Cobra SMARTsense Soil Moisture

12954-00

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Fig. 1: 12954-00 Cobra SMARTsense Soil Moisture

Operating instructions

CE The unit complies with the applicable EC-guidelines

TABLE OF CONTENTS

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.
- Do not open the unit.

2 PURPOSE AND CHARACTERISTICS

The sensor measures the volumetric water content (%VWC) in the soil and transmits the measured values via Bluetooth or USB to any end terminal devices, e.g. a tablet computer or smartphone.

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

Pressed for longer 3s	Switch sensor on/off
Pressed 3x quickly	Start offline measurement
Pressed 2x quickly	Stop offline measurement

If the sensor is to be connected via USB, it is not necessary to press the power button longer 3s.

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

3.2 USB port

The battery, which is permanently installed in the sensor, is charged via the type C USB port. Furthermore, communication with the terminal device (Computer/Tablet) takes place via this interface.

3.3 Functional elements

The moisture-sensitive element is located in the plug-in probe, which is connected to the sensor via a connecting cable.

3.4 Functionality of the sensor

The sensor measures the soil moisture as volumetric water content (% VWC). The VWC is a measure of the amount of water contained in a soil volume, expressed as a percentage of the volume. For example, if 1m³ consists of 0.15m³ of air, 0.40m³ of water and 0.45m³ of soil minerals, the VWC is 40%.

The sensor measures moisture by utilising the electrical properties of a moisture-sensitive element, e.g. its resistance, which changes with moisture. The sensor emits an alternating current signal at one end and receives it at the other. If the moisture content of the soil is higher, the impedance for the AC signal decreases, resulting in a stronger signal at the receiving end. If, on the other hand, the moisture content of the soil is lower, the signal attenuation increases, resulting in a weaker received signal. The sensor uses these signal fluctuations to calculate the percentage water content per unit volume of soil

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.

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 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.

A 9-digit code is printed on the back of the sensor (Fig.2). The last 4 digits of the code are displayed in the software as the sensor designation (Fig.3). This allows an exact assignment of the sensors possible with the software.

Fig. 2

Fig. 3

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.

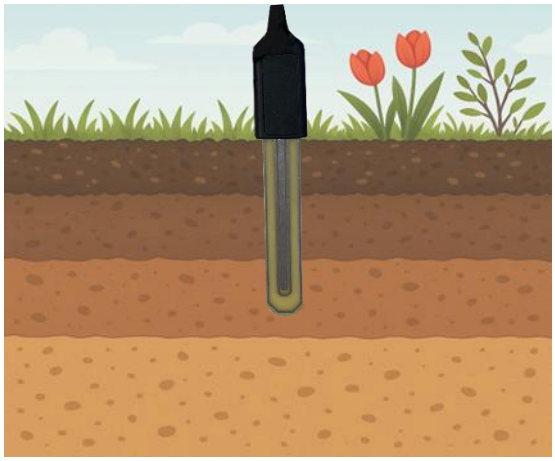
Selection of the sensor via the USB interface

For this purpose the sensor must be plugged into the USB port of the end device. It is not necessary to switch on the sensor. The sensor is automatically recognized and displayed. It can be selected and connected directly.

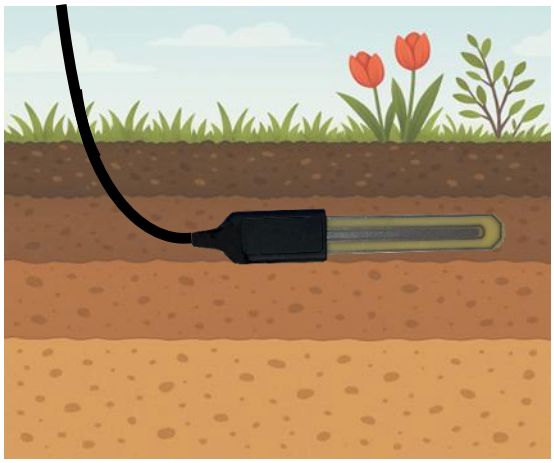
5.2 Recording soil moisture measurement data

Only the insertion probe is waterproof and may be inserted into the ground, but not the sensor. Ensure that the sensor is not exposed to high levels of moisture.
Never pull the probe out of the ground by the connecting cable as this can damage the probe.

Either push the probe vertically into the ground until the blade of the probe is completely sunk into the ground. Ensure that the probe is completely surrounded by soil. Air pockets can falsify the measured values.



If you want to determine the moisture in a specific layer of soil, bury the probe horizontally in the ground and only lead the connecting cable out of the ground to the sensor.



Start the measured value recording by pressing the recording button in the measureAPP software.

5.3 Offline measurement

Switch on the sensor by pressing the power button for more than 3s. To start an offline measurement, press the power button 3 times in quick succession. The Bluetooth LED then flashes green 3 times in rapid succession to acknowledge the successful start. To stop a measurement, press the switch-on button 2x in quick succession. The Bluetooth LED also acknowledges this by flashing quickly.

Offline measurements can be read out via the measureAPP or measureLAB software. Furthermore, offline parameters such as data rate and measurement duration can be set. After the set measurement duration has elapsed, the offline measurement is automatically terminated. However, the measurement can always be ended prematurely by pressing the switch-on button.

5.4 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.

6 TECHNICAL DATA

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

Measuring range	0 … 60 %(VWC)
Resolution	0.1 %
Accuracy	± 5 %
Max. date rate (Wireless)	2 Hz
Battery capacity	250 mAh
Max. wireless range (open field)	30 m
Dimensions (length x width x height)	100 x 40 x 27 mm
Weight	52 g

7 SCOPE OF DELIVERY

The extent of delivery is as follows

- Cobra Soil Moisture 12954-00
- Measuring probe
- USB connecting cable type C 07935-00
- Operating instructions

8 ACCESSORIES

The following accessories are available:

- Cobra SMARTlink 12999-99
- USB Bluetooth adapter 07936-00
- USB connecting cable type C 07935-00
- 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 12954-00 complies with Directive 2014/53/EU. The complete text of the EU Declaration of Conformity is available at the following Internet address:
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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11 NOTES ON BATTERY AND RECHARGEABLE BATTERY DISPOSAL

As we sell batteries and rechargeable batteries or devices containing batteries and rechargeable batteries, we are obliged under the Battery Act to inform you of the following: Batteries and rechargeable batteries may not be disposed of with household waste, but you are legally obliged to return used batteries and rechargeable batteries. Used batteries may contain harmful substances that can damage the environment or your health if they are not stored or disposed of properly. Batteries also contain important raw materials such as iron, zinc, manganese or nickel and are recycled. You can either send the batteries back to us after use or return them free of charge in the immediate vicinity (e.g. in shops or at municipal collection centres). Batteries or rechargeable batteries that contain harmful substances are labelled with the symbol of a crossed-out dustbin.