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## Operating instructions

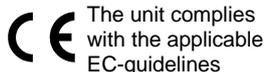


Fig. 1: 12913-00 Cobra SMARTsense Ammonium Ion

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## 1 SAFETY PRECAUTIONS



### Caution!

- Carefully read these operating instructions completely before operating this instrument. This is necessary to avoid damage to it, as well as for user-safety.
- Only use the instrument for the purpose for which it was designed.
- Only use the instrument in dry rooms in which there is no risk of explosion.
- Protect the instrument from dust, moisture and vapours. Use a slightly moist lint-free cloth to clean the instrument. Do not use aggressive cleaning agents or solvents.

## 2 PURPOSE AND CHARACTERISTICS

The sensor is used for the measurement of ammonium ion concentrations in liquids and the wireless transmission of the measured values via Bluetooth to any end device such as tablets, smartphones, etc.

### 3 FUNCTIONAL AND OPERATING ELEMENTS

#### 3.1 Operating elements

The sensor has an on-button and two LEDs for indicating the Bluetooth and battery charge status.

##### On-button

Press the on-button for more than 3 seconds to switch the sensor on and off

##### Bluetooth-LED

Flashing red every 2 seconds	Not connected
Flashing green every 2 seconds	Connected to the terminal device
Flashing green every 4 seconds	Running measurement

##### Battery charge LED

Flashing red every 5 seconds	Low battery
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#### 3.2 Measurement inputs

On the front side of the sensor there is a BNC connector to which the supplied ammonium ion-selective electrode (PNH<sub>3</sub>-2-004) can be connected.

### 4 NOTES ON OPERATION

The device fulfils all of the technical requirements that are compiled in current EC guidelines. The characteristics of this product qualify it for the CE mark.

This instrument is only to be put into operation under specialist supervision in a controlled electromagnetic environment in research, educational and training facilities (schools, universities, institutes and laboratories).

The individual connecting leads are each not to be longer than 2 m.

The instrument can be so influenced by electrostatic charges and other electromagnetic phenomena (HF, bursts, indirect lightning discharges) that it no longer works within the given specifications. Carry out the following measures to reduce or eliminate the effect of such disturbance: Ensure potential equalization at the PC (especially with Laptops). Use screening. When a total failure of the instrument occurs, unplug it and plug it back in again for a reset.

### 5 HANDLING

This section describes the start-up of the sensor and the recording of measurement data. Please read this section thoroughly in order to avoid failures or operating errors.

#### 5.1 Start-up

Switch the sensor on by pressing the on-button for more than 3 seconds. The Bluetooth LED lights up red. Start the software and select the sensor.

There is a 9-digit code on the back of the sensor (Fig.2). The last 4 digits of the code corresponds to the last four digits of the sensor name in the software (Fig.3).



Fig.2

This allows an exact assignment of the sensors with the software.



Fig.3

After the sensor has been selected in the software, the LED flashes green to indicate a correct connection. If the sensor is switched on and not connected, it switches off automatically after 5 minutes.

Connect the supplied ammonium electrode PNH<sub>3</sub>-2-004 to the BNC connector of the sensor.



Fig. 4

#### 5.2 Filling the conductive liquid into the electrode

**Important: The indicated molar masses refer to substances in the anhydrous state!**

Before using the electrode for the first time, it must be filled with the electrolyte solution supplied. Dilute the powder in the container with 30 ml of deionised water.

Alternatively, you can prepare the electrolyte solution yourself.

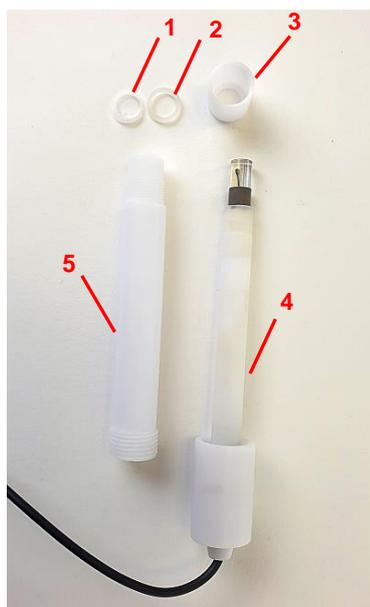
##### Preparation of the electrolyte solution:

1 M NaCl (one-molar sodium chloride solution), 1 M NH<sub>4</sub>Cl (one-molar ammonium chloride solution) and H<sub>2</sub>O deionised are required as stock solutions.

The concentration of the electrolyte solution should be 10 mM NH<sub>4</sub>Cl. Due to the strong dilution of the electrolyte solution, we recommend preparing it in larger quantities. For the preparation of 1 litre electrolyte solution you need:

- 890 ml H<sub>2</sub>O deionised
- 10 ml 1 M NH<sub>4</sub>Cl
- 100 ml 1 M NaCl

Proceed with the filling as described below:



- 1 = Diaphragm
- 2 = Sealing ring
- 3 = Front cap
- 4 = Electrode
- 5 = Outer shell

Fig.5

Unscrew the outer cover (5) from the electrode (4) and then also unscrew the front cap (3) from the outer cover (5).

Now check that the diaphragm (1) and the sealing ring (2) are correctly seated. The sealing ring must not be twisted or inserted crookedly.



Fig.6

Now screw the front cap with inserted diaphragm and sealing ring onto the outer casing(5) again.

Then carefully fill 7-8 ml of conductive liquid into the outer casing(5) using the enclosed syringe.



Fig. 7

Now carefully push the electrode into the filled outer casing and then turn the electrode with the outer casing (hand-tight).

**ATTENTION: Please do not use any tool to tighten. This may destroy the electrode or tear the membrane.**

### 5.3 Activating the electrode

If the electrode is used for the first time or has not been used for more than 1 week, it must be immersed in the activation solution for 24 hours before use. Make sure that the lower part of the electrode does not rest on the bottom of the container, as this may damage the membrane. Then rinse the electrode in deionised water.

#### Preparation of the activation solution:

1 M  $\text{NH}_4\text{Cl}$  (one-molar ammonium chloride solution) and  $\text{H}_2\text{O}$  deionised are required as stock solutions.

The concentration of the activation solution should be 10mM  $\text{NH}_4\text{Cl}$ . Due to the strong dilution of the activation solution, we recommend to prepare it in larger quantities. For the preparation of 1 litre activation solution you need:

- 990 ml  $\text{H}_2\text{O}$  deionised
- 10 ml 1 M  $\text{NH}_4\text{Cl}$

### 5.4 Calibration

Perform a 2-point calibration using measureAPP. Use 160 mg/l for the 1st measuring point and 1600 mg/l for the 2nd measuring point. The calibration solutions are prepared from the stock solutions. Use a magnetic stirrer with uniform stirring speed for uniform mixing.

#### Recipe for calibration solutions:

To prepare 1 litre of calibration solution you will need:

- 1000 ml  $\text{H}_2\text{O}$  deionised
- 1600 mg ammonium chloride

Take 100 ml of the prepared solution and add 900 ml of distilled water to it. You now have 900 ml calibration solution with 1600 mg/l and 1000 ml calibration solution with 160 mg/l available.

#### Hints:

- To ensure the measuring accuracy, the measuring electrode should be immersed for 60 seconds in the respective solutions at constant temperature, buffer solution and stirring speed before calibration and measurement. Between completion of calibration and start of measurement, the electrode must be immersed in the activation solution for at least 5 minutes.
- Before changing samples, the electrode should be completely cleaned and the residual water carefully dried to avoid cross-contamination between samples.

### 5.5 Measured value recording

The ion electrode is completely immersed in the medium to be measured at the measuring head. If a number of different test solutions are to be measured, it is advisable to rinse the ion electrode with deionized water between two measurements and carefully shake off the water to avoid cross-contamination of the samples.

### 5.6 Maintenance and cleaning of the electrode

After use, clean the electrode with deionized water and dry carefully. Fit the protective cover, but make sure that the lower end of the electrode does not rest on the bottom of the protective cover.

## 5.7 Possible sources of error.

1. If the electrode membrane is not mounted tightly, measuring solution enters the inside of the electrode and falsifies the measured values. Replace the conductive liquid as described in 5.2.
2. Sediments settle on the electrode membrane and block the membrane's function. Replace the membrane and ensure careful cleaning and storage.
3. The service life of an ammonia electrode is approx. 1 year, regardless of use or storage. Older electrodes may have an adverse effect on measurements. Therefore, replace the electrode after approx. 1 year.

## 5.8 Replacing the battery

### Remove the battery



Fig. 8

Open the sensor by turning the screw cap on the back of the sensor counter-clockwise, e.g. with a coin.



Fig. 9

Lever the battery sensitively, e.g. with the help of a small screwdriver or a small pair of scissors, out of its socket. Insert the screwdriver as shown in Fig. 9.

### Insert new battery

Slide the battery under the golden metal nose (Fig.10-1). Make sure that the battery is completely under the metal nose and completely pushed to the upper edge.

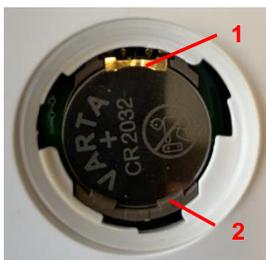


Fig. 10

Push the battery into the socket by pressing lightly on the opposite side.

The battery slips under the two plastic lugs (Fig. 10-2), which is also noticed by a short "click".

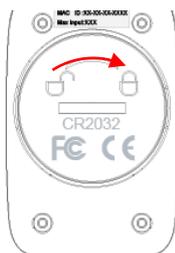


Fig. 11

Before closing, make sure that the seal in the lid is not bent and lies neatly on the edge of the lid. Then tighten the cover clockwise.

## 6 TECHNICAL DATA

Operating temperature range: 5 - 40°C  
Relative humidity < 80%.

Measuring range	0.9... 1800 mg/l
Resolution	0.5 mg/l
Accuracy*	±10%
Max. data transfer rate	10 Hz
Battery type	CR2032
Max. wireless range (open field)	30 m
Dimensions (WxHxD)	90 x 44 x 23 mm
Weight (incl. electrode)	97 g

\*After calibration

## 7 SCOPE OF DELIVERY

The scope of delivery includes:

- Cobra SMARTsense Ammonium Ion 12913-00
- Ammonium Ion-selective electrode PNH<sub>3</sub>-2-004
- Instruction manual

## 8 ACCESSORIES

The following accessories are available:

- Button cell CR2032, 3 V 07922-15
- Cobra SMARTlink 12999-99
- Ammonium Ion-selective electrode PNH<sub>3</sub>-2-004 12913-10
- Free measureApp available from supplier portals

iOS

Android

Windows



## 9 CONFORMITY



PHYWE Systeme GmbH & Co.KG hereby declares that the radio system type 12913-00 complies with the 2014/53/EU directive. The complete text of the EC Declaration of Conformity is available at the following Internet address:

[www.phywe.com/en/ec-declaration](http://www.phywe.com/en/ec-declaration)

## 10 DISPOSAL

The packaging mainly consists of environmentally-friendly materials that should be returned to the local recycling stations.



Do not dispose of this product with normal household waste. If this unit needs to be disposed of, please return it to the address that is stated below for proper disposal

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