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Temperature Sensors

► Temperature Sensor

(Product No. 3100)

Celsius range: -30°C to 110°C

Fahrenheit range: -22°F to 230°F

Accuracy $\pm 0.3^{\circ}\text{C}$ ($\pm 0.5^{\circ}\text{F}$) at 0 - 70°C, rising to $\pm 0.6^{\circ}\text{C}$ ($\pm 1.1^{\circ}\text{F}$) at extremes of range.
Resolution 0.1°C (0.1°F)

A general-purpose temperature sensor with a thermistor housed at the end of a stainless steel tube.

► The fast response Temperature Sensor

(Product No. 3101)

Celsius range: -30°C to 110°C

Fahrenheit range: -22°F to 230°F

Accuracy $\pm 0.3^{\circ}\text{C}$ ($\pm 0.5^{\circ}\text{F}$) at 0 - 70°C, rising to $\pm 0.6^{\circ}\text{C}$ ($\pm 1.1^{\circ}\text{F}$) at extremes of range.
Resolution 0.1°C (0.1°F)

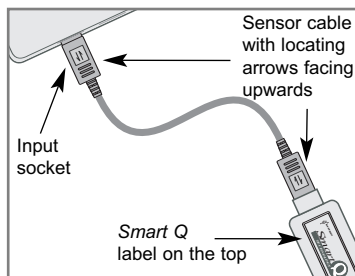
This product is similar to Product No. 3100 except the thermistor is not housed. It is therefore flexible and has a much faster response.

Introduction

The *Smart Q* Temperature sensors are equipped with a micro controller that greatly improves the accuracy, precision and consistency. They are supplied calibrated with degrees Celsius (in °C) as the default range.

Connecting

- Hold the Temperature sensor housing with the *Smart Q* label showing on the top.
- Push one end of the sensor cable (supplied with the **EASYSense** unit) into the shaped socket on the sensor housing with the locating arrow on the cable facing upwards.
- Connect the other end of the cable to the input socket on the **EASYSense** unit (with the locating arrow facing upwards).
- The **EASYSense** unit will detect that the Temperature sensor is connected.



To set the range

The Temperature sensor can record temperature using either the Celsius (°C) or Fahrenheit (°F) range. To alter the currently selected range:

- Connect the Temperature sensor to the **EASYSense** unit.
- Start the **EASYSense** program and select one of the logging modes from the Home page. Select **Sensor Config** from the **Settings** menu.
- Select the Temperature sensor from the list and click on the **Change Range** button.
- The current range will be highlighted. Select the required range, click on OK.
- Close Sensor Config. Click on **New** and then Finish for the change in range to be detected.

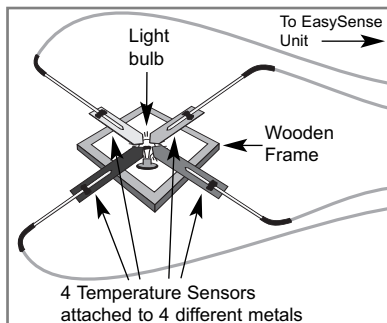
The range setting will be retained until changed by the user. With some **EASYSense** units it is possible to change the range from the unit. Please refer to the **EASYSense** user's manual.

Temperature Sensor (*Product No. 3100*)

This Temperature sensor has a thermistor housed at the end of the stainless steel tube. The tube is 3 mm by 200 mm and is made from AISI 316 stainless steel, which has a particularly low thermal inertia with negligible effect on the measured temperature. It provides a high level of corrosion and chemical resistance making it suitable for use with experiments in chemistry, biology, physics, earth and environmental science.

Practical information

- It is the tip of the Sensor that is sensitive to temperature. Lay the Sensor on its side, not its end, when measuring a surface temperature.
- Temperatures higher than 150°C (302°F) may damage the Sensor.
- The PVC insulation on the connecting cable has a working range of -10 to 85°C (14 to 185°F), so keep this cable away from the source of heat.
- Do **not** put any part of the Sensor in a direct flame or on a hot plate.
- Avoid submerging the Sensor beyond the stainless steel portion.
- Wash the Sensor thoroughly after use.
- The boiling point of water will vary with changes in air pressure. At one atmosphere of pressure (101.3 kPa, 1013 mBar) pure water boils at 100°C (212°F). Water boils when the vapour pressure of water equals the pressure of the gases above water, so if the pressure changes, then the temperature that the water boils at will also change.



Boiling Point of Water vs. Pressure

Temperature in °C	100.0	99.5	99.0	98.5	98.0	97.5
Pressure in kPa	101.3	99.5	97.8	96.0	94.4	92.7

- AISI 316 stainless steel has a high resistance to corrosion from a wide variety of weak acids and alkalis. Some environments e.g. saltwater may cause some discolouration to the stainless steel tube but this will have no effect on the Sensor's performance.

The Sensor can be left in an alkaline solution such as Sodium Hydroxide (NaOH) for up to 48 hours, with only minor discoloration. We do not recommend use in a solution whose concentration is greater than 3 mol dm⁻³. The maximum length of time recommended for exposure to an acid is dependent on the acid's concentration. In general, we do not recommend that Temperature sensors be left to soak in acids of between 1 - 3 mol dm⁻³ concentration for longer than 48 hours. The exceptions to this rule are Hydrochloric acid (HCl), and Sulphuric Acid (H₂SO₄).

The maximum recommended times for exposure are:

1M HCl	20 minutes
2M HCl	10 minutes
3M HCl	5 minutes

1M H ₂ SO ₄	48 hours
2M H ₂ SO ₄	20 minutes
3M H ₂ SO ₄	10 minutes

Suggested investigations:

- *Monitoring indoor and outdoor temperature*
- *Weather studies*
- *Insulation studies*
- *Monitoring endothermic and exothermic reactions*
- *Solubility of salts*
- *Studying freezing, boiling points and cooling rates*
- *Evaporation, radiation, conduction and convection investigations*
- *Energy content of fuels and foods*
- *Heat of fusion investigations*

The fast response Temperature Sensor (*Product No. 3101*)

The thermistor wires are covered by highly flexible heat-shrink tubing. This makes the Sensor suitable for measuring temperature in a confined space or attached to the body for physiology experiments.

Practical information

- Temperatures higher than 125°C (257°F) or lower than -30°C (-22°F) may damage the Sensor.
- This Temperature sensor is **not** recommended for use with laboratory chemicals.
- Do **not** put any part of the Sensor in a direct flame or on a hot plate.
- The diameter of the thermistor bead is approximately 2 mm.

Suggested investigations:

- *Body mapping*
- *Changes in skin temperature due to exercise and perspiration*
- *Pressure/Temperature relationship of a gas*

Warranty

All Data Harvest Sensors are warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase provided they have been used in accordance with any instructions, under normal laboratory conditions. This warranty does not apply if the Sensor has been damaged by accident or misuse. In the event of a fault developing within the 12 month period, the Sensor must be returned to Data Harvest for repair or replacement at no expense to the user other than postal charges.

Note: Data Harvest products are designed for **educational** use and are not intended for use in industrial, medical or commercial applications.



WEEE (**W**aste **E**lectrical and **E**lectronic **E**quipment) Legislation.
Data Harvest Group Limited are fully compliant with WEEE legislation and are 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.