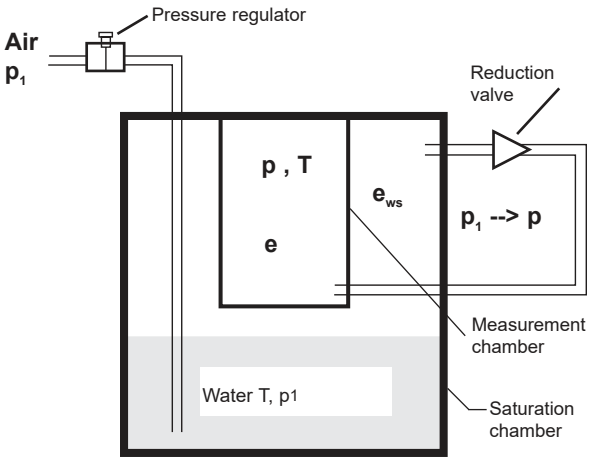
The HUMOR 20 is traceable to international standards and can be delivered with an official, internationally recognised OEKD calibration certificate. Due to its high accuracy, the HUMOR 20 is the basis for accredited calibration laboratories for relative humidity.

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 100-230 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.

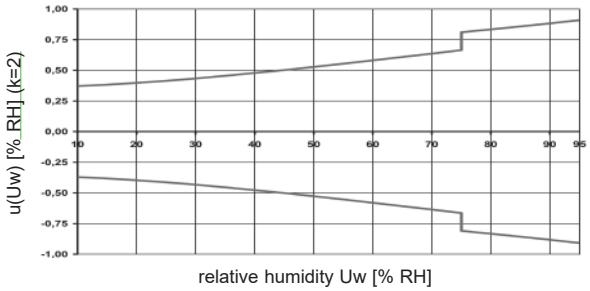
The software which is included in the scope of supply allows the user to record measurement values in a log file, to print out calibration protocols and to configure or to readjust the HUMOR 20.

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.

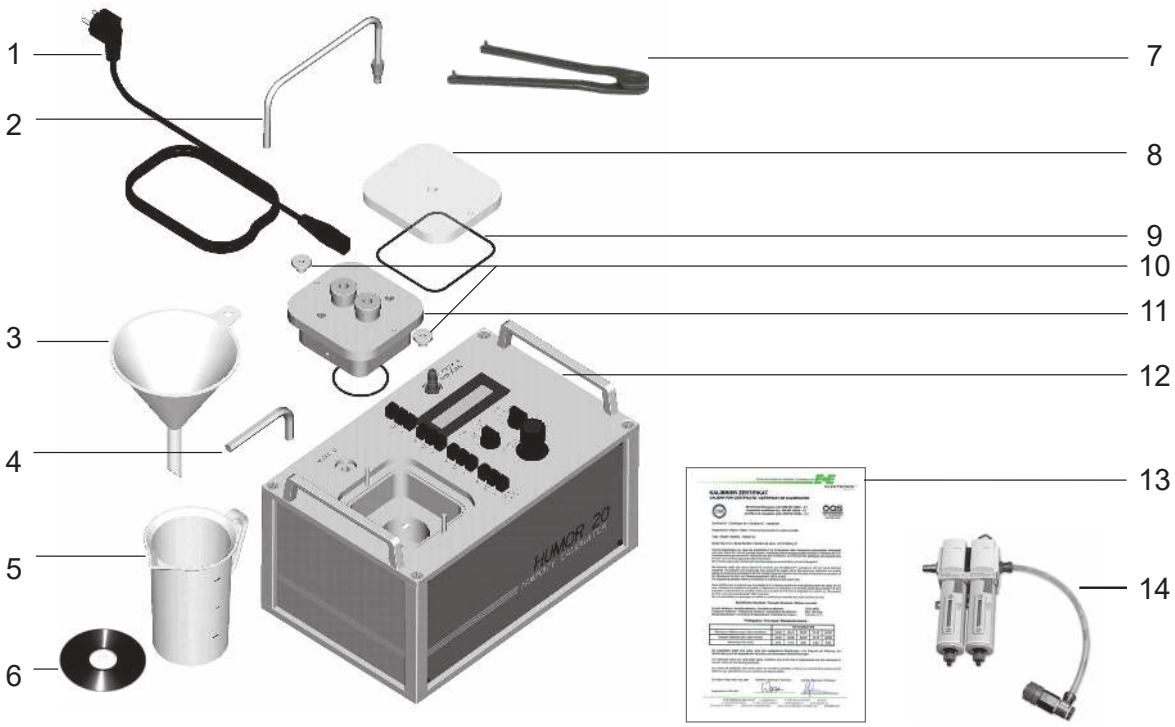
Automatic Calibration Module

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" x 9.4")
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 EN61326-1:2006 EN61000-6-2:2006 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).

Federal Ministry for Economics and Labour
Österreichischer Kalibrierdienst (ÖKD)

CERTIFICATE OF ACCREDITATION

We confirm that the Calibration Laboratory of
E + E Elektronik GmbH
Langwiesen 7, A-4209 Engerwitzdorf,
is accredited for the following quantities:

humidity of air and temperature

The accreditation was given with the document No. BMWA-96.113/0340-II/11/2006
dated 17 March 2006.
The scope of accreditation is included in the accreditation document and in the directory of accredited calibration laboratories of Austria.
The registration number of this calibration laboratory is ÖKD 23.

The accreditation was performed in accordance with the requirements of the following documents: Act concerning Metrology, Federal Law Gazette No. 152/1950, last amended by Federal Law Gazette I No. 137/2004, Ordinance concerning Calibration Service, Federal Law Gazette No. 42/1994, last amended by Federal Law Gazette II No. 490/2001, Accreditation Act, Federal Law Gazette No. 468/1992, last amended by Federal Law Gazette I No. 85/2002, EN ISO/IEC 17025:2005.

Vienna, 17 March 2006

Dipl.-Ing. Freistetter Gerald

Dr. Twaroch Christoph

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

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.

KALIBRIER ZERTIFIKAT
CALIBRATION CERTIFICATE

E+E Elektronik Ges.m.b.H. Langwiesen 7 A-4209 Engerwitzdorf Austria

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

Converter unit

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.
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, EE371, EE381	HA011063
	EE03 (only display of measured values)	HA011056
	EE07	HA011057
	EE08 type D	HA011060
	EE160 with analogue output	HA011059
	EE671 with analogue output	HA011064
	EE150, EE4x1 with analogue output	HA011065

Order Example

Position 1: EE-PCA
E+E Product Configuration Adapter

Position 2: HA011059
Cable for EE160 with analogue output

Accessories

EE-PCS — free download at www.epluse.com/configurator
Power supply adapter — V03 (see data sheet „Accessories“)

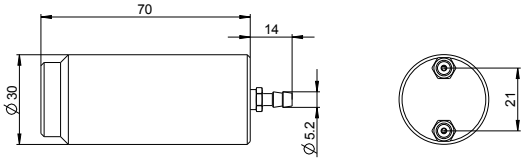
Accessories

FILTER CAPS FOR HUMIDITY AND DEWPOINT SENSORS WITH PROBE Ø12 mm (0.47")

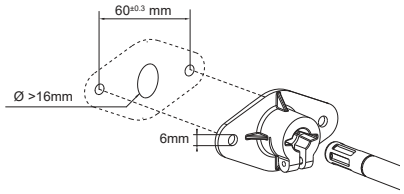
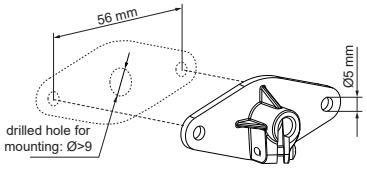
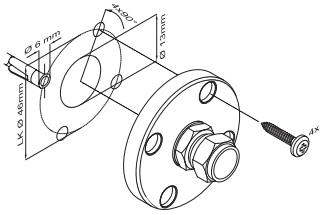
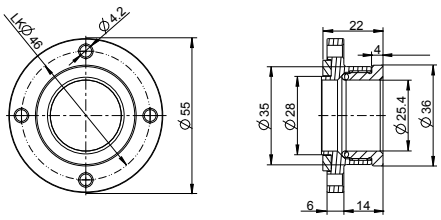
The right choice of appropriate filter cap is essential for best long term performance in the application.
For assistance please contact the E+E representative - http://www.epluse.com/en/service-support/locations-distributors/.

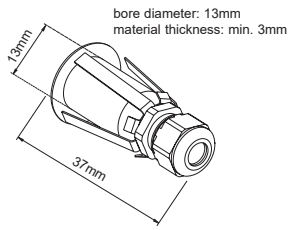
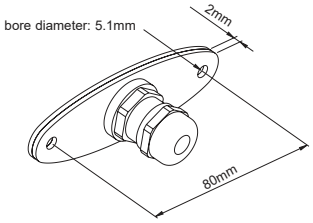
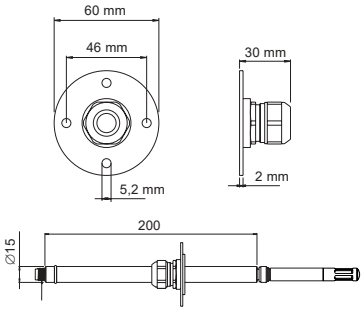
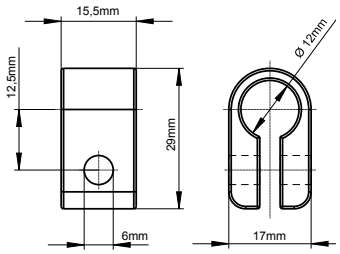
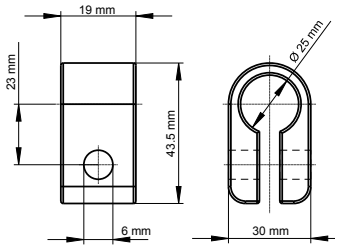
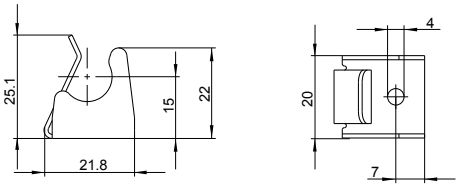
FILTER NAME	CONSTRUCTION	FEATURES	APPLICATIONS	ORDER CODE
Membrane 	Body: polycarbonate Filter: PTFE membrane Pores size: 1 µm Length: 34 mm (1.34")	Very good protection against fine dust T range: -40…80 °C (-40...176 °F) Response time $t_{10/90}$: 15 s	Building automation Dusty environment	HA010101
Stainless steel sintered 	Material: sintered stainless steel Pores size: 10 µm Length: 33 mm (1.30")	For high mechanical stress and strong pollution T range: -40…180 °C (-40...356 °F) Response time $t_{10/90}$: 30 s	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: 50 µm Length: 33 mm (1.30")	For very dirty, oily environment T range: -40…180 °C (-40...356 °F) Response time $t_{10/90}$: 14 s	Industrial process control Chemical industry Very polluted environment Unsuitable for condensing environment	HA010105
Metal grid 	Body: polycarbonate Filter: stainless steel wire mesh Pores size: 30 µm Length: 33 mm (1.30")	For high RH / condensing environment, low mechanical stress and low pollution level T range: -40…120 °C (-40...248 °F) Response time $t_{10/90}$: 15 s	Climate control Dryers and humidifiers HVAC	HA010106
Stainless steel grid 	Body: stainless steel Filter: stainless steel wire mesh Pores size: 30 µm Length: 39 mm (1.54")	For high RH / condensing environment, average mechanical stress and low pollution level T range: -40…180 °C (-40...356 °F) Response time $t_{10/90}$: 15 s	Industrial process control Clean rooms	HA010109
H_2O_2 	Material: PTFE sintered Pores size: 50 µm Length: 33 mm (1.30")	Catalytic filter for H_2O_2 environment T range: -40…180 °C (-40...356 °F) Response time $t_{10/90}$: 14 s	Pharma Biotech Sterilization with H_2O_2	HA010115
PTFE stainless steel 	Body: stainless steel Filter: PTFE membrane, replaceable Pores size: 2 µm Length: 39 mm (1.54")	For outdoor and meteorology, high pollution levels T range: -40…180 °C (-40...356 °F) Response time $t_{10/90}$: 14 s Water ingression pressure > 0.5 bar	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: 30 µm Length: 25 mm (1")	For high RH / condensing environment, low mechanical stress, low pollution level T range: -40…120 °C (-40...248 °F) Response time $t_{10/90}$: 15 s	Meteorology, outdoor Climate control	HA010113
Stainless steel 	Material: stainless steel Openings: ø3 mm Length: 32 mm (1.26")	For moisture in oil measuring devices	Hydraulic, lubrication and isolation oil monitoring	HA010110

FILTER CAPS FOR EE872 CO_2 PROBES Ø25 mm (0.98“)

NAME	CONSTRUCTION	FEATURES	APPLICATIONS	ORDER CODE
PTFE 	Material: PTFE sintered Pores size: 50 µm Length: 62 mm (2.44”)	Standard filter for CO_2 probes T range: -40…60 °C (-40...140 °F)	Greenhouses Agriculture Outdoor CO_2 monitoring	HA010123
H_2O_2 	Material: PTFE sintered Pores size: 50 µm Length: 62 mm (2.44”)	Catalytic filter for H_2O_2 environment T range: -40…60 °C (-40...140 °F)	Pharma Biotech Sterilization with H_2O_2	HA010124
Calibration adapter / Protection cap 	Material: Polycarbonate	Dimensions in mm 		HA010785

MOUNTING FLANGES

NAME	SUITABLE FOR	DIMENSIONS in mm	ORDER CODE
Plastic flange Ø12 mm (0.47“) 	EE160, EE210 EE650, EE660, EE576 EE850, EE8915 EE060, EE061 EE671		HA010202 (light grey) HA010214 (black)
Plastic flange Ø6 mm (0.24“) 	EE431 EE150		HA401101
Stainless steel flange Ø12 mm (0.47“) 	EE23 EE310 EE33 EE1900, EE1950		HA010201
Stainless steel flange Ø25 mm (0.98“) 	EE872		HA010226

NAME	SUITABLE FOR	DIMENSIONS in mm	ORDER CODE
Stainless steel flange Ø5 mm (0.2") 	EE23 - model H		HA010208
Stainless steel flange Ø8 mm (0.3") 	EE75 EE33-MFTJ (temperature probe)		HA010207
Duct mounting kit 	EE07 EE220		HA010209
Wall mounting clip Ø12 mm (0.47") 	All probes Ø12 mm (0.47") T range: -40...60 °C (-40...140 °F) Material: LDPE		HA010211
Wall mounting clip Ø25 mm (0.98") 	EE872 T range: -40...60 °C (-40...140 °F) Material: LDPE		HA010227
Stainless steel wall mounting clip Ø12 mm (0.47") 	EE1900, EE1950 EE310 EE23 EE33	Material: stainless steel 1.4404 	HA010225

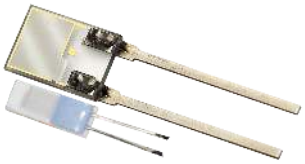
LC DISPLAYS

NAME	SUITABLE FOR		ORDER CODE
LC display + cover 	EE220	metal	D07M-EE220
		polycarbonate	D07P-EE220
	EE23	metal	D03M-EE23
		polycarbonate	D03P-EE23
	EE23-T5	metal	D05M-EE23T5
		polycarbonate	D05P-EE23T5
	EE33	metal	D05M-EE33

POWER SUPPLY UNIT

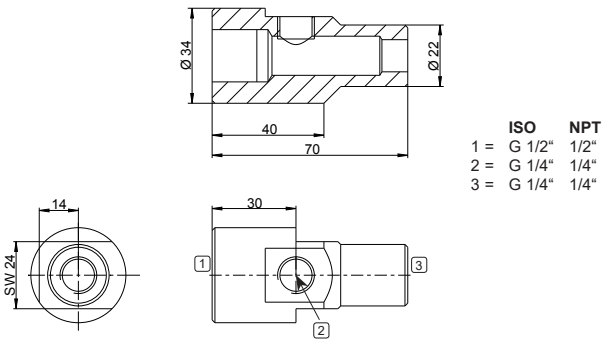
NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Power supply adapter 	All E+E devices with 24 V DC supply max: 0.625 A	External power supply 100-240V AC / 50-60Hz 0.5A Suitable for Europe / US / UK /Korea / China	V03

REPLACEMENT SENSING ELEMENTS

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Replacement sensing elements 	EE23 EE310	Replacement humidity sensing elements	FE09 FE09-HC01 (with coating)
		Replacement temperature sensing elements	TE38

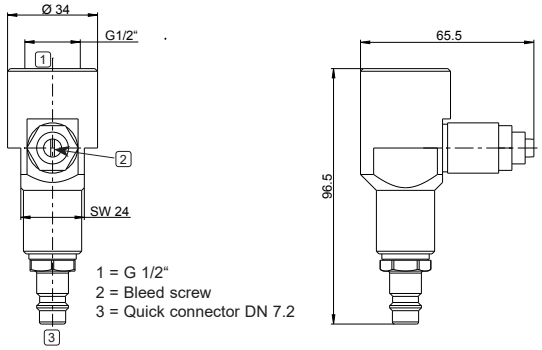
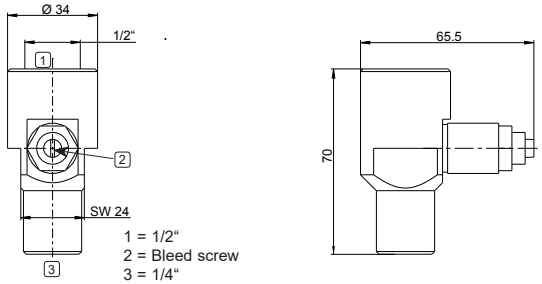
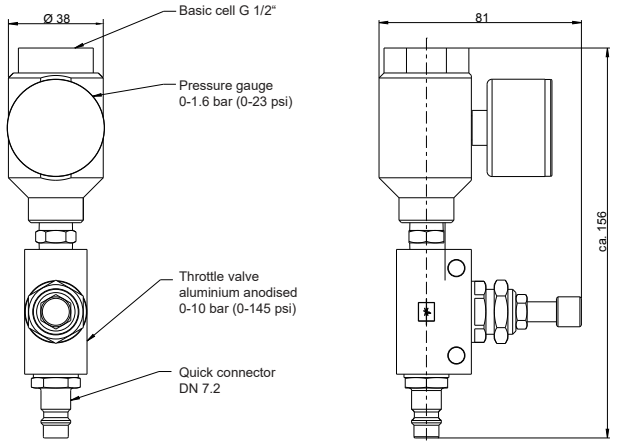
SAMPLING CELLS

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Basic sampling cell 	EE371 EE354 EE355	The basic sampling cell is designed for a pressure range from 0...64 bar (0...928 psi). It allows a simple integration of a dew point sensor into a self-constructed sampling system. Dimensions in mm:	ISO: HA050103 NPT: HA050105



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

SAMPLING CELLS

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
ISO sampling cell 	EE371 EE354 EE355	The sampling cell is optimized for compressed air lines with pressure range 0...10 bar (0...145 psi). The flow of air can be adjusted with the bleed screw. The G ½" ISO version features a quick connector suitable for standard DN7.2 air connection, which allows for the sampling cell to be mounted and removed without process interruption. Dimensions for ISO (in mm): 	ISO: HA050102
NPT sampling cell 		Dimensions for NPT (in mm): 	NPT: HA050107
Sampling cell for atmospheric dew point 	EE371 EE354 EE355	The sampling cell is optimized for measuring the athmoperic dew point temperature in compressed air lines with pressure range 0...10 bar (0...145 psi). It features a quick connector suitable for standard DN7.2 air connection, which allows for the sampling cell to be mounted and removed without process interruption. The pressure in the sampling cell could be zeroed by the needle valve. Dimensions in mm: 	HA050106

DRIP WATER PROTECTION

In applications with high humidity and condensation or for outdoor use, sensor probes should be protected against dripping water.

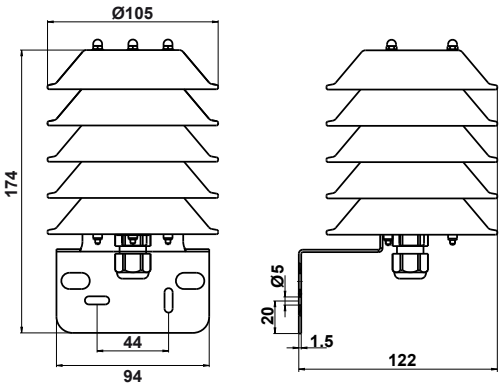
NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Drip water protection 	All sensing probes with Ø12 mm (0.47")	Protection cap Ø85 mm (3.35"), fixing onto the sensing probe by cable gland.	HA010503

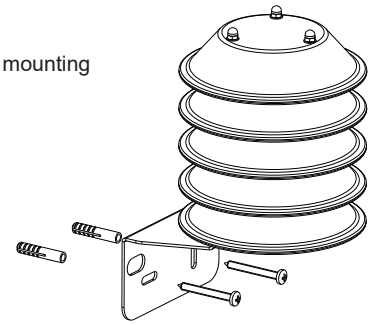
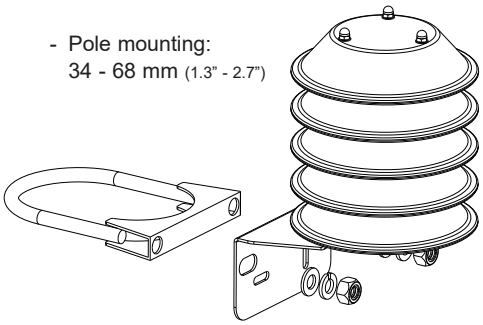
PROTECTION CAP

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Protection cap for Ø12 mm (0.47") probe 	All sensing probes with Ø12 mm (0.47")	Sensing head protection during site cleaning or sterilization. T range: -40…80 °C (-40…176 °F) L: 50.4 mm (1.98") Ø: 12.5 mm (0.49")	HA010783

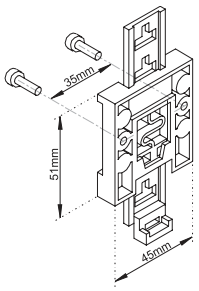
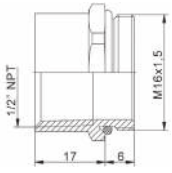
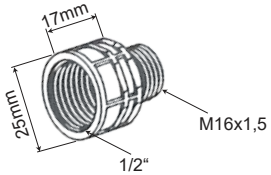
RADIATION SHIELD

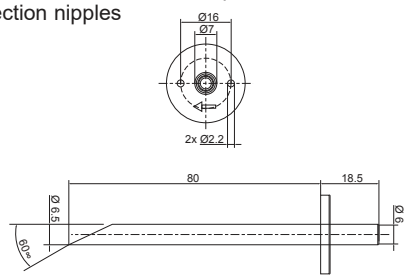
For outdoor applications the measuring devices shall be equipped with a radiation shield which provides protection from rain, snow and ice. This causes also a natural ventilation which largely prevents overheating of the sensing probe in the sun and thus a distortion of the measured values. All E+E radiation 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, EE310, EE210 with remote sensing probe EE060, EE061 EE07, EE071 EE08 type E EE33-J (RH probe)		HA010502

NAME	SUITABLE FOR	DIMENSIONS / MOUNTING	ORDER CODE
Radiation shield with screw-in thread (M16x1.5) and additional cable gland for probes with Ø6 mm (0.24“) 	EE33-J (T probe) EE08 type D.	Mounting options: - Wall mounting  - Pole mounting: 34 - 68 mm (1.3“ - 2.7“) 	HA010506

MOUNTING AND CONNECTING AIDS

NAME	SUITABLE FOR	DIMENSIONS / DESCRIPTION	ORDER CODE
Bracket for DIN rail mounting 	EE220 EE23 EE310 EE360 Only for plastic enclosure.		HA010203
Conduit adapter, stainless steel 	Devices with cable gland M16x1.5	Adapter M16x1.5 to ½“ NPT (US conduit fitting) 	HA011101
Conduit adapter, plastic 	Devices with cable gland M16x1.5	Adapter M16x1.5 to ½“ NPT (US conduit fitting) 	HA011110

NAME	SUITABLE FOR	DIMENSIONS / DESCRIPTION	ORDER CODE
Pressure tight feedthrough 	EE33-MFTJx EE33-MFTKx	For probes with Ø12 mm (0.47“) and Ø6 mm (0.24“) Probe assembly up to 20 bar (300psi)	HA011102: ½“ISO, probe: Ø12 mm (0.47“) HA011103: ½“NPT, probe: Ø12 mm (0.47“) HA011104: ½“ISO, probe: Ø6 mm (0.24“) HA011105: ½“NPT, probe: Ø6 mm (0.24“)
Pressure connection set 	EE600	2 m PVC hose with two ABS pressure connection nipples 	HA011304

REFERENCE PROBES

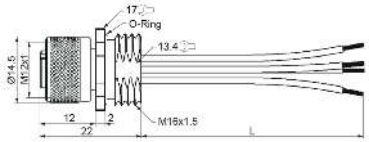
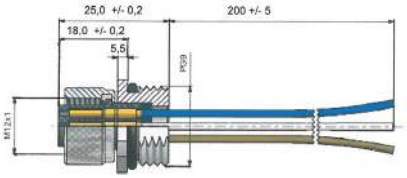
NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Reference probe 	EE220	EE07 probes with fix output values for checking the EE220 basic unit (test report included). probe 1: 90 % RH / 5 °C (41 °F) probe 2: 10 % RH / 45 °C (113 °F)	HA010403

INTERFACE CABLES AND CONVERTORS

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
RS232 to USB 	E+E devices with RS232 interface	High speed converter from RS232 DB9 (male) to USB Microsoft WHQL approved	HA020110
E2 to RS232 for EE07 	EE07	E2 to RS232 converter, incl. software for test and data Connector A: M12 Connector B: DB9 (female) Cable length: 2m (6.6ft)	HA011001
E2 to RS232 for EE03 	EE03	E2 to RS232, incl. software for test and data recording Connector A: 4 pole wire to board connector Connector B: DB9 (female) Cable length: 2 m (6.6ft)	HA011002
E2 Test and configuration adapter 	EE894 with E2 interface	Connecting CO_2 modules with E2 interface to a PC for test and configuration, inkl. software and supply adapter. Connector A: Test board with power supply Connector B: DB9 (female)	HA011010

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
E2 to RS232 for EE08 	EE08	E2 to RS232, incl. software für configuration, adjustement or test Connector A: screw terminal or M12 via connection cable Connector B: DB9 (female) Cable length: 2 m (6.6ft)	HA011005
RS232 interface cable with free ends 	EE33	RS232 interface cable for connection to screw terminals Connector A: DB9 (female) Connector B: flying leads Cable length: 2 m (6.6ft)	HA010301
RS232 interface cable 	EE33 EE371 EE381	RS232 interface cable Connector A: DB9 (female) Connector B: 6 pol wire to board connector Cable length: 2 m (6.6ft)	HA010304
RS232 interface 	EE33	RS232 interface cable with connector option C06 Connector A: DB9 (female) Connector B: M12 Cable length: 2 m (6.6ft)	HA010311
Modbus configuration adapter 	EE071 EE354 EE355 EE364 EE872	For test and configuration with a PC, incl. supply adapter. Connector A: USB Connector B: M12	HA011012 HA011013 HA011018
USB configuration adapter 	EE10 digital EE160 digital EE210, EE211 EE4x1 digital EE650, EE660 EE800, EE820, EE850	For test and configuration with a PC, incl. supply adapter. Connector A: USB Connector B: 10 pole wire to board connector	HA011066
USB adapter cable 	EE1900, EE1950	For test and configuration with a PC. Connector A: USB Connector B: 10 pole wire to board connector	HA011017

CONNECTORS

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Flange coupling, 5 pole 	EE060 type PM EE07 EE071 EE872	M12x1 flange coupling L = 50 mm (2") 	HA010705
Flange coupling, 8 pole 	EE060 type PV EE08 type D EE364	M12x1 flange coupling 	HA010703
Connector, 4 pole socket 	EE07, EE071 EE060 type PM EE820 HUMLOG20 E	M12x1 cable connector, 4 pole, IP67 (NEMA 4), for self assembly	HA010707
Connector, 5 pole socket 	EE354, EE355 EE33 - C03/C08 EE23 - C03 EE310 - E4, E6, E12, AM3 EE360 - E4, E6, E12, AM3 EE75 - C12/C13 EE671 type S EE77x - type Q EE872, EE8915	M12x1 cable connector, 5 pole, IP67 (NEMA 4), for self assembly	HA010708
Connector, 8 pole socket 	EE08 type PV EE08 type D EE364	M12x1 cable connector, 8 pole, IP67 (NEMA 4), for self assembly	HA010704
Connector, 5 pole plug 	EE310 / EE360: E5, E6, E12	M12x1 cable connector, 5 pole, IP67 (NEMA 4), for self assembly	HA010709

CABLES

NAME	SUITABLE FOR	DESCRIPTION	ORDER CODE
Connection cable EE220/EE244 	EE07 - EE220/EE244 EE244	Connecting cable for: - EE07 with EE220/EE244 - EE871 with EE244 5 pole, M12x1 plug-socket, shielded (shield connected to pin 5), PUR	HA010801 (2 m / 6.6 ft) HA010802 (5 m / 16.4 ft) HA010803 (10 m / 32.8 ft)
Connection cable, 5 pole 	LOGPROBE20-HUMLOG20 E EE060 PM EE671 type S EE354, EE355 EE771 EE772 EE776	Connecting cable for: - LOGPROBE20 with HUMLOG20 E - EE771, EE772, EE776 - EE060 PM 5 pole, M12x1 plug-socket, shielded, PUR	HA010816 (2 m / 6.6 ft) HA010817 (5 m / 16.4 ft) HA010818 (10 m / 32.8 ft)
Connection cable, 5 pole 	EE060 type PM EE07, EE071 EE671 type S EE354, EE355 EE820 EE872 EE8915	5 pole, M12x1 socket - free ends, shielded, PUR	HA010819 (1.5 m / 4.9 ft) HA010820 (5 m / 16.4 ft) HA010821 (10 m / 32.8 ft)
Connection cable, 8 pole 	EE06 type PV EE08 type D EE364	8 pole, M12x1 socket - free ends, shielded, PUR	HA010322 (1.5 m / 4.9 ft) HA010323 (3 m / 9.8 ft) HA010324 (5 m / 16.4 ft) HA010325 (10 m / 32.8 ft)
Connection cable OMNIPORT / OILPORT 	OMNIPORT 30 OILPORT 30	M12 connecting cable 5 pole, M12x1 plug-socket, unshielded, PUR	HA010813 (2 m / 6.6 ft) HA010814 (5 m / 16.4 ft) HA010815 (10 m / 32.8 ft)
Protection cap 	M12 female connector		HA010781
Protection cap 	M12 male connector		HA010782

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…100	001
0…200	010
0…300	007

0…500	002
0…1000	003
0…2000	013
0…2500	014

0…5000	006
0…6000	005
0…10000	004
0…20000	009

0…30000	008
0…100000	011

Water activity (AW)

0…1	001

Water content (X) - [ppm]

0…30	012
0…100	001
0…200	010
0…300	007

0…500	002
0…1000	003
0…2000	013
0…2500	014

0…5000	006
0…6000	005
0…10000	004
0…20000	009

0…30000	008
0…100000	011
0…200000	015

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

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