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SERIES EE28 / EE 30

HUMIDITY/TEMPERATURE TRANSMITTER FOR INDUSTRIAL APPLICATIONS

EE28 and EE30 transmitters from E + E Elektronik are designed for the accurate measurement of humidity and temperature in a wide range of industrial applications.

E + E have combined modern microprocessor technology with a long experience of humidity sensor elements to produce this multifunctional transmitter series. Various different mechanic and electronic versions are available with a number of useful options to enable optimal adjustment to nearly every practical application in the field of industrial and climate control.

The EE28 and EE30 transmitter range enables measurements between 0...100 %RH and between -40...+180 degC (-40...356 degF). Full temperature compensation allows exceptional accuracy of measurement.

The core component for this highly accurate and reliable transmitter is the E + E capacitive humidity sensor element. This HC series element offers excellent long term stability, very low hysteresis, and high chemical resistance. These product characteristics have been proven during countless practical operations.

The measurement values for humidity and temperature are available as analogue output signals. You can choose between 4 to 20mA or any voltage signal between 0 to 10V with the possibility of setting the scale according to specific requirements. This flexibility is provided by the practical operation of modern microprocessor technology. Choosing the kind of output signal and scaling is done by means of the RS 232 serial interface.

Communication via PC is assisted by a very user friendly graphic software, running under MS Windows™. Therefore later changes of original factory settings are simple to carry out.

The transmitters are available with housings for wall or duct mounting applications, as well as with remote sensor probe on a flying lead up to 10 meters in length. This useful feature is for installation in small spaces or for high temperature applications, where the housing has to be mounted apart from the measuring points.

To meet the needs of hard industrial usage, the series EE28 and EE30 is also available with a robust and attractive aluminium housing. For common industrial and semi - industrial solutions it should be convenient to use the light plastic housing.

Additionally the transmitters can be supplied with a local LC-display on the housing cover, which shows the actual measurement readings.

07/1999 Technical data are subject to change



MAIN FEATURES

- Highest accuracy up to 180 degC
- Dew point and absolute humidity (only EE30)
- Free selectability and free scale
- Robust and attractively designed housing
- Humidity sensor interchangeable
- Separated sensor head with cable length up to 10 m

Additional functions for SERIES EE30:

As well as standard measurement of humidity and temperature, the transmitter EE30 offers the following additional calculated variables:

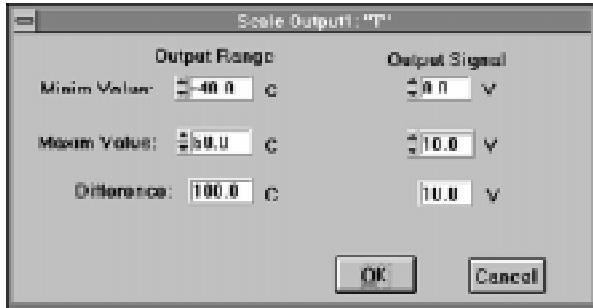
dew point temperature, frost point temperature, wet bulb temperature, water vapour pressure, mixing ratio, absolute humidity and specific enthalpy.

For further software processing the measured values are available on the serial RS 232 output.

SOFTWARE DESCRIPTION

All EE28 and EE30 transmitters are equipped with user friendly software, running under MS WINDOWS™. Through clear and menu controlled graphics, users have the possibility of individual transmitter configuration, of monitoring and recording measurement data, and of easy service functions.

It is also possible to communicate directly with the transmitter via standard terminal software to integrate the EE28/30 into free memory programmed controls. All digital data to and from the transmitter is transferred via an RS232 C serial interface.



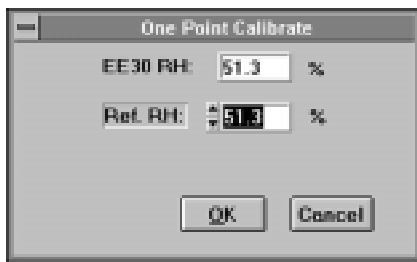
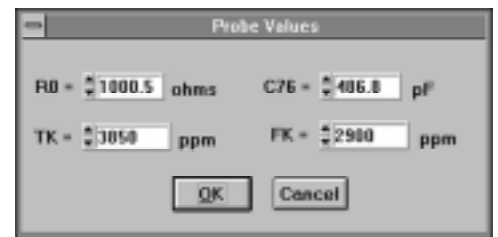
Freely selectable and scalable outputs

The User has a free choice of allocating the measuring value on the two analogue outputs. Output range and output signal are freely scalable and selectable. The measuring interval is individually adjustable.

Sensor exchange

Humidity sensors as well as temperature sensors are simply interchangeable. If a sensor element is damaged it is possible to order replacement sensors from the manufacturer. The electronic device is easily adjusted via software, through direct input of the delivered sensor data.

Expensive and time consuming transmitter returns are therefore unnecessary.



Calibration

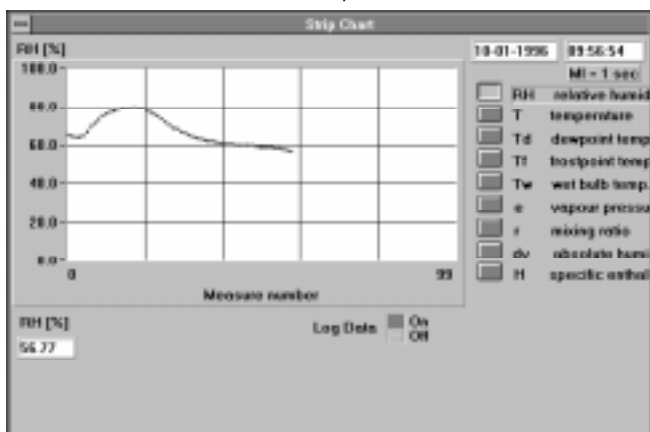
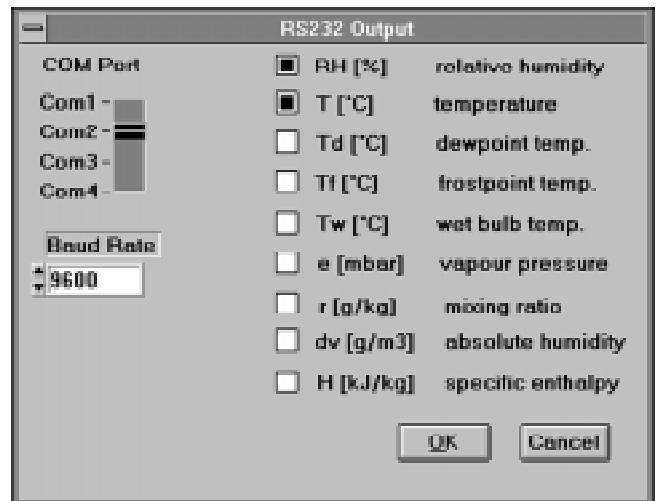
The EE28/30 software provides an one-point calibration procedure for relative humidity and temperature. On request the transmitters can be easily adjusted through a simple program step. For humidity calibration we offer a reliable reference calibration set. (see accessories)

Calculated variables (only for EE30)

Using the two measured values of relative humidity and temperature, the EE30 is able to calculate the following additional variables.

- dew point temperature Td
- frost point temperature Tf
- wet bulb temperature Tw
- water vapour pressure e
- mixing ratio r
- absolute humidity dv
- specific enthalpy H

The calculation functions are displayd on the analogue outputs as well as on the RS 232C serial output.



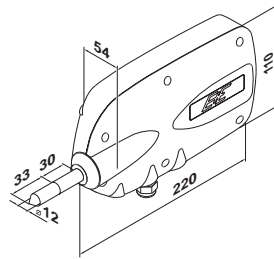
Display functions for measuring value (only for EE30)

Actual measuring values can be displayed on-line on the computer screen. The values can be described in a strip chart or in the form of a continuous output list.

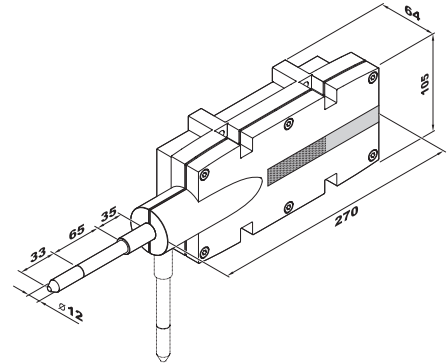
Via Data-logging function measuring values can be stored in an ASCII code format on diskette or hard disk. They can be read and processed by almost all standard software programmes. (e.g. Excel, Lotus 123, Quattro Pro, etc.)

DIFFERENT MODELS

WALL MOUNTING APPLICATIONS

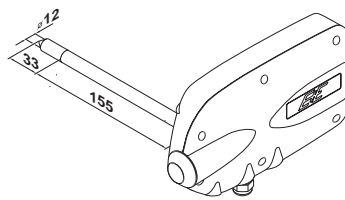


EE301 AND EE28-xAx

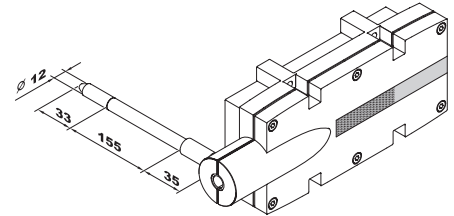


working temperature range-sensor probe: -40 ... +60 degC (-40 ... 140 °F)

DUCT MOUNTING APPLICATIONS

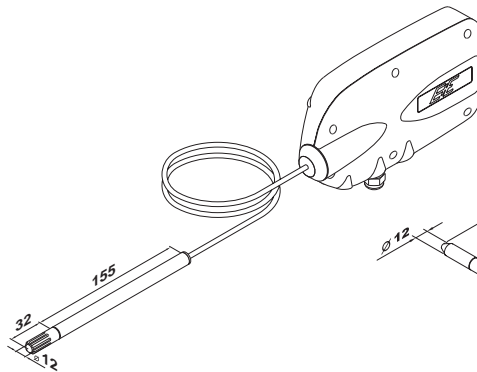


EE302 AND EE28-xBx

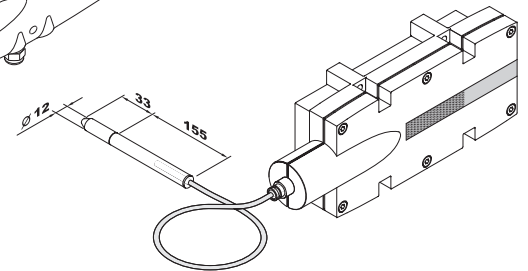


working temperature range-sensor probe: -40 ... +80 degC (-40 ... 176 °F)

MEASURING IN SMALL SPACES

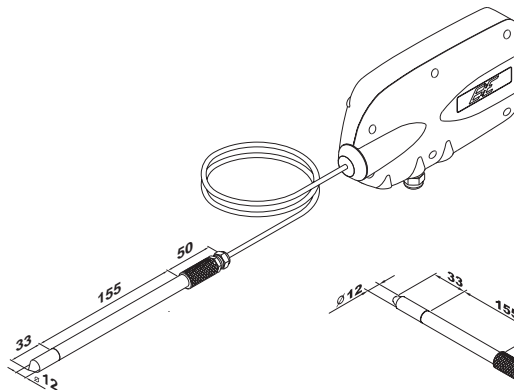
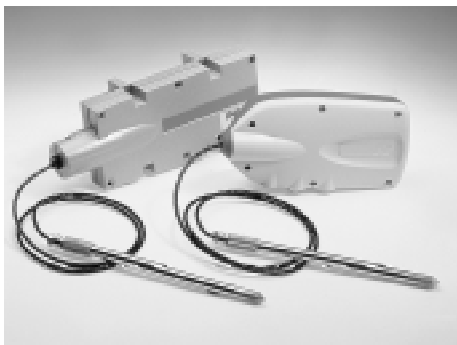


EE303 AND EE28-xCx

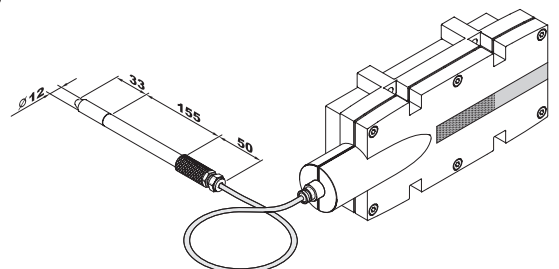


working temperature range-sensor probe: -40 ... +120 degC (-40 ... 248 °F)

HIGH TEMPERATURE APPLICATIONS




EE304 AND EE28-xDx



working temperature range-sensor probe: -40 ... +180 degC (-40 ... 356 °F)

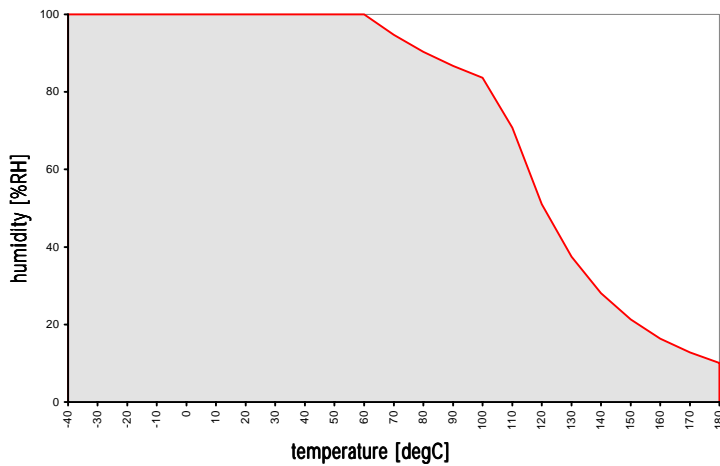
TECHNICAL DATA

Working range humidity ¹⁾	0...100 % RH		
Accuracy humidity incl. hysteresis and nonlinearity with calibration against certificated standards standard calibration	± 1% RH (0...90% RH) ± 2% RH (0...90% RH)	± 2% RH (90...100% RH) ± 3% RH (90...100% RH)	
Temperature dependance electronics, humidity	typical 0.06 %RH/degC		
Temperature dependance sensor probe, humidity	< 0.03 % RH/degC		
Response time with filter at 20 degC / t90	< 30 sec.		
Response time without filter at 20 degC / t90	< 10 sec.		
Working range temperature	-40..60 (80,120, 180) degC -40..140 (176, 248, 356) °F according to type of sensor probe		
Temperature sensor element	Pt 1000 (DIN EN 60751, Class A)		
Accuracy temperature, electronics	typical ± 0.1 degC		
Temperature dependance of electronics, temperature	typical 0.005 degC/degC		
Two freely selectable and scalable outputs 0...100 %RH / -40...60 (80, 120, 180) degC analogue	0 - 5 V 0 - 10 V 4 - 20 mA	< 1.0 mA < 1.0 mA R _L < 400 Ohm	
Supply voltage	SELV 24 VDC/VAC ± 15%		
Optional power supply unit	100 - 260 VAC / 50-60 Hz max. (only for metal housing)		
Current consumption	- two voltage outputs - two current outputs	for SELV: typ. 60 mA typ. 100 mA	for mains supply: typ. 25 mA typ. 25 mA
System requirements for communication-software	IBM compatible AT, 386/33 MHz or higher (with Coprocessor), appr. 5 MB free hard disk memory, 4 MB RAM, 3.5 " disk drive, serial interface, mouse (recommended), MS WINDOWS 3.1 or higher		
Serial bus type for PC communication	RS 232C		
Housing	cast aluminium or ABS-plastic / IP65		
Cable socket	PG 7 or PG 9; for cable diameter 5 - 9 mm		
Connection	screw terminals max. 1.5 mm ²		
Sensor protection	sintered stainless steel filter, PTFE filter or metal grid filter		
Working temperature range, electronics	-40 ... +60 degC (-40 ... 140 °F)		
Storage temperature range	-30 ... +60 degC (-22 ... 140 °F)		
Working and storage temperature range, housing with display	0 ... +40 degC (32 ... 104 °F)		
Electromagnetic compatibility according	EN50081-2 EN50082-2	EN50081-1 EN50082-1	

Additional functions for EE30

Serial output	RS 232C					
Calculation functions		from		to		unit
			EE301	EE302	EE303 / 304	
dew point temperature	Td	-80 (-112)	60 (140)	80 (176)	100 (212)	degC (°F)
frost point temperature	Tf	-80 (-112)	0 (32)	0 (32)	0 (32)	degC (°F)
wet bulb temperature	Tw	0 (32)	60 (140)	80 (176)	100 (212)	degC (°F)
water vapour 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)
absolut humidity	dv	0 (0)	150 (60)	300 (150)	700 (300)	g/m ³ (gr/ft ³)
specific enthalpy	H	-50 (-15000)	400 (150000)	1000 (350000)	2800 (999999)	kJ/kg (lbf/lb)

1) WORKING RANGE HUMIDITY SENSOR



The allowed working range for the humidity sensor element is shown in terms of humidity/temperature limits.

Although the sensors don't tend to deteriorate under harm conditions, basic data can only be specified within the limits for the working range.

TYPICAL MEASURED VALUES AT 10 degC, 40 degC AND 70 degC

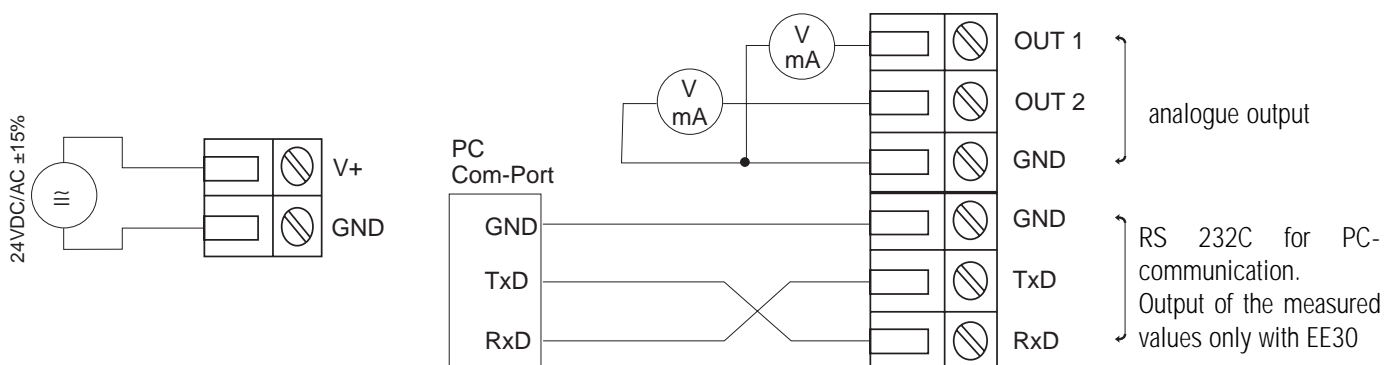
The following results illustrate the high measuring accuracy even at high temperatures. The excellent reproduction of the sensor characteristics are the basis for such outstanding measuring results.

check point		deviation of the display from the refenc value
Temperature in degC	rel. humidity in %	rel. humidity in %
10	10	0,9
	40	-0,5
	70	-0,8
	95	-0,1
	40	1,1
40	10	0,4
	40	-0,6
	70	-0,8
	95	0,1
70	10	-0,1
	40	-1,0
	70	-0,6
	90	0,8
	40	0,2

source of data: Physikalisch-Technische Bundesanstalt (PTB)

test product: EE304

CONNECTING DIAGRAMM



ACCESSORIES

DIGITAL DISPLAY

The EE28/30 transmitters are available with a local display on the housing cover. With this interesting feature you have the possibility to display on-line the current measured values.



POWER SUPPLY UNIT

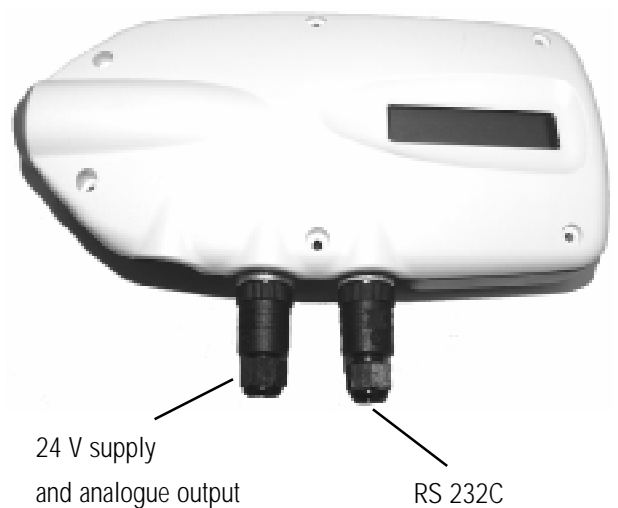
To connect directly to the common electric supply line the transmitters can be fitted with an integrated power supply unit. Supply voltages between 100 V and 260 V AC are possible. (only available for metal housing)



An external 230 V AC / 18 V DC power supply unit is available for plastic housings.

CONNECTION PLUG

The EE28/30 series is available with two connection plugs, which are of advantage for quick and easy connections.(e.g. for applications, which are difficult to get to or for laboratory employment)



DUST FILTER CAPS



To protect the active surface of the humidity sensor from undue pollution, the sensor probes can be fitted with various dust filter caps, depending on the application.

Sintered stainless steel filter: for industrial, agricultural and food applications, aggressive media, mechanical and thermal stress; working range up to 180 degC

PTFE filter: in chemical aggressive environment; working range up to 180°C

metal grid filter: for high humidity and danger of saturation; working range up to 120 degC

MOUNTING DEVICE

For simple duct fixing we recommend the use of our stainless steel mounting devices.

The main features are as follows:

- penetration depth infinitely adjustable
- easiest mounting
- sealing of measuring chamber



CALIBRATION SET



To check and possibly adjust the transmitter series EE28/30, we offer user friendly calibration equipment.

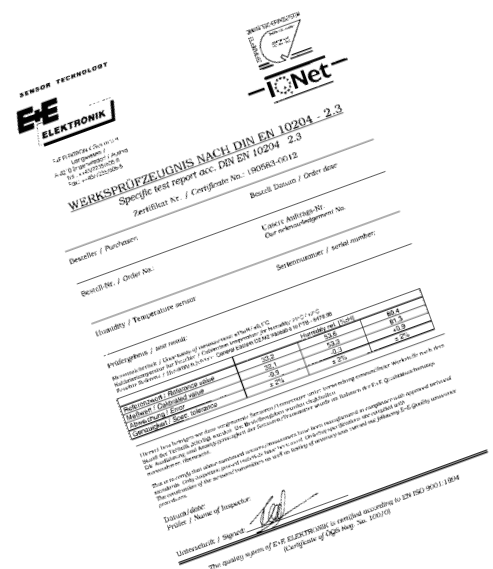
The calibration devices are carefully designed for specific use with the EE28/30 probe, to allow accurate and reliable calibration without influence from the surrounding air.

Non saturated liquid lithium-chloride solutions serve as the standards. These are available in sets of five ampoules, which may be stored for an indefinite length of time.

CALIBRATION CERTIFICATE

Based on the high measuring accuracy the EE28/30 series is suitable as reference device.

To meet the high demands regarding monitored measuring instruments, it is possible to order our series EE28/30 either with works certificate according DIN EN 10204 - 2.3 as well as with an official PTB calibration certificate.



ORDER INFORMATION

CODE FOR SERIES EE30

CODE 1	MODEL	
EE301	wall mounting	up to 60 degC (140 °F)
EE302	duct mounting	up to 80 degC (176 °F)
EE303	separated sensor probe	up to 120 degC (248 °F)
EE304	separated sensor probe	up to 180 degC (356 °F)
CODE 2	HOUSING TYPE	
P	plastic housing	
M	metal housing	
CODE 3	FILTER CAP	
3	sintered stainless steel filter	
5	PTFE filter	
6	metal grid filter	
CODE 4	CABLE LENGTH FOR SEPARATED SENSOR PROBE (only for EE303 and EE304)	
02	2m	
05	5m	
10	10m	
CODE 5	PROBE LENGTH	
no Code	standard length according drawing	
xxx	others in mm (on request)	

CODE FOR SOFTWARE SETTINGS

CODE 1	SETTING FOR OUTPUT 1									
A	relative humidity	RH	[%]	[%]	F	water vapour pressure	e	[mbar]	[psi]	
B	temperature	T	[degC]	[°F]	G	mixing ratio	r	[g/kg]	[gr/lb]	
C	dew point temperature	Td	[degC]	[°F]	H	absolute humidity	dv	[g/m³]	[gr/ft³]	
D	frost point temperature	Tf	[degC]	[°F]	J	specific enthalpy	H	[kJ/kg]	[lbf/lb]	
E	wet bulb temperature	Tw	[degC]	[°F]						
CODE 2	SETTING FOR OUTPUT 2									
acc. CODE 1										
CODE 3	OUTPUT 1									
2	0 - 5 V									
3	0 - 10 V									
6	4 - 20 mA									
CODE 4	OUTPUT 2									
acc. CODE 3										
CODE 5	UNIT of the measured values									
no Code	metric (SI-units)									
E01	no metric									
CODE 6	RANGES FOR TEMPERATURE OUTPUT									
no Code	standard -40...60 (80, 120, 180 degC)[-40...140 (176, 248, 356 °F)]									
T07	0 ... 60 degC		(32 ... 140 °F)							
T08	-30 ... 70 degC		(-22 ... 158 °F)							
T09	-30 ... 120 degC		(-22 ... 248 °F)							
T10	-20 ... 120 degC		(-4 ... 248 °F)							
Txx	others on request									

Order example: EE304-P305/CB36: humidity/temperature transmitter series EE30: Model = 304; P = plastic housing; 3 = sintered stainless steel filter; 05 = 5 m cable length; no Code = probe length: 155 mm; SOFTWARE SETTINGS: C = SETTING FOR OUTPUT 1: dew point temperature; B = SETTING FOR OUTPUT 2: temperature; 3 = OUTPUT1: 0-10 V; 6 = OUTPUT 2: 4-20 mA; metric units; range for temperature output: -40 to +180degC

EE28	CODE 1	HOUSING
	P	plastic housing
	M	metal housing
	CODE 2	MODEL
	A	wall mounting up to 60 degC (140 °F)
	B	duct mounting up to 80 degC (176 °F)
	C	separated sensor probe up to 120 degC (248 °F)
	D	separated sensor probe up to 180 degC (356 °F)
	CODE 3	FILTER
	3	sintered stainless steel filter
	5	PTFE-filter
	6	metal grid filter
	CODE 4	CABLE LENGTH (only for model C and D)
	02	2m
	05	5m
	10	10m
	CODE 5	PROBE LENGTH
	no Code	standard length according drawing
	xxx	others (on request)

CODE 1	OUTPUT 1
2	0 - 5 V
3	0 - 10 V
6	4 - 20 mA
CODE 2	OUTPUT 2
acc. CODE 1	
CODE 3	UNIT of the measured values
no Code	metric (SI-units)
E01	no metric
CODE 4	RANGES FOR TEMPERATURE OUTPUT
no Code	standard output -40...60 (80, 120, 180 degC) [-40...140 (176, 248, 356 °F)]
T07	0 ... 60 degC (32 ... 140 °F)
T08	-30 ... 70 degC (-22 ... 158 °F)
T09	-30 ... 120 degC (-22 ... 248 °F)
T10	-20 ... 120 degC (-4 ... 248 °F)
Txx	others on request

Order example: EE28-PA6/66-T07: humidity/temperature transmitter, plastic housing, wall mounting, metal grid filter, probe length standard 30 mm / output1: 4-20 mA, output2: 4-20 mA, metric units, temperature output 0 to 60 degC

ORDER INFORMATION

	CODE
sintered stainless steel filter	HA 01 01 03
PTFE-filter	HA 01 01 05
metal grid filter	HA 01 01 06
RS 232 interface cable	HA 01 03 01
stainless steel mounting flange	HA 01 02 01
protection cap for sensor probe	S01
2 pcs. connection plugs	C03
LC-Display	D01
power supply unit 100-260 V AC for metal housing	V01
external power supply	V02

	CODE
calibration device (without humidity standards)	HA 01 04 01
humidity standards 10 % RH	HA 01 04 10
humidity standards 35 % RH	HA 01 04 35
humidity standards 50 % RH	HA 01 04 50
humidity standards 80 % RH	HA 01 04 80
humidity standards 95 % RH	HA 01 04 95
specific test report acc. DIN EN 10204 - 2.3	HA 01 06 01
PTB - Calibration certificate	HA 01 06 02
replacement humidity sensor	FE 10
replacement temperature sensor	TE 38



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