E+E

your partner
in sensor
technology.

User Manual Sigma 05

Modular Sensor Platform

DNV



Modbus

www.epluse.com

Content

1 General Information ... 3
1.1 Explanation of Warning Notices and Symbols ... 3
1.2 Safety Instructions ... 4
1.2.1 General Safety Instructions ... 4
1.2.2 Intended Use ... 4
1.2.3 Mounting, Start-up and Operation ... 5
1.3 ESD Protection ... 5
2 Scope of Supply ... 5
3 Product Description ... 6
3.1 General ... 6
3.2 Dimensions ... 6
3.3 Device Mounting ... 7
3.4 Electrical Connection ... 7
3.5 Sensing Probes ... 8
3.5.1 Sigma Plug-and-Play ... 8
3.5.2 Sigma Compatible E+E Probes and Sensors ... 9
3.6 Probe Interface: RS485 with Modbus RTU Protocol ... 10
3.7 Electronics Board ... 11
3.8 LED Array Indication ... 12
3.9 Display Functionality ... 12
3.9.1 Power Up, Scan ... 12
3.9.2 Normal Operation ... 13
3.9.3 Configuration ... 13
4 Plug-and-Play Operation / Setup ... 14
5 Manual Operation / Setup ... 17
6 Maintenance and Service ... 18
6.1 Display Exchange and Retrofitting ... 18
6.2 Firmware Update ... 18
6.3 Reference Probe ... 18
6.4 Error Indication on the Analogue Output (NAMUR) ... 18
6.5 Repairs ... 19
6.6 Spare Parts ... 19
7 Accessories ... 19
8 Technical Data ... 20
9 Conformity ... 21
9.1 Declarations of Conformity ... 21
9.2 Electromagnetic Compatibility ... 21
9.3 FCC Part 15 Compliance Statement ... 21
9.4 ICES-003 Compliance Statement ... 21
9.5 DNV Type Approval ... 21
10 Recycling of the Device ... 22

1 General Information

This user manual is intended to ensure proper handling and optimal functioning of the device. The user manual shall be read before commissioning the equipment and it shall be provided to all staff involved in transport, installation, operation, maintenance and repair. E+E Elektronik Ges.m.b.H. accepts no liability for any warranty or liability claims arising from this publication or improper handling of the product(s) described.

All information, technical data and diagrams included in this document are based on the information available at the time of writing. The document may contain technical inaccuracies and typographical errors. The contents will be revised on a regular basis and changes will be implemented in subsequent versions. The product(s) described and the contents of this document may be changed or improved at any time without prior notice.

All rights are reserved by E+E Elektronik Ges.m.b.H. No part of this document may be reproduced, published or publicly displayed in any form or by any means, nor may its contents be modified, translated, adapted, sold or disclosed to a third party without prior written permission of E+E Elektronik Ges.m.b.H.

PLEASE NOTE

Find this document and further product information on our website at www.epluse.com/sigma05.

1.1 Explanation of Warning Notices and Symbols

Safety precautions

Precautionary statements warn of hazards in handling the device and provide information on their prevention. The safety instruction labeling is classified by hazard severity and is divided into the following groups:

DANGER

Danger indicates hazards for persons. If the safety instruction marked in this way is not followed, the hazard will verly likely result in severe injury or death.

WARNING

Warning indicates hazards for persons. If the safety instruction marked in this way is not followed, there is a risk of injury or death.

CAUTION

Caution indicates hazards for persons. If the safety instruction marked in this way is not followed, minor or moderate injuries may occur.

NOTICE

Notice signals danger to objects or data. If the notice is not observed, damage to property or data may occur.

Informative notes

Informative notes provide important information that is characterised by its relevance.

INFO

The information symbol indicates tips on handling the device or provides additional information on it. This information is useful to achieve optimum performance of the device.

The title field may deviate from “INFO” depending on the context. For instance, it may also read “PLEASE NOTE”.

1.2 Safety Instructions

1.2.1 General Safety Instructions

NOTICE

Improper handling of the device may result in its damage.

- The Sigma 05 enclosure, the sensing probes connected shall not be exposed to unnecessary mechanical stress.
- Do not apply the supply voltage to the RS485 data lines.
- The Sigma 05 electronics are sensitive to electrostatic discharge (ESD). Take appropriate protective measures when touching it.
- Use the Sigma 05 only as intended and observe all technical specifications.

1.2.2 Intended Use

The Sigma 05 is a sensor hub for up to 3 E+E probes. Depending on the probes, Sigma 05 can be employed in most various industries and applications. The sensing probes can be connected directly to the host device or via M12 cables. Refer to chapter 3.5 Sensing Probes for details on the “Sigma plug-and-play” and the “Sigma compatible” probes.

The use of the Sigma 05 in any other way than described in this manual bears a safety risk for people and the entire measurement installation and is therefore not allowed.
The manufacturer cannot be held responsible for damages as a result of incorrect handling, installation, and maintenance of the device.

In order to avoid damage to the device or health hazards, the device may not be manipulated with tools other than specifically described in this manual.

The Sigma 05 may only be utilised in accordance with the stipulations of the present user manual and the specification in chapter 8 Technical Data. Otherwise, measurement inaccuracy might occur and failures cannot be ruled out.

⚠ WARNING

Non-compliance with the product documentation may cause safety risks for people and the entire measurement installation.

The manufacturer is not liable for any damage caused by improper handling, installation and maintenance of the device.

- Do not use the Sigma 05 in explosive atmosphere or for measurement in aggressive gases.
- This device is not appropriate for safety, emergency stop or other critical applications where device malfunction or failure could cause injury to human beings.
- Handle the sensing probes employed with Sigma 05 according to their respective user manuals.
- The device may not be manipulated with tools other than specifically described in this manual.

NOTICE

Failure to follow the instructions in this user manual may lead to measurement inaccuracy and device failures.

- The Sigma 05 may only be operated under the conditions described in this user manual and within the specification included in chapter 8 Technical Data.
- Any unauthorised product modifications will invalidate all warranty claims. Modifications may only be carried out with the express authorisation of E+E Elektronik Ges.m.b.H.!

1.2.3 Mounting, Start-up and Operation

The Sigma 05 Modular Sensor Platform has been produced under state of the art manufacturing conditions, has been thoroughly tested and has left the factory after fulfilling all safety criteria The manufacturer has taken all precautions to ensure safe operation of the device. The device shall be set up and installed in a way that does not impair its safe use. All applicable local and international safety guidelines for safe installation and operation of the device have to be observed. This user manual contains information and warnings that must be observed in order to ensure safe operation.

PLEASE NOTE

The manufacturer or his authorised agent can only be held liable in case of willful or gross negligence. In any case, the scope of liability is limited to the corresponding amount of the order issued to the manufacturer. The manufacturer assumes no liability for damage caused by non-compliance with the applicable regulations, operating instructions or the specified operating conditions. Any consequential damage is excluded from liability.

WARNING

Non-compliance with the product documentation may result in accidents, personal injury or property damage.

- Mounting, installation, commissioning, start-up, operation and maintenance of the device may only be carried out by qualified staff. Such staff must be authorised by the operator of the facility to carry out the mentioned activities.
- The qualified staff must have read and understood this user manual and must follow the instructions contained within. The manufacturer accepts no responsibility for non-compliance with instructions, recommendations and warnings.
- All process and electrical connections must be thoroughly checked by authorised staff before commissioning the device.
- Do not install or start-up a device suspected to be faulty. Mark it clearly as faulty and remove it from the process.
- Service operations other than described in this user manual may only be performed by the manufacturer. A faulty device may only be investigated and possibly repaired by qualified, trained and authorised staff. If the fault cannot be fixed, the device shall be removed from the process.

1.3 ESD Protection



The sensing elements and the electronics board are ESD (electrostatic discharge) sensitive components of the device and must be handled as such. Failure to do so may damage the device by electrostatic discharge when touching exposed sensitive components.

2 Scope of Supply

- The Sigma 05 Modular Sensor Platform according to the ordering guide.
- Quick Guide
- Mounting material
- Test report according to DIN EN 10204-2.2

3 Product Description

3.1 General

The Sigma 05 is a host device acting as a hub for intelligent E+E sensors with RS485 interface and Modbus RTU protocol. It accommodates up to 3 probes and features 2 analogue outputs as well as an optional display for maximal 3 measurands. The probes are pluggable and can be easily interchanged.

Configuration

In its factory setting, the Sigma 05 automatically detects and recognises Sigma plug-and-play probes, performing an autonomous, rule-based hub setup. Please refer to chapter 4 Plug-and-Play Operation / Setup for details.

For a setup deviating from default, the Sigma 05 can be configured manually by means of the free PCS10 Product Configuration Software. Please refer to chapter 5 Manual Operation / Setup for details.

Supply

The Sigma 05 voltage supply shall be class III ⧐ (USA & Canada: Class 2).

NOTICE

Please note that the supply voltage applied to the probes connected to the RS485 interface is always equal to the supply voltage applied to Sigma 05. Choose the Sigma 05 supply voltage (in the range from 15 to 30 V DC) to match the probe supply requirements.

Please refer to chapters 3.4 Electrical Connection and 8 Technical Data.

Output

The Sigma 05 features two freely selectable and scalable analogue outputs. Please refer to chapter 8 Technical Data.

Materials

The Sigma 05 enclosure is available in polycarbonate or die-cast aluminium.

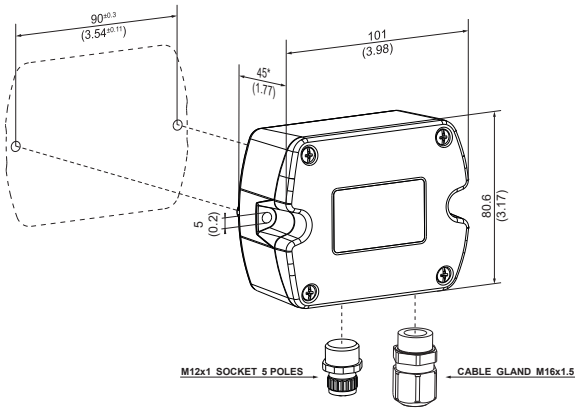
Display

The optional display features backlight and shows up to 3 measurands including the symbol of the physical quantity and the measurement unit. The font size automatically adapts to the number of lines. See chapter 3.9.2 for details. The display can be retrofitted to Sigma 05 devices that were originally ordered without a display. Please refer to chapter 6.6 Spare Parts.

3.2 Dimensions

Values in mm (inch)

Polycarbonate or die-cast aluminium enclosure



*The polycarbonate enclosure without display: 46 mm (1.81").

3.3 Device Mounting

The Sigma 05 shall be mounted onto a wall or other vertical surface, with the connectors pointing downwards.

The probes can be connected directly to the Sigma 05 or remotely via unshielded connection cables with a maximal length of 10 m (32.8 ft) (available as accessories, see the Sigma 05 datasheet).

NOTICE

For long-term reliability, it is of utmost importance to employ quality extension cables with tightly cast M12 connectors.

3.4 Electrical Connection

⚠ WARNING

Incorrect installation, wiring or power supply may cause overheating and therefore personal injuries or damage to property.

Cables must not be under voltage during electrical installation and connection or disconnection, especially at terminal connections on circuit boards. For correct cabling of the device, always observe the presented wiring diagram for the product version used.

The manufacturer cannot be held responsible for personal injuries or damage to property as a result of incorrect handling, installation, wiring, power supply and maintenance of the device.

The Sigma 05 features spring clamp terminals for connecting the power supply and the analogue outputs. The cables are fed into the enclosure through the M16x1.5 cable gland.

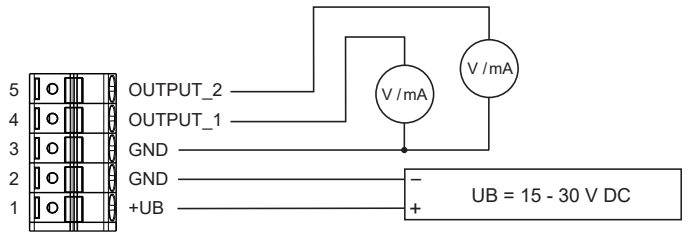
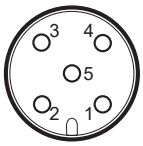


Fig. 1 Voltage supply and outputs

M12 socket for RS485 connection



M12 device socket
front view

Pin	Assignment
1	Supply voltage UB
2	RS485 B (D-)
3	GND
4	RS485 A (D+)
5	Not assigned

Tab. 1 Sigma 05 pin assignment of the sensing probe connector (RS485 / Modbus RTU protocol)

PLEASE NOTE

The supply voltage applied to the probes connected to the RS485 interface is always equal to the supply voltage applied to Sigma 05.

NOTICE

Power off Sigma 05 before connecting or disconnecting sensing probes. Failing to do so may cause damages to Sigma 05 and to the probes.

- Choose the Sigma 05 supply voltage (in the range from 15 to 30 V DC) to match the probe supply requirements.
- To minimise self-heating and its effect on the measurement accuracy of the RH and / or T probes, use a lower supply voltage, e.g. 15 V DC. Self heating manly affects RH and / or T probes with metal enclosures and is negligible for probes with plastic enclosure. Refer to the datasheet of the respective probe.

To fulfil IP65 / NEMA 4(X) protection rating of the Sigma 05, the cable gland used to insert the cable for supply and outputs must be tightly closed. Furthermore, the front cover of Sigma 05 must be properly closed.

PLEASE NOTE

Some E+E probes with both, analogue output and digital interface, feature a configuration pin (pin no. 5) to enable configuration via the digital interface. As the Sigma 05 uses of the probes' digital interface as default, this pin is not connected.

PLEASE NOTE

The aluminium enclosure must always be earthed for DNV EMC.

3.5 Sensing Probes

3.5.1 Sigma Plug-and-Play

"Sigma Plug-and-Play" means that Sigma 05 automatically detects the connected E+E Modbus probes at start-up and performs a rule-based setup. Depending on the connected probes, a predefined set of up to 5 measurands is assigned to the analogue outputs and to the display, refer to chapter 4 Plug-and-Play Operation / Setup.

E+E Sigma Plug-and-Play Probe	Modbus address
EE072	234
EE074	233
EE671	238
EE680	68
EE872	237
HTP501 DNV 1)	69
MOP301 DNV 1)	70
TDS501	229
Reference Probe Modbus RTU HA010406	232

1) DNV approved probe variants and DNV approved Sigma 05 variants form a DNV conform sensor setup with or without display

Tab. 2 Sigma 05 plug-and-play probes and their Modbus address

INFORMATION

Sigma 05, HTP501 and MOP301 are available with DNV approval which form a DNV conform sensor setup with or without display.

Please note that a display is not available for DNV approved Sigma 05 with aluminium enclosure.

3.5.2 Sigma Compatible E+E Probes and Sensors

The “Sigma compatible” E+E probes and sensors fulfil the following criteria:

RS485 Serial communication	Selectable values (via PCS10)
Baud rate	9 600, 19 200, 38 400, 57 600, 76 800, 115 200
Data bits	8
Parity	Even, odd, none
Stop bits	1, 2
Modbus RTU protocol	
Modbus address	1...247
Function Code	03, 04
Data format	According to standard IEEE754, floating point 32 bit, big-endian, word swapped.

Tab. 3 Digital interface options for “Sigma compatible” E+E probes

To operate with the Sigma 05 sensor hub, the “Sigma compatible” probes require manual setup (see chapter 5 Manual Operation / Setup) and possibly connection adapters.

PLEASE NOTE

All E+E probes and sensors with an RS485 interface and Modbus RTU protocol are “Sigma compatible”.

To connect non-plug-and-play probes such as the TDS401H, please note the following:

- The supply voltage of the Sigma 05 must correspond to the supply requirements of the probes.
- A suitable connection cable is required to connect the probes to the Sigma 05.
- The Sigma 05 must be configured manually using the PCS10 Product Configuration Software.

How to connect the TDS401H

1. Connect the TDS401H probe to the Sigma 05 using the appropriate M12 cable (e.g. cable HA010813 / HA010814 / HA010815, please refer to the accessories datasheet).
2. Connect the power supply to the Sigma 05. Ensure that the supply voltage meets the requirements of the TDS401H (range 18 - 28 V DC).
3. Configure the Sigma 05 manually using the PCS10 Product Configuration Software (refer to chapter 5 Manual Operation / Setup).

TDS401H Modbus RTU Protocol Settings

	Factory settings	Selectable values (via PCS10)
Baud rate	9600	9
Data bits	8	8
Parity	Even	Even, odd, none
Stop bits	1	1, 2
Modbus address	243	1...247

Device address, baud rate, parity and stop bits can be set via:
PCS10 Product Configuration Software and the appropriate configuration cable HA011018.
The PCS10 can be downloaded free of charge from www.epluse.com/pcs10.

Tab. 4 Interface default settings

TDS401H Modbus Register Map

FLOAT32

Parameter	Unit	Register number[1] [DEC]	Register address[2] [HEX]
Read register: function code 0x03 / 0x04			
Dew point temperature, Td	°C	1105	450
	°F	1107	452
	K	1147	47A
Frost point temperature, Tf	°C	1131	46A
	°F	1133	46C
	K	1149	47C
Volume concentration, Wv	ppm	1151	47E
Temperature, T	°C	1003	03EA
	°F	1005	03EC
	K	1009	03F0
Relative humidity, RH	%	1021	03FC
Water vapour partial pressure, e	mbar	1101	44C
	psi	1103	44E

1) Register number (decimal) starts from 1
2) Register address (hexadecimal) starts from 0

Tab. 5 TDS401H FLOAT32 measured data register

Unless otherwise specified, the rest of this manual deals with Sigma plug-and-play probes.

3.6 Probe Interface: RS485 with Modbus RTU Protocol

	Factory settings	Selectable values (via PCS10)
Baud rate	9600	9 600, 19 200, 38 400, 57 600, 76 800, 115 200
Data bits	8	8
Parity	Even	Even, odd, none
Stop bits	1	1, 2
Modbus address	-	The Sigma 05 is a Modbus master with no address

Tab. 6 Interface default settings

The recommended settings for multiple devices in a Modbus RTU network are 9 600, 8, even, 1.
The Sigma 05 represents 1 unit load in an RS485 network.

RS485 communication settings can be changed with PCS10 Product Configuration Software.

3.7 Electronics Board

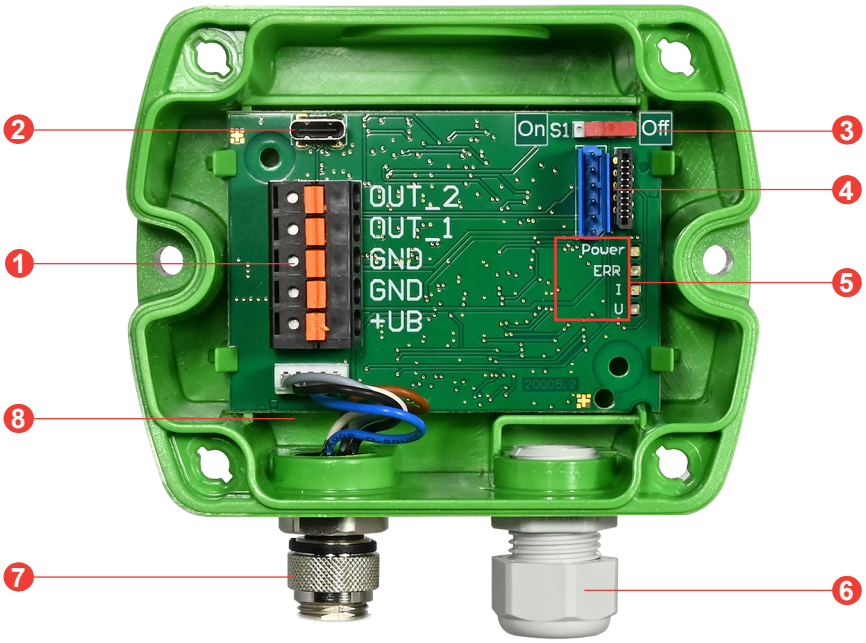


Fig. 2 Sigma 05 electronics board

No.	Function
1	Spring clamp terminals for power supply and analogue outputs
2	USB-C configuration interface
3	Slide switch for the 120 Ω RS485 network termination resistor
4	FFC cable socket for the display
5	LED array  Green: Power Red: Error Orange: Current outputs Blue: Voltage outputs The function of each LED is outlined at chapter 3.8 LED Array Indication.
6	M16 cable gland
7	M12 socket: RS485 interface and power supply for the probes
8	Data and power lines towards the probe(s)

Tab. 7 Accessible board components

3.8 LED Array Indication

LED	Behaviour
Power (green)	The LED flashes every second as soon as the microcontroller of the Sigma 05 is active. This indication is independent of the power source (USB or power terminals).
Error (red)	Constantly OFF: no errors detected The LED flashes every second: fatal error (error code retrieval with PCS10) The LED flashes shortly every two seconds: problems with Modbus probe configuration. Check the setup with PCS10 and/or the wiring.
Current outputs (orange)	Constantly ON: Two active current outputs. Constantly OFF: ▪ The Sigma 05 is USB-powered, therefor the analogue outputs are disabled or ▪ One output is set to voltage and the other to current.
Voltage outputs (blue)	Constantly ON: Two active voltage outputs. Constantly OFF: ▪ The Sigma 05 is USB-powered, no analogue output is possible or ▪ One output is set to voltage and the other to current. Orange and blue LEDs are constantly ON simultaneously: the automatic probe discovery is active, or the device is starting up and has not yet activated the configuration (approximately 1 s).

Tab. 8 Behaviour of on-board LED array

3.9 Display Functionality

3.9.1 Power Up, Scan

After powering up in Automatic Probe Discovery mode (the default setting), a progress bar consisting of single points indicates that the Sigma 05 is scanning the RS485 interface for sensing probes. A question mark will appears approximately every 12 seconds for as long as no probes are detected, see Fig. 3.



Fig. 3 Display during RS485 interface scan

The display turns to normal operation as soon as one or more sensing probes are discovered.

3.9.2 Normal Operation

Depending on the number of measurands automatically or manually assigned to it, the display shows up to 3 lines with the measurand symbol, the measured value and the unit.



Fig. 4 Display layouts in normal operation

3.9.3 Configuration

If the Sigma 05 host device is connected to a PC via USB only (e.g. if there is no voltage supply at the spring clamp terminals, see Fig. 5), the display will show the USB symbol.



Fig. 5 Sigma 05 with USB connection active only

The flashing of measured data every second indicates that the corresponding measurand has gone beyond the thresholds defined via PCS10.

If the communication between the Sigma 05 and any sensing probe is disturbed, resulting in no measured data being available, the corresponding display lines will show “--,--”. See Fig. 6.



Fig. 6 Sigma 05 with interrupted communication towards sensing probe(s)

Please refer to chapter 5 Manual Operation / Setup for a comprehensive overview of the configuration options.

4 Plug-and-Play Operation / Setup

This operating mode requires Sigma plug-and-play probes according to Tab. 6. The Sigma 05 sensor hub's "Automatic Probe Discovery" must be enabled (this is the default setting).

The standard procedure for initiating plug-and-play operation is as follows:

- Mount the Sigma 05
- Connect the plug-and-play sensing probes
- Power up the Sigma 05

Upon power on, the Sigma 05 automatically starts the "Automatic Probe Discovery" process by scanning the RS485 interface.

Auto-discovery on the electronics board is indicated by a flashing green LED and orange and blue LEDs, that are constantly on, see Tab. 5 (Behaviour of on-board LED array).

As soon as the Sigma 05 discovers at least one probe, it performs the setup autonomously according to predefined rules. This automatocally sets the display layout and analogue outputs according to Tab. 6.

If needed, the predefined plug-and-play setup can subsequently be altered using the PCS10 Product Configuration Software, see chapter 5 Manual Operation / Setup.

		Analogue Output 1			Analogue Output 2			Display Line 1		Display Line 2		Display Line 3	
	Probes	**Measurand**	**Scale SI**	**Scale US**	**Measurand**	**Scale SI**	**Scale US**	**SI**	**US**	**SI**	**US**	**SI**	**US**
1	EE072	RH	0...100 %	0...100 %	T	-40...80 °C	-40...176 °F	RH [%]	RH [%]	T [°C]	T [°F]		
2	EE074	T	-40...80 °C	-40...176 °F				T [°C]	T [°F]				
3	EE872-M13	CO_2	Range of probe	Range of probe	RH	0...100 %	0...100 %	CO_2 [ppm]	CO_2 [ppm]	RH [%]	RH [%]	T [°C]	T [°F]
4	EE872-M10	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]				
5	EE671	v	Range of probe	Range of probe				v [m/s]	v [ft/min]				
6	EE680	vn	Range of probe	Range of probe	T	0...50 °C	32...122 °F	vn [m/s]	vn [ft/min]	T [°C]	T [°F]		
7	HA010406	RH	0...100 %	0...100 %	T	-40...180 °C	-40...356 °F	RH [%]	RH [%]	T [°C]	T [°F]		
8	EE072	RH	0...100 %	0...100 %				RH [%]	RH [%]				
	EE074				T	-40...80 °C	-40...176 °F			T [°C]	T [°F]		
9	EE872-M13	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]				
	EE072				RH	0...100 %	0...100 %			RH [%]	RH [%]	T [°C]	T [°F]
10	EE872-M10	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]				
	EE072				RH	0...100 %	0...100 %			RH [%]	RH [%]	T [°C]	T [°F]
11	EE671	v	Range of probe	Range of probe				v [m/s]	v [ft/min]				
	EE072				RH	0...100 %	0...100 %			RH [%]	RH [%]	T [°C]	T [°F]
12	EE680	v	Range of probe	Range of probe				vn [m/s]	vn [ft/min]				
	EE072				RH	0...100 %	0...100 %			RH [%]	RH [%]	T [°C]	T [°F]
13	EE872-M13	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]			RH [%]	RH [%]
	EE074				T	-40...80 °C	-40...176 °F			T [°C]	T [°F]		
14	EE872-M10	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]				
	EE074				T	-40...80 °C	-40...176 °F			T [°C]	T [°F]		
15	EE671	v	Range of probe	Range of probe				v [m/s]	v [ft/min]				
	EE074				T	-40...80 °C	-40...176 °F			T [°C]	T [°F]		
16	EE680	vn	Range of probe	Range of probe				vn [m/s]	vn [ft/min]				
	EE074				T	-40...80 °C	-40...176 °F			T [°C]	T [°F]		
17	EE872-M13	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]			T [°C]	T [°F]
	EE671				v	Range of probe	Range of probe			v [m/s]	v [ft/min]		
18	EE872-M13	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]			T [°C]	T [°F]
	EE680				vn	Range of probe	Range of probe			vn [m/s]	vn [ft/min]		
19	EE872-M10	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]				
	EE671				v	Range of probe	Range of probe			v [m/s]	v [ft/min]		
20	EE872-M10	CO_2	Range of probe	Range of probe				CO_2 [ppm]	CO_2 [ppm]				
	EE680				vn	Range of probe	Range of probe			vn [m/s]	vn [ft/min]	T [°C]	T [°F]

		Analogue Output 1			Analogue Output 2			Display Line 1		Display Line 2		Display Line 3	
	Probes	**Measurand**	**Scale SI**	**Scale US**	**Measurand**	**Scale SI**	**Scale US**	**SI**	**US**	**SI**	**US**	**SI**	**US**
21	EE680	vn	Range of probe	Range of probe				vn [m/s]	vn [ft/min]			T [°C]	T [°F]
	EE671				v	Range of probe	Range of probe			v [m/s]	v [ft/min]		
22	HTP501	RH	0...100 %	0...100 %	T	-40...120 °C	-40...248 °F	RH [%]	RH [%]	T [°C]	T [°F]		
23	HTP501	RH	0...100 %	0...100 %				RH [%]	RH [%]	T [°C]	T [°F]		
	EE074				T	-40...120 °C	-40...248 °F					T [°C]	T [°F]
24	MOP301	aw	0...1	0...1	T	-40...120 °C	-40...248 °F	aw [-]	aw [-]	T [°C]	T [°F]		
25	MOP301	aw	0...1	0...1				aw [-]	aw [-]	T [°C]	T [°F]		
	EE074				T	-40...120 °C	-40...248 °F					T [°C]	T [°F]
26	TDS501	Td	-70…20 °C	-94...68 °F				Td [°C]	Td [°F]				
27	TDS501	Td	-70…20 °C	-94...68 °F				Td [°C]	Td [°F]				
	EE074	T			T	-40…80 °C	-40…176 °F			T [°C]	T [°F]		
28	TDS501	Td	-80…20 °C	-112...68 °F				Td [°C]	Td [°F]				
	EE680	v			v	Range of probe	Range of probe			v[m/s]	v[ft/min]	T [°C]	T [°F]

5 Manual Operation / Setup

The Sigma 05 is ready to use and does not require any configuration by the user. The Sigma 05 factory setup corresponds to the specified order code. Please refer to the data sheet at www.epluse.com/sigma05. If needed, the factory setup can be changed with the help of the PCS10 Product Configuration Software and the USB cable to connect the Sigma 05 to a PC (HA010327).

For changing the factory setup of the sensor platform with PCS10, proceed as follows:

1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on a PC.
2. Connect the Sigma 05 to a PC using the USB concection cable.
3. Start the PCS10 software.
4. On the PCS10 opening page scan the ports and identify the connected device.
5. Click on the desired Sigma 05 hub device and disable the “Automatic probe discovery” in the “Probe settings” view.

PLEASE NOTE

As long as the “Automatic Probe Discovery” is enabled, the PCS10 will only display information about the Sigma 05 and connected probes in the “Live View” display, along with the measured data. All configuration features are disabled.

6. Start configuration. Please observe the PCS10 Help dropdowns for further information.

PLEASE NOTE

The USB interface only supplys power to the Sigma 05 electronics. This means that the probes connected to Sigma 05 are not supplied with powered and consequently the functions of the PCS10 are limited.

The limited setup functionality (for USB supply only) includes the following:

- Set the name of each individual device
- Export and import the Sigma 05 configuration

To access the full range of setup functions, the Sigma 05 must be powered via the spring clamp terminals. Full setup functionality additionally includes:

- Reading the measured data.
- Add and assign measurands from the probes
- Add new probes
- Change the probe communication parameters
- Change the display layout
- Change the output signals
- Scale the outputs
- Set warning thresholds for the measurands on the display
- Set the error indication on the analogue outputs, see chapter 6.4.
- Perform offset and 2-point adjustment of the probes connected to Sigma 05

6 Maintenance and Service

6.1 Display Exchange and Retrofitting

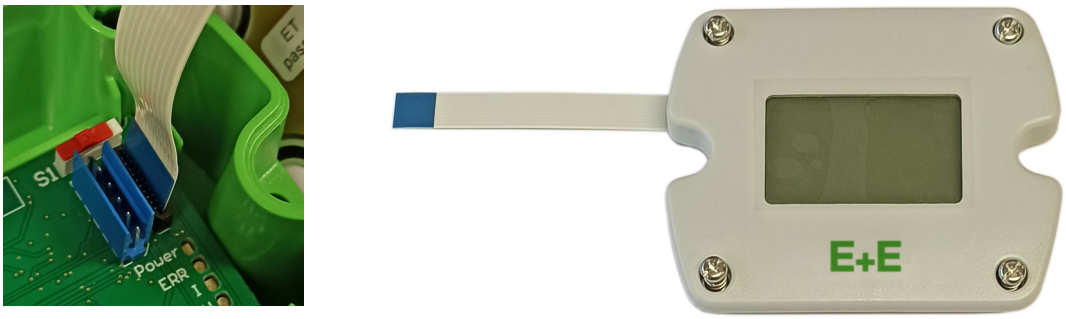


Fig. 7 Display and FFC cable connection on the Sigma 05 electronics board

When connecting the display's FFC cable to the Sigma 05 electronics board, please observe the correct orientation. The blue cable stiffener needs to be on the left side as shown in Fig. 7.

NOTICE

Disconnecting or connecting the display while the Sigma 05 is powered may cause damages to the Sigma 05 and to the display.

Always switch off the Sigma 05 before exchanging the display.

6.2 Firmware Update

Connect the Sigma 05 to a PC. Start the PCS10 Product Configuration Software while the PC is connected to the internet, and scan the COM port connected to Sigma 05 as described in chapter 5 Manual Operation / Setup, point 4. If a firmware update is available, it will be indicated in the "Information" view of the PCS10. Select the desired update by clicking on it, then click on the "Update firmware" button to proceed. Also refer to the help pop-up in the "Information" view.

6.3 Reference Probe

The Reference Probe Modbus RTU (HA010406) facilitates a functional and accuracy check of the Sigma 05 sensor hub. Please refer to the Reference Probe's Quick Guide at www.epluse.com/sigma05.

NOTICE

Always power off the Sigma 05 before connecting or disconnecting the sensing or reference probes. Failure to do so may result in damage to the device and to the probes.

6.4 Error Indication on the Analogue Output (NAMUR)

The Sigma 05 sensor hub features an error indication on its analogue outputs according to the NAMUR NE 043 recommendations (Standardization of the Signal Level for the Failure Information of Digital Transmitters, Edition 2003-02-03, see www.namur.net/en/recommendations-and-worksheets/current-nena.html).
The feature is enabled by factory default and can be disabled and configured with the PCS10 Product Configuration Software.

Output signal	NAMUR signal level
0 - 5 V	5.5 V
0 - 10 V	11 V
0 - 20 mA	21 mA
4 - 20 mA	21 mA

Tab. 9 NAMUR error indication

6.5 Repairs

PLEASE NOTE

Repairs may only be carried out by the manufacturer. The attempt of unauthorised repair excludes any warranty claims.

6.6 Spare Parts

Description	Code
Display for Sigma 05 for polycarbonate enclosure	D09P

7 Accessories

For further information please refer to the Accessories datasheet.

Accessories	Code
Modbus configuration adapter, M12 4 poles ↔ USB	HA011018
PCS10 Product Configuration Software (Free download: www.epluse.com/pcs10)	PCS10
Connection cable, unshielded, 5 poles, M12x1plug ↔ socket **2 m (6.6 ft)** **5 m (16.4 ft)** **10 m (32.8 ft)**	 HA010813 HA010814 HA010815
Reference probe Modbus RTU	HA010406
Power supply adapter 100 - 240 V AC to 24 V DC not DNV approved	V03
USB cable for PC connection (USB-A to USB-C), 1.8 m (5.9 ft)	HA010327
Y-style splitter, M12x1, 1 plug ↔ 2 sockets, 5 poles	HA030204
Connector, M12x1 plug, 5 poles, for self assembly	HA010706
Connector, M12x1 socket, 5 poles, for self assembly	HA010708
Protection cap for M12 socket	HA010781
Protection cap for M12 plug	HA010782

8 Technical Data

Probe connection

Max. number of sensing probes[1)]	3
Max. number of measurands	5 (2 on the analogue outputs, 3 on the display)
Electrical connection	M12x1 socket 5 poles

1) Compatible E+E probes see section “Plug-and-Play Probe” above.

Digital

Probe interface	RS485
Protocol **Factory settings** **Supported Baud rates**[1)] **Measured data types**	Modbus RTU 9 600 Baud, 8 databits, parity even, 1 stop bit 9 600, 19 200, 38 400, 57 600, 76 800 and 115 200 FLOAT32 and INT16

1) For details on the communication setting refer to the User Manual and the Modbus Application Note at www.epluse.com/sigma05.

Outputs

Analogue

Two freely selectable and scalable outputs	0 - 1 / 0 - 2,5 V / 0 - 5 / 0 - 10 V 4 - 20 mA 3-wire 0 - 20 mA 3-wire	-1 mA < I_L < 1 mA R_L < 500 Ω R_L < 500 Ω	I_L = load current R_L = load resistance
Accuracy of analogue outputs at 20 °C (68 °F)	0.02 % FS for 0 - 10 V and 0 - 20 mA		FS = full scale

General

Power supply class III ⧫III USA & Canada: Class 2 supply necessary	15 - 30 V DC		
Supply current to the probes, max.	0.5 A		
Electrical connection	Screw terminals max 2.5 mm²		
Cable glands	Cable gland M16x1.5, for cable ∅4...8 mm (0.16...0.31")		
Configuration interface	USB-C on the electronics board		
Working and storage conditions **Without display** **With Display**	0…95 %RH, non-condensing 700…1 200 mbar -40…+60 °C (-40...+140 °F) -20…+50 °C (-4...+122 °F)		
Enclosure		**Plastic**	**Metal**
	Material	Polycarbonate	Aluminium Al 383
	Protection rating[1)]	IP65 / NEMA 4X	IP65 / NEMA 4
	Conformity	UL94 V-0, with Display UL94 HB approved	
Electromagnetic compatibility	EN 61326-1:2013 EN IEC 61326-1:2021 FCC Part15 Class A	EN 61326-2-3:2013 EN IEC 61326-2-3:2021 ICES-003 Class A	Industrial Environment Industrial Environment DNV-CG-0339
Conformity	CE UKCA DNV[2)]		
Type approval	DNV Certificate No. TAA00003FA		
Configuration software	PCS10 Product Configuration Software Free download from www.epluse.com/pcs10.		

1) With appropriate cable / probe connector (M12x1 female), see section “Accessories” below.
2) DNV scope of approval: please refer ordering guide.

9 Conformity

9.1 Declarations of Conformity

E+E Elektronik Ges.m.b.H. hereby declares that the product complies with the respective regulations listed below:

CE European directives and standards.

UKCA UK statutory instruments and designated standards.

DNV DNV (Det Norske Veritas) maritime type approval.

Please refer to the product page at www.epluse.com/sigma05 for the Declarations of Conformity.

9.2 Electromagnetic Compatibility

EMC for industrial environment.
The sensor is a group 1 device and corresponds to class A.

⚠ WARNING

This device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.

9.3 FCC Part 15 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

9.4 ICES-003 Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

9.5 DNV Type Approval

Approval standard DNV-CG-0339:2021

Location Classes	
Temperature	D
Humidity	B
Vibration	B
EMC	B
Enclosure	B / IP65

10 Recycling of the Device

PLEASE NOTE

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with relevant environmental protection requirements. Please observe local regulations for the disposal of the device.

For disposal, the individual components of the device must be separated according to local recycling regulations. The electronics shall be disposed of correctly as electronics waste.

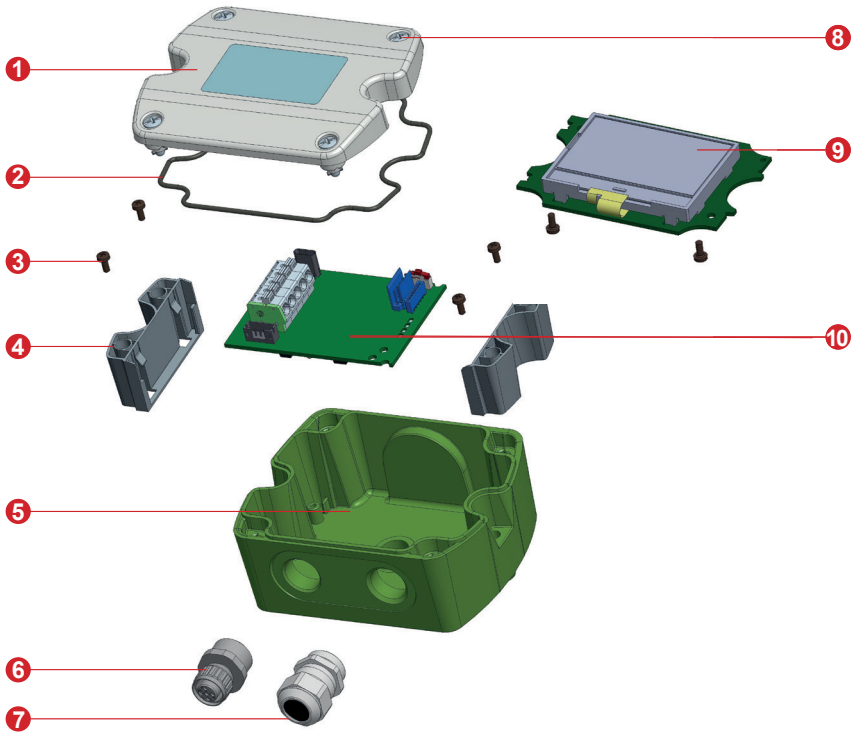


Fig. 8 Sigma 05

No.	Part	Material	Recycling Type
1	Cover	Polycarbonate	Plastics waste
2	Rubber seal	Neoprene	Plastics waste
3	Screws	Steel	Metal waste
4	PCB fixation (for metal version)	Plastic	Plastics waste
5	Enclosure base with probe tube	Plastic	Plastics waste
		Metal	Metal waste
6	M12 probe connection	Metal	Metal waste
7	Cable gland	Polyamide	Plastics
		Metal	Metal waste
8	Bayonet screws	Steel	Metal waste
9	Display with electronics board	Various materials	Electrical and Electronics waste
10	Electronics board	Various materials	Electrical and Electronics waste

Tab. 10 Recycling of the parts of the Sigma 05

Company Headquarters &
Production Site

E+E Elektronik Ges.m.b.H.
Langwiesen 7
4209 Engerwitzdorf | Austria
T +43 7235 605-0
F +43 7235 605-8
info@epluse.com
www.epluse.com

Subsidiaries

E+E Sensor Technology (Shanghai) Co., Ltd.
T +86 21 6117 6129
info@epluse.cn

E+E Elektronik France SARL
T +33 4 74 72 35 82
info.fr@epluse.com

E+E Elektronik Deutschland GmbH
T +49 6171 69411-0
info.de@epluse.com

E+E Elektronik India Private Limited
T +91 990 440 5400
info.in@epluse.com

E+E Elektronik Italia S.r.l.
T +39 02 2707 86 36
info.it@epluse.com

E+E Elektronik Korea Ltd.
T +82 31 732 6050
info.kr@epluse.com

E+E Elektronik Corporation
T +1 847 490 0520
info.us@epluse.com

your partner
in sensor
technology.

BA_Sigma_05 | Version v2.1 | 07-2026
© Copyright E+E Elektronik Ges.m.b.H. | All rights reserved.

www.epluse.com