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### Operating instructions

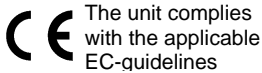


Fig. 1: 12936-01 Cobra SMARTsense Spirometer

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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 sensor is used for measuring the respiratory volume and volumetric flow rate and for transferring the values to a terminal device, e.g. a tablet computer, smartphone, etc., via Bluetooth or USB.

The sensor is neither suitable nor approved for medical purposes. It is intended solely for didactic purposes. This device must not be used for defined measurements on humans in order to diagnose an illness or disease, i.e. it is not intended for monitoring, treating or alleviating illnesses or diseases. As a consequence, it is not subject to the strict constraints of the Medical Devices Act.

### 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 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

Attach the supplied mouthpiece with filter to the sensor.



Fig. 2: Connecting the mouthpiece with filter

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 on the back of the sensor (Fig.3). The last 4 digits of the code are displayed as the sensor name in the software (Fig.4). This enables the precise assignment of the sensors within the software.

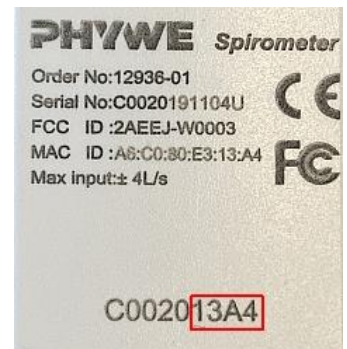


Fig. 3

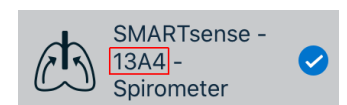


Fig. 4

#### 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.

### 5.3 Recording of measurement data

#### Measuring principle:

Inside the tube, the air flow hits several small lamella. The result is a slight flow resistance, leading to a small difference in pressure. This pressure difference is evaluated electronically. In accordance with the Hagen–Poiseuille law, the pressure drop upstream and downstream of the lamella in laminar flow is directly proportional to the volume flow Q (flow rate).

The volume V is calculated by integrating the flow rate as a function of time.

The pressure difference is lowest when the spirometer is upright. Depending on how you hold the sensor, an offset value of the flow rate may be displayed. This can result in the calculated volume increasing continuously even though you are not breathing into the sensor.

#### Set flow rate to zero:

To do this, connect the sensor to the PHYWE measure APP. Place the sensor in an upright position. Select the 'Set to zero' button under Configuration in the measureAPP. Select the spirometer here and zero the sensor. You can then carry out your measurement.

#### Measurement:

To minimize falsification of the measurement results, ensure that the spirometer has been 'zeroed' before use. Stand upright and start the measurement. Exhale and inhale evenly through the attached cardboard tube. Then, inhale as deeply as possible and then exhale completely, if possible. Stop the measurement. This spirogram provides information about the various parameters of the respiratory volume, e.g. the vital capacity and tidal volume.

### 5.4 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.

## 6 TECHNICAL DATA

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

#### Flow Rate

Measuring range	-10 l/s ~ 10 l/s
Resolution	0.01 l/s
Accuracy	±3%

#### Volume:

Measuring range	-15 l ~ 15 l
Resolution	0.01
Accuracy	±3%

Max. data rate	200 Hz
Battery capacity	250 mAh
Max. wireless range (open field)	30 m
Dimensions (length x width x height)	120x 40 x 37 mm
Weight	63 g

## 7 SCOPE OF DELIVERY

The extent of delivery is as follows

• Cobra SMARTsense Spirometer	12936-01
• USB cable type C	07935-00
• 1x Mouthpiece including filter	12936-20
• Operating instructions	

## 8 ACCESSORIES

The following accessories are available:

• Cobra SMARTlink	12999-99
• USB-charger	07934-99
• USB cable type C	07935-00
• USB-Bluetooth-Adapter	07936-00
• Software measureLAB	14580-61
• Mouthpiece including filter	12936-20
• Cardboard mouthpiece with filter paper	12936-10
• Free measureApp available from supplier portals	

iOS



Android



Windows



## 9 CONFORMITY



PHYWE Systeme GmbH & Co.KG hereby declares that the radio system type 12936-01 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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