Microbiological incubator

An **incubator** usually has a chamber volume of between 20 and 800 litres and a temperature range from +5 °C above room temperature to +100 °C, even though breeding temperatures usually do not exceed 40°C (details on the basic operation and features of a **temperature control chamber**). As a rule, natural **convection** is sufficient in **microbiology incubators**. When fully loaded, however, a forced air circulation can support **temperature distribution** inside the chamber (for details on heating, natural **convection** and forced air circulation, see 1.3.1.).

Since hygiene is extremely important when working with living organisms, some manufacturers offer the option of sterilising the interior in the **incubator** (see Hygiene and Avoiding Contamination).

Special case: Cooled incubators

Cooled incubator with compressor and inner glass door

Normal temperatures in a microbiological **incubator** lie at around the same temperature as the human body (37 °C). For applications that require temperatures in the range of room temperature and below down to sub-zero temperatues, or if the ambient temperature is very high, special **cooled incubators** are the products of choice. In food biology, the **cooled incubator** is used, for example, for shelf-life tests and for storage purposes, in agricultural science for soil germination, in environmental technology for determining the biochemical oxygen demand, in biology for cultivating model organisms such as threadworms or fruit flies and for the cultivation of fungi or yeast, and in protein biology for growing crystals. Equipped with additional lighting (day-night rhythm), the **cooled incubator** is ideal for growing plants in zoology.

Compressor cooling in the cooled incubator

In practice, the interior in the **cooled incubator** is mainly cooled by means of a compressor, as is found in

conventional refrigerators. In order to prevent so-called cold spots, and thus the drying out of samples, some manufacturers separate the components of the cooling system from the interior with a cooled air jacket (see condensation).

Peltier cooling in the cooled incubator

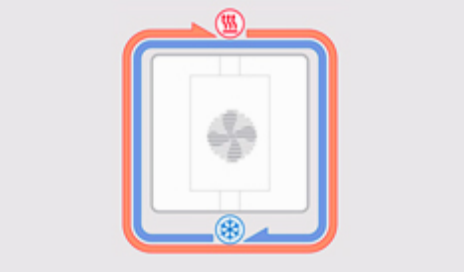
Some manufacturers offer **cooled incubators** that are heated and cooled by means of **Peltier technology**. If a **Peltier element** is energised, one side is cooled and the opposite side simultaneously heats up. Simply by reversing the polarity of the supply voltage, the hot and cold sides of the **Peltier element** can be swapped. The advantages of **Peltier technology** lie in a low energy consumption in partial load operation, a low noise level and high control precision. Since cooled incubators with **Peltier elements** work almost without any vibration, they are particularly suitable for **protein crystallography** and **breeding insects**.

Overview Glossary Temperature control chamber

Picture credit: Memmert GmbH + Co. KG

Autor:

Heating and cooling a cooled incubator by means of Peltier-technology



Air jackets around the interior of a cooled incubator prevent samples from drying out

Memmert Incubators

Incubator

Cooled Incubator

Peltier-cooled incubator

CO2 Incubator