# 1160 - Wireless Light & Colour Sensor

Revision: 0 | DS166

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# Introduction

Thank you for purchasing the Smart Wireless Light & Colour Sensor. We pride ourselves on producing high quality products that meet with the demands of the busy classroom environment. If you have any problems using this sensor, please read this documentation in full before contacting the Data Harvest support team.


## Overview

The Wireless Smart Light and Colour Sensor is USB and Bluetooth compatible. Using Bluetooth, a sensor can connect to mobile devices, tablets, laptops and desktops.

**The sensor house five active elements:**

- An ambient light level sensor
- A directional light level sensor
- An RGB colour sensor
- A white light LED illumination source

All of the elements can be used individually or together in any combination.

The ambient light sensor is on the top of the sensor body, it is used to measure the amount of light available from a wide field measurement.

The direction light sensor is at the end of a collimator that reduces the impact of non directional light. Measurements form this sensor will be from when the sensor is pointing directly at the light source.

The RGB sensor will return colour information of a reflective surface on the RGB percentage schema. The white LED can be used to act as a constant light source for comparison.

The white LED is to provide a constant light source for comparison of colour.

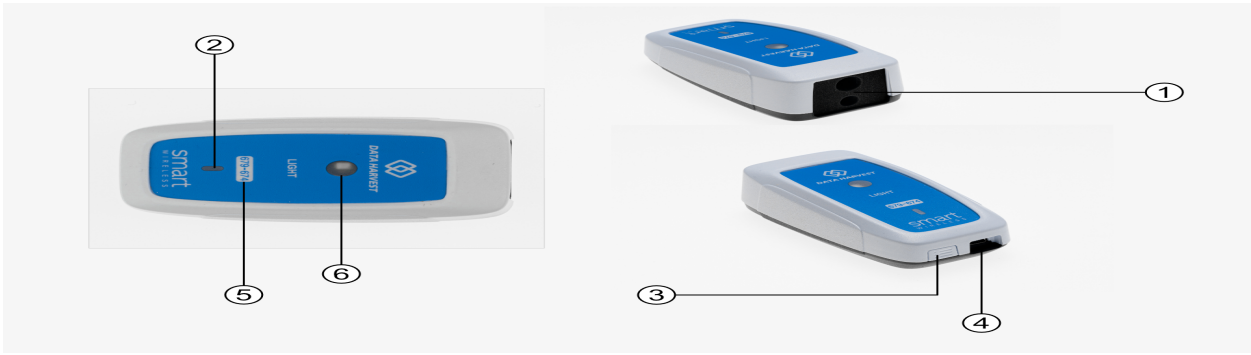
## Pack Contents

This product is supplied with the following items:

- 1 X Wireless Light & Colour Sensor
- 1 x USB Connecting Lead

## Operational Overview

The diagram below shows the specific parts of the sensor. Read further to explore the functionality of each part of the sensor.




1. Sensor End Cap (Direct Light)
2. Status Indicator
3. On/Off Switch
4. USB Port
5. Unique ID Number
6. Ambient Light Sensor

## Sensor End Cap, Directional light, colour sensors and illumination LED (1)

Most Smart Wireless Sensors feature an end cap that is specific to the requirements of the device's internal sensor. The end cap for the Light sensor houses the directional light sensor (fast), directional light sensor (slow), RGB sensor and the LED light source. The Light source is on the smaller hole (at the bottom of the plate when the label of the sensor is uppermost). The light sensors are in the larger hole to the top of the sensor plate.

The light sensor and illuminating LED are open to the environment to maximise performance, they are not protected from contact with anything in the environment.

## The Status Indicators (2)

The sensor features a single status indicator that changes colour and flashes. See the table below for further information.

| Status Light | | Indicates |
|---|---|---|
| No light | | Sensor is Off. Short press the On/Off switch |
| Blue flashing | | Sensor On and Bluetooth advertising |
| White flashing | | Charging via USB mains charger or USB port |
| Green flashing | | Communication with the EasySense2 app (via USB or Bluetooth) has been established |

| | | |
|---|---|---|
| Orange flashing |  | Recording data |
| Red flashing |  | Battery is low |

## On/Off Switch (3)

The sensor's on/off switch allows you to turn the sensor on, off or perform a hard reset.

### To switch the sensor off

- Press and hold down the On/Off switch until the white light shows, then release.
- If not communicating with the EasySense2 app, the sensor will turn off after a period of one hour of inactivity.

### Hard resetting the sensor

- If necessary, attach the sensor to power.
- Press and hold down the On/Off button for at least 8 seconds until the status LED gives a flash of blue light, then release.
- If the sensor fails to respond, contact Product Support at Data Harvest. Please provide details of:
    - The computer platform it is being used with and the EasySense2 app's version number.
    - A description of the problem being encountered.

## USB Port (4)

Use to connect to a computer or a charging unit.

For specific USB or Bluetooth connectivity instructions, please see the 'Connectivity' section of this documentation.

For instructions on charging your device, see the section on 'Charging the Sensor'.

## Unique ID Number (5)

All Smart Wireless Sensors are labelled with a unique ID number. This number is used in the EasySense2 app, so that you can identify each sensor when making a connection wirelessly.

## Ambient Light Sensor (6)

The sensor located under the small transparent window measures the ambient light.

# Connectivity

The sensor is both USB and Bluetooth compatible. Install the EasySense2 app, if it is not already on your device. For details of how to operate the EasySense2 app, please refer to the EasySense2 documentation.

## USB Connectivity

### Quick Steps

1. Connect the sensor to the computer's USB port using the USB cable supplied.
2. The computer will automatically detect a new device and depending on your operating system, will install any applicable device drivers.
3. Start EasySense 2 app.
4. Within the EasySense2 app, the Devices icon will change to green to show that the sensor is connected, and the status light on the sensor will also turn green.
5. Begin your practical investigations.

## Bluetooth Connectivity

Using Bluetooth, the sensor can wirelessly connect to mobile devices such tablets and mobile phones, as well as desktop or laptop computers, giving students the ability to run experiments independently without being tethered to a device.

See the EasySense2 app user manual system requirements for further details.

### Quick Notes on Bluetooth Connectivity

Only use with the EasySense2 app, you do not need to pair the device. If paired, the sensor will not be available to the EasySense2 app.

Computers or devices will need to support Bluetooth Low Energy (BLE). For further information refer to the instructions provided for the EasySense2 app.

### Quick Steps

1. Short press the on/off switch to turn the sensor on, blue LED will flash.
2. Open the EasySense2 app.
3. Select the Devices icon.
4. Select your sensor from the list of available sensors to connect to the device. Your sensor is identified by its unique ID in the list.
5. Click on connect at the side of your sensor in the list.
6. The Devices icon will change to green and the status light on the sensor will flash green to indicate a connection has been established.
7. Begin your practical investigations.

## Charging the Sensor

The Smart Wireless sensors are fitted with a rechargeable lithium-ion battery and can be charged via the USB port. Use the supplied USB lead to connect the sensor either directly to a USB port on your computer, a powered USB hub or a USB mains charger that outputs 5 V at 500 mA or more.

A full charge can take up to 4 hours.

## Additional Information

Whenever the sensor is connected to the USB port on the computer or to a USB mains charger (output 5 V at 500 mA or more), it will automatically recharge the battery (LED status flashing white).

When connected to a computer, the computer should be turned on and not in sleep or standby mode, as the battery may drain instead of charge.

The sensor will stay awake for 60 mins when Bluetooth advertising (LED status flashing blue).

Lithium-ion batteries are ‘memory-free’ and prefer a partial rather than a full discharge. Constant partial discharges with frequent recharges will not cause any harm. Frequent full discharges should be avoided whenever possible. Ideally the sensor should be stored at about 40% or more charge.

The speed at which a lithium-ion battery will age is governed by both its storage temperature (preferably less than 40℃) and state-of-charge.

## Firmware Updates

Occasionally Data Harvest may release updated firmware which will contain improvements or new features.

Updates will take place when you connect your sensor to the EasySense2 app. You will be given the option to decline an update.

Updates can be performed over USB or Bluetooth and will typically take less than one minute. Updating firmware over USB will be quicker than Bluetooth.

Do not disconnect the sensor, or power off during the update.

If you have a wireless connection to the EasySense2 app, the sensor will have to be reconnected after performing the update.

## Usage Information

By default the sensor will be set to Directional Light 100k Fast when connected to the software. To change to another range use Devices.

The sensor is not waterproof. It may be cleaned using a damp cloth. Do not immerse in water or detergent.

The light sensors and LED on the sensor plate are open to the environment.

**The end cap “pit” where the sensor is located, acts as a collimator and helps to reduce the effect of non-directional light.**

To get the best data from the Ambient range show the label face of the sensor at right angles to the illumination source (for example if making an estimate to under canopy light position the sensor parallel to the ground with the sensor point to the sky).

The illumination source is under control of the software, it is designed to produce a common light source when measuring reflected colour, if the illumination of the surface is good or self-illuminating (e.g., LED screen) it does not need to be used.

Do not place the sensor in an environment in which high humidity levels are possible as this may result in damage or malfunction.

## Practical Investigations

The Smart Wireless Light & Colour Sensor can be used to investigate a number of scientific experiments such as:

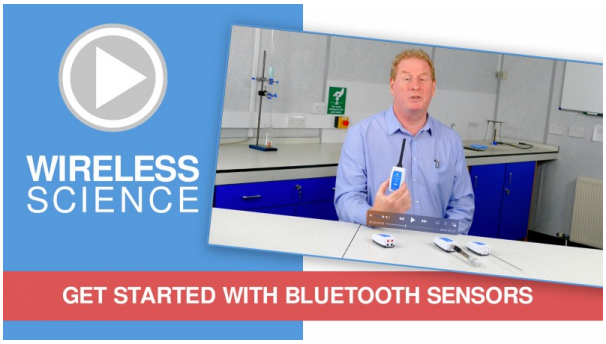
- Comparison of the available light in an environment, for example in different rooms, or under a tree canopy compared to the open space between canopy cover
- Measure the flicker of fluorescent lights and the time slice flicker of LED lamps. Compare d.c. power source illumination vs a.c. power source illumination
- Light vs distance (illustration of inverse square law), identify a constant change in light intensity (for example light intensity vs. bubble production in photosynthesis).
- As part of an apparatus to measure the start-up events of a lamp (with light, voltage, current)
- Polarizing filters
- Youngs single and double slits
- Reflections
- Colour measurement of coloured papers, transparent filters etc.

## Online Videos

Learn how to use data logging in the classroom with our Secondary Science Academy demonstration videos, which will walk you through using the new EasySense2 app and show you how to get hands-on with the latest Bluetooth wireless sensors. The video experiments will show you how to get the best out of your science lessons.

New online content is being continuously uploaded onto our YouTube channel, including practical worksheets as well as videos.

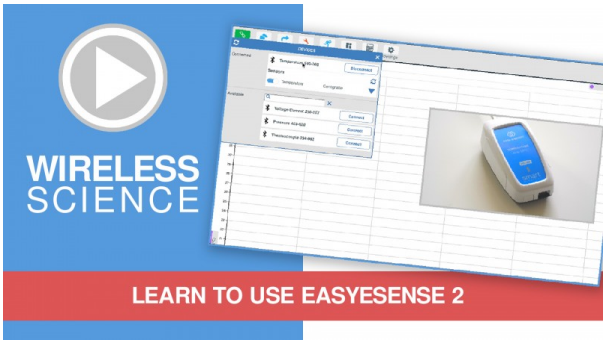
See our website for further information and links.




### Explore Bluetooth Sensors

Are you looking to make the jump to our smart wireless sensors? Or have you recently purchased them and want to know more about how they work?

View video playlist




### Explore EasySense2

The core of our science platform is our EasySense2 software. In these videos you will learn everything from the basics of our software to the most in-depth features.

View video playlist


## Explore Science Practicals

See our Smart Wireless Sensors in action with a range of practical experiments. This is the best way to get started with the new Bluetooth sensors!

View video playlist

## Sensor Specifications

Please read the following table for sensor specifications.

| Feature | Detail |
|---|---|
| Measurement Ranges | Ambient Light: 30k Lux and 200k Lux<br><br>Direct Light: 4K Lux and 16K Lux slow<br>1K, 10K and 100K Lux fast<br><br>Direct Colour: High and low sensitivity and Red, Green, Blue and White<br><br>White illumination LED |
| Resolution | Ambient Light: 1Lux<br><br>Direct Light: 0.1Lux 4K Slow<br>1Lux 16K Slow<br>1Lux 1K Fast<br>5Lux 10K Fast<br>50Lux 100k Fast<br><br>Direct Colour: 0.01% |
| Fastest logging speed | Ambient Light: 100ms<br><br>Direct Light:<br>4K Slow: 200ms<br>16K Slow: 50ms<br>1K, 10K and 100K Fast 50µs<br><br>Direct Colour:<br>Low Sensitivity, 200ms<br>High Sensitivity 500ms |
| Connectivity | Wired via USB<br>Wireless via Bluetooth |
| Bluetooth Specifications | Bluetooth 4.2 low energy radio, single mode compliant<br>Transmit (TX) power: 0 dBm<br>Receiver (RX) sensitivity: - 90 dBm<br>Usable transmission range: up to 10 m in open air<br>Frequency Range: 2.402 to 2.480 GHz operation |
| Internal Battery | Rechargeable internal lithium-ion 3.7 V<br>Power specification: 5 V at 500 mA |
| Storage/Operating Temperature | 0 - 40℃ |
| Humidity | 0 to 95% RH (non-condensing) |
| Physical Specifications | Weight: approx. 68 g<br>External dimensions: approx. height 34 mm x width 50 mm x length 91 mm |

# Limited Warranty

For information about the terms of the product warranty, see the Data Harvest website at: https://data-harvest.co.uk/warranty

## Product Repairs

When returning goods to Data Harvest, please download and complete the repair return form to ensure you have sent us all the information we require, and send it to us alongside the item to be repaired. The second page of this form includes a return address label.

If you have purchased a Data Harvest manufactured product via a different company, please also supply proof of purchase.

## Postage Charges

- In the event of a fault developing, the product must be returned in suitable packaging to Data Harvest for repair or replacement at no expense to the user other than postal charges.
- There will be no postal charge for the return of repaired goods to any mainland UK address (for other areas, additional shipping charges may apply).

## Out of Warranty Repairs

Please visit https://data-harvest.co.uk/repairs for the most up to date charges for out of warranty repairs.

## Warranty on Repaired Items

Once an item has been serviced and repaired, the product will have 1 year warranty against further failure of the component repaired.

## International Returns

Please contact the authorised Data Harvest representative in your country for assistance in returning equipment for repair.

# Compliance

This product complies to the following standards

## Waste Electrical and Electronic Equipment Legislation

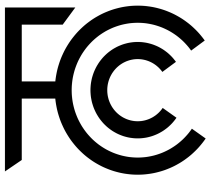
Data Harvest Group Ltd is fully compliant with WEEE legislation and is pleased to provide a disposal service for any of our products when their life expires. Simply return them to us clearly identified as 'life expired' and we will dispose of them for you.

## FCC Details

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## CE

This product conforms to the CE specification. It has been assessed and deemed to meet EU safety, health and environmental protection requirements as required for products manufactured anywhere in the world that are then marketed within the EU.



## Troubleshooting

If you experience any problems with your product, please try the following troubleshooting tips before contacting the Data Harvest support team.

| Feature | Detail |
|---|---|
| Loss of Bluetooth Connectivity | **If the sensor loses Bluetooth connection and will not reconnect try:**<br>Closing and reopening the EasySense 2 app.<br><br>Switching the sensor Off and then On again.<br><br>If you are using a Bluetooth Smart USB Adaptor on your computer, unplug the adaptor, plug back in again and try to reconnect.<br><br>Hard reset the sensor and then try to reconnect. |

## Notices

Please read the following notices with regards to using your sensor

1. The sensor is much smarter than traditional Bluetooth sensors and you are not required to pair the device. If paired, the sensor will not be available to the EasySense 2 app.
2. When the sensor is connected to a computer, the computer should be turned on and not in sleep or standby mode or the battery may drain instead of charge.
3. Data Harvest products are designed for educational use and are not intended for use in industrial, medical or commercial applications.
4. The sensor is not waterproof.
5. Plastic parts may fade or discolour over time if exposed to UV light. This is normal and will not affect the operation of the sensor.

# Contact Information

To contact Data Harvest directly, please use any of the following channels

## Traditional Communications

Data Harvest Group Ltd.
1 Eden Court, Eden Way,
Leighton Buzzard,
Bedfordshire,
LU7 4FY
United Kingdom

**Tel:** +44 (0) 1525 373666
**Fax:** +44 (0) 1525 851638
**Sales email**: sales@data-harvest.co.uk
**Support email**: support@data-harvest.co.uk

## Online Communications

We have active social media support channels using the following platforms

- Facebook
- Twitter
- YouTube

## Office Opening Hours

Monday to Thursday - 08:30 to 16:45
Friday - 08:30 to 13:30
Saturday & Sunday & UK Bank Holidays - Closed

## PDF Translations

The PDF formatted download of this manual is by default provided in the English (United Kingdom) language. If an alternative translation is available, it will be listed here.

We have for your convenience included a webpage translation feature to the online documentation which will allow you to translate and print individual pages of this documentation.

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