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# + Datasheet EE240

Wireless Sensor Network for  
Humidity, Temperature and CO<sub>2</sub>



# EE240

## Wireless Sensor Network for Humidity, Temperature and CO<sub>2</sub>

The EE240 wireless sensor network is based on the IEEE 802.15.4 radio standard for energy-efficient communication and is ideal for both building automation and industrial process control. The use of the Zigbee protocol enables star and tree topologies. The network is self-configuring and self-healing, properties that increase the scalability and reliability of data transmission. It stands out by the usual reliable E+E sensor technology, high data transmission security and easy maintenance.

An EE240 network consists of an EE242 base station, up to 50 transmitters / routers and up to 500 wireless transmitters with a total maximum of 2 000 measured values: relative humidity (RH), dew point temperature (Td), temperature (T) and carbon dioxide (CO<sub>2</sub>).

### EE242 Base Station

The EE242 base station controls the entire network. It receives information from all the wireless transmitters and routers and supplies the measured data via Ethernet / Modbus TCP, Ethernet / JSON and RS485 / Modbus RTU. Four measurands can be assigned to the voltage or current analogue outputs. The measured data as well as status information is available also on the optional display.

### EE244 Modular Transmitter / Router

The EE244 transmitters and routers feature an IP65/NEMA 4X enclosure and an optional display. The antenna can be connected either directly into the EE244 enclosure or located remote with an optional 2 m (6.6 ft) cable. With an optional adapter, the devices can be mounted on DIN rails.

Depending on its version, the EE244 transmitter accommodates up to 3 sensing probes for RH and T and can be powered by an external power supply adapter or/and by batteries. The EE244 router accommodates up to 2 sensing probes and requires external power supply.



EE242 base station

EE244 transmitter / router

**Sensing Probes for EE244**

The probes (EE07 for RH/T or T only) feature M12 connectors and are interchangeable. They can be plugged directly into the EE244 enclosure or located remotely using a cable of up to 10 m (33 ft) length.

**EE245 Modular Room Transmitter**

The EE245 is designed for indoor use and measures any combination of CO<sub>2</sub>, RH and T. It features an elegant enclosure, optional display and can be powered with batteries or with an external power supply adapter.

The snap-on enclosure with entire electronics located in the front cover simplifies installation and maintenance. The back cover, which contains just the screw terminals, can be mounted and wired without the front cover, thus avoiding the exposure of the electronics to construction site pollution.



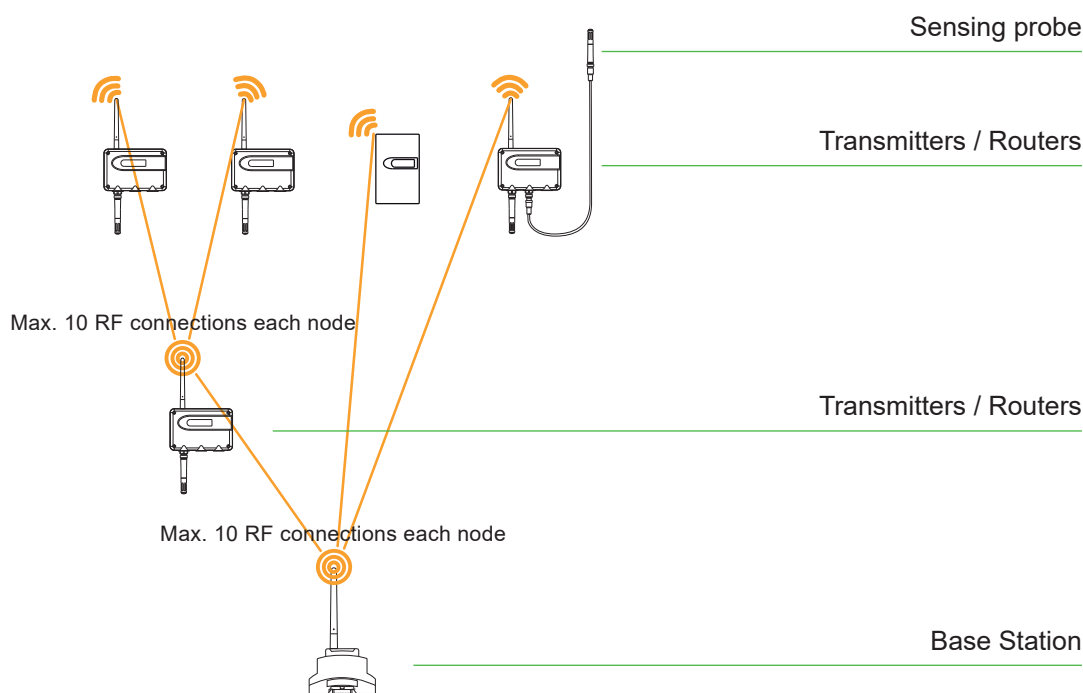
Sensing probes for EE244



EE245 room transmitter

# Features

- Operates worldwide on license free 2.4 GHz frequency band
- Typical transmission range of 60 m (197 ft) inside buildings and 1 000 m (3 300 ft) in the open field
- Stable network and reliable data transmission
- AES-128 encryption provides highest data security
- Webserver in the base station facilitates wireless network setup as well as remote access, diagnosis and maintenance via web browser
- Reference probes for check of EE244 and for loop calibration available
- Interchangeable RH/T sensing probes for EE244 can be plugged directly or installed remotely up to 10 m (33 ft)
- Pluggable, interchangeable CO<sub>2</sub> and RH sensing modules for EE245
- CO<sub>2</sub> measurement employs dual wavelength non-dispersive infrared (NDIR) technology
- Proprietary E+E coating protects the RH sensing elements against dust, dirt and corrosive deposits



RF coverage: up to 60 m within buildings / up to 1 000 m free field (without obstacles)

## Operation of Parallel EE240 Sensor Networks with Overlapping Radio Ranges

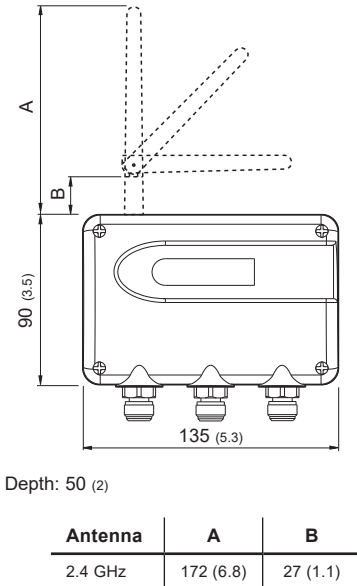
All devices are linked directly or indirectly to a EE242 base station. If there are two or more networks installed in the same location, their transmission ranges may overlap. In such cases, stable operation requires a logical network separation by individually encoding all devices of each network, refer to ordering code NC. Please contact your E+E representative for assistance and network structure clarification.

# Dimensions

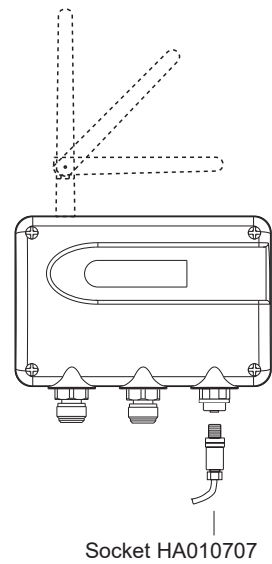
Values in mm (inch)

## Transmitter / Router

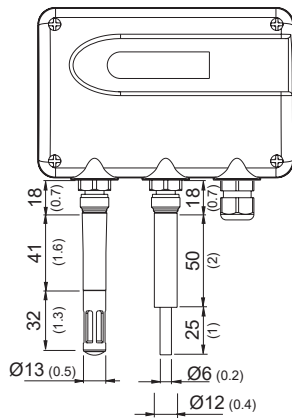
EE244-AF6NP3 enclosure dimensions



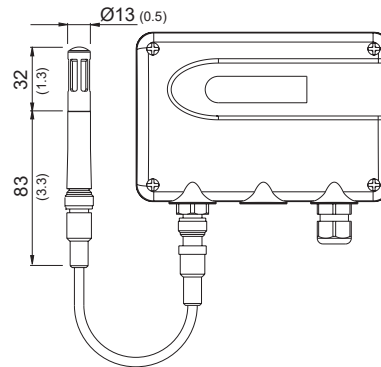
EE244-AFx9NP2



EE244 with plugged probes



EE244 with remote probe



## Sensing probes for EE244

Refer to the respective data sheet for details

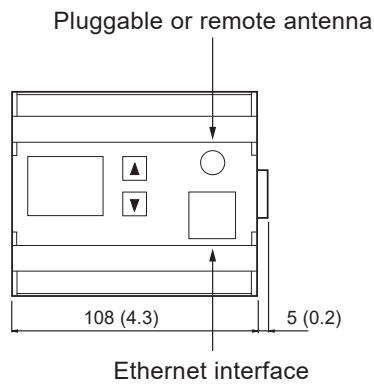
EE07 Humidity and Temperature Probe with Digital Output: [www.epluse.com/ee07](http://www.epluse.com/ee07)

# Dimensions

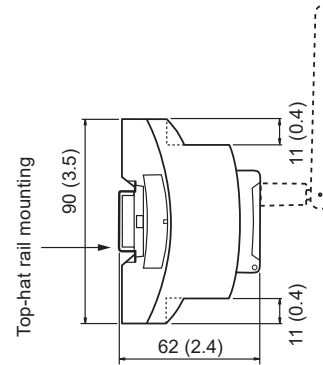
Values in mm (inch)

## Base station

EE242 - front view

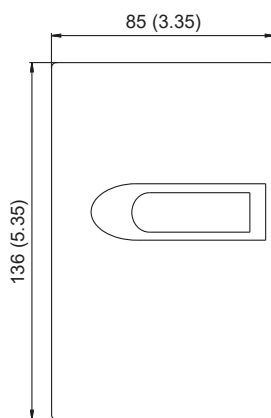


EE242 - side view

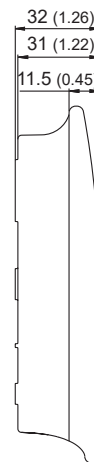


## Room transmitter

EE245 - front view




EE245 - side view




# Technical Data

## EE242 Base Station

Digital interface / protocol	Ethernet / Modbus TCP or JSON RS485 / Modbus RTU / ASCII
Analogue outputs	0 - 5 V                      -1 < I <sub>L</sub> < 1 mA 0 - 10 V                     -1 < I <sub>L</sub> < 1 mA 0 - 20 mA / 4 - 20 mA    R <sub>L</sub> < 500 Ω  I <sub>L</sub> = load current R <sub>L</sub> = load resistance
Number of analogue outputs	4
Accuracy of analogue outputs	±5 mV resp. ±10 µA
Temperature dependence of analogue outputs, max.	0.1 $\frac{mV}{^{\circ}C}$ resp. 1 $\frac{\mu A}{^{\circ}C}$
Resolution of analogue outputs	0.7 mV resp. 1.5 µA
Temperature range operation and storage With display Without display	-20...+50 °C (-4...122°F) -30...+50 °C (-22...122°F)
Power supply class III  USA & Canada: Class 2 supply necessary	24 V AC/DC ±20%
Electrical connection	Screw terminals max. 2.5 mm <sup>2</sup>
Current consumption typ. max.	I <sub>L</sub> = 150 mA at 24 V DC I <sub>L</sub> = 180 mA at 24 V DC
Enclosure  Material Protection rating	Polycarbonate (PC) IP20

## EE244 Transmitter and Router

Max. number of sensing probes <sup>1)</sup> Battery powered External supply	3 2
Max. number of measurands Battery powered External supply	6 4
Temperature range operation and storage With display Without display	-20...+50 °C (-4...122 °F) with display -40...+50 °C (-40...122 °F)
Working temperature range of probes	Refer to data sheet of respective probe
Battery supply with EE244-AF6x	4x1.5 V AA <sup>2)</sup> (not in the scope of supply)
External supply with EE244-AFx9x <sup>3)</sup> class III  USA & Canada: Class 2 supply necessary	8 - 28 V DC
Current consumption with external supply typ. max.	I <sub>L</sub> = 20 mA at 24 V DC I <sub>L</sub> = 35 mA at 24 V DC
Enclosure  Material Protection rating	Polycarbonate (PC) IP65/NEMA 4X


1) For technical data of sensing probes, please refer to [www.epluse.com/ee07](http://www.epluse.com/ee07).

2) Battery lifetime >1 year with a measuring data transmission every 5 min (for RH/T).

3) Choice between batteries and external power supply via jumper on the electronics board for EE244-AF6E9x possible.


# Technical Data

## EE245 Room Transmitter

<b>Accuracy</b>  <div style="margin-left: 40px;"> <b>Temperature</b>                      @ 20 °C (68 °F)                      @ 20...55°C (68...131 °F)                 </div> <div style="margin-left: 40px;"> <b>Relative humidity</b>                      @ 23 °C (73 °F)                      30...70 %                      70...90 %                 </div> <div style="margin-left: 40px;"> <b>CO<sub>2</sub></b>                      @ 25 °C and 1013 mbar (77 °F and 14.7 psi)                      2 000 ppm                      5 000 ppm                 </div>	±0,3 °C (0.54 °F) ±0,4 °C (0.72 °F)  ±3 % ±5 %  < ±50 ppm + 2 % of m.v. < ±50 ppm + 3 % of m.v.
	m.v. = measured value
<b>Antenna</b>	Internal
<b>Operation and storage conditions</b>	-5...+55 °C (23...131°F) / 0...90 %RH (non-condensing)
<b>Battery supply</b>	4x1.5 V AA <sup>1)</sup> (not in the scope of supply)
<b>External power supply class III</b>  USA & Canada: Class 2 supply necessary	8 - 28 V DC / 12 V AC (±20 %)
<b>Electrical connection</b>	Screw terminals 1.5 mm <sup>2</sup>
<b>Enclosure</b>	<div style="margin-left: 40px;"> <b>Material</b>                          Polycarbonate (PC)                     </div> <div style="margin-left: 40px;"> <b>Protection rating</b>                          IP30                     </div>

1) Choice between batteries and external power supply via jumper on the electronics board for EE244-AF6E9x possible

## General

<b>Transmission frequency</b>	2.4 GHz
<b>Transmission standard</b>	IEEE 802.15.4
<b>Transmission power</b>	8 dBm
<b>Transmission range</b>	Up to 60 m (197 ft) indoors, up to 1 000 m (3 300 ft) in open field
<b>Approval</b>	ETSI / FCC Part 15.247 / IC
<b>Electromagnetic compatibility</b>	EN 61326-1      EN 61326-2-3      Industrial environment FCC Part15 ClassA      ICES-003 ClassA
<b>Conformity</b>	



# Ordering Guide

## Base Station

Feature	Description	Code	
HW configuration		<b>EE242-</b>	
	Output	0 - 5 V	<b>A2</b>
		0 - 10 V	<b>A3</b>
		0 - 20 mA	<b>A5</b>
		4 - 20 mA	<b>A6</b>
	Display	Without display	<b>No code</b>
Display with backlight		<b>D2</b>	
Network configuration (device encoding)	None	<b>NC0</b>	
	Encoded networks <sup>1)</sup>	<b>NC1</b>	
SW configuration	Output 1 measurand	Relative humidity RH [%]	<b>No code</b>
		Other measurand ( <i>xx</i> see measurand code below)	<b>MAxx</b>
	Output 1 scaling low	0	<b>No code</b>
		Value	<b>SALValue</b>
	Output 1 scaling high	100	<b>No code</b>
		Value	<b>SAHValue</b>
	Output 2 measurand	Temperature [°C]	<b>No code</b>
		Temperature [°F]	<b>MB2</b>
		Other measurand ( <i>xx</i> see measurand code below)	<b>MBxx</b>
	Output 2 scaling low	Value	<b>SBLValue</b>
	Output 2 scaling high	Value	<b>SBHValue</b>
	Output 3 measurand	Dew point temperature Td [°C]	<b>No code</b>
		Dew point temperature Td [°F]	<b>MC53</b>
		Other measurand ( <i>xx</i> see measurand code below)	<b>MCxx</b>
	Output 3 scaling low	Value	<b>SCLValue</b>
	Output 3 scaling high	Value	<b>SCHValue</b>
Output 4 measurand	CO <sub>2</sub> [ppm]	<b>No code</b>	
	Other measurand ( <i>xx</i> see measurand code below)	<b>MDxx</b>	
Output 4 scaling low	Value	<b>SDLValue</b>	
Output 4 scaling high	Value	<b>SDHValue</b>	

1) For parallel operated networks with overlapping transmission ranges.  
 The devices will come configured with their network ID. Each network gets its own ID, information about the network structure is necessary at the time of ordering. Please contact your E+E representative for assistance and clarification.

## Measurand Code for Output 1 and 2 in the Ordering Guide

Measurand	Unit	Code	
		<b>MAxx / MBxx / MCxx / MDxx</b>	
Temperature	T	°C	<b>1</b>
		°F	<b>2</b>
Relative humidity	RH	%	<b>10</b>
Dew point temperature	Td	°C	<b>52</b>
		°F	<b>53</b>
CO <sub>2</sub>	ppm	<b>30</b>	



Please note:  
 No mix of metric/non-metric units allowed.

# Ordering Guide

## Transmitter / Router

Feature	Description	Code			
HW configuration		EE244-			
	Function	Transmitter	AF6		
		Router		AF7	
	Electrical connection	Without (battery powered only)	No code		
		M12 plug for external power supply		E9 <sup>1)</sup>	E9
	Number of probes	0			NP0
		1	NP1	NP1	NP1
2		NP2	NP2	NP2	
3		NP3			
Display	Without display	No code			
	Display	D1			
Network configuration (device encoding)	None	NC0			
	Encoded networks <sup>2)</sup>	NC1			
SW	Units		No code		
		Metric (SI)	U2		
			Non-metric (US/GB)		

1) EE244-AF6E9 additionally supports battery supply changeover via jumper, see manual  
External power supply recommended for CO<sub>2</sub> measurement (not included in the scope of supply).

2) For parallel operated networks with overlapping transmission ranges.

The devices will come configured with their network ID. Each network gets its own ID, information about the network structure is necessary at the time of ordering. Please contact your E+E representative for assistance and clarification.

## Room Transmitter

Feature	Description	Code		
HW configuration		EE245-		
	Model	RH + T	M1	
		T	M3	
		CO <sub>2</sub> + T		M11
		RH + CO <sub>2</sub> + T		M12
	CO <sub>2</sub> range	0...2000 ppm		HV1
		0...5000 ppm		HV2
Display	Without display	No code		
	Display	D1		
Network configuration (device encoding)	None	NC0		
	Encoded networks <sup>1)</sup>	NC1		
SW	Units		No code	
		Metric (SI)	U2	
			Non-metric (US/GB)	

1) For parallel operated networks with overlapping transmission ranges.

The devices will come configured with their network ID. Each network gets its own ID, information about the network structure is necessary at the time of ordering. Please contact your E+E representative for assistance and clarification.

# Order Example

## Position 1 - Base Station

**EE242-A3D2NC0SBL0SBH50SCL-20SCH50SDL0SDH2000**

Feature	Code	Description
Output	<b>A3</b>	0 - 10 V
Display	<b>D2</b>	Display with backlight
Network configuration	<b>NC0</b>	None
Output 1 measurand	<b>No code</b>	Relative humidity RH [%]
Output 1 scaling low	<b>No code</b>	0 %RH
Output 1 scaling high	<b>No code</b>	100 %RH
Output 2 measurand	<b>No code</b>	Temperature [°C]
Output 2 scaling low	<b>SBL0</b>	0 °C
Output 2 scaling high	<b>SBH50</b>	50 °C
Output 3 measurand	<b>No code</b>	Dew point temperature Td [°C]
Output 3 scaling low	<b>SCL-20</b>	-20 °C
Output 3 scaling high	<b>SCH50</b>	50 °C
Output 4 measurand	<b>No code</b>	CO <sub>2</sub> [ppm]
Output 4 scaling low	<b>SDL0</b>	0 ppm
Output 4 scaling high	<b>SDH2000</b>	2000 ppm

## Position 2 - Transmitter / Router

**EE244-AF6E9NP2D1NC0U2**

Feature	Code	Description
Function	<b>AF6</b>	Transmitter
Electrical connection	<b>E9</b>	M12 plug for supply
Number of probes	<b>NP2</b>	2
Display	<b>D1</b>	Display
Network configuration	<b>NC0</b>	None
Units	<b>U2</b>	Non-metric (US/GB)

## Position 3 - Sensing Probes

**EE07-M1F2, EE07-M3HS2**

## Position 4 - Cable for remote sensing probes

**HA010801, HA010802**

# Order Example

## Position 1 - Base Station

**EE242-A6NC1SBL-40SBH60SCL0SCH50SDL0SDH5000**

Feature	Code	Description
Output	A6	4 - 20 mA
Display	No code	Without display
Network configuration	NC1	Encoded networks
Output 1 measurand	No code	Relative humidity RH [%]
Output 1 scaling low	No code	0 %RH
Output 1 scaling high	No code	100 %RH
Output 2 measurand	No code	Temperature [°C]
Output 2 scaling low	SBL-40	-40 °C
Output 2 scaling high	SBH60	60 °C
Output 3 measurand	No code	Dew point temperature Td [°C]
Output 3 scaling low	SCL0	0 °C
Output 3 scaling high	SCH50	50 °C
Output 4 measurand	No code	CO <sub>2</sub> [ppm]
Output 4 scaling low	SDL0	0 ppm
Output 4 scaling high	SDH5000	5000 ppm

## Position 2 - Transmitter / Router

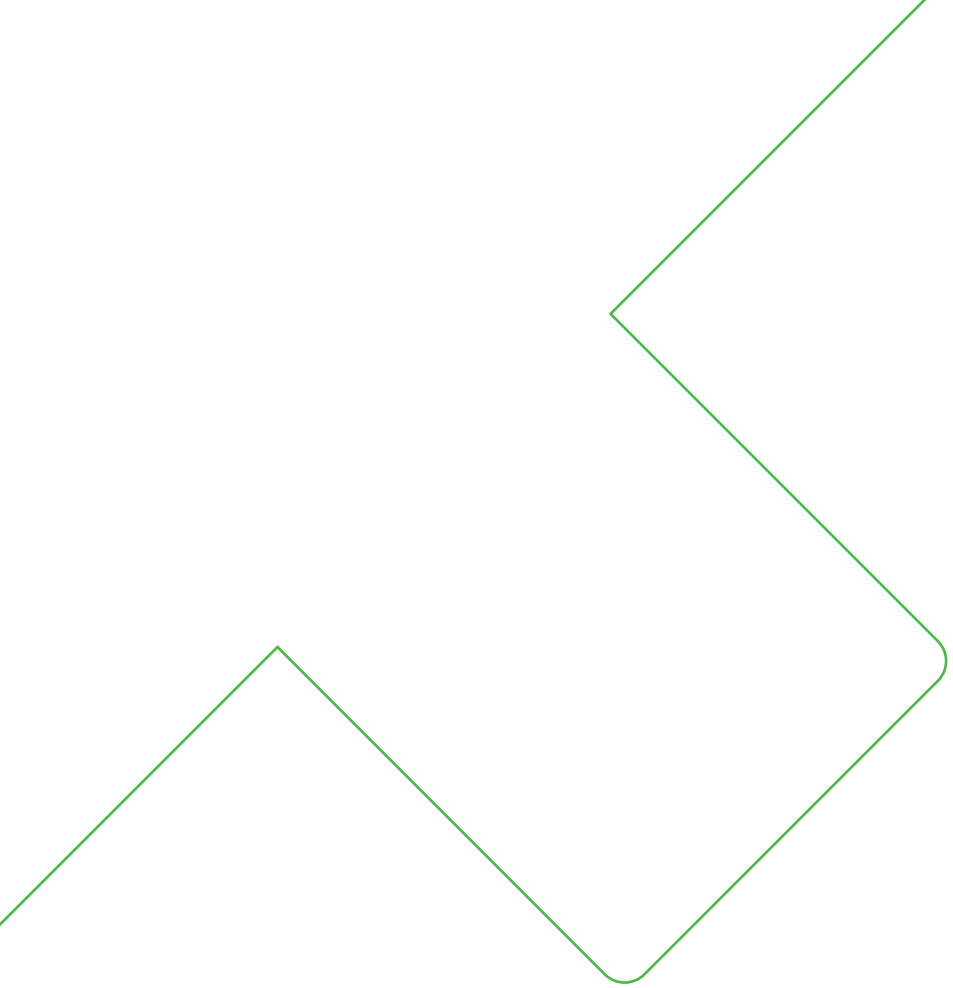
**EE245-M12HV2D1NC1**

Feature	Code	Description
Model	M12	RH + T + CO <sub>2</sub>
CO <sub>2</sub> range	HV2	0...5 000 ppm
Display	D1	Display
Network configuration	NC1	Encoded networks
Units	No code	Metric (SI)

# Accessories

For further information see datasheet [Accessories](#).

Accessories general	Code	
Cable for remote sensing probe	2 m (6.6 ft)	HA010801
	5 m (16 ft)	HA010802
	10 m (33 ft)	HA010803
Base station EE242	Code	
Antenna cable 2 m (6.6 ft)	HA010330	
Crossover cable (PC to base station)	HA010333	
External power supply unit	V03	
Transmitter EE244	Code	
Antenna cable 2 m (6.6 ft)	HA010330	
Bracket for rail installation	HA010203	
Reference probes	HA010403	
M12x1 cable connector, 4 pole socket for self assembly	HA010707	
External power supply unit	V03	
Transmitter EE244	Code	
External power supply unit	V03	



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