

# AtmoSAFE means controlled atmosphere and applied climate protection

The heating and cooling process of interiors in temperature-control appliances is by nature very energy-intensive. For this reason, Memmert was one of the first manufacturers to begin resolutely developing energy-efficient, environmentally friendly laboratory devices based on Peltier technology, to replace conventional heating systems and cooling compressors, with all their disadvantages.

The first appliance to be launched was the IPP Peltier-cooled incubator in 2000. It was followed by the HPP constant-climate chamber, the CDP Peltier cooling unit for waterbaths, the VOcool cooled vacuum oven and the IPS cooled storage incubator.

## Peltier technology gains a permanent place among laboratory devices

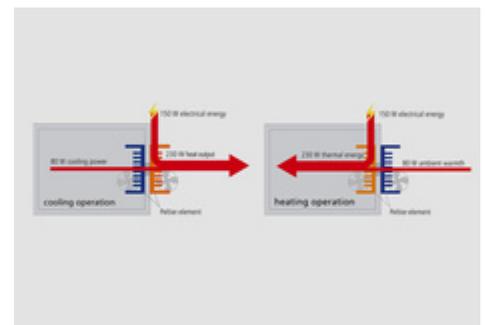
Since the 18th century, the Peltier effect has been known, in which heat is transferred from one material to another when current is applied between two semiconductor materials with different properties (change in conductivity). The main industrial application is in **Peltier elements**, which due to their compact size can be used to cool electronic components, in coolers or in laboratory measuring equipment.

However, the low level of effectiveness of **Peltier elements** in switching and polarity reversal procedures, as well as the sensitivity to stress until now prevented a broader application of this **environmentally friendly** technology. In the Year 2000, Memmert succeeded in adapting the Peltier principle for the first time for more powerful **laboratory devices** – so that this could now be heated and cooled with just one single system. A **Peltier element** in a **Peltier-cooled incubator** or a Peltier **constant-climate chamber** is switched up to 16,000 times a second, thus enabling an extremely sensitive temperature control.

## Innovation GreenLab: “Electronic heat pump”

Memmert uses **Peltier technology** like an **electronic heat pump**. If a **Peltier element** is put under voltage, one side is cooled and the opposite side simultaneously heats up. The thermal energy is thus transported from the cold to the warm side.

In comparison to conventional **laboratory devices** with cooling functions based on compressor technology, the thermal energy in the surroundings is converted to heat



Peltier element works as an

thermal energy in the surroundings is converted to heat energy with Peltier appliances, replacing up to a third of the heat energy required. The main advantage of **Peltier technology** is that only the energy that is really needed to keep the temperature constant is used – for working temperatures close to the ambient temperature, the energy requirements are very low as a result. For this reason, no energy is required for standby mode, in contrast to a compressor, which may not be switched on and off too frequently during operation.

electronic heat pump

## Innovation GreenLab: “Heating and cooling with Peltier”

It is well-known that the working life of **Peltier elements** is drastically reduced by continual switching and polarity reversal procedures – but permanent polarity reversal in particular is necessary to be able to technically implement heating and cooling in the **cooled incubator** or **constant-climate chamber** in a single system. Especially after the setpoint temperatures have been reached in the interior (partial load operation), the temperature is continually fine-tuned (in the 1/10 degree range) between heating and cooling to keep it constant. The degree of effectiveness of appliances with compressors falls drastically from this point onwards, whereas the Memmert **Peltier technology** can fully prove its superiority in energy efficiency with a savings potential of up to 90%. The pulse-width modulated bipolar 2-quadrant controller developed by Memmert enables a gentle switchover between hot and cold, with a minimised thermo-mechanical voltage load on the modules. Since the first IPP **Peltier-cooled incubator** was ready for the market, more than 3300 Memmert Peltier appliances have been sold, and until now there have been no complaints or repairs because of the failure of a **Peltier element** through thermo-mechanical overload.

## Applied climate protection in the heating oven: Save up to 90% operating costs and reduce CO<sub>2</sub> emissions at the same time

Economic: The Peltier appliances stand out because of their savings potentials of up to 90% in operating costs (dependent on the temperature selected in the oven and on the ambient temperature). Since there is no need for compressors and conventional heating, both the manufacturing process and the use of materials are considerably more climate-friendly than competing technologies.

Recyclable: All Memmert laboratory devices – including those appliances based on Peltier technology – are made exclusively of high-quality stainless steel. They do not

**Laboratory devices with Peltier technology**

[HPP Constant climate chamber](#)

[IPP Peltier-cooled incubator](#)

[Cooling unit waterbath](#)

require any extra coating, and can therefore be almost fully recycled when they reach the end of their working life. Because they are manufactured in just one location in Germany, logistics costs covering delivery of appliances are minimised. All workplaces in its production are equipped with energy-efficient lighting.

Environmentally friendly production: In the production and packaging of equipment, use of compound materials is restricted as far as possible; of course the EU directives 2002/95/EC (RoHS) and 2002/96/EC (WEEE) are fulfilled, separate collection and extensive recycling of waste and residue from the production process; use of environmentally friendly processes and materials in manufacture, e.g. lead-free soldering, no coating, no use of lasers to cut metal, a filter unit for welding work.

Quiet-running: It is quite common that compressors with a high level of noise are used to cool the interior. Appliances based on Peltier technology, in contrast, run extremely smoothly and quietly.

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