E+E

your partner
in sensor
technology.

User Manual EE355

Dew Point Sensor
down to -60 °C Td (-76 °F Td)



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 ... 4
1.3 Environmental Aspects ... 5
2 Scope of Supply ... 5
3 Product Description ... 6
3.1 General ... 6
3.2 Dimensions ... 6
3.3 Electrical Connection ... 7
3.4 Auto-Calibration ... 7
3.5 Measuring Range and Accuracy ... 8
4 Mounting and Installation ... 8
4.1 Installation Location ... 8
4.2 Sensor Installation Directly into the Process ... 9
4.3 Sensor Installation in a Sampling System ... 9
5 Setup and Configuration ... 10
5.1 PCS10 Product Configuration Software ... 10
5.2 RS485 Digital Interface ... 11
5.2.1. Modbus RTU Protocol Settings ... 11
5.3 Modbus Register Map ... 12
5.4 Modbus RTU Example ... 13
6 Maintenance and Service ... 14
6.1 Calibration and Adjustment ... 14
6.2 Dew Point Adjustment by the User ... 14
6.3 Filter Cap Exchange ... 14
6.4 Cleaning the Sensing Element ... 15
6.5 Repairs ... 15
6.6 Spare Parts ... 15
7 Accessories ... 16
8 Technical Data ... 16
9 Conformity ... 18
9.1 Declarations of Conformity ... 18
9.2 Electromagnetic Compatibility ... 18
9.3 FCC Part 15 Compliance Statement ... 18
9.4 ICES-003 Compliance Statement ... 18

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/ee355.

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.

- Avoid any unnessessary mechanical stress and inproppriate use.
- Do not apply the supply voltage to the RS485 data lines.
- Installation, electrical connection, maintenance and commissioning may only be carried out by qualified personnel.
- Use the EE355 only as intended and observe all technical specifications.
- The sensor elements must not be touched when replacing the filter cap.
- Never operate the device without filter cap.
- For sensor cleaning and filter cap replacement please refer to the “Cleaning Instructions” at www.epluse.com.

1.2.2. Intended Use

The EE355 is intended for the dew point temperature (Td) measurement of compressed air and other non-corrosive and non-flammable gases at pressures. The sensor can be installed in a pressurised system up to 80 bar (1 160 psi). The probe is pressure-tight and has leak rate B according to EN 12266-1.

⚠ WARNING

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

The manufacturer cannot be held responsible for damages as a result of incorrect handling, installation and maintenance of the device.

- Do not use the EE355 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.
- The device may not be manipulated with tools other than specifically described in this manual.

NOTICE

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

- The EE355 may only be operated in accordance to the conditions described in this user manual and within the specification included in chapter 8 Technical Data.
- The installation, inspection and maintenance steps recommended by the manufacturer must be observed and carried out in the interests of the user’s safety and the functionality of the equipment.
- Any unauthorised product modifications will invalidate all warranty claims. Modifications may only be carried out with express authorisation of E+E Elektronik Ges.m.b.H.!

The device is constructed for the operation of separated extra-low voltage (SELV).

1.2.3. Mounting, Start-up and Operation

The EE355 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 cause 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 Environmental Aspects

PLEASE NOTE

Products from E+E Elektronik Ges.m.b.H. are developed and manufactured in compliance with all 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.

2 Scope of Supply

- EE355 Dew Point Sensor down to -60 °C Td (-76 °F)
- M12x1 cable connector, 5 pole socket, straight (included if order code AC2 is selected)
- Inspection certificate according to DIN EN 10204-3.1
- Quick Guide

3 Product Description

3.1 General

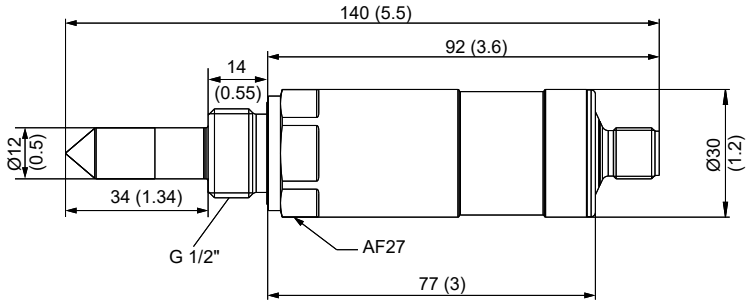
The compact EE355 Dew Point Sensor with a measuring range down to -60 °C Td (-75 °F Td) and a robust stainless steel enclosure is ideal for OEM (Original Equipment Manufacturer) applications in compressed air systems, plastic dryers and industrial drying processes.
The core of the EE355 is the monolithic measuring cell type HMC200, manufactured in thin-film technology. Due to the excellent long-term stability and durability against condensation, the EE355 requires low maintenance.
An integrated auto-calibration procedure enables a measurement accuracy of <2 °C Td (<3.6 °F Td).
The recommended calibration interval is 2 years.
The measured values for dew point, frost point or volume concentration are available on an analogue 4 - 20 mA and a digital Modbus RTU output.

3.2 Dimensions

Values in mm (inch)

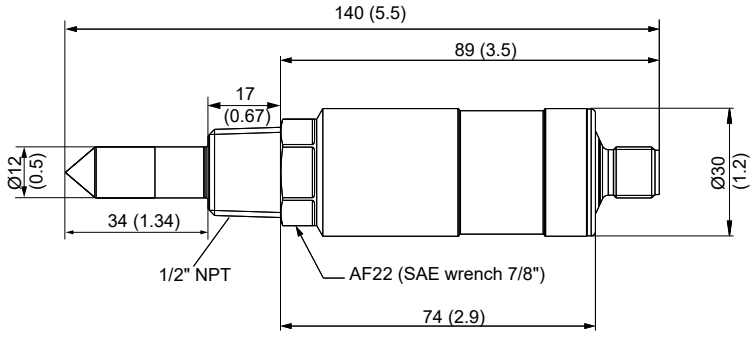
ISO Thread

G 1/2"



NPT Thread

1/2"



3.3 Electrical Connection

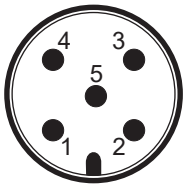
⚠ WARNING

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

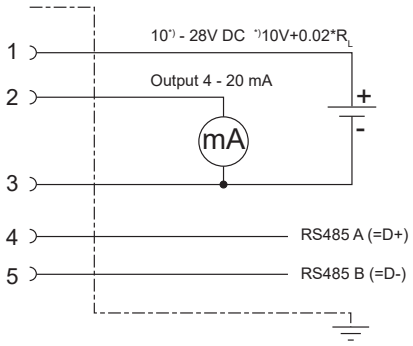
For correct cabling, always observe the presented wiring diagram for the product version used.

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 EE355 is electrically connected via the 5-pole M12x1 plug. An attachable connector with a 5-pole socket is included.



M12 device plug
front view



Pin number	Function	Wire colours for accessory: Connection cable HA010819/20/21
1	Supply voltage	brown
2	Output 4 - 20 mA	white
3	GND	blue
4	RS485 A (D+)	black
5	RS485 B (D-)	grey

NOTICE

To meet the EMC Directive 2014/30/EU a shielded cable must be used. The connection cable mentioned above (accessory HA0108xx, 5-pole M12x1 socket – free ends, PUR insulation), has a shielding included and is available in several lengths (refer to chapter 7 Accessories).

3.4 Auto-Calibration

Dew point temperatures ranging from -60 to -20 °C (-76...-4 °F) at room temperatures correspond to relative humidities of 0.08 to 5.37 %RH.

To guarantee the accuracy at the lowest humidity, even the smallest drift effects in the humidity sensing element must be compensated.

A special auto-calibration method is used to compensate the usual drift effects, which leads to high-precision measurements even at the lowest dew point temperatures.

Auto-calibration is carried out every 30 minutes and takes approx. 3 minutes.

When putting the device into operation after a long interruption, the regular auto-calibration procedure might require a long time to bring the device within specs. Therefore, an advanced auto-calibration mechanism takes place 5 min after power on.This advanced auto-calibration mechanism takes a little bit longer than the regular auto-calibration and is performed up to 5 times during the first hour of operation.

During auto-calibration, the analogue output can switch to one of two states:

- Frozen output signal, keeping the last measured value (default behaviour)
- 1 mA during advanced auto-calibration and 2 mA during standard auto-calibration

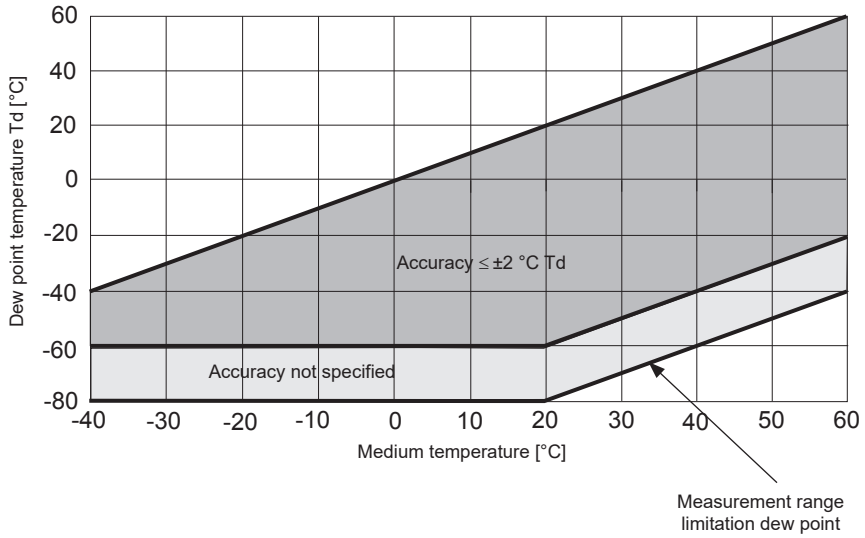
The auto-calibration behaviour depends on the sensor configuration which can be changed with the help of the PCS10 Product Configuration Software. Please refer to chapter 5 Setup and Configuration.

3.5 Measuring Range and Accuracy

The EE355 has an accuracy of ±2 °C specified within the measuring range -60...+60 °C dew point.

Measuring Signal Limitation	
at medium temperature ≤20 °C	Td limitation = -80 °C
at medium temperature >20 °C	Td limitation = medium temperature -100 °C

e.g. at medium temperature 40 °C the measuring signal is limited at -60 °C dew point temperature.



Tab. 1 Dew point measurement range and specified accuracy

The maximum scaling of the analogue output is -100...+80 °C dew point.

4 Mounting and Installation

4.1 Installation Location

The location must offer optimum measuring conditions. The air around the sensing element must be able to circulate freely.

Differences in temperature between the process and the installation location do not affect the dew point measurement. However, changes in gas pressure also impact the dew point temperature. If there is a pressure difference between the installation site and the process, the measurement can deviate from the actual dew point temperature by several tens of degrees.

The exact effects of pressure changes on the dew point can be simulated using the E+E humidity calculator. Further details can be found on our website www.epluse.com.

Leakage should be avoided, as ingress of moisture from the environment will interfere with the measurement.

PLEASE NOTE

On delivery, the sensor is protected by a cap that keeps the dew point sensor dry. The cap should only be removed immediately before installation in the application.

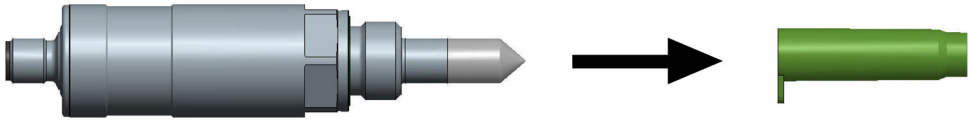


Fig. 1 Removal of the protection cap

4.2 Sensor Installation Directly into the Process

For direct installation in the pipeline, a shut-off valve should be installed on both sides of the process. The sensor can therefore be easily removed for maintenance and calibration work.

PLEASE NOTE

A sealing ring with an NPT 1/2" thread is not permitted. Use a suitable PTFE (Polytetrafluoroethylene) sealing tape or sealant instead.

1. Insert the sensor into the process and tighten it by hand as far as possible.
2. If available, check the sealing ring for correct centring.
3. Tighten the screw connection to a defined torque of 30 Nm.

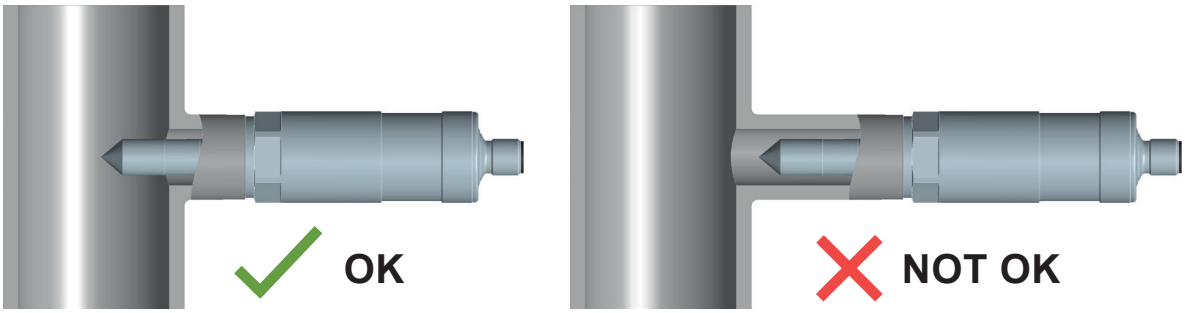


Fig. 2 Direct installation into the pipe

4.3 Sensor Installation in a Sampling System

Sampling is essential when a direct installation of the sensor in the process is not possible or not required. Reasons for this may be:

- The process temperature is too high
- The sensor must be protected from contamination.
- The removal of the sensor must not interrupt the process.

PLEASE NOTE

To obtain a representative sample of the process gas and to avoid measurement errors, the following must be observed:

- Be aware that differences in pressure between the process and the sampling chamber will result in significant measuring errors.
- Measurements at low dew point temperatures are sensitive to humidity diffusing from the environment due to leaks. Therefore, the sampling system must be pressure-tight.
- Use non-hygroscopic materials.
- The sampling line should be as short as possible.
- The response time increases if the gas flow is <1 l/min (0.25 gpm).
- A too low gas flow can result in back-diffusion of humidity from the environment and distort the measurement.

The pipe material has a significant influence on the response time and the lowest reachable dew point. As illustated in Fig. 3, different tubing materials release moisture over time when flushed with very dry gas after being at ambient humidity.

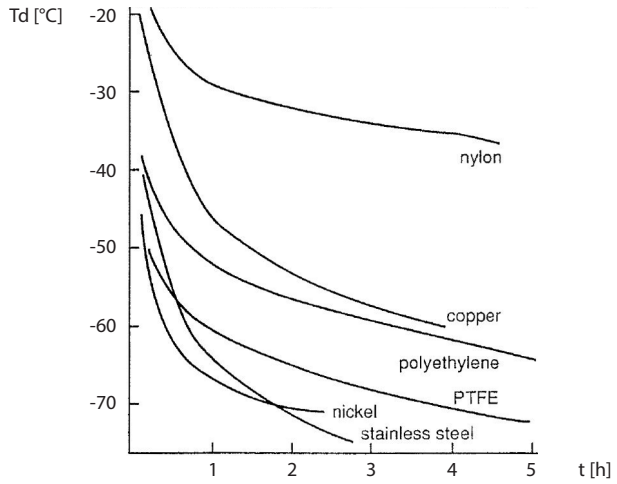


Fig. 3 Moisture given off by different tubing materials (© National Physical Laboratory)

Several sampling cells are optionally available:

- Basic sampling cell
- Sampling cell with quick connector and bleed screw
- Sampling cell for atmospheric dew point

Please refer to chapter 7 Accessories in this document and to the EE355 datasheet.

5 Setup and Configuration

The EE355 is ready to use and does not require any further configuration. The factory setup of EE355 corresponds to the specified order code. Please refer to the datasheet at www.epluse.com/ee355.

If needed, the factory setup can be modified. This chapter describes the configuration possibilites with the PCS10 Product Configuration Software and via the digital RS485 interface with Modbus RTU.

Modbus parameters can be set, the scaling of the analogue output can be changed and the behaviour of the analogue output during auto-calibration can be selected. For the auto-calibration behaviour, refer to chapter 3.4 Auto-Calibration.

5.1 PCS10 Product Configuration Software

The PCS10 provides a convenient graphical user interface to the EE355 for changing the factory setup via PCS10 and Modbus configuration adapter (HA011013).

NOTICE

Data integrity might not be provided during firmware download.

Ensure that the device is only powered by the USB interface during firmware update, otherwise the update may fail.

To use the software for changes in settings, please proceed as follows:

1. Download the PCS10 Product Configuration Software from www.epluse.com/pcs10 and install it on the PC.
2. Connect the ABC123 to the PC using the Modbus configuration adapter.
3. Start the PCS10 software.
4. Follow the instructions on the PCS10 opening page to scan the ports and to identify the connected device.
5. Click on the desired setup or adjustment mode from the main PCS10 menu on the left. Follow the PCS10 online instructions that are displayed when clicking on the “Tutorial” button.
6. Upload changes to the sensor by pressing the “Sync” button.

5.2 RS485 Digital Interface

PLEASE NOTE

- The EE355 can be used in Modbus networks that are based on RS485. Therefore, observe the RS485 specifications, especially regarding unit loads and bus termination.
- For proper function, the power supply must be strong enough to ensure supply voltage within the specified range (refer to chapter 8 Technical Data) at any time and at all devices in the bus. This is particularly relevant when using long and thin cables which can cause high voltage drop.

5.2.1. Modbus RTU Protocol Settings

	Factory settings	Selectable values (via PCS10)
Baud rate	9 600	9 600, 19 200, 38 400
Data bits	8	8
Parity	Even	None, even, odd
Stop bits	1	1, 2
Modbus address	243	1...247

Tab. 2 Modbus RTU protocol settings

PLEASE NOTE

- The recommended settings for multiple devices in a Modbus RTU network are 9600, 8, even, 1.
- The EE355 represents 1 unit load on an RS485 network.

Device address, baud rate, parity and stop bits can be set via:

- PCS10 Product Configuration Software and the Modbus configuration adapter HA011013.
  The PCS10 can be downloaded free of charge from www.epluse.com/pcs10.
- Modbus protocol in the register 1 (0x00) and 2 (0x01).
  See Application Note Modbus AN0103 (available at www.epluse.com/ee355).

The serial number as ASCII-code is located in read-only registers 1 - 8 (0x00 - 0x07).
The firmware version is located in read-only register 9 (0x08) (bit 15...8 = major release; bit 7...0 = minor release).
The sensor name as ASCII-code is located in read-only registers 10 - 17 (0x09 - 0x11).

NOTICE

When reading information that spans multiple registers, it is always necessary to read all registers, even if the desired information requires less.

NOTICE

To obtain the correct floating point values, both registers have to be read within the same reading cycle. The measured value may change between two Modbus requests. This can cause inconsistencies in the exponent and mantissa.

INFO

The Modbus function codes mentioned throughout this document shall be used as described in the MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3, chapter 6:
www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf

Communication settings (INT16)

Parameter	Register number[1] [Dec]	Register address[2] [Hex]	Size[3]
Write register: function code 0x06			
Modbus address[4]	1	00	1
Modbus protocol settings[4]	2	01	1

Device information (INT16)

Parameter	Register number[1] [Dec]	Register address[2] [Hex]	Size[3]
Read register: function code 0x03 / 0x04			
Serial number (as ASCII)	1	00	8
Firmware version	9	08	1
Sensor name (as ASCII)[5]	10	09	8
State of auto-calibration 0 ... normal operation 1 ... auto-calibration active	501	1F4	1

Application parameter

Parameter	Type	Register number[1] [Dec]	Register address[2] [Hex]	Size[3]
Read register: function code 0x03/04 / Write register: function code 0x10				
Working pressure[5][6]	FLOAT32	5001	1388	2

1) Register number (decimal) starts from 1.
2) Register address (hexadecimal) starts from 0.
3) Number of registers.
4) For Modbus address and protocol settings see Application Note Modbus AN0103 (available at www.epluse.com/ee355).
5) Register available only for the EE355 with Firmware Version 2.00-Rev 01 and higher.
6) Working pressure is expressed in mbar, with 2 decimal digits (e.g. 1008.25), default value 1013.25 mbar.
Example of Modbus frame to be sent to write Working pressure 1008.25 mbar:
Request [Hex]: F3 10 13 88 00 02 04 10 00 44 7C 1D C3
Response [Hex]: F3 10 13 88 00 02 D0 74.

Tab. 3 EE355 registers for device setup

INFO

- Working pressure is only implemented in the Modbus map for the EE355 with firmware version 2.00-Rev 01 or higher.

5.3 Modbus Register Map

The measurement data is saved as 32 bit floating point values (data type FLOAT32) and as 16 bit signed integer values (data type INT16). Depending on the measurement unit selected, the measurements are saved in SI or US/GB units. Measurement unit selection is made by means of the ordering code or with the help of the PCS10 Product Configuration Software.

FLOAT32

Parameter	Unit[1]	Register number[2] [DEC]	Register address[3] [HEX]
Read register: function code 0x03 / 0x04			
Dew point temperature, Td	°C, °F	32	1F
Frost point temperature, Tf	°C, °F	42	29
Volume concentration, Wv	ppm	60	3B
Water vapour partial pressure, e	mbar, psi	30	1D
Relative humidity (Uw), RH	%	28	1B
Temperature, T	°C, °F	26	19

INT16

Parameter	Unit[1)]	Register number[2)] [DEC]	Register address[3)] [HEX]
Read register: function code 0x03 / 0x04			
State of auto-calibration 0 ... normal operation 1 ... auto-calibration active	-	501	1F4
Write register: function code 0x06			
Modbus address[4)]	-	1	00
Modbus protocol settings[4)]	-	2	01

1) The choice of measurement units (metric or non-metric) must be done according to the ordering guide, see EE355 datasheet. Switching from metric to non-metric or vice versa by using the PCS10 is not possible.
2) Register number (decimal) starts from 1.
3) Register address (hexadecimal) starts from 0.
4) For Modbus address and protocol settings see Application Note Modbus AN0103 (available at www.epluse.com/ee355).

Tab. 4 EE355 FLOAT32 and INT16 measured data registers

INFO

Set the working pressure via the PCS10 Product Configuration Software (all firmware versions) or via Modbus protocol at register 5001 (only for EE355 with Firmware Version 2.00-Rev 01 and higher) to obtain the correct volume concentration Wv value if the working pressure differs from the ambient pressure.

5.4 Modbus RTU Example

The E355's Modbus address is 243 [0xF3].

Please refer to

- MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3, chapter 6: www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf
- E+E Application Note Modbus AN0103 (available at www.epluse.com/ee355)

Read the temperature (FLOAT32) T = 25.087642669677734375 °C from register address 0x19:

Master (e.g. PLC) → **EE355**

Request [Hex]:

Modbus address	Function code	Starting address Hi	Starting address Lo	Qty. of registers Hi	Qty. of registers Lo	CRC	
F3	03	00	32	00	02	70	D6

Response [Hex]:

Modbus address	Function code	Byte count	Register 1 value Hi	Register 1 value Lo	Register 2 value Hi	Register 2 value Lo	CRC	
F3	03	04	B3	7E	41	C8	5E	A6

Tab. 5 Example temperature query

NOTICE

To obtain the correct floating-point values, both registers have to be read within the same read cycle. The measured value may change between two Modbus requests. This can cause inconsistencies in the exponent and mantissa.

Decoding of floating point values:

Floating point values are stored according to IEEE754. The byte pairs 1, 2 and 3, 4 are transformed as follows (numbers taken from T reading Modbus request/response example above):

Modbus response [Hex]

Byte 3 (Register 1 - Hi)	Byte 4 (Register 1 - Lo)	Byte 1 (Register 2 - Hi)	Byte 2 (Register 2 - Lo)
B3	7E	41	C8
MMMMMMMM	MMMMMMMM	SEEEEEEE	EMMMMMMM

Tab. 6 Modbus response

IEEE754

Byte 1	Byte 2	Byte 3	Byte 4
41	C8	B3	7E
0100 0001	1100 1000	1011 0011	0111 1110
SEEE EEEE	EMMM MMMM	MMMM MMMM	MMMM MMMM
Decimal value: 25.087642669677734375			

Tab. 7 Data representation according to IEEE754

6 Maintenance and Service

6.1 Calibration and Adjustment

The EE355 can be calibrated / adjusted with the help of the PCS10. For this purpose, the sensor needs to be connected to a PC via a Modbus configuration adapter.

Definitions

- **Calibration** documents the accuracy of a measurement device. The device under test (specimen) is compared with the reference and the deviations are documented in a calibration certificate. During the calibration, the specimen is not changed or improved in any way.
- **Adjustment** improves the measurement accuracy of a device. The specimen is compared with the reference and brought in line with it. An adjustment can be followed by a calibration which documents the accuracy of the adjusted specimen.

6.2 Dew Point Adjustment by the User

Dew point adjustment is only possible at low dew points. The adjustment can only be carried out if the difference between the ambient temperature and the reference dew point temperature is >60 °C.

Example:

Ambient temperature = 20 °C

Reference dew point temperature must be lower than -40 °C.

6.3 Filter Cap Exchange

In a dusty, polluted environment, it might be necessary to replace the filter cap occasionally. In most cases, visible contamination or dirt indicate a clogged filter. Longer response time of the measurement also indicates a clogged filter cap. In this cases the filter cap should be replaced by a new one. The order code for new filters is HA010103.

Observe the following aspects when replacing the filter.

Procedure:

1. Carefully unscrew the filter cap counter-clockwise to avoid damaging the sensing element.
2. Handling the filter can clog the pores. Use gloves when screwing on the new filter.

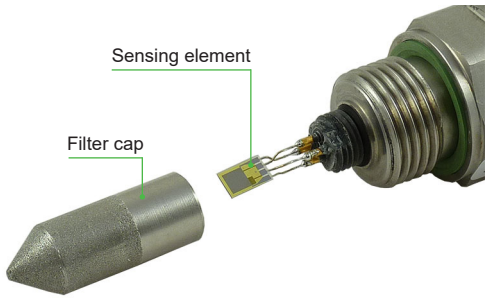


Fig. 4 EE355 Filter and Sensor

6.4 Cleaning the Sensing Element

NOTICE

- Never touch the sensing element
- Any attempt to clean the sensing element mechanically such as rubbing or brushing will certainly lead to its irreversible damage.

- For cleaning instructions please refer to www.epluse.com/ee355.

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
Stainless steel sintered filter cap	**HA010103**

7 Accessories

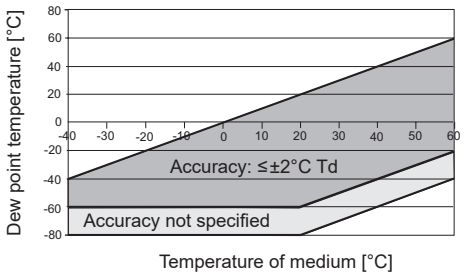
For further information please refer to the Accessories datasheet.

Description	Code
Modbus configuration adapter, M12 ←→ USB	**HA011013**
Sensor connection cable, shielded, 5 poles, M12x1 socket ←→ wire ferrules, PUR insulation 1.5 m (4.9 ft) 5 m (16.4 ft) 10 m (32.8 ft)	**HA010819** **HA010820** **HA010821**
E+E Product configuration software (Free download: www.epluse.com/pcs10)	**PCS10**
Sampling cell ISO G 1/2" with quick connector	**HA050102**
Sampling cell NPT with bleed screw	**HA050107**
Sampling cell ISO G 1/2" for atmospheric dew point	**HA050106**
Basic sampling cell with ISO G 1/2" connector	**HA050103**
Basic sampling cell with NPT connector	**HA050105**

8 Technical Data

Measurands

Dew Point Temperature (Td)

Measuring range	-60...60 °C Td (-76...140 °F Td)
Accuracy[1)]	
Response time t_{90}	< 5 min for step -5 °C Td (+23 °F Td) → -50 °C Td (-58 °F Td) < 20 s for step -50 °C Td (-58 °F Td) → -5 °C Td (-23 °F Td)

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

Volume Concentration (Wv)

Measuring range @ 1 013 mbar (14.7 psi)	20...200 000 ppm
Accuracy @ 20 °C (68 °F) and 1 013 mbar (14.7 psi)	±(5 ppm + 9 % from measured value)

Outputs

Analogue

Scalable output[1)] **Td, Tf or Wv**	4 - 20 mA 3-wire	R_L < 500 Ω	R_L = load resistance
Max. configurable scaling	-100...+80 °C Td (-148...+176 °F Td)	0...200 000 ppm	
Resolution	2 µA		

1) The EE355 simultaneously features an analogue current output and the RS485 interface.

Digital

Digital interface	RS485 (EE355 = 1 unit load)
Protocol **Factory settings**[1)] **Supported Baud rates** **Measured data types**	Modbus RTU 9 600 Baud, parity even, 1 stop bit, Modbus address 243 9 600, 19 200 and 38 400 FLOAT32 and INT16
Temperature dependency	±5 ppm of the measuring range / °C (Deviating from 20 °C)

1) Find more details about communication setting in the User Manual and the Modbus Application Note at www.epluse.com/ee355.

General

Power supply class III USA & Canada: Class 2 supply necessary	18 - 28 V DC
Current consumption @ 24 V DC	<20 mA + load current during normal measurement 100 mA + load current during auto-calibration
Electrical connection	M12x1, 5 poles, stainless steel 1.4404
Filter	Stainless steel sintered
Pressure working range	0...80 bar (0...1 160 psi)
Humidity working range	0...100 %RH
Temperature working range	-40...+70 °C (-40...+158 °F)
Storage conditions	-40...+60 °C (-40...+140 °F) 0...95 %RH, non-condensing
Enclosure **Material** **Protection rating**	Stainless steel 1.4404 (AISI 316L) IP65 / NEMA 4X
Electromagnetic compatibility	EN 61326-1 EN 61326-2-3 Industrial environment FCC Part15 Class B ICES-003 Class B
Conformity	CE UKCA
Configuration and adjustment	PCS10 Product Configuration Software (free download: www.epluse.com/pcs10) and configuration adapter

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.

and

UKCA UK statutory instruments and designated standards.

Please refer to the product page at www.epluse.com/ee355 for the Declarations of Conformity.

9.2 Electromagnetic Compatibility

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

9.3 FCC Part 15 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which thereceiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

9.4 ICES-003 Compliance Statement

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

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

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_EE355 | Version v1.8 | 06-2025
© Copyright E+E Elektronik Ges.m.b.H. | All rights reserved.

www.epluse.com