

Temperature Sensor

(Product No. 3100)

Ranges:

Celsius: -30°C to 110°C

Fahrenheit: -22°F to 230°F

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

Resolution 0.1°C (0.1°F)



Fast response Temperature Sensor

(Product No. 3101)

Ranges:

Celsius: -30°C to 110°C

Fahrenheit: -22°F to 230°F

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

Resolution 0.1°C (0.1°F)



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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 (°C) as the default range

Connecting

- Push one end of the sensor cable (supplied with the **EASYSense** unit) into the hooded socket on the sensor housing.
- Connect the other end of the sensor cable to the input socket on the **EASYSense** unit.
- The **EASYSense** unit will detect that the Temperature sensor is connected and display values using the currently selected range. If the range is not suitable for your investigation, set to the correct range.

To set the range

The Temperature sensor can record temperature using either the Celsius (°C) or Fahrenheit (°F) range.

With some **EASYSense** units it is possible to set the range from the unit. Please refer to the **EASYSense** unit's user manual.

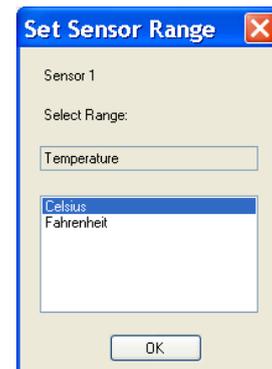
To alter the range in the EasySense software:

1. Select **EasyLog** from the Home screen.
2. Select the **New** recording wizard icon. 
3. Click on the sensor's name.
4. A set sensor range window will open. Select the required range, then OK.
5. Select Finish to exit the wizard.

Or

1. From the Home screen select **Sensor Config** from the Settings menu.
2. Select the Temperature sensor from the list and click on the **Change Range** button.
3. The current range will be highlighted. Select the required range and click on OK.
4. Close Sensor Config.

The range setting will be retained until changed by the user.



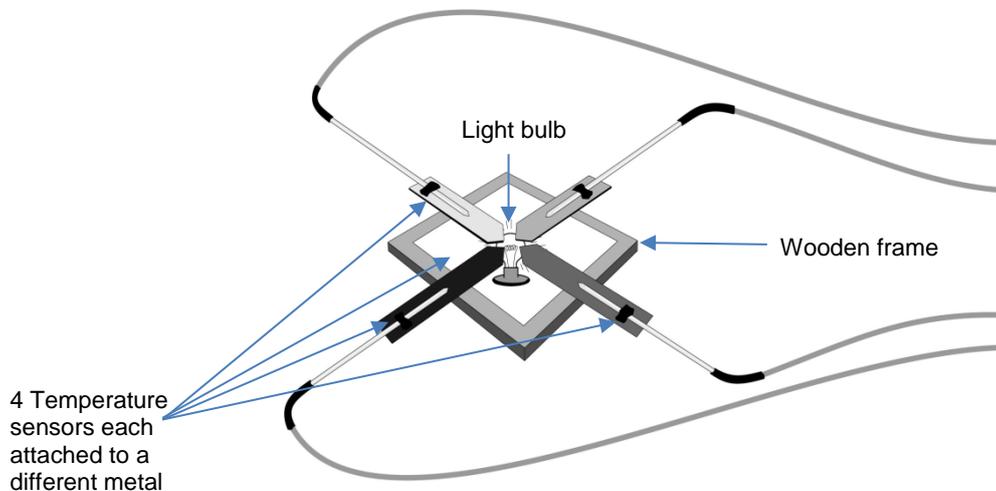
Temperature Sensor

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 & environmental science.

Practical information

- It is the very 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.

E.g. Boiling Point of Water vs. Pressure

Pressure in kPa	Pressure in mBar	Temperature in °C	Temperature in °F
101.3	1013	100.0	212
99.5	995	99.5	211.1
97.8	978	99.0	210.2
96.0	960	98.5	209.3
94.4	944	98.0	208.4
92.7	927	97.5	207.5

- AISI 316 stainless steel has a high resistance to corrosion from a wide variety of weak acid and alkali. Some environments e.g. saltwater, may cause some discoloration 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 concentrations 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:

Concentration of Hydrochloric acid	Maximum exposure
1 mol dm ⁻³	20 minutes
2 mol dm ⁻³	10 minutes
3 mol dm ⁻³	5 minutes

Concentration of Sulphuric acid	Maximum exposure
1 mol dm ⁻³	48 hours
2 mol dm ⁻³	20 minutes
3 mol dm ⁻³	10 minutes

Investigations

- *Monitoring indoor and outdoor temperature*
- *Weather studies*
- *Insulation studies*
- *Solar homes*
- *Monitoring endothermic and exothermic reactions*
- *Solubility of salts*
- *Studying freezing and boiling points*
- *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

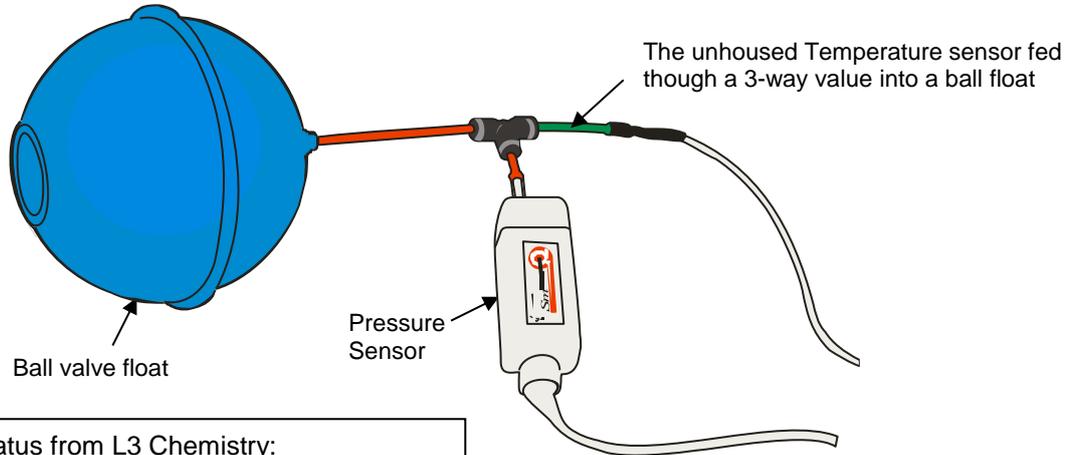
The thermistor wires are covered by highly flexible heat-shrink tubing. This makes the Sensor suitable for measuring temperature in a confined space or attached to the body for physiology experiments.

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 & perspiration*
- *Pressure / Temperature relationship of a gas*



Apparatus from L3 Chemistry:
Pressure/Temperature relationship of a gas

Limited warranty

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

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

WEEE (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.