WEATHER SENSOR
W62
USER GUIDE

CENTRE FOR MICROCOMPUTER APPLICATIONS

https://cma-science.nl

Short description

The CMA Wireless Weather Sensor W62 is a compact handheld device for measuring various weather-related parameters, including temperature, humidity, barometric pressure, wind speed and wind direction, light intensity, and UV index. A wind vane and tripod are provided to support accurate and convenient measurements with the sensor.

The power button on the top of the sensor allows you to turn the sensor on/off. The sensor is equipped with an OLED color display which shows some sensor information and the measured by the sensor values. This makes the sensor suitable to use as an independent measuring instrument.

Press the power button to change which sensor readings are shown on the screen; the display presents the values of two to three sensors at a time.

The sensor can be used wirelessly via Bluetooth or wired via USB with the Coach 7 or Coach 7 Lite programs/apps on computers (Windows and Mac), Chromebooks and mobile devices (Android and iOS).

How the sensor works

The CMA Wireless Weather Sensor W62 has a few built-in sensors, each using a dedicated sensing method:

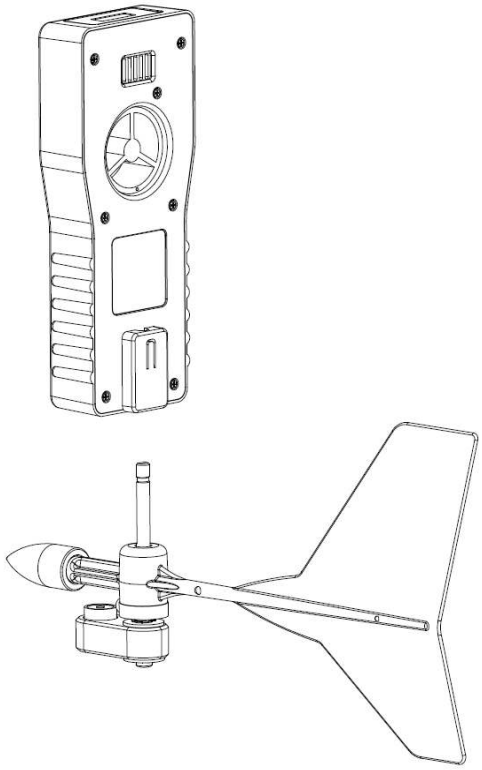
- Air temperature is measured with a semiconductor temperature transducer. For best accuracy, the transducer should be shaded from direct sunlight.
- Relative humidity is measured with a polymer-type humidity sensor. For reliable results, the sensor should be in shaded conditions and at ambient air temperature. Readings are given as a percentage %, representing the ratio of the current water vapor pressure to the saturation vapor pressure.
- Barometric pressure is measured by an internal pressure transducer. The device reports actual local air pressure (not adjusted to sea level) in hPa.
- Wind speed is measured using an impeller-type anemometer, with its axis of rotation parallel to the wind's direction. A small magnet in the impeller generates a signal proportional to wind speed, which is recorded as a positive value regardless of rotation direction. For accurate measurements, wind should flow straight into the back of the impeller, with a minimum detectable speed of 0.5 m/s.
- Wind direction is determined using a built-in electronic compass that measures the Earth's magnetic field. When the device is mounted on a vane, it detects its orientation relative to magnetic north.
- Light intensity is measured with an ambient light sensor that uses a photodiode optimized to match the human eye's sensitivity to visible light. Results are given in lux.

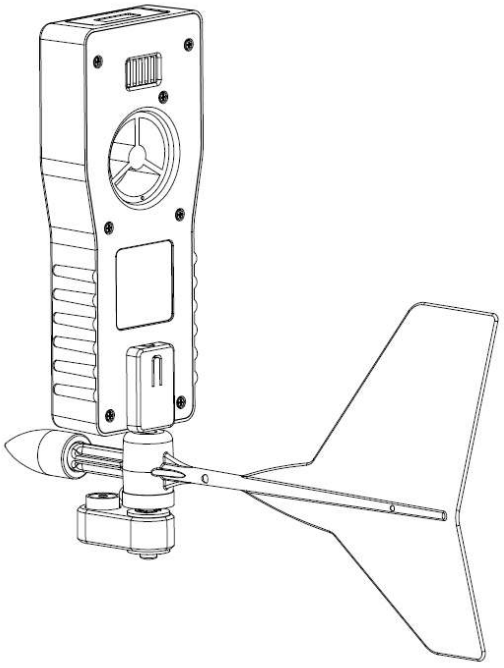
- UV index is determined using a UV-sensitive sensor that measures the intensity of ultraviolet radiation from the sun. The UV Index scale, standardized by the World Health Organization, indicates potential risks to skin and eye health, with higher values meaning greater risk and shorter safe exposure times.

Installing the tripod and wind vane

To measure wind direction, use the wind vane together with the tripod.

1. Attach the tripod to the bottom of the wind vane's circular level.
2. Insert the wireless weather device into the center post, making sure the front of the device faces the head of the wind vane.
3. Set up the tripod at the measurement location, then adjust the legs gradually until the bubble in the circular level is centered.





Calibration

The CMA Wireless Weather Sensor W62 is supplied with a factory calibrations and does not to need be calibrated.

Software

You can use the Weather sensor W62 with Coach 7 or Coach 7 Lite (free) program on computers (Windows and Mac) or Coach 7 and Coach 7 Lite (free) app on mobile devices (Android and iOS). For Chromebooks, we offer a special Android app. The support for wireless sensors is added starting from Coach version 7.12.

Check the CMA website for the latest installations. https://cma-science.nl/downloads_en

Working with Sensor

- Turn the Weather sensor on by pressing its power button.
- The sensor briefly displays its Bluetooth identification code. This ID code is also printed on the sticker located on the bottom side of the sensor box.
- Then the display shows:
  - the Bluetooth mode, Mobile or PC.
    Mobile indicates Bluetooth Low Energy mode which should be used when working with mobile devices (Android, iOS), Chromebook and Apple computers.
    PC indicates Bluetooth Classic which should be used for Windows computers.
  - the battery level, and
  - the measured value(s).
- Now you can use the sensor as an independent measuring instrument.
- Press the power button to change which sensor readings are shown on the screen; the display presents the values of two to three sensors at a time
- To turn off the sensor press and hold its power button for 3 sec. To save its battery the sensor automatically turns off after 5 minutes of inactivity (no connection to power, no communication).

Collecting data via the Bluetooth connection

Mobile devices, Chromebooks, and Apple computers

For mobile devices (Android, iOS), Chromebooks and Apple computers Bluetooth Low Energy technology is used for wireless communication. For these devices **do not pair** the sensor just use it directly in the Coach software.

- Turn the Weather sensor on.
- Ensure your sensor is set to Mobile mode.
  If the display shows in the top-left corner 'PC' first you must set the sensor to the Mobile mode. Turn off the sensor. Then press and hold the power button until the text 'Bluetooth mode Change Mobile' is shown, then release the button. The mode is set to 'Mobile', meaning Bluetooth Low Energy is used.
- Start the Coach 7 or Coach 7 Lite program/app.
- Select a Measurement Activity for Wireless Weather sensor (**do not use** the Dashboard Activity 'Measurement with Wireless sensors').

- Coach starts searching for Weather sensors which are turned on and in the Mobile discovery mode. The found sensors appear in the list.
- Select the Weather sensor you want to connect to. If needed check the sensor's Bluetooth ID which is located on the sensor's bottom label.
- When the connection is established the Bluetooth symbol appears in the top-left corner of the sensor's display and sensor icons appear showing the measured values.
- By default, all 7 weather parameters are displayed in the panel.
- To limit the number of displayed parameter values in the panel, right-click the display and select the **Sensors Selection** option. In the dialog that appears, each sensor has a switch next to its name that allows you to show or hide it in the panel.
- Now you are ready to use the Weather sensor for your measurement.

Windows computers

For Windows computers, Bluetooth Classic technology is used for wireless communication. Before you start to use the sensor for measurement in Coach you **have to pair** it.

- Turn the Weather sensor on.
- Ensure your sensor is set to PC mode.
  If the display shows in the top-left corner 'Mobile' first you must set the sensor to the PC mode. Turn off the sensor. Then press and hold the power button until the text 'Bluetooth mode Change PC' is shown, then release the button. The mode is set to 'PC', meaning Bluetooth Classic is used.
- Pair your sensor.
  - Go to the Windows Settings **Bluetooth and other devices** and select **Add Bluetooth or other devices**. Select **Bluetooth device**.
  - Windows looks for Bluetooth devices and after a while lists discovered devices. The wireless sensors are listed with their Bluetooth IDs.
  - Select the sensor you want to connect to. If needed check the sensor's Bluetooth ID which is located on the bottom label of your sensors.
  - When the connection is successfully established Windows indicates that the sensor is paired and ready to go.
  - Click **Done** to accept it. The sensor appears in the list of paired Bluetooth devices.
- Start the Coach 7 or Coach 7 Lite program/app.
- Select a Measurement Activity for Wireless Weather sensor (**do not use** the Dashboard Activity 'Measurement with Wireless sensors').
- Coach starts searching for Weather sensors which are turned on and in the Mobile discovery mode. The found sensors appear in the list.
- Select the Weather sensor you want to connect to. If needed check the sensor's Bluetooth ID which is located on the sensor's bottom label.

- When the connection is established the Bluetooth symbol appears in the top-left corner of the sensor's display and sensor icons appear showing the measured values.
- By default, all 7 weather parameters are displayed in the panel.
- To limit the number of displayed parameter values in the panel, right-click the display and select the **Sensors Selection** option. In the dialog that appears, each sensor has a switch next to its name that allows you to show or hide it in the panel.

Collecting data via the USB connection

For computers (Windows and Mac) the Force/Acceleration sensor can also be used as a USB sensor. When using this connection, the sensor can measure with a higher sampling frequency of up to 1000 Hz.

- Turn the Weather sensor on.
- Use the provided USB cable to connect the sensor to a USB port.
- Start the Coach 7 or Coach 7 Lite program/app.
- Select a Measurement Activity for Wireless Weather sensor (**do not use** the Dashboard Activity 'Measurement with Wireless sensors').
- The connected USB sensor should be detected automatically.
- When the connection is established the USB symbol appears in the top-left corner of the sensor's display and icons show measured data.
- Now you are ready to use the Weather for your measurement.

Charging the sensor

An internal rechargeable battery (Li-Poly 3.7 V, 700 mAh) powers the sensor. The battery symbol located in the top-right corner of the sensor's display shows the battery level. When the battery level becomes critical, the battery gauge shows an empty battery. Use the provided cable to connect the sensor to a USB port for charging. A fully discharged battery requires up to 2 hours of charge time to become fully charged again. To prolong battery life, automatic power down turns the sensor off after 5 minutes of inactivity.
To replace the battery, use **only** the approved rechargeable batteries provided by CMA.

Measurement tips

- After a sudden change in temperature or humidity, the sensor may need several seconds to adjust to the new conditions. Watch the readings and wait until they stabilize before recording data.
- When measuring wind speed, ensure the anemometer faces directly into the wind for accurate results. If using the wind vane and tripod, set up so the vane freely aligns with the wind direction.

- For accurate temperature and humidity readings, keep the sensor out of direct sunlight. Direct sun can cause the temperature transducer to read higher and humidity lower than the actual ambient values.
- Avoid direct contact with liquid water. Prolonged exposure to rain or splashing can cause inaccurate measurements or damage.

Sea-level Corrected Pressure

A typical weather station does not report the actual measured barometric pressure. Rather, it reports a "sea-level corrected" value. The sea-level corrected pressure can be approximated by use the following formula:

$$P_{sea\ level}\ (hPa) \approx P_{measured}\ (hPa) + 1013*(1-exp^{-h/7000})$$

where h is the sensor's elevation in m.

Secondary calculations

The Weather multi-sensor measure primary quantities like temperature, humidity, pressure, wind speed and direction, light level, and UV index. From these basic measurements, many other weather parameters can be calculated.
Some of them tell us how the weather "feels.", other are important in science, engineering, and environmental studies.
The following quantities can be derived based on the primary values recorded by the weather sensor:

- Dew point — shows when condensation or fog will form,
- Absolute humidity — relates to "how much water is really in the air",
- Vapor pressure deficit (VPD) — connects to plant growth and evaporation,
- Heat index — "feels like" temperature on hot days,
- Wind chill — "feels like" temperature on cold, windy days,
- Air density — links temperature, pressure, and wind energy
- Wind power density — lets students estimate potential wind turbine output,
- Cloud base height (LCL) — a quick cloud formation predictor,
- Beaufort scale — easy wind speed classification without much math,
- UV exposure time — connects UV index to sun safety,
- Irradiance from illuminance — shows sunlight as energy, not just brightness.

Technical Specifications

Sensor kind	Digital, on-sensor digital conversion
Measuring ranges	Temperature: -40 .. 60 ℃ Humidity: 0 .. 100 %RH Barometer: 300 .. 1100 hPa Wind direction: 0 .. 360 ° Anemometer: 0 .. 30 m/s Illuminance: 1 .. 188 000 lux UV Index: 0 .. 11 index
Resolution	Temperature: 0.1 ℃ Humidity: 0.1 %RH Wind Direction: ±5 ° Wind Speed: 0.1 m/s Light Intensity: 1 lux UVI: 0.1 Barometer: 0.1 hPa
Maximal sampling rate	1 Hz
Display	OLED 0.96" (128*64 px)
Battery	Li-Poly Rechargeable Battery (3,7 V 700 mAh)
Battery life after full charge	Approximately 8 hours Battery life varies by use, configuration, temperature, and many other factors; actual results will vary.
Connection	Bluetooth 5, Low Energy (Mac, Android, iOS) Bluetooth 2.1, Classic (Windows) USB 2.0 (type C)
Bluetooth ID	W62WEAT-xxx

Warranty:

The Weather sensor W62 is warranted to be free from defects in materials and workmanship for a period of 36 months from the date of purchase provided that it has been used under normal laboratory conditions. This warranty does not apply if the sensor has been damaged by accident or misuse. The sensor battery is a consumable and is warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase.

Discard batteries according to local regulations.

Note: *This product is to be used for educational purposes only. It is not intended for industrial, medical, research, or commercial applications.*

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