EE29/EE31 Series

Multifunctional Industrial Transmitter for Humidity / Temperature / Dew Point / Absolute Humidity...

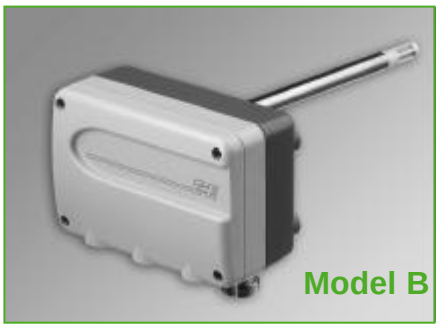
The precise and reliable measurement of humidity in industrial processes is gaining more and more importance. The multifunctional transmitters series EE29/31 offer the ideal solution.


Model A

The result of many years of experience in humidity measurement technology for industrial applications, the EE29/31 series builds on the E+E high-quality HC series capacitive humidity sensor elements.

The optimal hardware structure for varying applications is achieved by combining various standard mechanical and electronic modules. User friendly MS Windows software tools simplify the configuration of the transmitter, the data recording, visualization and processing.

The measured values are available on two freely configurable and scaleable analogue outputs and on the serial RS232 interface. With an optional RS485 module up to 32 EE31 transmitters can be connected on a network to one single PC interface.


Model B

Two freely configurable optional alarm outputs can be set by software. The measured data and the corresponding MIN/MAX values can be viewed on the optional LCD display.

Other features especially tailored for harsh industrial applications are the new housing concept consisting of three modules, the easy on-site adjustment and calibration, and the interchangeable sensor option. These features allow for very fast and easy servicing of the transmitter.

By selecting a suitable housing version the EE29/EE31 series can be used for the entire range of humidity measurement applications:


Model D/E

- Model A for wall mounting
- Model B for duct mounting
- Model D with remote sensing probe for measurements in the extended temperature range -40...180 degC
- Model E with remote sensing probe for pressure tight applications between 0.01...15 bar
- Model F with rear cable outlet for wall mounting in clean room applications. The hidden cables and the smooth housing are major requirements for easy cleaning and sterilization.


Model F

Product comparison EE29 - EE31

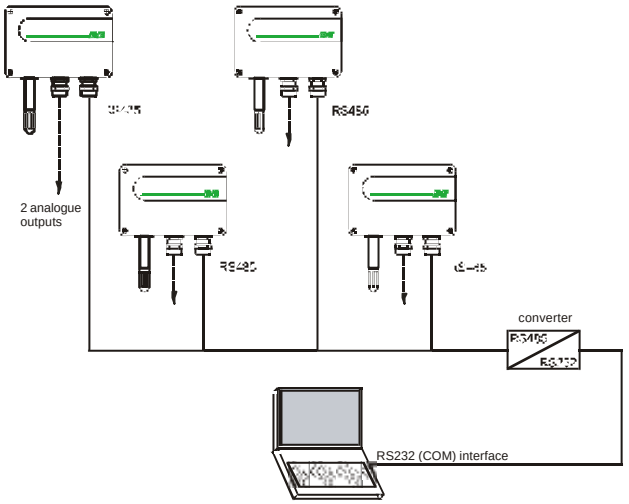
Functions	Comment	EE29	EE31
Measurement of relative humidity and temperature		✓	✓
two freely scaleable and configurable analogue outputs		✓	✓
five basic hardware configurations		✓	✓
Remote sensing probe up to 20m		✓	✓
On-site adjustment for relative humidity and temperature		✓	✓
LED indication of transmitter status		✓	✓
RS232 for transmitter configuration via PC		✓	✓
Configuration software	standard supply	✓	✓
Alternating display with MIN/MAX indication	optional	✓	✓
two freely configurable alarm outputs	optional	✓	✓
Interchangeable sensor cable	optional	✓	✓
Sensor protection (coating)	optional	✓	✓
Plug connection	optional	✓	✓
Calculated values h, r, dv, Tw, Td, Tf, e			✓
Digital data output via RS232 interface			✓
Digital data output via RS485 interface	optional		✓
Network of up to 32 instruments via RS485 bus	optional		✓
Data logging and analysis PC software	optional		✓

EE31 - Network with up to 32 transmitters

Up to 32 EE31 transmitters can be connected in a RS-485 bus system to a single PC interface.

The measured and calculated data is stored in a PC database which is available for further processing by using the E+E datalogging and analysis software.

The data base can also be stored in ASCII format or in a database with ODBC interface.



Software Tools

The following software tools are available for the EE29/31 series:

	EE29	EE31
Configuration Software (standard supply)	✓	✓
datalogging and analysis Software (optional)		✓

Configuration Software:

The Configuration Software is used for:

- flexible, easy, and fast setup of the analogue and alarm outputs.
- adjustment of the humidity and temperature outputs.
- exchange of the sensing probe or of the sensors.

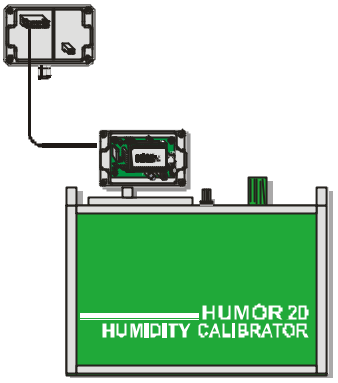
Datalogging and Analysis Software:

This user friendly software tool is a great help for easy data analysis in graphical or spreadsheet format on a PC as well as for data and alarms management by e-mail or SMS.

Easy calibration and adjustment of the transmitter

The modular housing of the EE29/EE31 enables a fast and easy on-site adjustment and calibration.
Using the optional extension cable one can adjust or calibrate the entire measurement loop without interrupting the measurement. No need for time-consuming dismounting and wiring of the instrument. This feature makes the EE29/31 series suitable for use in regulatory environments (e.g. FDA, GAMP).

The adjustment of humidity and temperature (2 points or 1 point) is performed either with a simple routine using two push buttons on the printed circuit board or with the configuration software.



2 Status LEDs

Two status LEDs on the printed circuit board indicate the transmitter status and eventual errors, especially useful during installation or service operations.

Sensor Coating

Operation in heavily polluted and/or corrosive environments is typical for many industrial processes and can lead to drift or damage of the humidity sensor and thus to false measured values. The unique protective coating developed by E+E for the sensing probe (ordering code: - HC) brings a significant improvement on the long-term stability of the transmitter in very dirty and aggressive environments.

Integrated Display

The actual measured and calculated values as well as the corresponding Min/Max values can be indicated on an optional display. The physical quantity to be displayed is choosen with the push buttons on the housing.

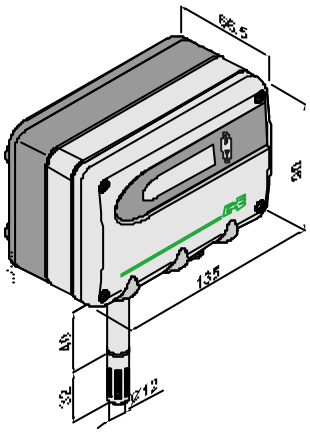
Interchangeable sensing probe

The interchangeable sensing probe with plug connection can be easily exchanged in the versions D and E. The installation of the probe cable (up to 20 m) is significantly simplified and can be installed prior to fitting the transmitter.

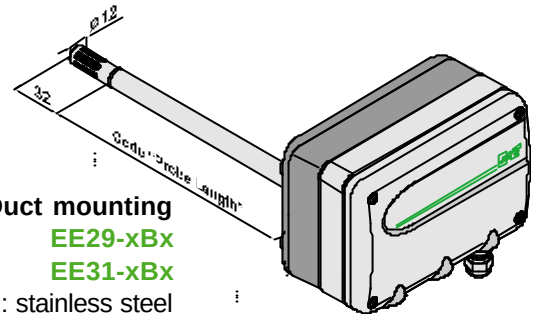
Alarm outputs

An optional alarm module with 2 relays outputs is available for control and alarm purposes. The selection of the physical quantity for the relay ouputs and the setting of threshold hysteresis can be easily made with the configuration software included in the standard scope of supply.

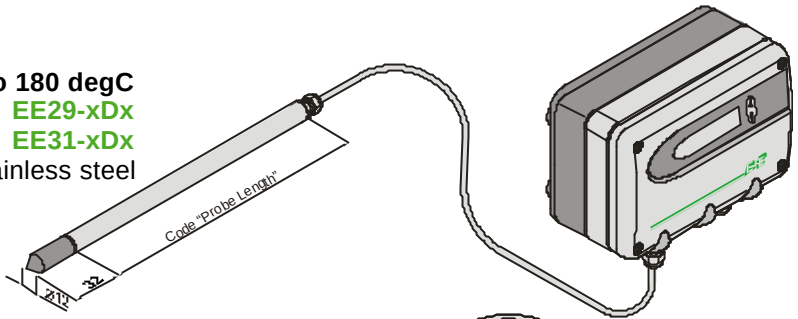
Housing dimensions (mm)



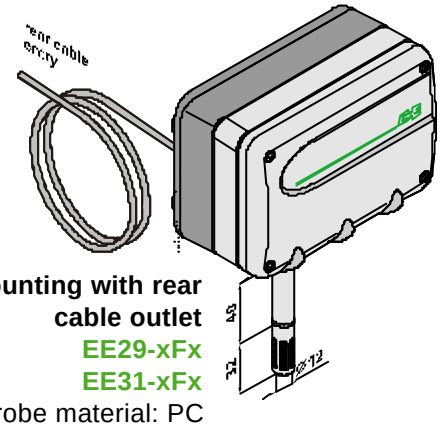
Wall mounting
EE29-xAx
EE31-xAx
Probe material: PC



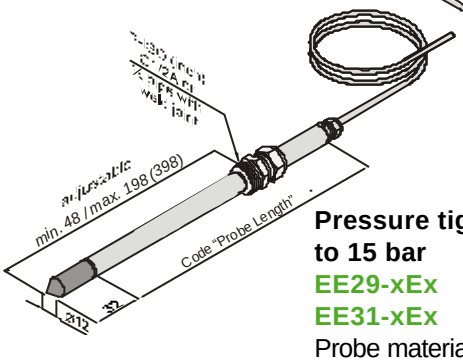
Duct mounting
EE29-xBx
EE31-xBx
Probe material: stainless steel



Remote probe for T up to 180 degC
EE29-xDx
EE31-xDx
Probe material: stainless steel



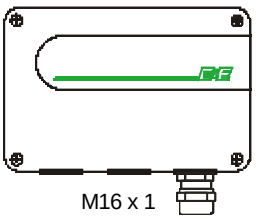
Wall mounting with rear cable outlet
EE29-xFx
EE31-xFx
Probe material: PC



Pressure tight probe up to 15 bar
EE29-xEx
EE31-xEx
Probe material: stainless steel

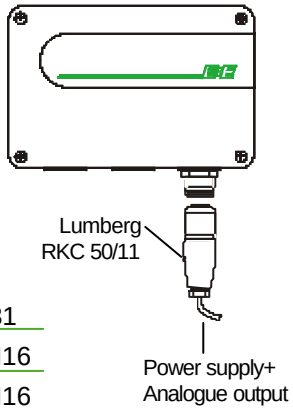
Connection versions

Standard

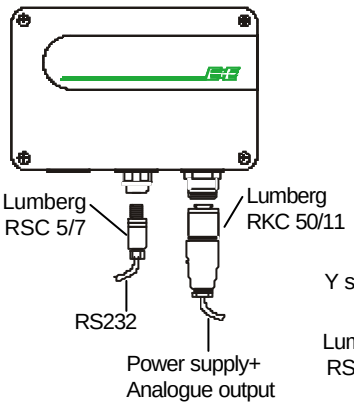


	EE29	EE31
Base instr.	1xM16	2xM16
Base instr. incl. Alarm output	2xM16	3xM16

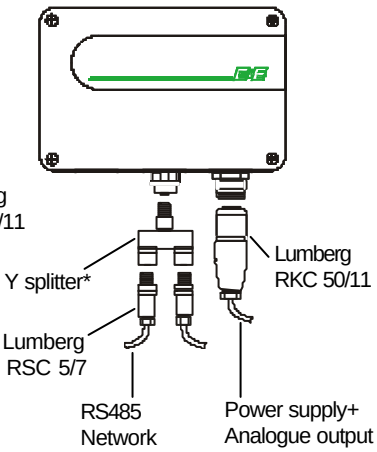
Plug Option C03



Plug Option C07



Plug Option C08



* Siemens 6ES7 194-1KA01-0XA0

Technical Data EE31

Measurement values

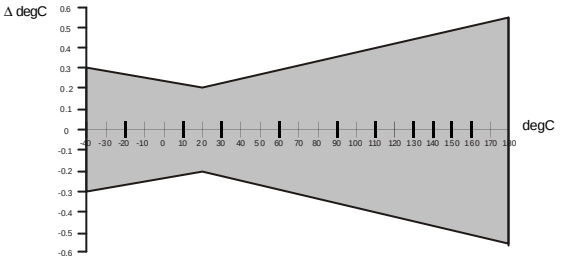
Relative humidity

Humidity sensor [1]	HC1000-400 or HC1000-400-HC01			
Working range [1]	0…100% RH			
Accuracy including hysteresis and non-linearity				
- Special calibration against certified standards	± 1% RH (0...90% RH)	± 2% RH (90...100% RH)		
- Standard calibration	± 2% RH (0...90% RH)	± 3% RH (90...100% RH)		
Temperature dependence of electronics	typ. ± 0,01% RH/degC			
Temperature dependence of sensing probe	typ. ± (0,002 + 0,0002 x RH [%]) x ΔT [degC]	ΔT = T - 20 degC		
Response time with metal grid filter at 20 degC / t_{90}	< 15s			

Temperature

Temperature sensor element	Pt1000 (Tolerance class A, DIN EN 60751)			
Working range sensing head	EE31-xAx	-40...60 degC (-40...140 °F)	EE31-xBx	-40...80 degC (-40...176°F)
	EE31-xDx	-40...180 degC (-40...356 °F)	EE31-xEx	-40...180 degC (-40...356°F)
	EE31-xFx	-40...60 degC (-40...140 °F)		

Accuracy (typ.)



Temperature dependence of electronics	typ. ± 0.005 degC/degC

Outputs [2]

Two freely selectable and scaleable analogue outputs	0 - 5V	-1mA < I_L < 1mA
0...100% RH / xx...yy degC respectively	0 - 10V	-1mA < I_L < 1mA
	4 - 20mA	R_L < 500 Ohm
	0 - 20mA	R_L < 500 Ohm
Serial interface	RS232C	
	RS485 optional	

Max. adjustable measurement range [2][3]

		from	up to			units
			EE31-A,F	*EE31-B*	*EE31-D,E*	
Humidity	RH	0	100	100	100	% RH
Temperature	T	-40	60	80	180	degC
Dew-point temperature	Td	-80	60	80	100	degC
Frost-point temperature	Tf	-80	0	0	0	degC
Wet-bulb temperature	Tw	0	60	80	100	degC
Water vapour partial pressure	e	0	200	500	1100	mbar
Mixture ratio	r	0	425	999	999	g/kg
Absolute humidity	dv	0	150	300	700	g/m³
Specific enthalpy	h	0	400	1000	2800	kJ/kg

General

Supply voltage	SELV 8...48V DC		
	SELV 12...35V AC		
Current consumption - 2x voltage output	for 24V DC/AC: typ. 40mA		
- 2x current output	typ. 80mA		
Pressure range for pressure tight probe	0,01...15bar		
System requirements for software	WINDOWS 98 or later; serial interface		
Housing / protection class	Plastic PC / IP65		
Cable gland	M16 x 1,5		
Electrical connection	screw terminals up to max. 1,5mm²		
Sensor protection	stainless steel sintered filter, PTFE filter or metal grid filter		
Operating temperature range of electronics	-40...+60 degC		
Working and storage temperature range Housing with display	-20...+50 degC		
Storage temperature range	-40...+60 degC		
Electromagnetic compatibility according to	EN61000-6-2 EN50081-1	EN61010-1	

[1] See Working range of the humidity sensor! [2] Can be easily changed by software. [3] See accuracy of computational functions.

Technical Data EE29

Measurement values

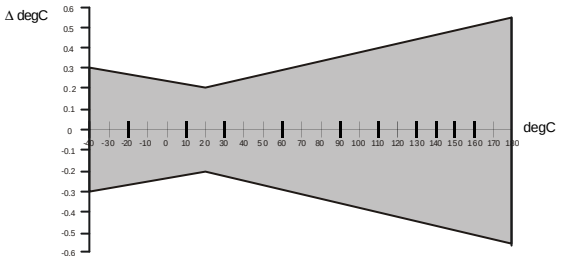
Relative humidity

Humidity sensor[1)]	HC1000-400 oder HC1000-400-HC01	
Working range[1)]	0...100% RH	
Accuracy including hysteresis and non-linearity		
- Special calibration against certified standards	± 1% RH (0...90% RH)	± 2% RH (90...100% RH)
- Standard calibration	± 2% RH (0...90% RH)	± 3% RH (90...100% RH)
Temperature dependence of electronics	typ. ± 0,01% RH/degC	
Temperature dependence of sensing probe	typ. ± (0,002 + 0,0002 x RH [%]) x ΔT [degC]	ΔT = T - 20 degC
Response time with metal grid filter at 20 degC / t_{90}	< 15s	

Temperature

Temperature sensor element	Pt1000 (Tolerance class A, DIN EN 60751)			
Working range sensing head	EE29-xAx	-40...60 degC (-40...140 °F)	EE29-xBx	-40...80 degC (-40...176°F)
	EE29-xDx	-40...180 degC (-40...356 °F)	EE29-xEx	-40...180 degC (-40...356°F)
	EE29-xFx	-40...60 degC (-40...140 °F)		

Accuracy (typ.)



Temperature dependence of electronics	typ. ± 0.005 degC/degC

Outputs [2)]

Two freely selectable and scaleable analogue outputs	0 - 5V	-1mA < I_L < 1mA
0...100% RH / xx...yy degC respectively	0 - 10V	-1mA < I_L < 1mA
	4 - 20mA	R_L < 500 Ohm
	0 - 20mA	R_L < 500 Ohm

General

Supply voltage	SELV 8...48V DC	
	SELV 12...35V AC	
Current consumption - 2x Voltage output	for 24V DC/AC: typ. 40mA	
- 2x Current output	typ. 80mA	
Pressure range for pressure tight sensor	0.01...15bar	
System requirements for software	WINDOWS 98 or later; serial interface	
Housing / protection class	Plastic PC / IP65	
Cable gland	M16 x 1.5	
Electrical connection	screw terminals up to max. 1.5mm²	
Sensor protection	stainless steel sintered filter, PTFE filter or metal grid filter	
Working temperature range of electronics	-40...+60 degC	
Working and storage temperature range		
Housing with display	-20...+50 degC	
Storage temperature range	-40...+60 degC	
Electromagnetic compatibility according to	EN61000-6-2	EN61010-1
	EN50081-1	

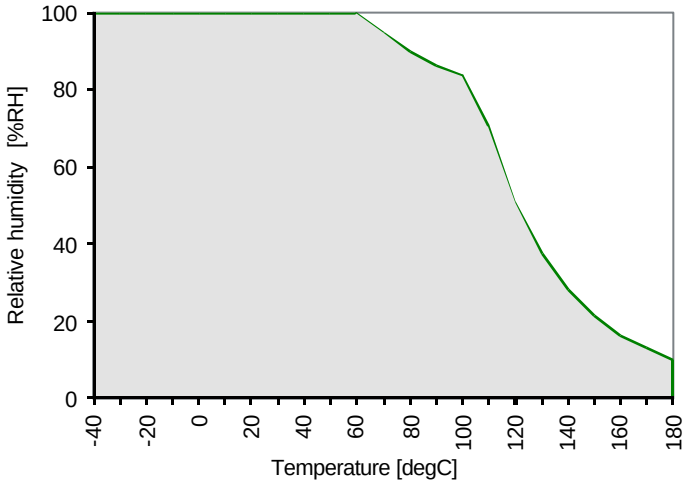
[1)] See working range of humidity sensor!

[2)] Can be easily changed by software.

Technical Data for Options EE29/EE31

Display	graphical LCD display (128x32 pixels), with integrated push-buttons for selecting parameters and MIN/MAX function			
Alarm outputs	2 x 1 switch contact 250V AC / 6A 28V DC / 6A			
Threshold + hysteresis	can be adjusted with configuration software			
Switching parameters	freely selectable between:		EE29	EE31
	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		✓

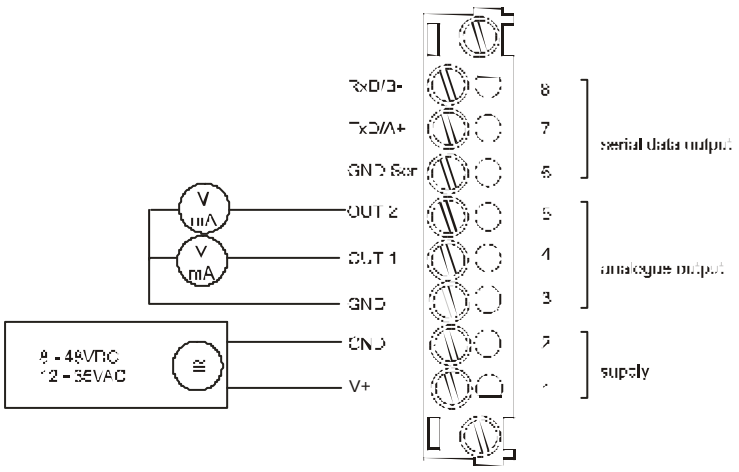
Operating range humidity sensor



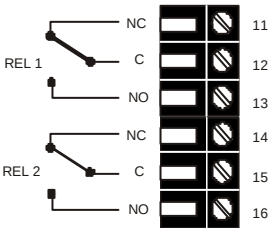
The gray area shows the allowed measurement range for the humidity sensor.

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

Connection diagram



Terminal configuration - Alarm output



Ordering Guide EE31

			EE31-PFT A	EE31-PFT B	EE31-PFT D	EE31-PFT E	EE31-PFT F
Hardware Configuration							
Filter	Stainless steel sintered filter	(3)	3	3	3	3	
	PTFE Filter	(5)	5	5	5		5
	Metal grid filter (up to 120 degC)	(6)	6	6	6		6
Cable length	2m	(02)			02	02	
	5m	(05)			05	05	
	10m	(10)			10	10	
	20m	(20)			20	20	
Probe length	50mm	(2)			2	2	
	200mm	(5)		5	5	5	
	400mm	(6)		6	6	6	
Pressure tight Feedthrough	1/2" male thread	(HA03)				HA03	
	1/2" Pipe weld joint	(HA05)				HA05	
	1/2" NPT thread	(HA07)				HA07	
Interface	RS232	(no Code)					
	RS485	(N)	N	N	N	N	N
Display	without display	(no Code)					
	with display	(D05)	D05	D05	D05	D05	D05
Alarm output	without relay	(no Code)					
	with relay	(SW)	SW	SW	SW	SW	SW
Plug	Cable thread	(no Code)					
	1 plug for power supply and outputs	(C03)	C03	C03	C03	C03	
	2 plugs for power supply/outputs and RS232	(C07)	C07	C07	C07	C07	
	2 plugs for power supply/outputs and RS485 Network	(C08)	C08	C08	C08	C08	
Sensing probe	fixed	(no Code)					
	interchangeable	(P01)			P01	P01	
Humidity sensor	HC1000-400	(no Code)					
	HC1000-400-HC01	(HC01)	HC01	HC01	HC01	HC01	HC01
Calibration	Standard	(no Code)					
	High-humidity calibration	(CA01)		CA01	CA01	CA01	

Software Configuration					
Physical parameters of outputs	Relative humidity	RH [%]	(A)	Output 1	Select according to Ordering Guide (A - H,J)
	Temperature	T [degC]	(B)		
	Dew-point temperature	Td [degC]	(C)	Output 2	Select according to Ordering Guide (A - H,J)
	Frost-point temperature	Tf [degC]	(D)		
	Wet-bulb temperature	Tw [degC]	(E)		
	Water vapour partial pres.	e [mbar]	(F)		
	Mixture ratio	r [g/kg]	(G)		
	Absolute humidity	dv [g/m³]	(H)		
	Specific enthalpy	h [kJ/kg]	(J)		
Type of output signals	0-5V		(2)		Select according to Ordering Guide (2,3,5,6)
	0-10V		(3)		
	0-20mA		(5)		
	4-20mA		(6)		
Measured value units	metric		(no Code)		
	not metric		(E01)		E01 E01 E01 E01 E01

Temperature range T	-40...60 degC (-40...140 °F)	(T02)	-20...100 degC (-4...212 °F)	(T14)	Output T Select according to Ordering Guide (T02 - T52)
Temperature range Td	-10...50 degC (14...122 °F)	(T03)	+20...100 degC (68...212 °F)	(T15)	
	0...50 degC (32...122 °F)	(T04)	0...120 degC (32...248 °F)	(T16)	Output Td Select according to Ordering Guide (Td02 - Td52)
	0...100 degC (32...212 °F)	(T05)	0...80 degC (32...176 °F)	(T21)	
	0...60 degC (32...140 °F)	(T07)	-40...80 degC (-40...176 °F)	(T22)	
	-30...70 degC (-22...158 °F)	(T08)	-20...80 degC (-4...176 °F)	(T24)	
	-30...120 degC (-22...248 °F)	(T09)	-40...160 degC (-40...320 °F)	(T33)	
	-20...120 degC (-4...248 °F)	(T10)	+20...140 degC (68...284 °F)	(T40)	
	-40...120 degC (-40...248 °F)	(T12)	-40...180 degC (-40...356 °F)	(T52)	

Order Example

EE31-PFTB55SW/BC2-T07-Td03

Humidity/Temperature Transmitter EE31 Series

Model:	duct mounting	Output 1:	T
Filter:	PTFE Filter	Output 2:	Td
Probe length:	200mm	Output signal:	0-5V
Alarm output:	yes	Temperature range T:	0...60 degC
		Temperature range Td:	-10...50 degC

Ordering Guide EE29

			EE29-PFT A	EE29-PFT B	EE29-PFT D	EE29-PFT E	EE29-PFT F
Hardware Configuration							
Filter	Stainless steel sintered filter	(3)	3	3	3	3	
	PTFE Filter	(5)	5	5	5		5
	Metal grid filter (up to 120 degC)	(6)	6	6	6		6
Cable length	2m	(02)			02	02	
	5m	(05)			05	05	
	10m	(10)			10	10	
	20m	(20)			20	20	
Probe length	50mm	(2)			2	2	
	200mm	(5)		5	5	5	
	400mm	(6)		6	6	6	
Pressure tight Feedthrough	1/2" male thread	(HA03)				HA03	
	1/2" Pipe weld joint	(HA05)				HA05	
	1/2" NPT thread	(HA07)				HA07	
Display	witout display	(no Code)					
	with display	(D05)	D05	D05	D05	D05	D05
Alarm output	without relay	(no Code)					
	with relay	(SW)	SW	SW	SW	SW	SW
Plug	Cable threadings	(no Code)					
	1 plug for power supply and outputs	(C03)	C03	C03	C03	C03	
Sensing probe	fixed	(no Code)					
	interchangeable	(P01)			P01	P01	
Humidity sensor	HC1000-400	(no Code)					
	HC1000-400-HC01	(HC01)	HC01	HC01	HC01	HC01	HC01
Calibration	Standard	(no Code)					
	High-humidity calibration	(CA01)	CA01	CA01	CA01	CA01	CA01
Software Configuration							
Physical parameters of outputs	Relative humidity	RH [%] (A)	Output 1	Select according to Ordering Guide (A or B)			
	Temperature	T [degC] (B)	Output 2	Select according to Ordering Guide (A or B)			
Type of output signals	0-5V	(2)		Select according to Ordering Guide (2,3,5,6)			
	0-10V	(3)					
	0-20mA	(5)					
	4-20mA	(6)					
Measured value units	metric	(no Code)					
	not metric	(E01)		E01	E01	E01	E01	E01
Temperature range T	-40...60 degC (-40...140 °F) (T02)	-20...100 degC (-4...212 °F) (T14)	Output T	Select according to Ordering Guide (T02 - T52)			
	-10...50 degC (14...122 °F) (T03)	+20...100 degC (68...212 °F) (T15)					
	0...50 degC (32...122 °F) (T04)	0...120 degC (32...248 °F) (T16)					
	0...100 degC (32...212 °F) (T05)	0...80 degC (32...176 °F) (T21)					
	0...60 degC (32...140 °F) (T07)	-40...80 degC (-40...176 °F) (T22)					
	-30...70 degC (-22...158 °F) (T08)	-20...80 degC (-4...176 °F) (T24)					
	-30...120 degC (-22...248 °F) (T09)	-40...160 degC (-40...320 °F) (T33)					
	-20...120 degC (-4...248 °F) (T10)	+20...140 degC (68...284 °F) (T40)					
	-40...120 degC (-40...248 °F) (T12)	-40...180 degC (-40...356 °F) (T52)					

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

- Filter caps
- Display
- Replacement sensor
- Humidity sensor
- Interface cable
- Mounting flange
- Bracket for installation onto mounting rails
- Drip water protection
- 1% Calibration
- Calibration set
- Datalogging and analysis software