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### Operating instructions

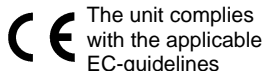


Fig. 1: 12924-01 Cobra SMARTsense Colorimeter & Turbidity

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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.
- Take care that no liquid penetrates in through the housing openings, as such penetration would result in damage to Sensor.
- Do not open the unit.

### 2 PURPOSE AND CHARACTERISTICS

The Cobra4 Sensor-Unit Colorimeter is used for measuring the absorption or transmission of light. For this purpose, there are five wavelengths: red: 650 nm, orange: 610 nm, green: 520 nm, blue 470 nm and violet 430 nm. The measured values are transferred to a terminal device, e.g. to a table computer, smartphone, etc., via Bluetooth or USB.

### 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** 

To switch the sensor on and off in Bluetooth mode, the power button must be pressed for longer than 3s. If the sensor is to be connected via USB, it is not necessary to press the power button. The button must be pressed briefly to advance the display values

**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 2 seconds	Low battery
Illuminated red	Active charging process
Illuminated green	Charging process completed

Display unit

The high-contrast OLED display indicates the LED color, wavelength and the transmission, absorption or turbidity value.

#### 3.2 Functional elements

The cuvette compartment is located under the lid that can be folded up.



Fig. 2: Functional elements

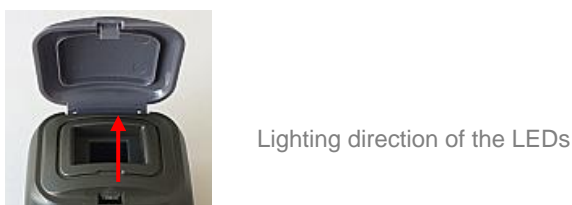


Fig. 3: Lighting direction of the LEDs

#### 3.3 USB port

The battery, which is permanently installed in the sensor, is charged via the type C USB port. Furthermore, communication with a computer takes place via this interface.

### 4 NOTES ON OPERATION

This 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.

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. Do not operate high frequency emitters (e.g. radio equipment or mobile radiotelephones) in the immediate vicinity. 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 Charging process

Use a USB-C cable to connect the sensor to a computer or USB charger (not included).

During the charging process, the battery charge LED lights up red. When the charging process is complete, the battery charge LED lights up green. The charging time for a completely discharged battery is 3 hours maximum.



Disconnect the charger at the latest four hours after the completion of the charging process. Otherwise, the service life of the battery may be negatively affected.

#### 5.2 Start-up

Switch on the sensor by pressing the power button for more than 3s. Now the Bluetooth LED flashes red. Start the software and select the sensor.

If the sensor is to be used via the USB interface, it does not need to be switched on. The sensor is connected directly to the end device using the supplied USB cable.

There is a 9-digit code printed below the display (Fig.4). The last 4 digits of the code are displayed as the sensor name in the software (Fig.3). This enables the precise assignment of the sensors within the software.



Fig. 4

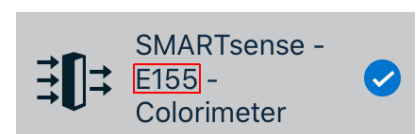


Fig. 5

## Selection of the sensor via the Bluetooth interface

Make sure that the Bluetooth interface is activated on the terminal device (PC/Tablet/Smartphone) and that the software is allowed to access the interface.

After the sensor has been selected in the software, the LED flashes green to indicate that the connection has been established correctly. After the sensor has been coupled with the software, the sensor is no longer visible to other users in the software, and therefore can no longer be selected.

If the sensor is switched on and not connected, it switches off automatically after 5 minutes.

## Positioning the cuvette

Insert the cuvette directly into the cuvette compartment that is intended for this purpose. The cuvette has two different types of sides: two opposite sides are transparent, and the other two are opaque or serrated. The transparent sides must be aligned in the lighting direction (Fig. 3). Then, close the cover and ensure that you can hear it lock.

## Measurement

For a conclusive measurement, it is important that the cuvette is clean, i.e. free from dust and fingerprints. The cuvettes can be cleaned rather well with kitchen paper (paper towel).

Fill your sample into the cuvette and ensure that it is free from air bubbles. Insert the cuvette as described hereinabove.

The light of the five wavelengths will be emitted continuously one after the other and the absorption will be measured.

The sensor has 5 channels (5 wavelengths) and 2 operating modes:

[T] Transmission (%): Part of the light that passes through the sample.

[A] Absorbance (Abs): The absorbance  $A$  is calculated based on the intensity without the sample ( $I_0$ ) and based on the intensity with the sample ( $I$ )

$$A = \log \frac{I_0}{I}$$

It is a unit-free measure.

Turbidity (NTU): The fraction of light scattered by the undissolved particles in the sample (nephelometry). A red LED with  $\lambda = 650$  nm serves as the light source

## 6 TECHNICAL DATA

Operating temperature range: 5 - 40°C

Rel. humidity < 80%

Measuring range: 5 Wave length (LEDs)

Red	650 nm
Orange:	611 nm
Green:	520 nm
Blue:	470 nm
Violet:	430 nm

## Transmission

Range	0...100 %
Resolution	0.1 %

## Absorbance

Range	0...3 Abs
Resolution	0.01 Abs
Accuracy	±0,03 Abs

## Turbidity

Range	0...400 NTU
Resolution	0.1 NTU
Accuracy	±5%

Max. data rate	1 Hz
Battery capacity	1000 mAh
Max. wireless range (open field)	30 m
Dimensions (length x width x height)	100 x 57 x 55 mm
Weight	103 g

## 7 SCOPE OF DELIVERY

The extent of delivery is as follows

• Cobra SMARTsense Colorimeter	12924-01
• USB connecting cable type C	07935-00
• Macro-cuvettes, PS, 4 ml	
• Operating instructions	

## 8 ACCESSORIES

The following accessories are available:

• Cobra SMARTlink	12999-99
• USB-charger	07932-99
• Macro-cuvettes, PS, 4 ml, 100 pcs	35663-10
• USB-Bluetooth-Adapter	07936-00
• Software measureLAB	14580-61
• Free measureApp available from supplier portals	

iOS



Android



Windows



## 9 CONFORMITY



PHYWE Systeme GmbH & Co.KG hereby declares that the radio system type 12924-01 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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