SENSORS

User Manual

Ambient Conditions Sensor

Model: ACS

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Notices and Warnings

Notices

Please **read all of this manual** before you install, operate or maintain this product. Pay attention to notes, warnings and instructions. The manufacturer cannot be held liable for any damage which occurs as a result of noncompliance with this manual.

Do not tamper with device. Should the device be tampered with in any manner other than a procedure which is described and specified in this manual, the warranty is cancelled and the manufacturer is exempt from liability.

The product is designed exclusively for the described application. Use of this product in conditions not specified in this manual or, contrary to the instructions provided by the manufacturer, is considered improper handling or improper use of the product. Improper handling will void your warranty. The manufacturer will not be held liable for any damages resulting from improper use of the product.

This manual should be read carefully by relevant personnel and the end user**.** This manual should be kept with the product and be made available as needed. **Once you install or use the product, you accept that you have read, understood and complied with this manual**.

CAA Sensors endeavours to make the content of this manual correct but is not responsible for omissions or errors and the consequences caused. In case of any doubts or questions regarding this manual or the product, please contact CAA Sensors.

Warnings

Ignoring the warnings can lead to serious injury and/or cause damage!

When handling, operating or carrying out maintenance on this product, personnel must employ safe working practices and observe all local health & safety requirements and regulations.

Improper operation or maintenance of this product could be dangerous and result in an accident causing damage to machinery or injury or death.

The manufacturer cannot anticipate every possible circumstance which may represent a potential hazard. The warnings in this manual cover the most common potential hazards and are therefore not all-inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by the manufacturer they must ensure that the product will not be damaged or made unsafe and that there is no risk to persons or property.

NEVER CHANGE ORIGINAL COMPONENTS WITH ALTERNATIVES.

Electrical Safety

Any contact with energised parts of the product, may lead to an electrical shock which can lead to serious injuries or even death. The user shall take all measures necessary to protect against electrical shock.

Consider all regulations for electrical installations.

The system must be disconnected from any power supply during maintenance work.

Any electrical work on the system is only allowed by authorised qualified personal.

Storage and transportation

The product should be transported and stored in its original packaging.

Make sure the product is stored at a temperature between -40°C to +85°C (-40°F to +185°F) and the humidity is <95%, no condensation.

Avoid direct UV and solar radiation during storage.

The manufacturer is not responsible for incidental damage caused by transportation or storage.

Cleaning

If you need to clean the sensor it is recommended to use a clean, dry cloth. For stubborn marks, use distilled water or isopropyl alcohol only.

Please note: contamination on the sensor tip will affect calibration and accuracy of the sensor. Removal of the contamination may not fix the issue.

Disposal

Electronic devices are recyclable material and do not belong in the household waste. The product, accessories and its packing material must be disposed according to local statutory requirements.

Introduction

Ambient Conditions Sensor

Intended use

CAA Sensors Ambient Conditions Sensors (ACS) are suitable for use in manufacturing, industrial, pharmaceutical and base building environments providing the sensor's specifications are met. This includes:

- The sensor is **not** used in pressurised areas.
- Air pressure between 0.6 to 1.1 bar (8.7 to 15.95 psi)
- Air temperature is between: -40°C to +85°C (-40°F to +185°F)
- Humidity is between 0 to 100% RH
- Altitude is between -500 to 4200 meters (1640 to 13780 ft)
- Power supply is between: 18 to 36 vDC
- The sensor is **not** used in explosive areas.

Refer to the *Specifications* section (next page) for full requirements.

The Ambient Conditions Sensor measures ambient temperature, relative humidity and pressure.

About the Sensor

The Ambient Conditions Sensor (ACS) is a multi-parameter device that simultaneously measures ambient temperature, humidity, and pressure.

The sensor is reliable, accurate and has long term stability. Ideal for use in locations where you want to get a better understanding of ambient conditions and the impact on plant and equipment.

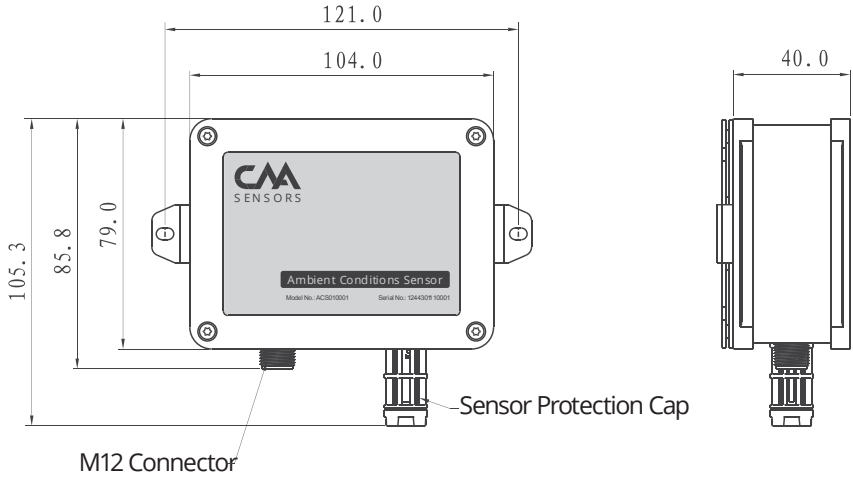
Specifications

Specifications

System	Ambient environments		
Medium (Gas)	Air		
Altitude	-500 to 4200 meters	-1640 to 13780 ft	
	Temperature		
Measurement Range	-40°C to +85°C	-40°F to +185°F	
Measurement Accuracy	±0.5°C		
Measurement Resolution	0.001		
Effect of Temperature on Accuracy	±0.2% to ±1.8% (-40 to +85 °C) Typical values ±0.6% @35 °C ±0.9% @50 °C		
	Pressure		
Measurement Range	60 to 110 kPa(a)	0.6 to 1.1 bar	8.7 to 15.95 psi
Measurement Accuracy	±0.2% RD		
Measurement Resolution	0.01		
	Humidity		
Measurement Range	0 to 100 %RH		
Measurement Accuracy	±2.0% RD		
Measurement Resolution	0.01		
	Outputs		
Output	Modbus RS485 / RTU		
Modbus Output Signals	Relative Humidity (RH), Temperature (°C), Pressure (kPa)		
	Power		
Power Supply	18 to 36 vDC		

	Max 2W @ 24vDC	
Electrical Connection	1 x 5 pin M12, female	
EMC	According to IEC 61326-1	
	Other Information	
Installation	Pipeline / Wall-mounted / DIN-rail	
Housing Material	ABS + AL6063	
Dimensions (L×W×H)	105 × 40 × 79 mm	4.1 x 1.6 x 3.1”
Weight	0.2 kg	7 ounces
Warranty	12 months	

Dimensions (mm)



Ambient Conditions Sensor Kit

Each pack comes with:

- ✓ Ambient Conditions Sensor
- ✓ Connector – either 5 meter cable with connector **or** connector only (no cable).

Ambient Conditions Sensor

Connector

M12 connector only
(no cable)

OR

5 meter cable with M12 connector

Installation

Installation Overview

Step 1 – Install the sensor

Step 2 – Wire the sensor (see '*Installation – Electrical*')

Step 3 – Check the sensor settings

Step 4 (optional) – Connect the sensor to your SCADA or energy management system

Notes and Warnings

WARNING! Incorrect installation can damage the sensor or cause it to work incorrectly.

Notes

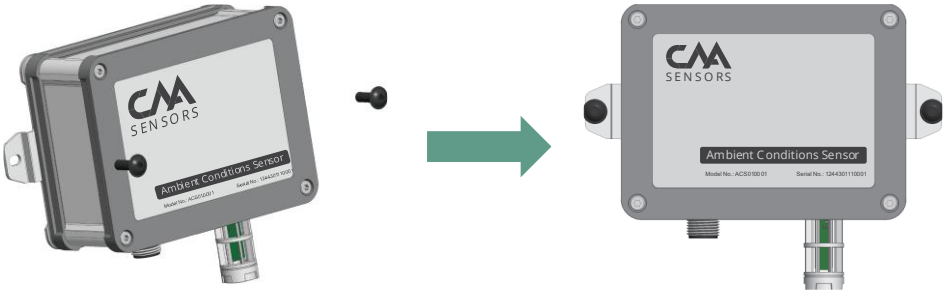
- Before installing the sensor, make sure it is rated for your system (refer to the "Specifications" section).
    - Use of the product outside specified ranges or operating parameters can lead to malfunctions and may damage the product or system.
- Do not use this product in explosive areas.
- Do not disassemble the product.
- Do **not** screw the M12 connector using force, otherwise it may damage the connection pins.
- Always check the M12 connectors to make sure they are wired correctly.
- Please follow local and national regulations before/during installation and operation.
- The system must be disconnected from any power supply during installation and maintenance work.
- Only authorised and qualified personnel can conduct electrical work.

Installation - Mechanical

Find a suitable location to install the sensor. Use one of the mounting methods below – wall mount, din rail mounting or pipe mount.

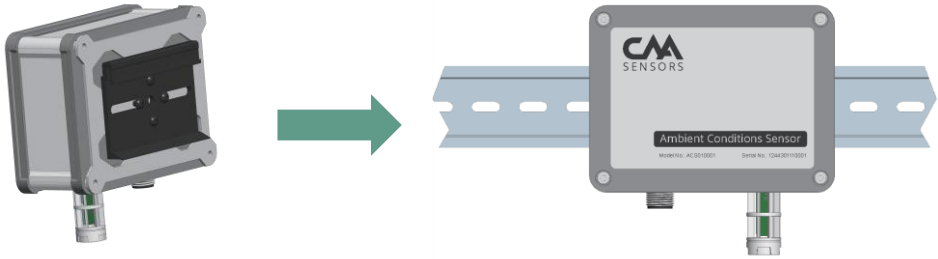
Wall Mount

Place the product at the designated position on the wall. Use 2 x screws and insert them through the mounting holes on the bracket. Tighten them with a screwdriver to complete the installation.



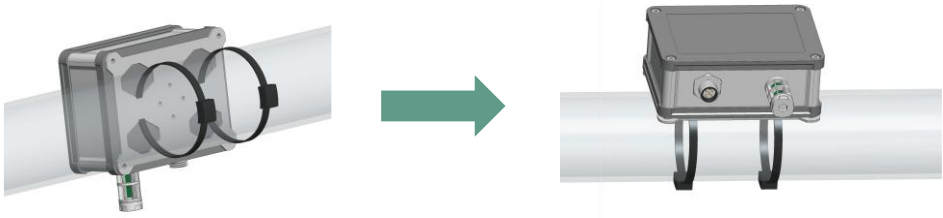
Din Rail Mounting

Slide the product into the pre-installed DIN-rail slot. The position can be adjusted as needed.



Pipe Mounting

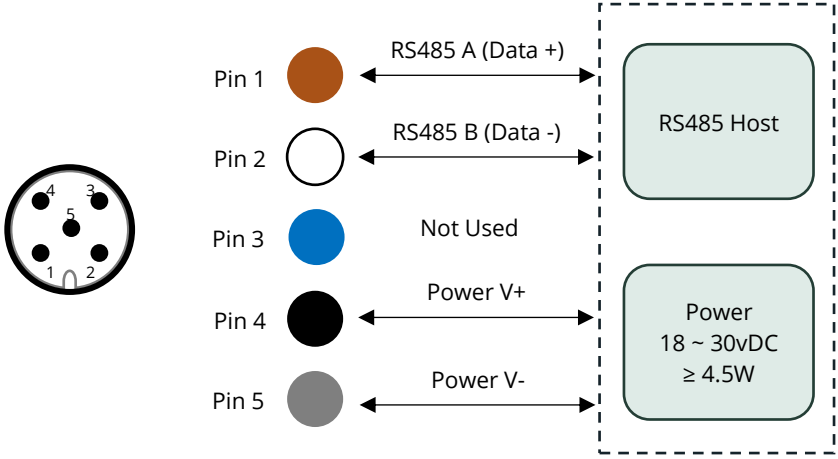
Prepare cable ties that match the pipe's circumference. Thread the cable ties through the holes on the back of the product and tie them to the corresponding position of the pipe



Installation – Electrical

WARNING! Incorrect wiring can damage the sensor or cause it to work incorrectly.

The Ambient Conditions Sensor has one 5 pin, M12 connector on the bottom of the sensor (see diagram below).



Commuication Settings

Default Modbus Settings

Default Modbus RTU (RS485) Settings					
Address	Baud Rate	Frame / Parity / Stop Bit	Response Time	Response Delay	Frame Spacing
1	9600	8 / N / 1	1 Sec	0 Milliseconds	7 Characters

Holding Register Definition

Logical channels, data and related holding registers

- Modbus read command: 0x03

Process Data Format: supports two data types: IEEE 754 float data and unsigned int data.

Float Format

Value (Decimal)	IEEE 754 float	Register N		Register N+1	
		High Byte	Low Byte	High Byte	Low Byte
123.4	0x42F6CCCD	0xCC	0xCD	0x42	0xF6

Unsigned int format

Value (Decimal)	Unsigned int	Register N		Register N+1	
		High Byte	Low Byte	High Byte	Low Byte
123456789	0x075BCD15	0xCD	0x15	0x07	0x5B

Byte Order = Little Endian Byte Swap.

- 32bit: CD AB
- 64 Bit: GH EF CD AB

Modbus Registers – Process Data

Holding Register	Data Type	Byte Length	Description	Comments	Read / Write
0	FLOAT_L	4	Temperature	ºC	Read
2	FLOAT_L	4	Relative Humidity	%RH	Read
20	FLOAT_L	4	Line Pressure (abs)	kPa	Read

An example write command is as follows

Floating point number v=123.4 its corresponding hex 0x42F6 CCCD. write this value to device address 1, holding register address 36 (pressure single point calibration offset)

Send Modbus commands：01 10 0024 0002 04 CCCD 42F6 EE0D

01: Device Address

10: Function code 16 in hexadecimal

0024: Keep register address 36 in hexadecimal

0002: Number of holding registers to be written

04: Number of holding register bytes (0x42F6 CCCD total 4 bytes)

CCCD: Floating point low 16 bits

42F6: Floating point high 16 bits

EE0D: CRC

Device Response：01 10 0024 0002 01C3

01: device address

10: Function code 16 in hexadecimal

0024: Keep register address 36 in hexadecimal

0002: Number of holding registers already written

01C3: CRC

Modbus Registers – Communication Configuration

Holding Register	Data Type	Byte Length	Description	Comments	Read / Write
Note: The Modbus Communication settings will take effect after writing a “1” to the holding register address 50. Then the Modbus master must change communication settings accordingly in order to communicate with the slave.					
50	UNSIGNED INT	2	Restart device Write “1” to restart device		Write
51	UNSIGNED INT	2	Device address	Range: 1 … 247 **Default** = 1	Read / Write
52	UNSIGNED INT	2	Baud Rate (bps)	12 = 1200 bps 24 = 2400 bps 48 = 4800 bps 96 = 9600 bps (**default**) 144 = 14400 bps 192 = 19200 bps 384 = 38400 bps 560 = 56000 bps 576 = 57600 bps 1152 = 115200	Read / Write
53	UNSIGNED INT	2	Parity	0 = None (**Default**) 1 = Odd 2 = Even	Read / Write
54	UNSIGNED INT	2	Stop Bit	1 bit (**default**) 2 bit	Read / Write
55	UNSIGNED INT	2	Response Time Out	1 ms/step Range: 0 … 255 ms	Read / Write

Trouble Shooting

Warranty

CAA Sensors provides a 12-month warranty for all sensors. The warranty covers materials and workmanship under the stated operating conditions from the date of delivery. Please report any findings immediately and within the warranty time.

If faults occur during the warranty period CAA Sensors will repair or replace the defective unit, without charge for repair labour and material costs but there is a charge for other services such as labour to remove or reinstall the instrument, transport and packing. Warranty repairs do not extend the period of warranty.

The following damage is excluded from this warranty:

- Improper use and non-adherence to the user manual.
- Use of unsuitable accessories.
- External influences (e.g. damage caused by vibration, damage during transportation, excess heat or moisture).

The warranty is cancelled when one of the following situations occurs:

- The user opens the measurement instrument without a direct request written in this manual.
- Repairs or modifications are undertaken by third parties or unauthorised persons.
- The serial number has been changed, damaged or removed.

Other claims, especially damage occurring on the outside of the instrument (eg dents, marks), are not included unless responsibility is legally binding.

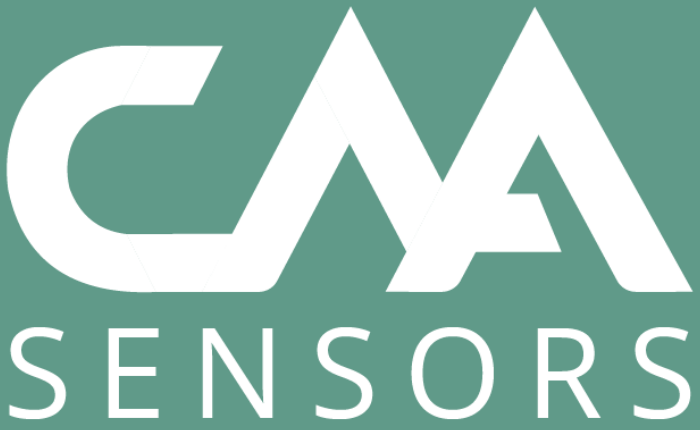
Calibration

The sensor is calibrated before delivery. The calibration date is printed on the certificate which is shipped with the sensor.

Sensors require calibration to remain accurate. The frequency of calibration depends greatly on the level of contamination within your system.

We recommend you calibrate the sensor every 2 years (provided the sensor is not exposed to contaminates or relative humidity above 85%). Calibration is excluded from the product warranty. For more information, contact CAA Sensors:

- Phone: +61 494095632
- What'sApp: +61 494095632
- E-mail: sales@caasensors.com



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