PHYWE
excellence in science

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Operating instructions

CE The unit complies with the applicable EC-guidelines
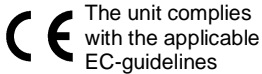
Fig. 1: 12946-00 Cobra SMARTsense Weatherstation

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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.
- 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 wind speed, wind direction, barometric pressure, humidity, dew point, wind chill temperature, ambient temperature, ambient light, UV index, PAR and irradiance. The GPS module reports latitude, longitude, altitude, speed and direction.

The measured values can be read off the display or transmitted via Bluetooth or USB to any end device such as tablets, smartphones, etc.

An offline measurement with subsequent evaluation of the measured data on a terminal device is also possible.

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3 FUNCTIONAL AND OPERATING ELEMENTS

3.1 Operating elements

The sensor has a power button, two arrow keys for navigation and 2 LEDs whose function is described below.

Function of the power button ⏻

Short press	Switch on the device
Long actuation (> 3s)	Switch on Bluetooth
	Switch off the device

Warning: To switch off the device, Bluetooth must be switched on.

Function of the button ⇕

Short press	Select vertical menu. (headings)
>3s actuated	Language configuration

Fig. 2

Function of the button ◁▷

Short press	Select horizontal menu. (measurement channels)
Long actuation (>3s) In category weather and light	Wind direction calibration
Long actuation (>3s) In section GPS	Switching GPS on / off

Functions of the Bluetooth LED ⸶

Flashes red every 2s	Not connected
Flashing green every 2s	Connected to terminal device
Flashing green every 4s	Measurement recording in progress

Functions of the charging ⊡

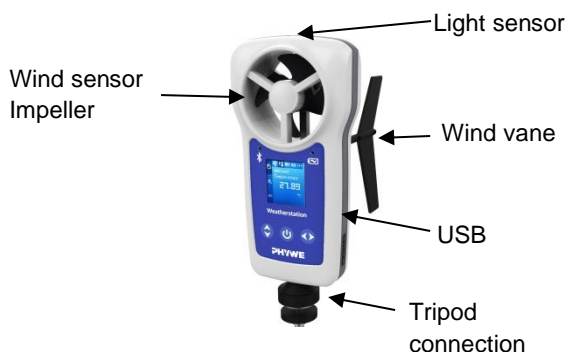| Flashing red	Low battery
Red luminous	Charging active
Green shining	Charging finished

3.2 Functional elements

Fig. 3

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.

To prevent moisture from penetrating, press the rubber cover onto the USB socket.

3.4 Wind sensor impeller

Position the impeller in the wind so that it is blown at a right angle, or press the unit onto the rotating head of the stand and mount the wind vane. The unit will now automatically position itself in the wind.

3.5 Wind vane

The supplied wind vane is screwed into the thread in the middle of the back and secured with the union nut. The wind vane automatically turns the unit into the wind when it is rotatably mounted, for example on a tripod.

3.6 Light sensor

The light sensor is mounted on the top of the unit, protected from water. Align the sensor according to the light source.

3.7 Tripod connection

Screw the unit onto the tripod with the wing screw on the tripod. Make sure that the rotating area in which the thread is located does not rotate during fixing the wing screw.

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.

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

Connect the sensor to a computer or an appropriate USB charger (not supplied) using a USB-C connection cable.

During charging, the charging LED lights up red. When the charging process is complete, the charging LED lights up green. The charging time for an empty battery is a maximum of 3 hours.

⚠ 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

5.2.1 Use without software / APP

After briefly pressing the power button ⏻ the Display open. All relevant measured values can now be displayed via two symbol menu bars. The selection is made via the arrow keys.

Measurement channels
Selection via the key ◁▷

Fig. 4

Categories :
Selection via the key ⬘⬙

Category Weather data

Wind speed:

The wind speed is determined from the rotation speed of the anemometer. It is important to ensure that the air can flow directly into the turbine. The wind speed must be at least 0.5 m/s to be measured.

Wind direction:

An electronic compass determines the wind direction in the range of 0...360°. N = 0°/360°, E = 90°, S = 180°, W = 270°.

To calibrate the electronic compass, press the key ◁▷ for at least 3 seconds. The display switches over (see fig.5 and fig.6). Now turn the sensor 3-4x in horizontal and 3-4x in vertical direction. The direction of rotation can be seen on the display.

Fig.5 horizontal calibration

Fig.6 vertical calibration

Ambient temperature:

The outside temperature is measured at the unit. To obtain accurate readings, the unit must not be exposed to sunlight.

Relative humidity:

The relative humidity indicates the saturation ratio of the air, taking into account the temperature, in percent (%). An air humidity of 100% means that the air is maximally saturated

Absolute humidity:

The absolute humidity indicates how many grams (g) of water are contained per cubic metre (m³) of air (water vapour density).

Dew point:

The dew point indicates the temperature to which air must be cooled until it is saturated with water vapour so that it can start to condense.

The following figure shows the dew point as a function of relative humidity for different temperatures:
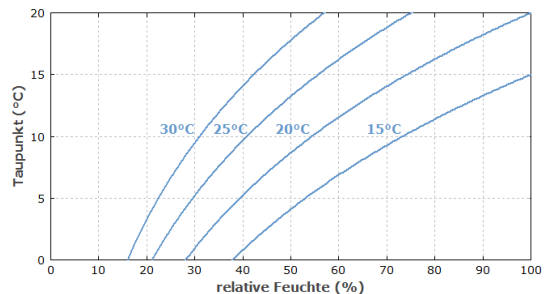
Fig. 7 : Dew point for 4 different temperatures

Wind Chill

The Wind Chill (also called wind chill or wind chill) describes the difference between the measured ambient temperature and the perceived temperature as a function of wind speed. It is defined for temperatures below 10°C, because from this temperature on the absolute humidity of the air is less than 1% to the air mass, and therefore its influence on the thermal conductivity and heat capacity is negligible.

	5 °C	3 °C	1 °C	0 °C	-1 °C
10 km/h	2,3	0,1	-2,1	-3,2	-4,3
15 km/h	-0,6	-3,0	-5,4	-6,6	-7,8
20 km/h	-2,9	-5,4	-8,0	-9,3	-10,6
25 km/h	-4,6	-7,3	-10,0	-11,3	-12,7
30 km/h	-6,0	-8,8	-11,6	-13,0	-14,4

Fig. 8: Wind Chill in the range -1...5°C and 10...30 km/h

Barometric pressure

The pressure corresponds to the weight of the column of air standing on a body on the surface of the earth. The measured pressure value corresponds to the actual ambient pressure, not the sea level-corrected pressure.

Category Lighting data

Ambient light

Ambient light is detected by the light sensor installed in the top of the housing.

Light sensor

Fig. 9

Attention: For correct measurement, it is important to ensure that the light sensor is free of dirt and that there are no water droplets in front of the light sensor.

UV Index

The UV index is an internationally standardised measure of the solar irradiance (UV radiation) effective for sunburn.

UV Index	Evaluation
0-2	low
3-5	moderate
6-7	high
8-10	very high
>10	extreme

PAR (Photosynthetically Active Radiation)

The wavelength range of the PAR value is 400-700nm, and thus largely covers the range of radiation visible to humans from 380-780nm. This light spectrum is mainly used in organisms for photosynthesis. The PAR value is measured in µmol/m2/s.

Irradiance

Irradiance describes the total power of incoming electromagnetic energy striking a surface - in relation to the size of the area. It is measured in W/m2.

Category GPS (Global Positioning System)

In order to get the longest possible battery life, the GPS functionality is deactivated when the weather station is switched on.

Press and hold the key ◁▷ for more than 3s to enable and disable GPS. (Make sure they are in the GPS section, otherwise the wind direction calibration will be activated).

For position recognition with GPS, at least 3 satellites must be recognised. The detection can take 1-2 minutes for weather conditions and satellite positions.

Attention: Reliable detection is only possible outside buildings.

Height

GPS elevations are based on an ellipsoid (a mathematical representation of the shape of the earth), while map elevation data is based on a vertical zero point associated with the geoid (commonly known as sea level). GPS elevation may be subject to a high degree of deviation due to the varying number of satellites detected for horizontal position detection (e.g. hidden by the earth).

Latitude

The geographical latitude is given as the angle between the line earth-centre-equator and the line earth-centre-place. North and south pole have a latitude angle of 90°. In order to distinguish places in the northern hemisphere from those in the southern hemisphere, the latitude is also given an N for north or an S for south in the traditional notation.

Longitude

The longitude is given as the angle between the line Earth Centre - Zero Meridian and the line Earth Centre - Location. The Greenwich meridian has an angle of 0°, while the opposite longitude, along which the dateline runs, has an angle of 180°.

The prime meridian divides the earth's surface into a western and an eastern hemisphere. In order to distinguish places on the two hemispheres from each other, the traditional notation additionally gives the longitude a W for west or an E for east.

The latitude and longitude are given in sexagesimal system. This is based on the number 60, where the coordinates consist of 3 components.

1. Longitude and latitude are given as angles (°).
2. Each degree has 60 minutes. These are indicated by a prime (′).
3. Each minute has 60 seconds, which can be identified by a double prime (″).

Speed

The GPS speed can be determined by using the Doppler effect. This describes the extent to which a radio signal is compressed or stretched when it is transmitted by an object in motion. The speed results from the frequency change Δf, the signal frequency f and the speed of light c: $v = \Delta f\, c\, /\, f\, /\, 2$.

The absolute accuracy is about 0.1 km/h.

True direction.

The True Direction refers to the true north pole (or Geographic North Pole), which differs from the magnetic north pole by a few degrees. The direction is shown in °.

Starting an offline measurement recording

To start a measurement, press the power button ⏻ three times in quick succession. Afterwards the Bluetooth LED ✶ flashes green 3 times in quick succession, confirming the successful start. To stop a measurement press the power button twice in quick succession. The green LED also acknowledges this.

○ Measurement stopped
□ Measurement started

Even during a started measurement, the display switches off after 5 minutes if no more keys are pressed. A flashing Bluetooth LED ✶ indicates that the measurement is still running.

With the PHYWE measuring software the measured data can be read out later via Bluetooth or USB.
Attention: Bluetooth cannot be activated during an ongoing offline measurement.

Language settings

To change the language, press the button ⇕ for longer than 3s. Now you can select the appropriate language with the push-button ⇕ . To confirm the selection, press the button again for more than 3s.

Use with software / APP

Switch on the sensor by pressing and holding 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 terminal device using the supplied USB cable.

A 9-digit code is printed on the back of the sensor (Fig.10). The last 4 digits of the code are displayed as sensor designation in the software (fig.11). This allows an exact assignment of the sensors possible with the software.
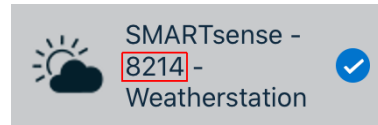

Fig. 10

Fig. 11

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.

6   TECHNICAL DATA

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

Wind speed:
Measuring range	1.8...54 km/h
Resolution	0.36 km/h

Wind direction:
Measuring range	0…360 °

ambient temperature:
Measuring range	-40…125 °C
Resolution	0.1 °C

Relative air humidity
Measuring range	0…100 %
Resolution	0.1 %

Absolute humidity
Measuring range	0...600 g/m3

Dew point
Measuring range	-10…40 °C

Wind Chill
Measuring range	-70…10 °C

Barometric pressure
Measuring range	450...1100 hPa
Resolution	0.2 hPa

Ambient light
Measuring range	0...128000 Lx
Resolution	1 Lx

UV Index
Measuring range	1…12
Resolution	1

PAR
Measuring range	0...2400 µmol/m2/s

Radiant intensity
Measuring range	0...1362 W/m2

Height
Measuring range	0…18000m

Longitude/Latitude
Measuring range	0…180°

Speed
Measuring range	0...1854 km/h

True direction
Measuring range	0…360°

Max. data rate	10 Hz
Battery capacity	1000 mAh
Max. radio range (free field)	30 m
Protection class	IP67
Dimensions (LxWxH)	80 x 170 x 38 mm
Mass	161 g

7   SCOPE OF DELIVERY

The extent of delivery is as follows
• Cobra SMART Weatherstation	12946-00
• USB connection cable type C	07935-00
• Wind vane	
• Tripod (incl. bag)	
• Operating instructions	

8   ACCESSORIES

The following accessories are available:
• USB-Charger	07934-99
• 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 12946-00 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

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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