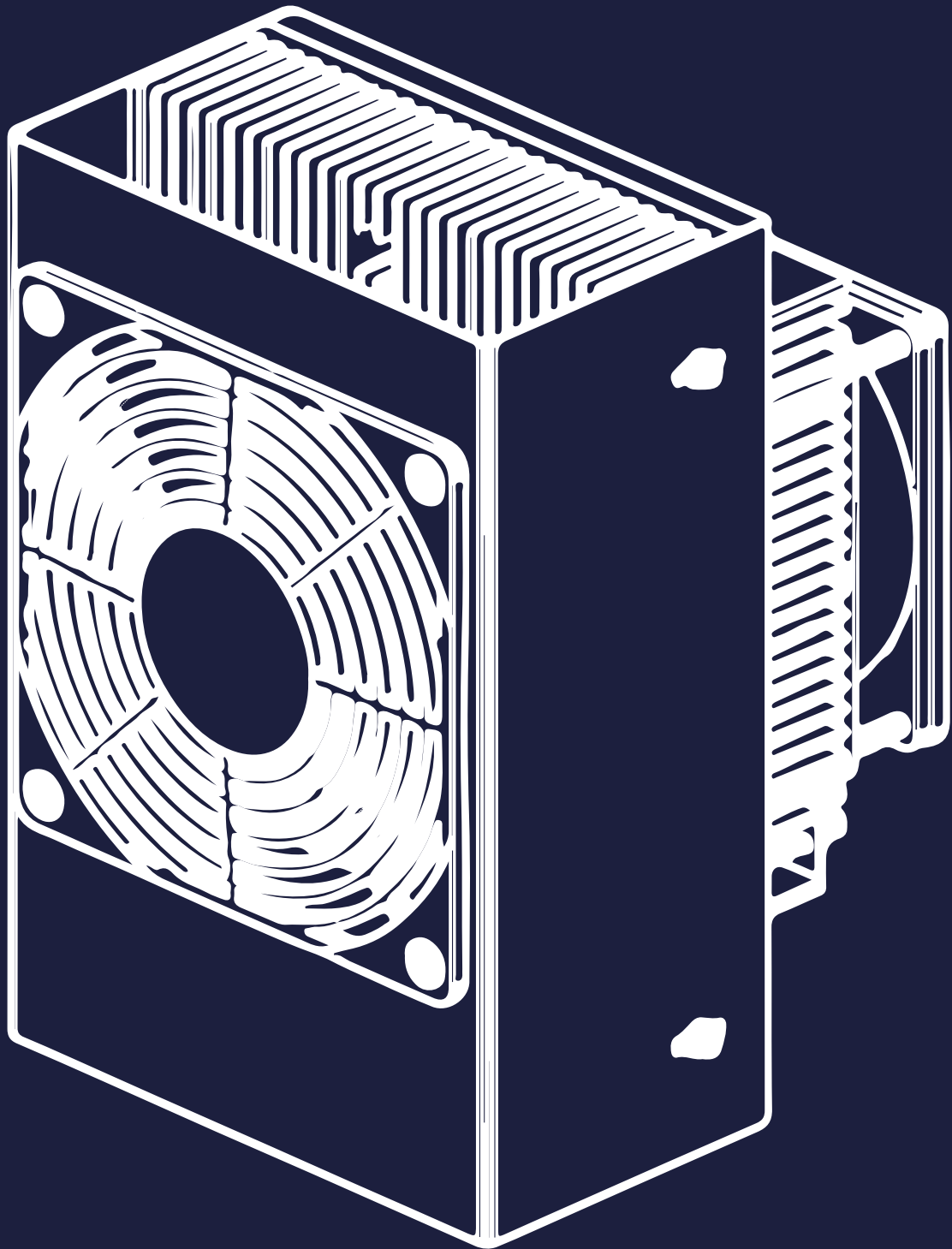


**DR. NEUMANN**

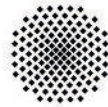
TECHNIK **Peltier**



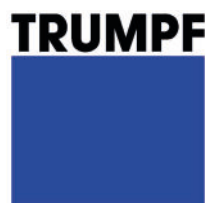
**YOUR PARTNER FOR THERMOELECTRIC SYSTEMS**



# References



Universität Stuttgart



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# Our Company

Dr. Neumann Peltier-Technik is **your partner for cabinet coolers and thermoelectric systems**. We offer refrigerant-free cooling for cabinets as well as customized cooling units that meet your application needs. The quality of our cabinet coolers has earned Dr. Neumann Peltier-Technik an excellent reputation in the market. Our national and international customer base values the effectiveness of our innovative cabinet coolers. Our engineers offer you a technologically ideal solution for your application.

- Please contact us



## ISO 9001:2015

Dr. Neumann Peltier-Technik GmbH is ISO Certified according to ISO 9001:2015



## OHRIS:2010

Dr. Neumann Peltier-Technik GmbH is occupational safety and plant safety certified according to OHRIS:2010



## Made in Germany

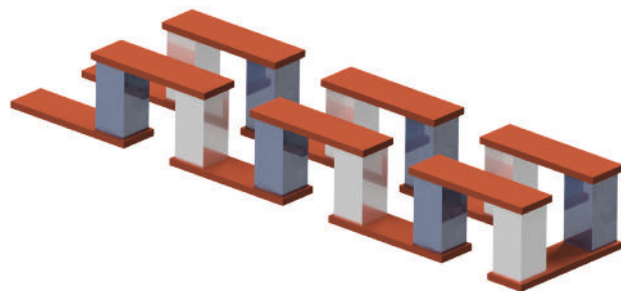
The thermoelectric products from Dr. Neumann Peltier-Technik GmbH are engineered and made in Bavaria, Germany

# The Peltier-Technology

What are the advantages of cooling with Peltier cooling components? Which differences and similarities to conventional compressor systems exists?

Both cooling systems have a heat flow from a cold to a warm reservoir.

In the **compressor system**, the heat transfer is carried out by a cooling fluid, which is compressed by the compressor and transported through the system.



In the **Peltier-Cooler System**, the electric current corresponds to the coolant of the compressor and the direct current voltage source is equivalent to the compressor.

---

A variety of applications can only be solved with Peltier technology.



## Miniature cooling

Peltier coolers can provide precisely defined small cooling capacities, which cannot be achieved with compressor cooling.



## Control accuracy

Peltier units can be controlled electronically with an accuracy of 0,01 Kelvin or better.



## Robustness

Peltier coolers can work in the most adverse environmental conditions. They are suited for working in high ambient temperatures or heavily polluted ambient air. Peltier coolers don't even have problems with vibrations or strong accelerations!



## Reversability

Peltier elements are easily reversible. Simply by reversing the polarity of the DC current heat can be produced where it was cooling previously, and vice versa.

# Custom Designs

Some situations require more than just looking at a catalogue. And that's exactly when you as our customer get to know one of our greatest strengths: **almost limitless flexibility.**

If you can't find the right device for your task in our product range, we will simply design one for you. **The team at Dr. Neumann Peltier-Technik, with its concentrated experience and combined knowledge, is able to take care of any enquiry.** Our development department is not afraid of any challenge and, in consultation with you, will quickly and precisely create a demand-oriented and economically suiting special solution exactly tailored to your individual needs.

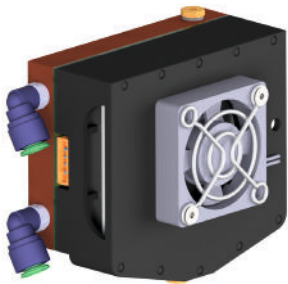
**All processes for customer-specific designs and developments from our company are certified according to the ISO 9001** quality regulations and offer the same high-quality standard as the products from our usual portfolio.

Does your product require to be approved for a specific market? We have extensive experience especially within e.g. the support of **UL-approval** as well as engineering and manufacturing in line with military standards and we will support you with all our know-how and expertise.

Documentation according to relevant norms and standards is also part of our range of services. Dr. Neumann Peltier-Technik uses a highly-efficient modular document structure in order to provide this service in a cost-effective way – even for multilingual applications.

Please feel free to contact us.  
Together we will find the ideal solution for you.

## Examples



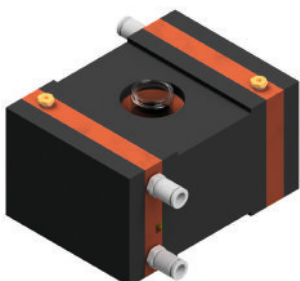
### Mini Dehumidifier

For reducing the humidity in laser heads, we developed a water-recooled mini dehumidifier for a customer consisting of a special copper heat exchanger and an integrated condensate drainage channel. The active ventilation of the condensate plate also increases the dehumidifying performance and at the same time generates a gentle air movement inside the laser head. The module is held in its ideal operating point via an external control, which we also developed, in order to provide efficient dehumidification of the laser head.



### Active Camera Cooling

Due to the food industries strict legal requirements, there is a variety of restrictions for a cooling system to be installed. In case of the camera cooling system shown on the left, we developed a closed system, which mainly consists of food-grade stainless steel and deliberately release its waste heat via free convection. The Peltier system regulates the temperature of three different cameras so that they can work at their ideal operating point. The resulting heat is transferred to a star shaped cooler made of stainless steel, where it can be submitted sufficiently to the surroundings.



### High Precision Test Tube Temperature Control

For an automated and high-precision temperature control of various test tubes and their contents, we developed a system which can be adjusted in the range of 0,01 K. The system also has been optimized from an economical point of view and consists of two identical water coolers for this purpose. The geometry and the structure of the system are simultaneously designed for an autonomous operation. An external control unit specially developed by us regulates the system efficiently and as needed.





Switch Cabinet

# Air Conditioning



The principle of Peltier cooling is similar to that of an electronic heat pump. The Peltier elements transfer thermal energy from the cold exchanger to the switch cabinet interior to the heat exchanger on the switch cabinet exterior. The warm air inside the switch cabinet is blown onto the cold exchanger by a fan and thereby cooled.

The heat exchanger on the switch cabinets exterior is then re-cooled by ambient air. The advantage of Peltier cooling is its functional reliability. In addition, our switch cabinet coolers can be used in moving or accelerating systems. All Dr. Neumann switch cabinet coolers are designed so that there is no air exchange between the switch cabinet interior and the surrounding air, even after installation. No maintenance for example changing the fan filters and cabinet interior cleaning is needed.

Our Cabinet coolers are quickly and easily installed and interchangeable due to identical installation dimensions for a specific size.

All our units of the “Standard” and “AC” series are equipped with temperature protection switches and alarm relays as standard. In addition, the exterior of all our switch cabinet coolers is designed to comply with degree of protection IP67 which guarantees the highest level of safety. Most of our “Standard” and “AC” series devices are UL recognized.

# Overview of Switch Cabinet Coolers

Type	Series	Size	Weight	Input Power	Supply Voltage	Recooling	Degree of Protection (outside)	Function	UL
FL-104-C	Standard	1	2,5 kg	50 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FN-104-C	Standard	1	2,5 kg	70 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FR-104-C	Standard	1	2,5 kg	100 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FL-208-C	Standard	2	5 kg	100 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FN-208-C	Standard	2	6 kg	140 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FR-208-C	Standard	2	7 kg	200 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FL-316-C	Standard	3	10 kg	200 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FN-316-C	Standard	3	11 kg	280 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FR-316-C	Standard	3	12 kg	400 W	24 V-DC	Air	IP 67	Cooling / Heating	yes
FL-208-AC	AC	2	6 kg	100 W	90 ... 305 V-AC, 47 ... 63 Hz	Air	IP 67	Cooling only	yes
FR-208-AC	AC	2	6 kg	200 W	91 ... 305 V-AC, 47 ... 63 Hz	Air	IP 67	Cooling only	yes
FL-416-AC	AC	4	12,5 kg	200 W	92 ... 305 V-AC, 47 ... 63 Hz	Air	IP 67	Cooling only	yes
FR-416-AC	AC	4	14,5 kg	400 W	93 ... 305 V-AC, 47 ... 63 Hz	Air	IP 67	Cooling only	yes
FL-536-AC	AC	5	25 kg	450 W	94 ... 305 V-AC, 47 ... 63 Hz	Air	IP 67	Cooling only	no
FR-536-AC	AC	5	25 kg	900 W	95 ... 305 V-AC, 47 ... 63 Hz	Air	IP 67	Cooling only	no
HL-104-C	HL	1	2,5 kg	50 W	24 V-DC	Air	IP 67	Cooling / Heating	no
HL-208-C	HL	2	5 kg	100 W	24 V-DC	Air	IP 67	Cooling / Heating	no
HL-316-C	HL	3	10 kg	200 W	24 V-DC	Air	IP 67	Cooling / Heating	no
LR-208-C	LRC	2	5 kg	200 W	24 V-DC	Water	IP 67	Cooling / Heating	no

# Performance Curves

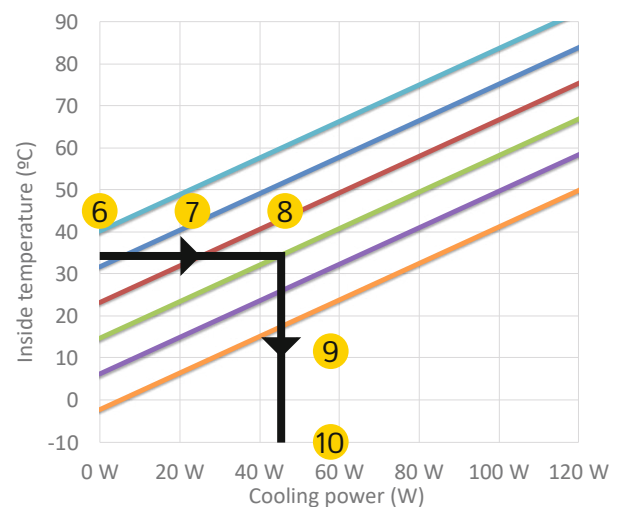
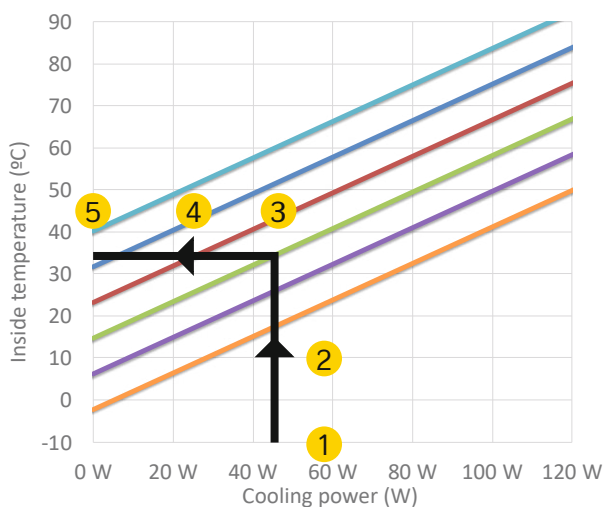
The performance diagrams of our coolers show the results of a long series of in-house tests for every single device type. They depict the exact performance of a cooler relative to the ambient temperature and internal temperature of the switching cabinet. For the layout design, the operating point is first assumed, which means that the cooling capacity of the Peltier device corresponds exactly with dissipation loss in the cabinet. That keeps the internal temperature stable. In order to determine this, the power loss is first marked on the X-axis of the diagram **1** and a vertical line **2** is drawn through it. On the Y-axis, a horizontal line **4** is drawn through the intersection of this vertical line and the line for maximum ambient temperature **3**. The adjusting internal cabinet

temperature **5** can now be read on this horizontal line. If the temperature is too high, the next larger cooler model is tested in the same way.

If the exact cooling capacity of a device at a given temperature needs to be determined, a horizontal line **7** is first drawn through the corresponding internal temperature **6** on the Y-Axis. A vertical line **9** is then drawn down to the X-axis through the intersection of the horizontal line and the colour coded maximum ambient temperature line **8**. This indicates the exact cooling capacity of the device. **10**



If you visit our website, you will find a calculation tool. There you can insert your values and get an automatic device suggestion.




— 20 °C — 30 °C — 40 °C — 50 °C — 60 °C — 70 °C



Switch Cabinet Cooler  
Series „Standard“

 -40°C - +70°C

 IP67-rated

 24 V-DC




The “Standard” series switch cabinet coolers are available in three sizes with three power grades each. They distinguish themselves with their compact designs and very high efficiency and offer superior performance despite their small size. All “Standard” series switch cabinet coolers are fitted with protection against overheating and alarm relays. The exterior has been designed to provide IP67 protection.





# Size 1


## Switch Cabinet Cooler

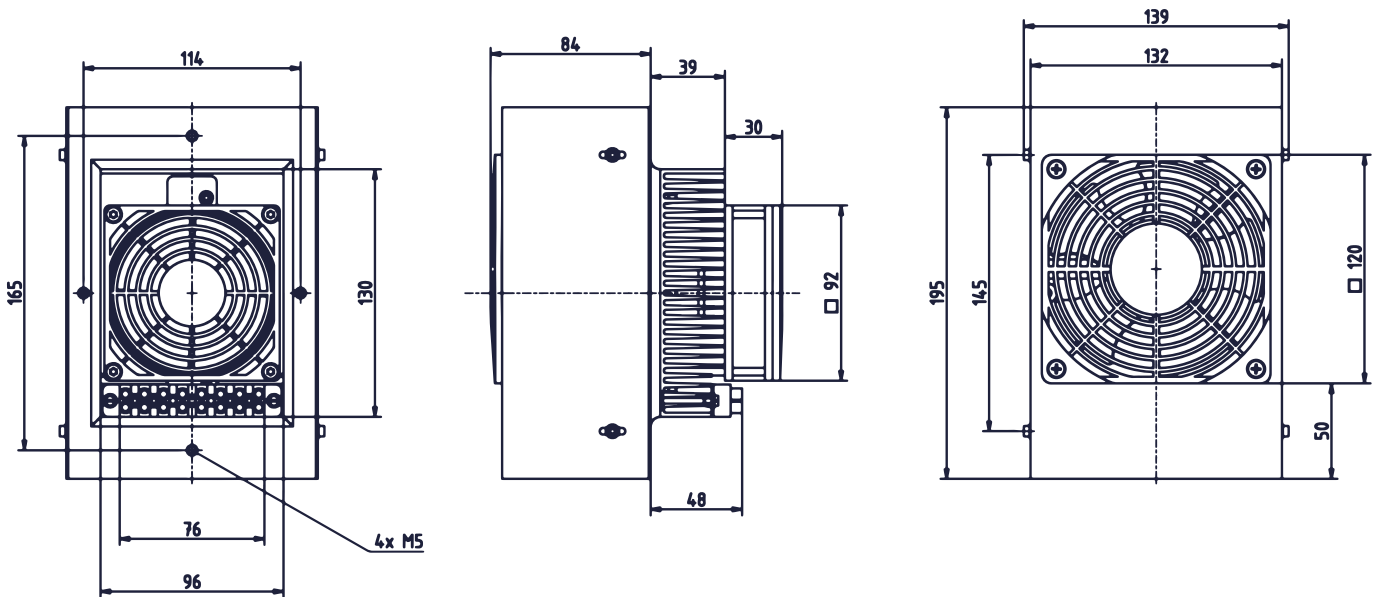
 2.5 kg

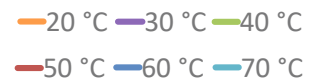
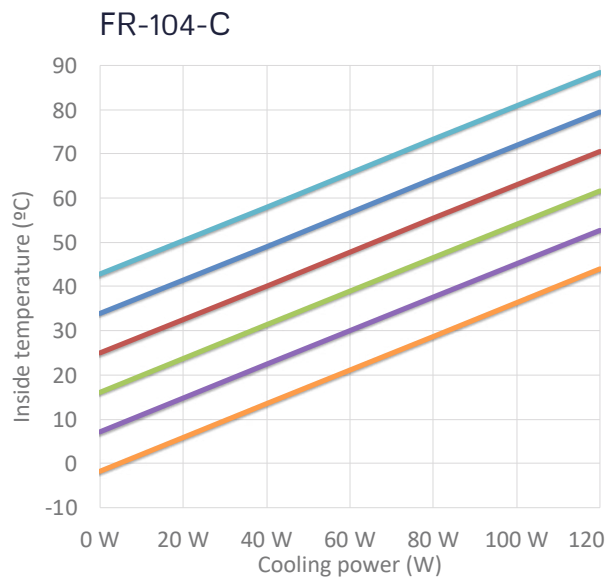
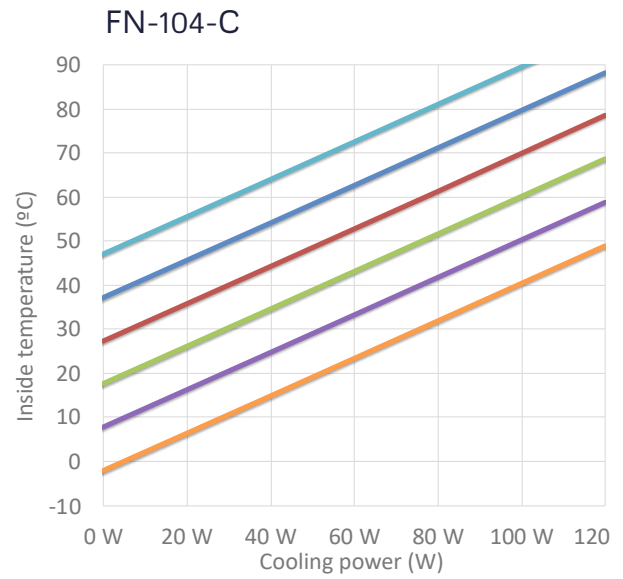
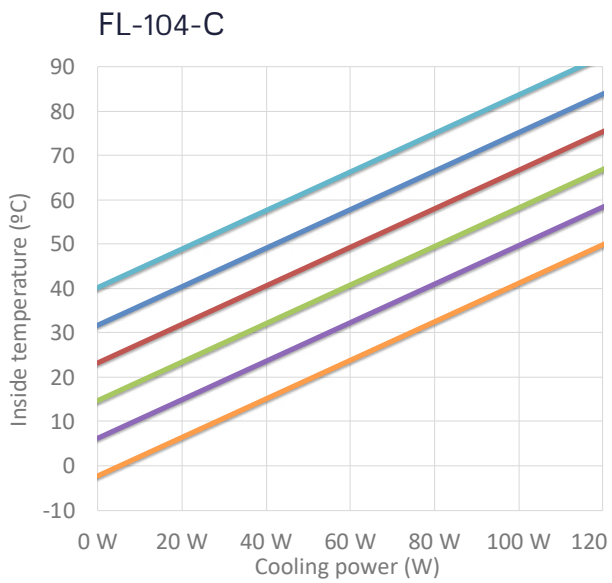
 139 x 195 x 153 mm

 -40°C - +70°C

 IP67-rated


 50W | FL-104-C  
 70W | FN-104-C  
 100W | FR-104-C








# Size 2


## Switch Cabinet Cooler

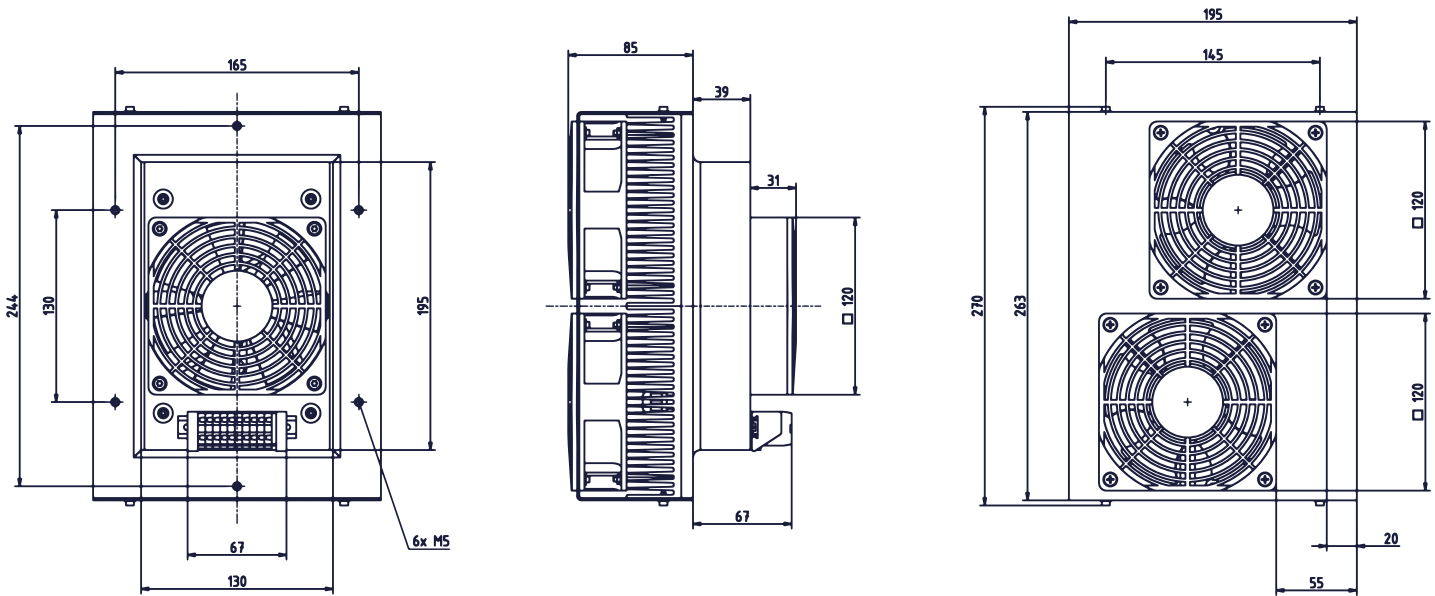
 5 kg

 195 x 270 x 155 mm

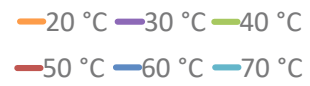
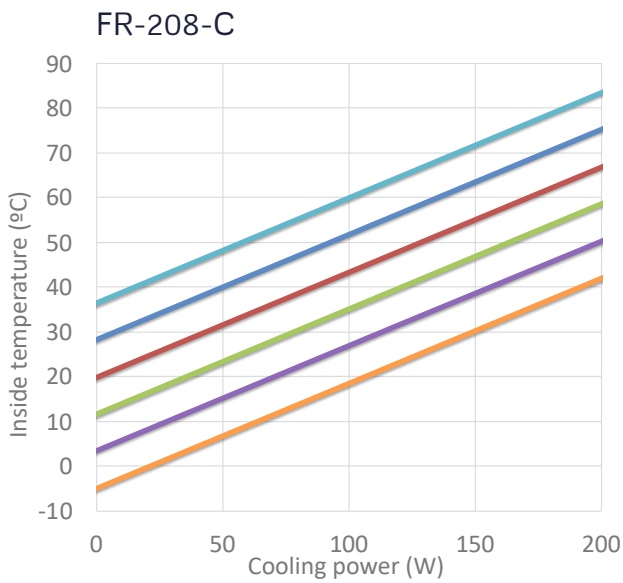
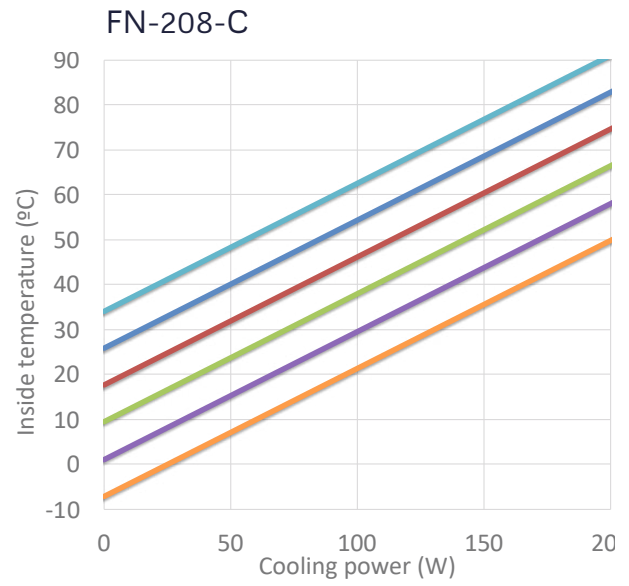
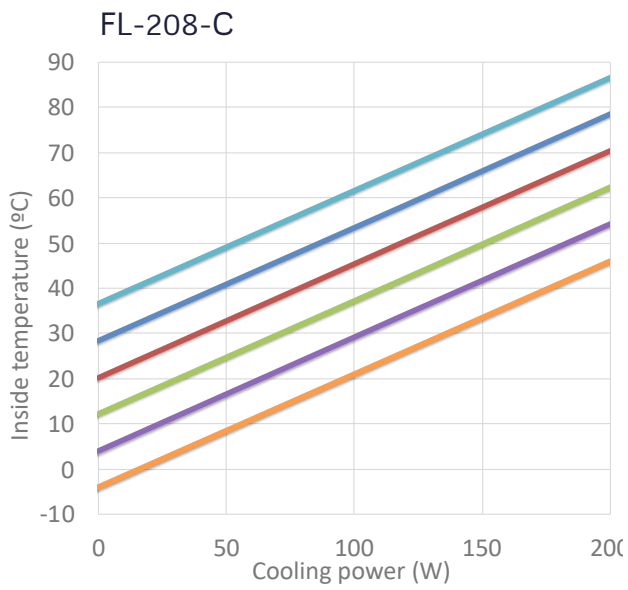
 -40°C - +70°C

 IP67-rated

 100W | FL-208-C  
 140W | FN-208-C  
 200W | FR-208-C










# Size 3


## Switch Cabinet Cooler

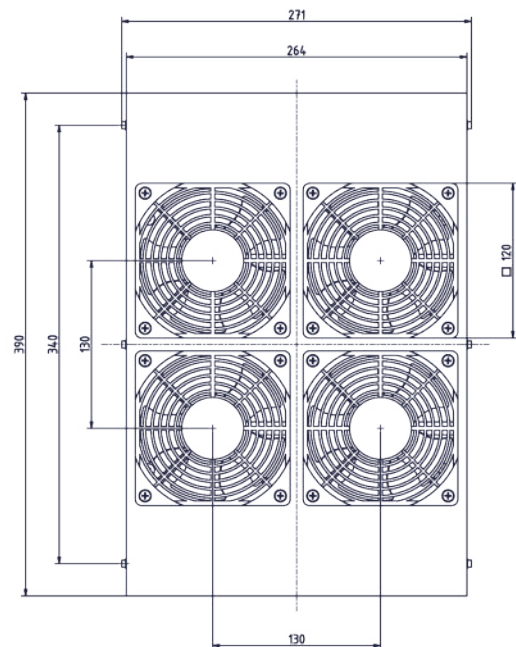
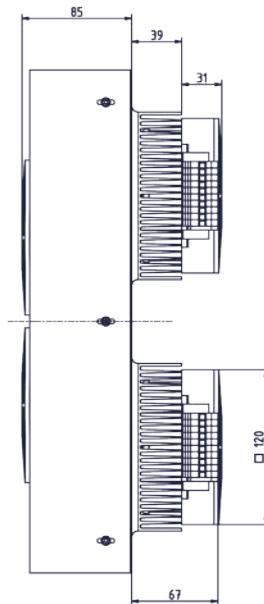
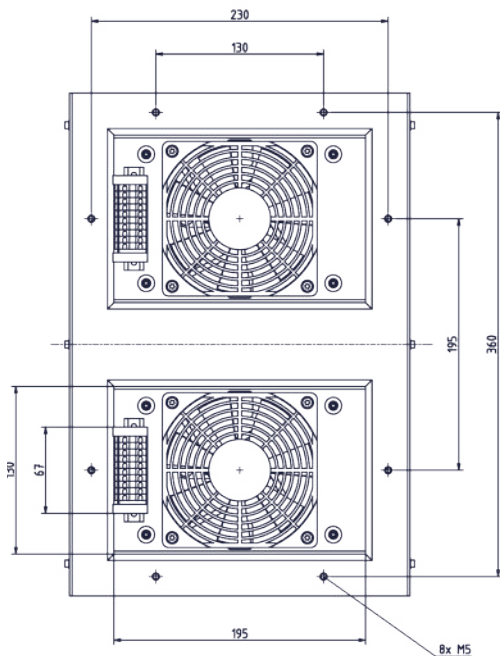
 10 kg

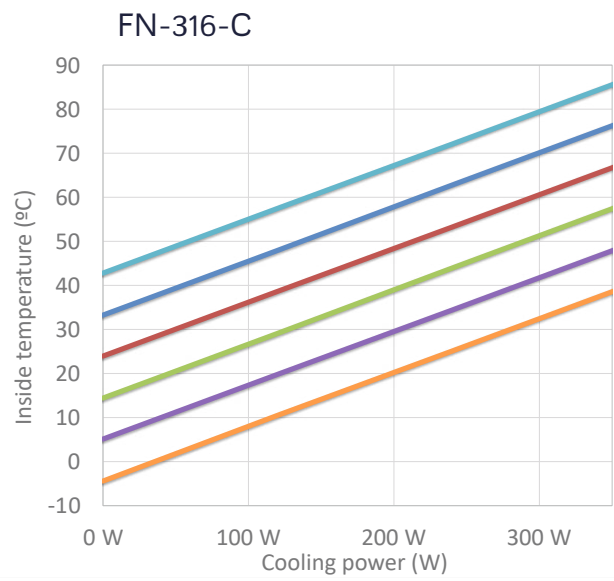
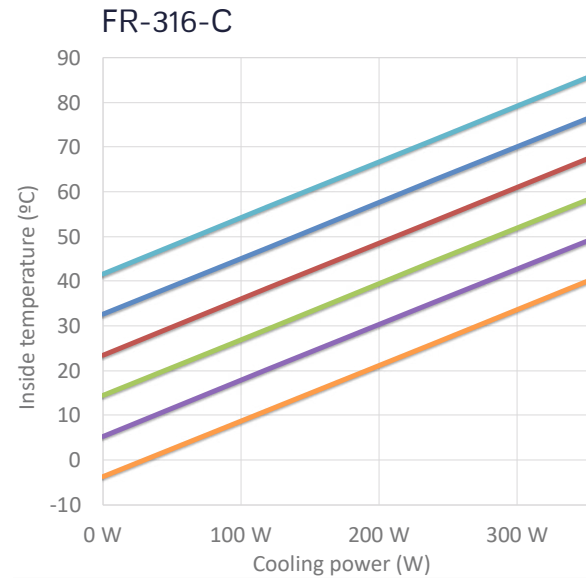
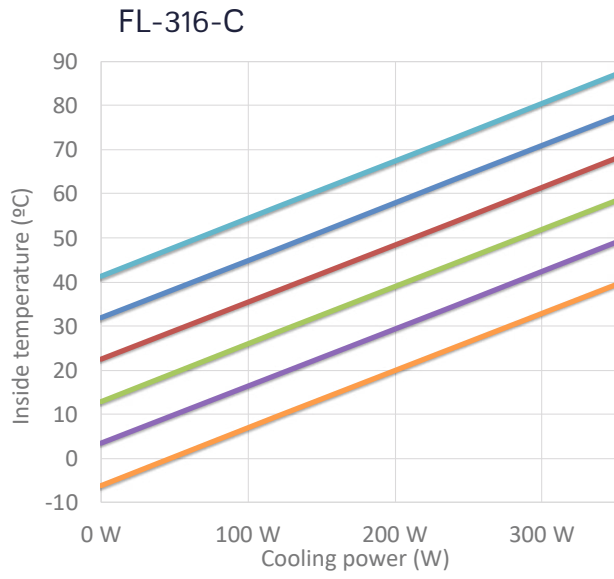
 271 x 390 x 155 mm

 -40°C - +70°C

 IP67-rated

 200W | FL-316-C  
 280W | FN-316-C  
 400W | FR-316-C








# Switch Cabinet Cooler Series „AC“

 -40°C - +70°C

 IP 67-rated

 90 .. 305 V-AC | 47 .. 63 Hz

  (except Size 5)  
File No. E488467 NEMA 1, 12, 4X


The “AC” series switch cabinet coolers are available in three sizes with two power grades each. They have built-in power supplies on the outside of the units. The devices of the “AC” Series can be operated with mains voltage and there is no extra power loss inside the cabinet to operate the Peltier cooler. All “AC” series switch cabinet coolers are fitted with protection against overheating and alarm relays. The exterior has been designed to provide IP67 protection. The units of the “AC” series are only suitable for cooling. However, a version for switching between cooling and heating is available on request.





# Size 2

## Switch Cabinet Cooler

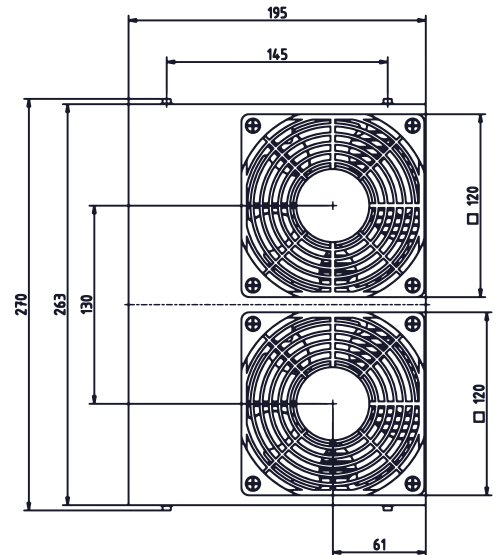
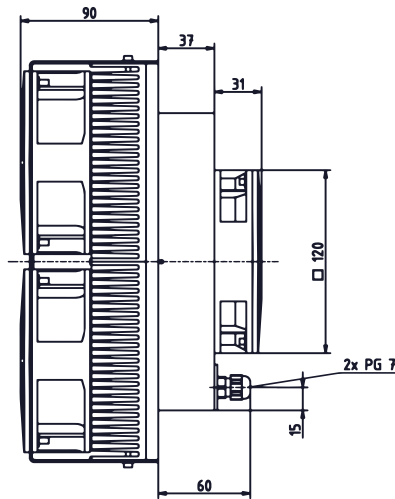
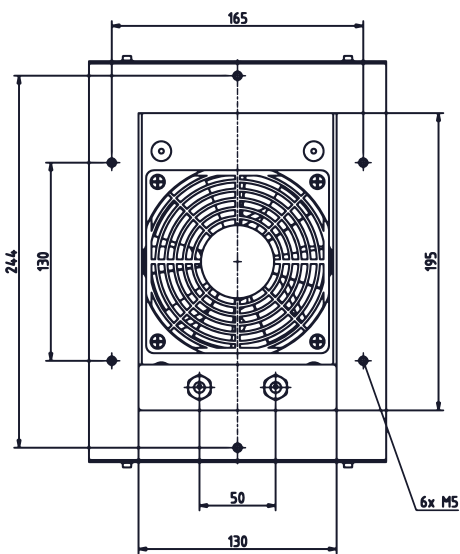
 6 kg

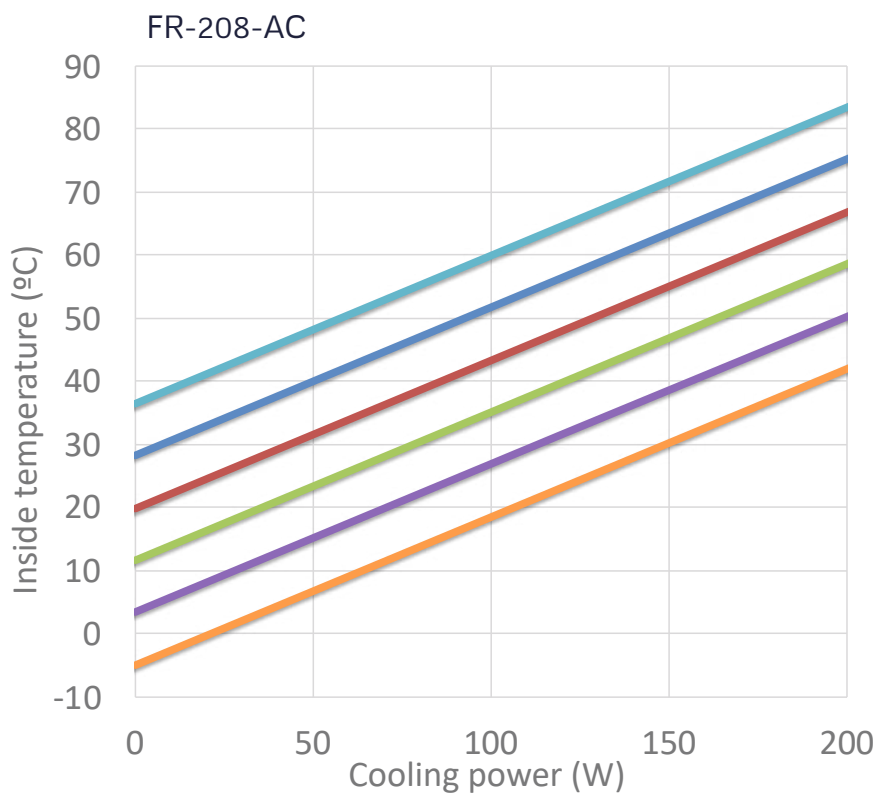
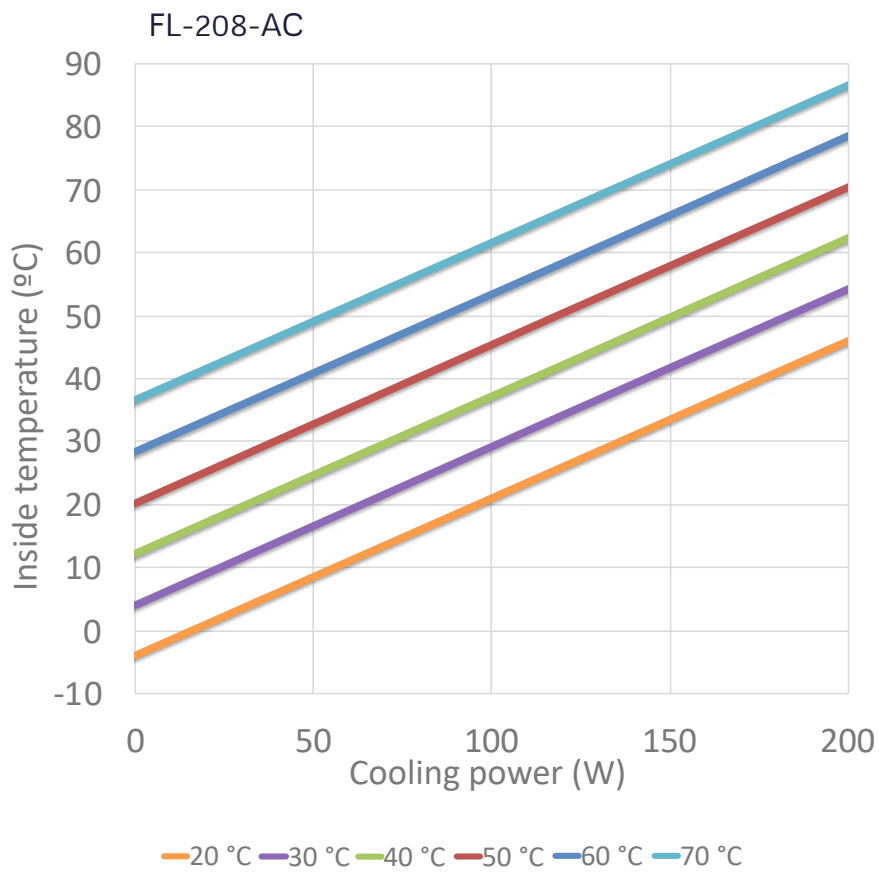
 195 x 270 x 158 mm

 -40°C - +70°C

 IP67-rated


 100W | FL-208-AC  
200W | FR-208-AC








# Size 4

## Switch Cabinet Cooler

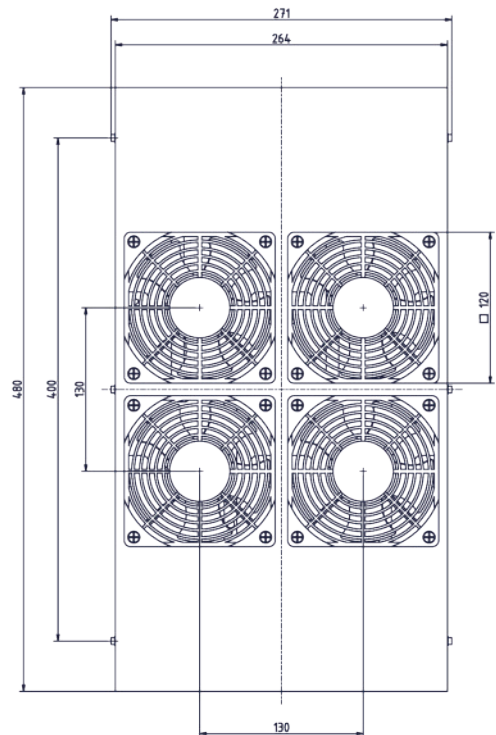
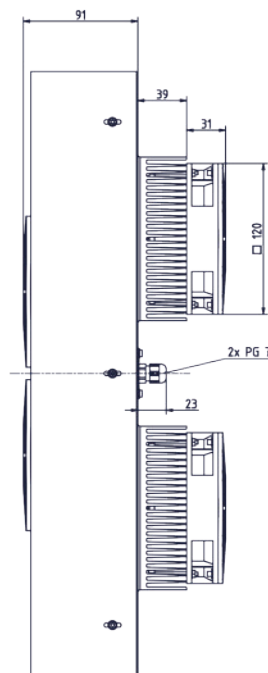
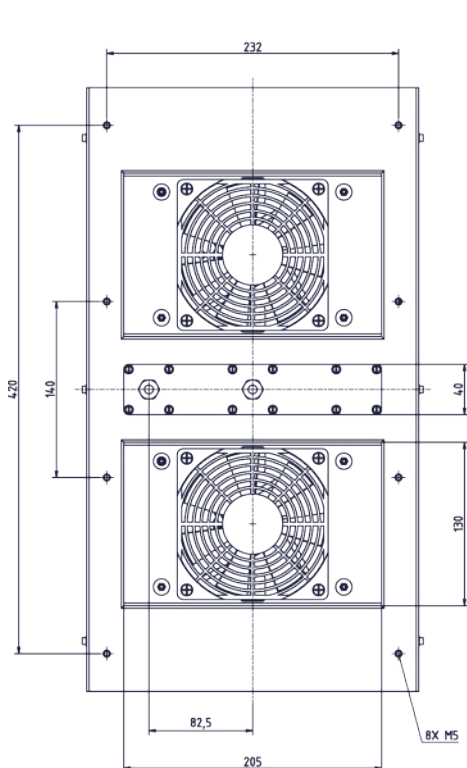
 12,5 kg / 14,5 kg

 271 x 480 x 161 mm

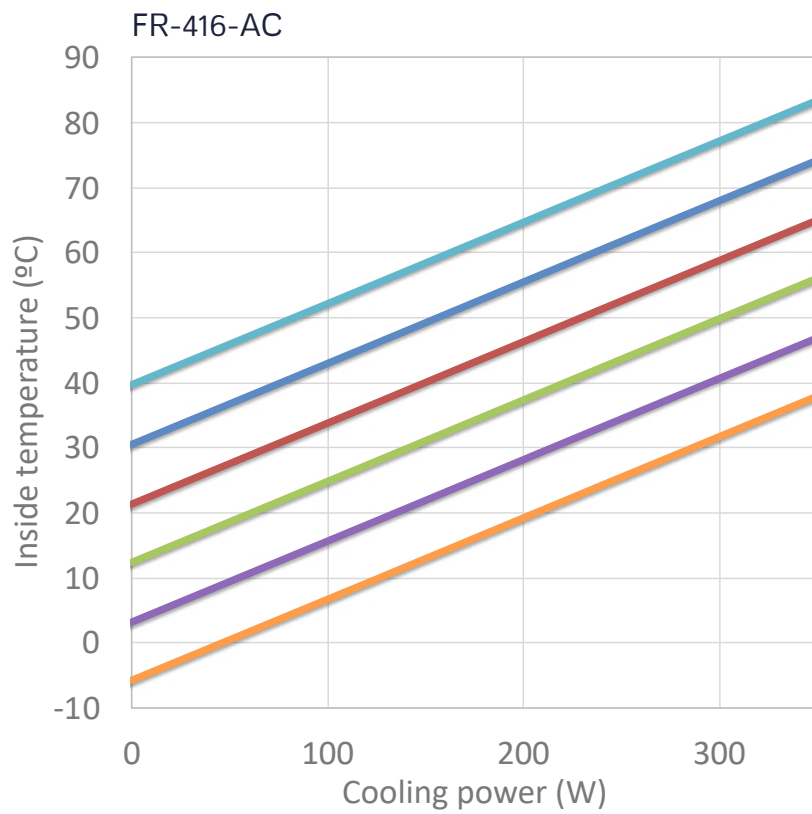
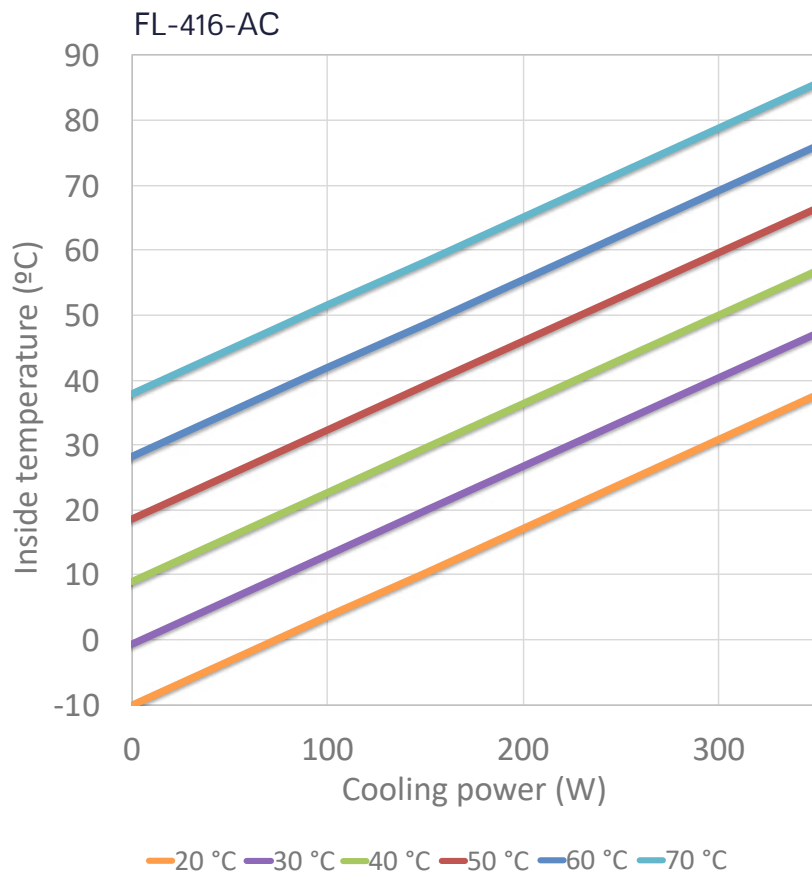
 -40°C - +70°C

 IP67-rated

 200W | FL-416-AC  
400W | FR-416-AC











# Size 5

## Switch Cabinet Cooler

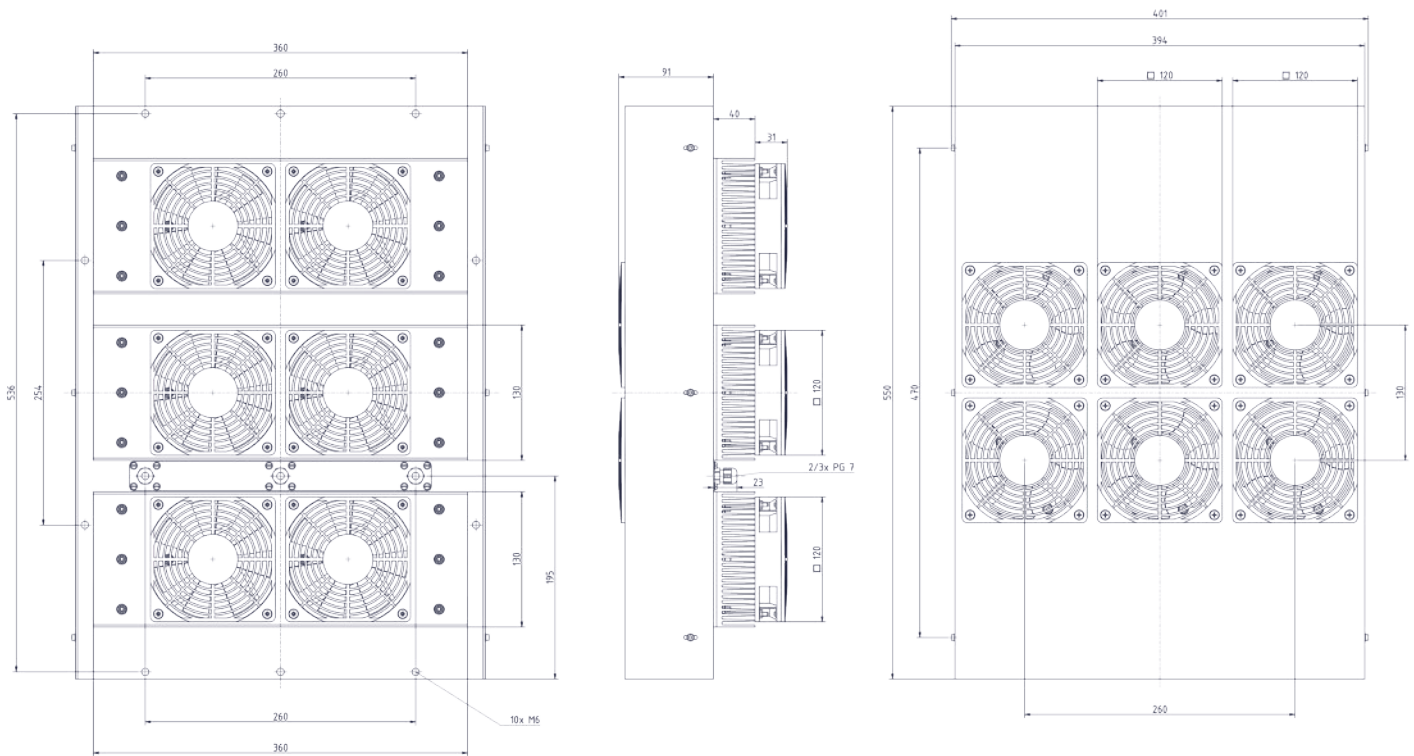
 25 kg

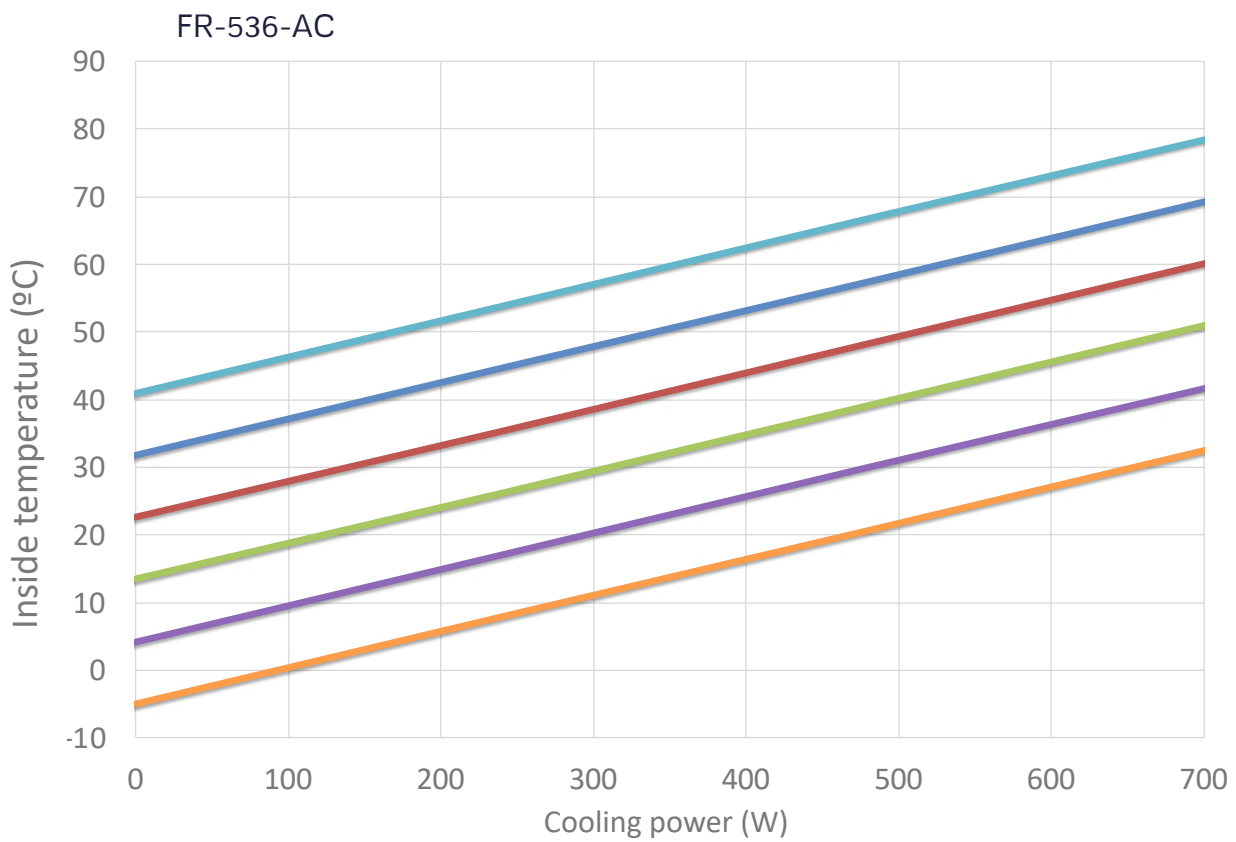
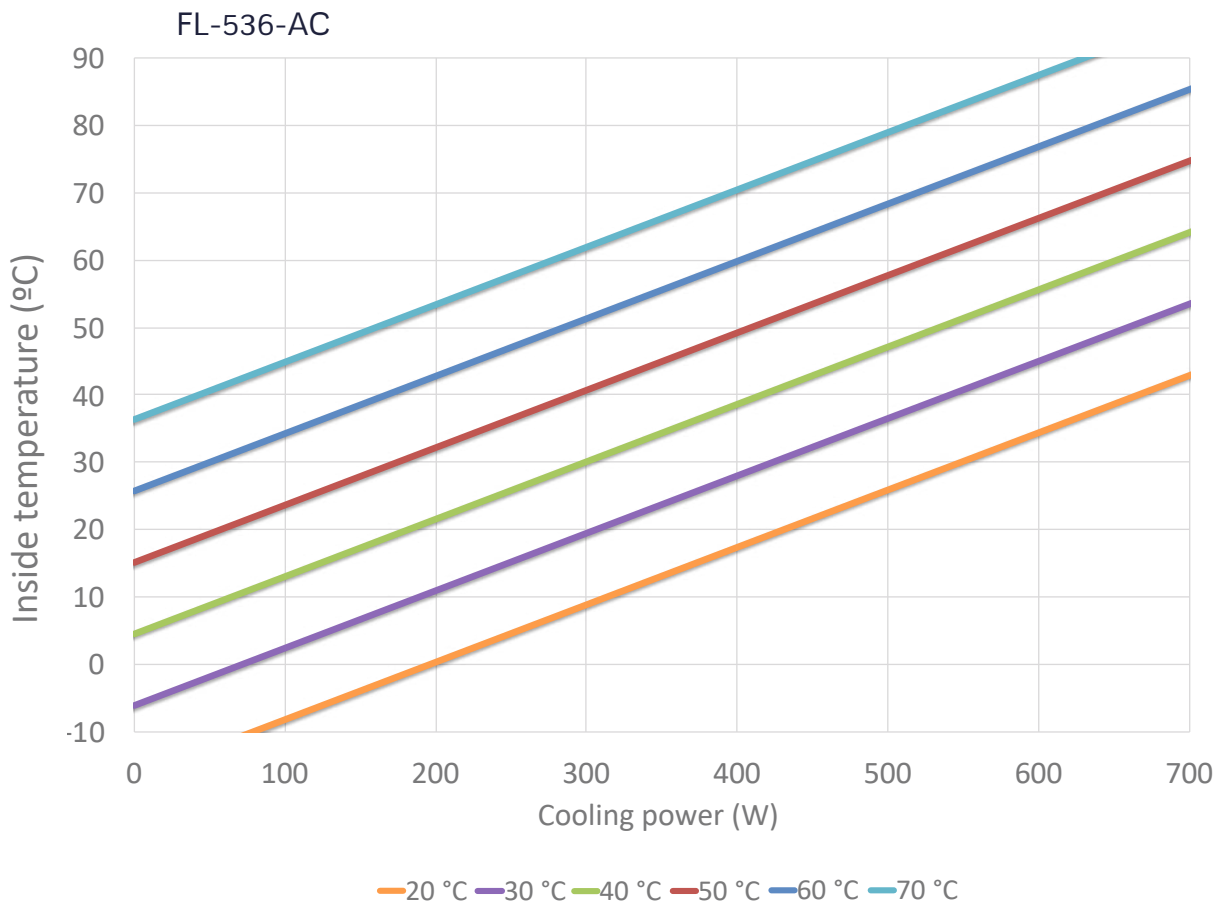
 401 x 550 x 162 mm

 -40°C - +70°C


 IP67-rated


 450W | FL-536-AC  
900W | FR-536-AC






 -40°C - +90°C

 IP 67-rated

 24 V-DC

# High-Temperature Cabinet Cooler Series „HL“




The high-temperature cabinet cooler **series "HL"** cools efficiently – even at high operating temperatures of up to 90 °C. Three models in three different sizes with the nominal input of 50 W 100 W and 200 W deal with demanding cooling tasks in an operating temperature range between -40 °C and +90 °C. The environmental protection class IP67 guarantees optimal protection against ambient, despite high temperatures. The "HL" cabinet coolers are equal in size and pin compatible to our "Standard" series.





# Size 1

## High-Temperature Cabinet Cooler

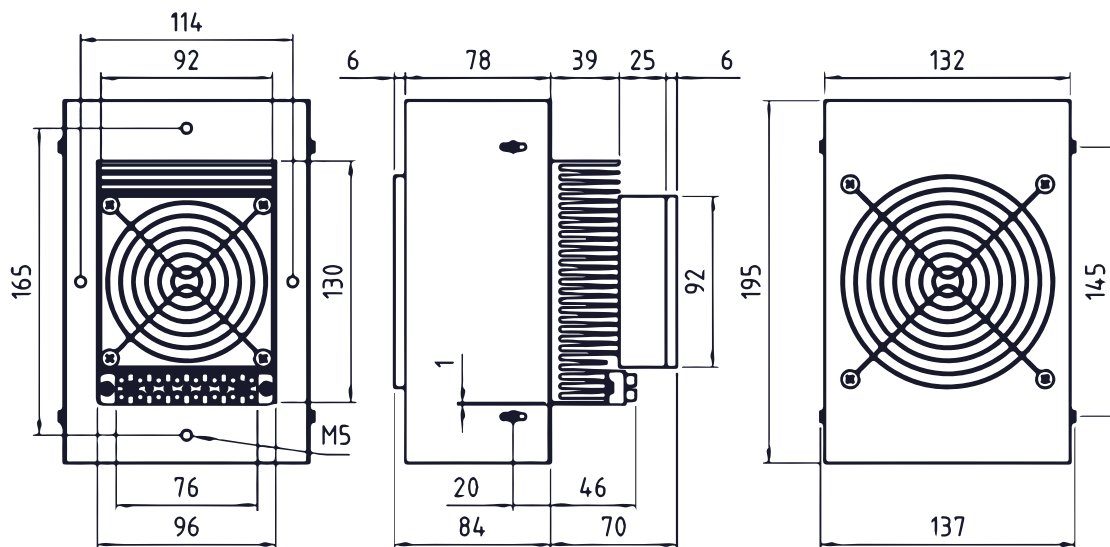
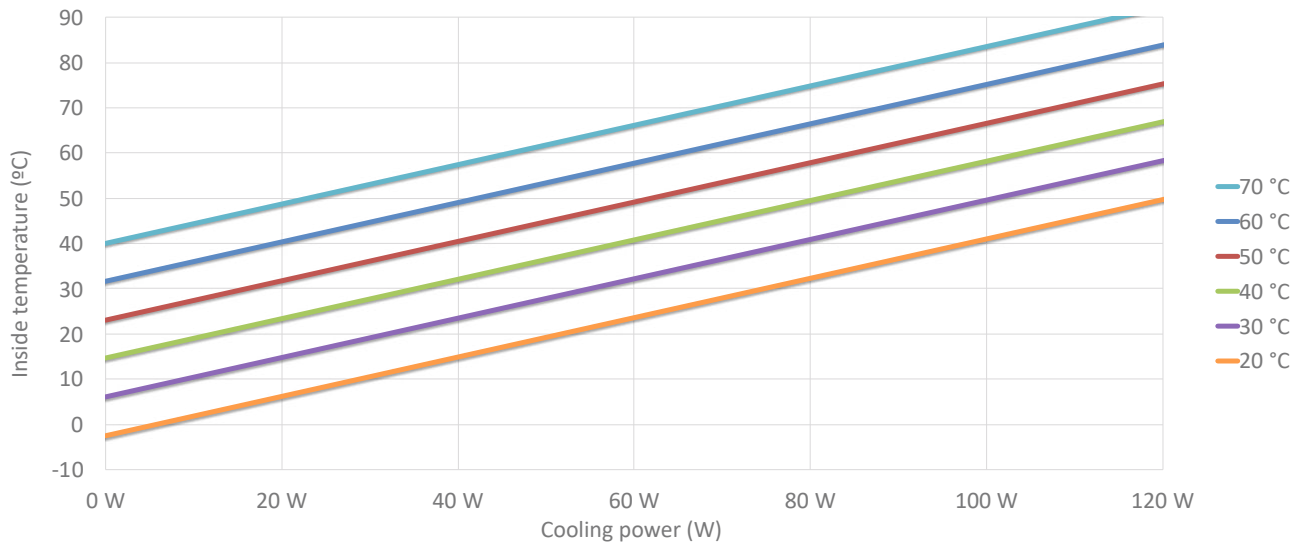
 2.5 kg

 137 x 195 x 154 mm

 -40°C - +90°C

 IP67-rated

 50W | HL-104-C



# Size 2

## High-Temperature Cabinet Cooler

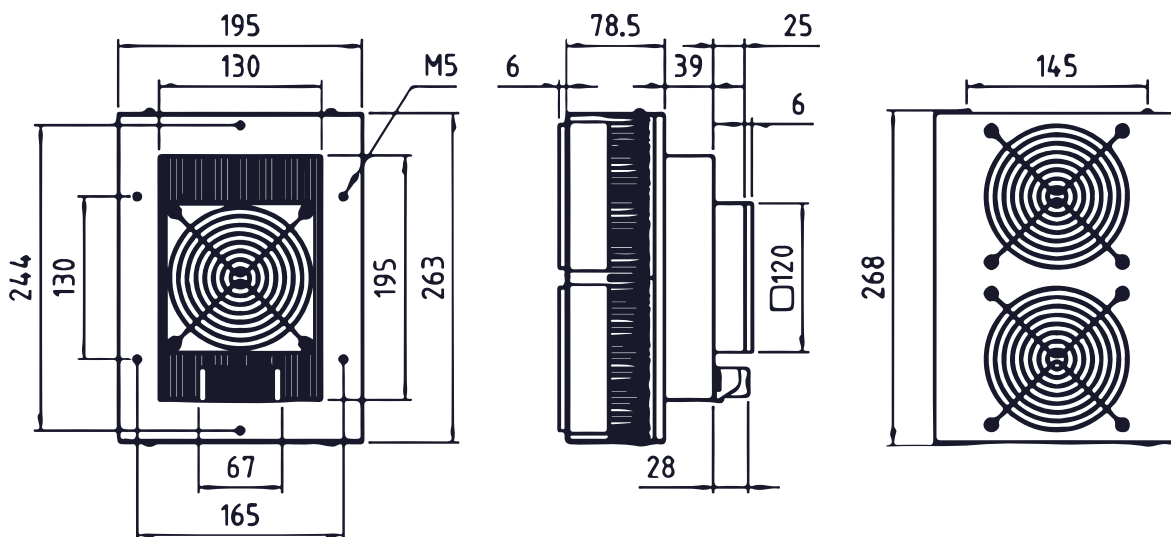
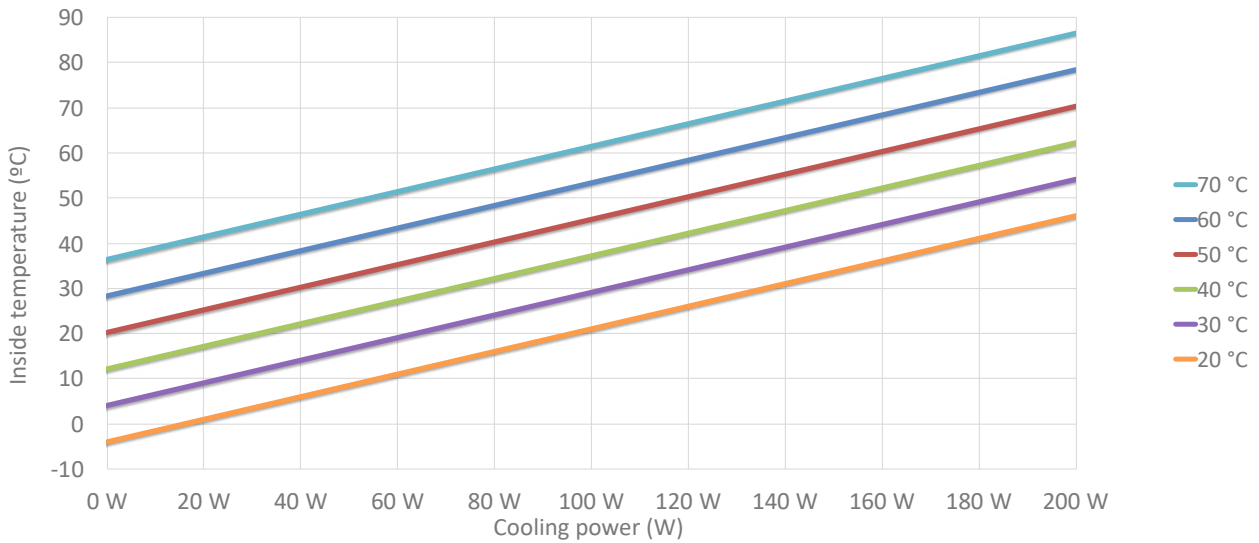
5 kg

195 x 268 x 154,5 mm

-40°C - +90°C

IP67-rated


100W | HL-208-C





# Size 3

## High-Temperature Cabinet Cooler

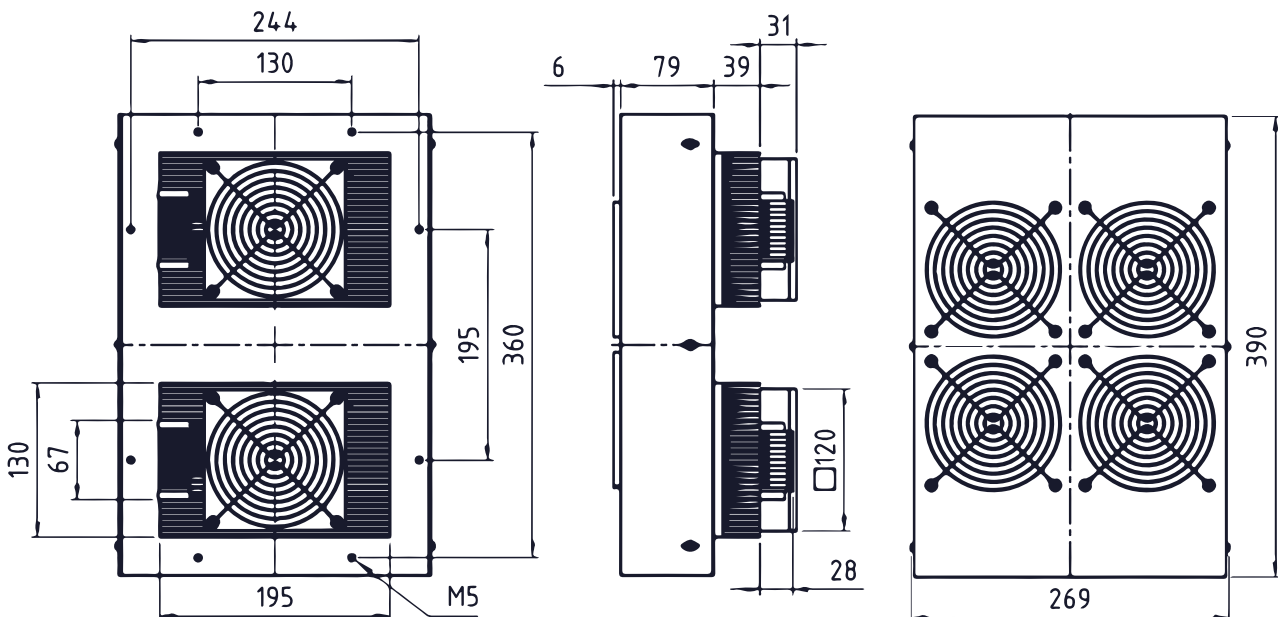
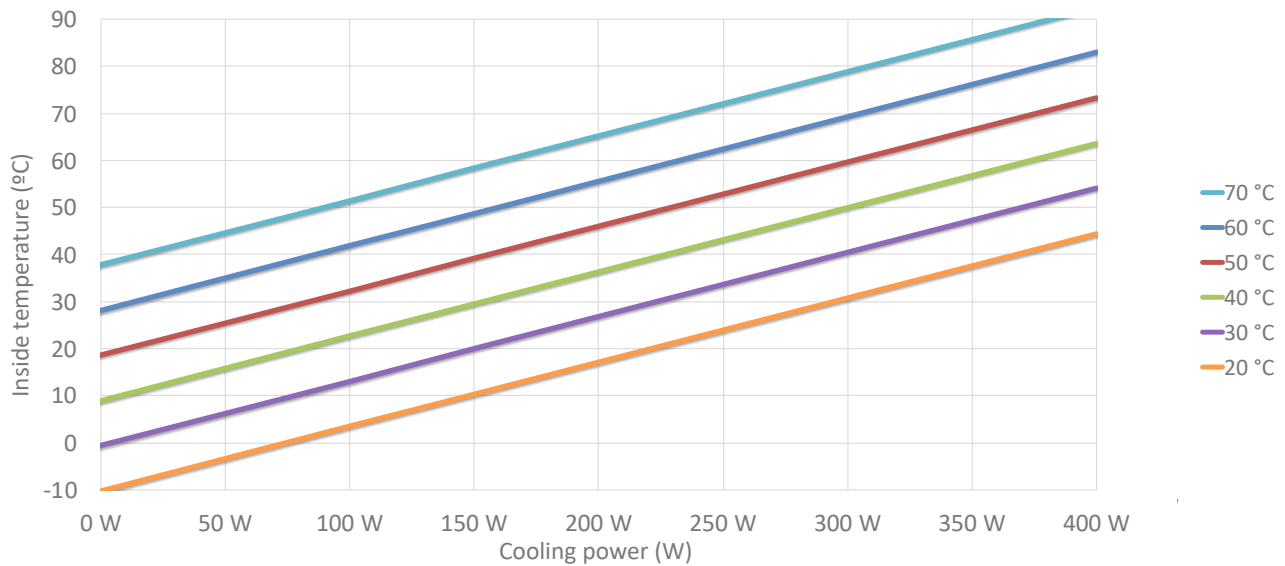
 10 kg

 269 x 390 x 155 mm

 -40°C - +90°C

 IP67-rated

 200W | HL-316-C










Switch Cabinet Cooler  
Series „LRC“

 +5°C - +90°C

 IP 67-rated

 24 V-DC

The „LRC“ series switch cabinet coolers have been especially for usage in machines. The cooling water, which is usually available in these applications can be easily used for cooling the units. The “LRC” series combines high power outputs with compact size and cooling, which is largely independent of the ambient temperature. The water path and the position of the hose connections can be configured as desired. In addition, the “LRC” series provides all the benefits of Peltier technology, such as position-independent installation and being able to change over to heating.



# Series „LRC“ Switch Cabinet Cooler

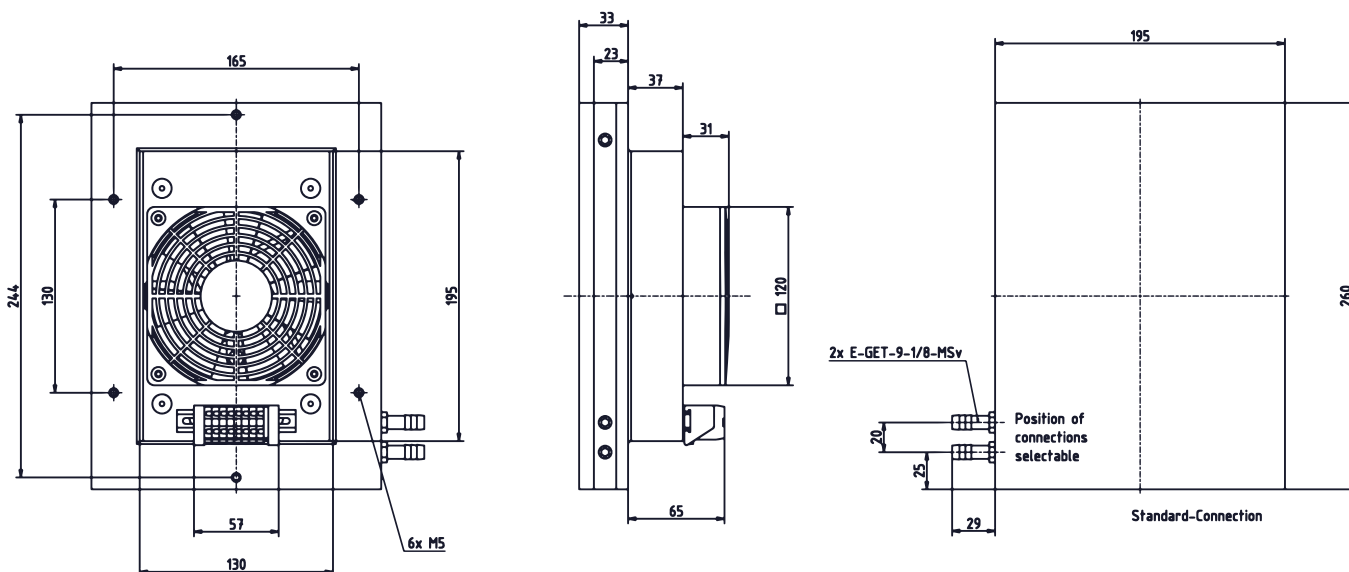
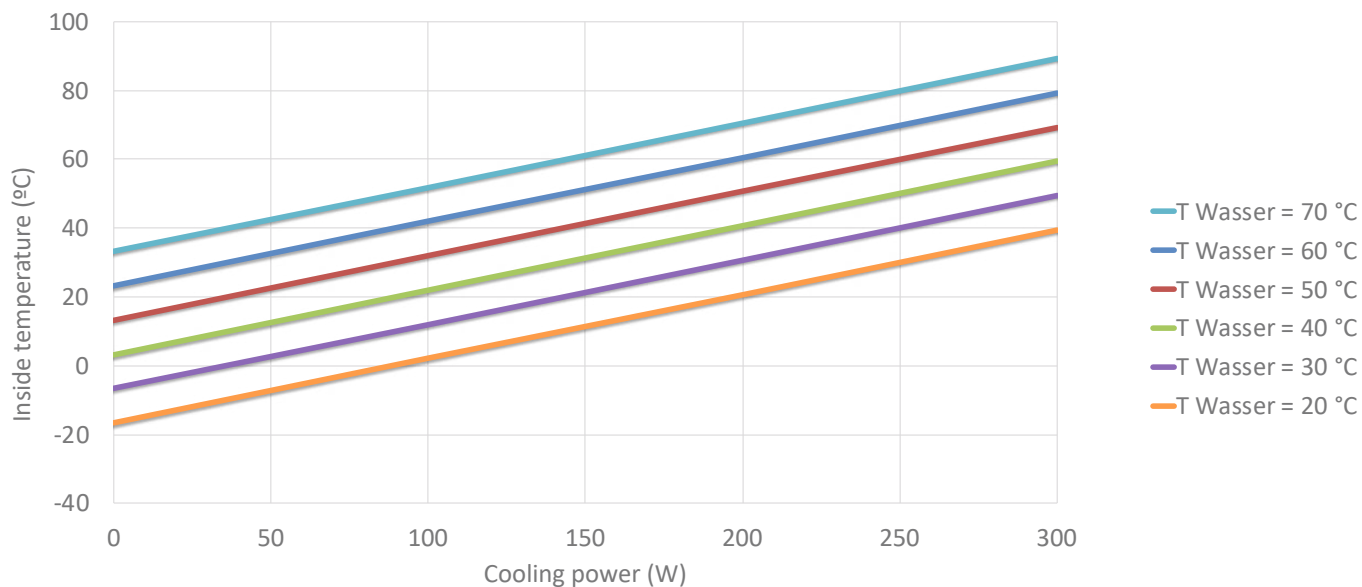
5 kg

195 x 260 x 101 mm

+5°C - +90°C

IP67-rated

200W








# Switch Cabinet Dehumidifier Series „PSE“

 +10°C - +70°C

 IP 67-rated

 24 V-DC



Dr. Neumann Peltier-Technik offers special variants of switch cabinet coolers – dehumidifiers.

For this purpose, a plate or a heatsink underneath the dewpoint is being cooled. The resulting cooled surface functions as a „cold trap“ and makes the humidity inside it condensate. Usually a drip pan is installed at the cold plate, which collects the condensed water and drains it out of the switch cabinet via a drainage tube.


This system can be modified extensively to your needs. Feel free to contact us about your application.




# Switch Cabinet Dehumidifier PSE-001-C


The PSE-001-C switch cabinet dehumidifier (patented) is a special form of switch cabinet cooler. In the switch cabinet interior, there is a ventilator-free cold plate on which the humidity condenses. The resulting water droplets run off the plate, are collected in a channel and drained out of the switch cabinet by a drainage tube. In order to avoid the formation of ice, the cold plate is equipped with a temperature sensor, which keeps the temperature of the cold plate in an ideal range by means of an integrated electronic regulator. In addition, the switch cabinet dehumidifier provides a control signal for the direct connection of a humidistat. All our units come equipped with temperature protection switches and alarm relays. The exterior of the unit is designed with IP67 protection, so that operation is possible in difficult environmental conditions.



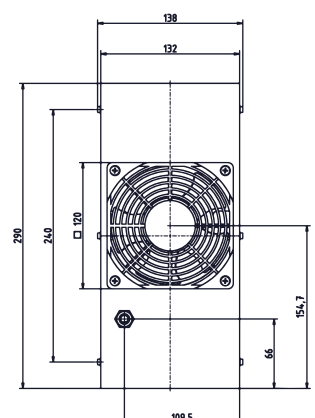
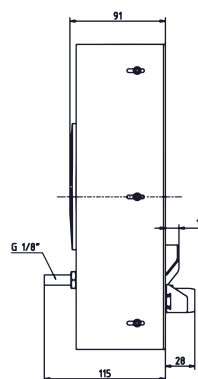
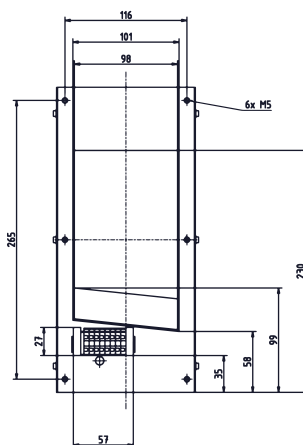
 3,2 kg

 138 x 290 x 143 mm

 +10°C - +70°C

 IP67-rated

 200W



**CAUS**  
File-Nr. E468447 NEMA 1, 12, 4X



# Ventilation-Upper-Part SEA-001-A

The Ventilation-Upper-Part SEA-001-A for the switch cabinet dehumidifier PSE-001-C increases its performance significantly, especially in cabinets without own air circulation in the interior. The Ventilation-Upper-Part moves the air in a continuous flow over the condensation plate. It is simply mounted onto the inside of the cabinet, directly above the dehumidifier's condensation plate. Additional drilling is not necessary for installing our devices since they are already fitted with mounting holes. The electrical connection is provided by two preinstalled terminals.

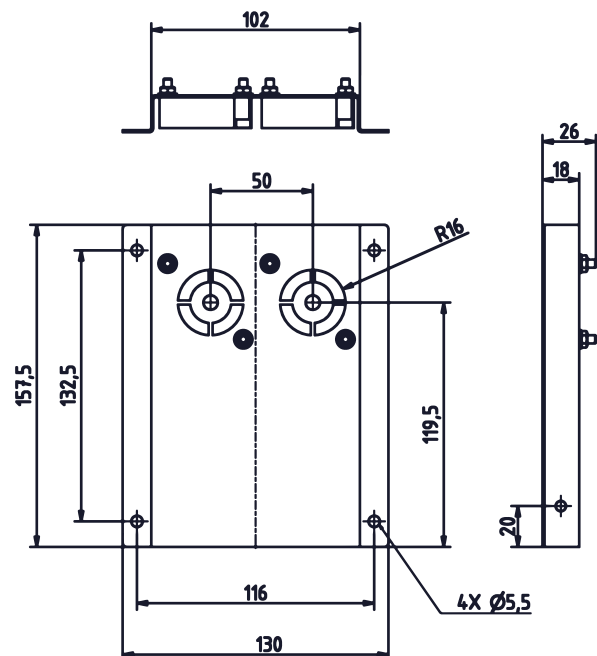


130 x 157,5 x 26 mm

-40°C - +70°C

IP67-rated

Max. input current: 0.2 A





# Special Options & Additional Parts

Dr. Neumann Peltier-Technik GmbH offers a wide range of special options and additional parts for their Peltier cooling products.

It is also possible to purchase a complete and tested system, with integrated power supply, insulation material and drainage channels. Of course, all the components in these complete systems are chosen so that they work together smoothly.

Additionally, your cooling system can be modified so that it will withstand different special environmental conditions.



# Salt-fog resistance

Protect your climating solution from a harsh, salty environment with the right options.

- Stainless Steel Hood
- Anodized Heatsinks
- V4A Mounting Material
- IP-Protection IP67





# Sandstorm-Hood

Cabinets in the desert will be climated, too. With the right option you will be on the safe side.

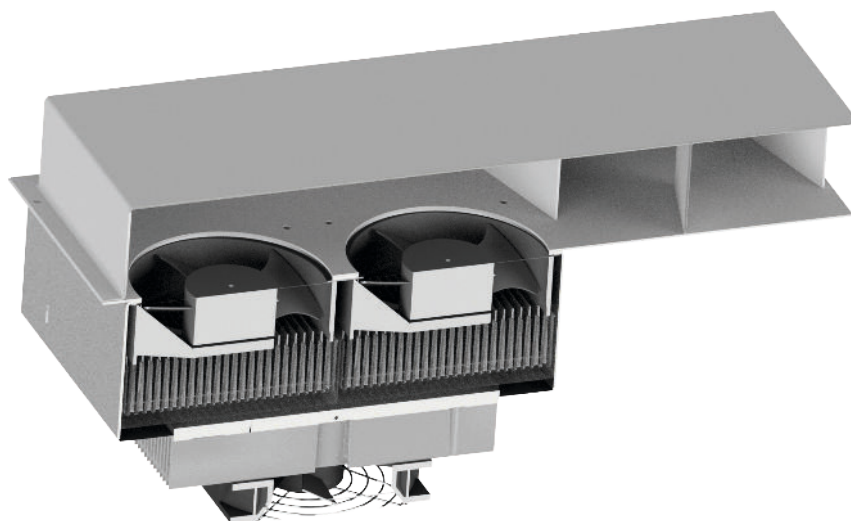
## Proofed to MIL-STD810G Method 510.5, procedure I+II

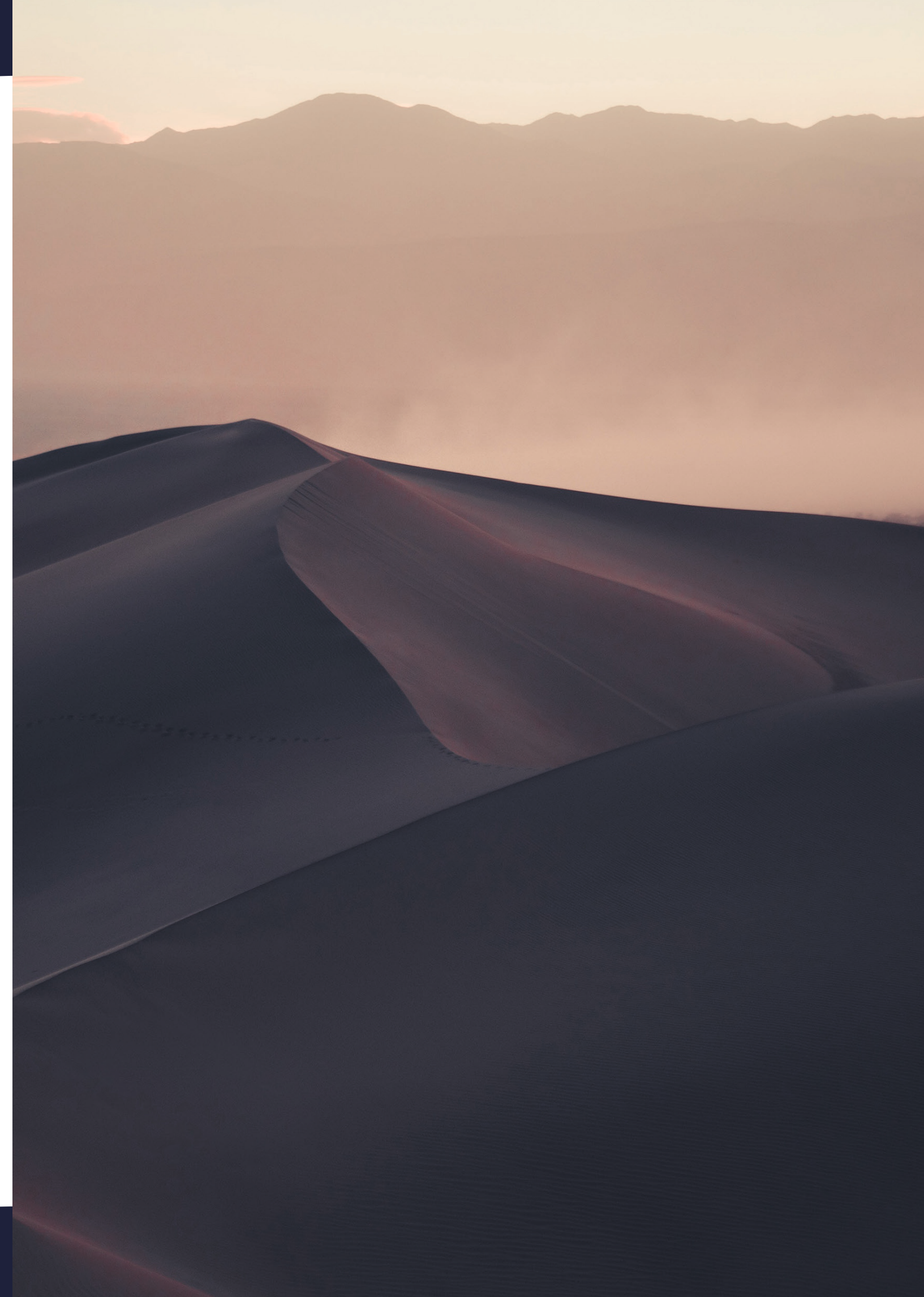
MIL-STD810G blowing sand test conditions:

I 61°C, 20 m/s, 2.2 g/m<sup>3</sup> Sand, 3 positions, 2 hours per position

MIL-STD810G blowing dust test conditions:

II 61°C, 8.9 m/s, 10.6 g/m<sup>3</sup> Dust, 3 positions, 2 hours per position





# Stacking Frames

Through the stacking frame, the device does not protrude into the interior of the switch cabinet – without a loss of cooling capacity.

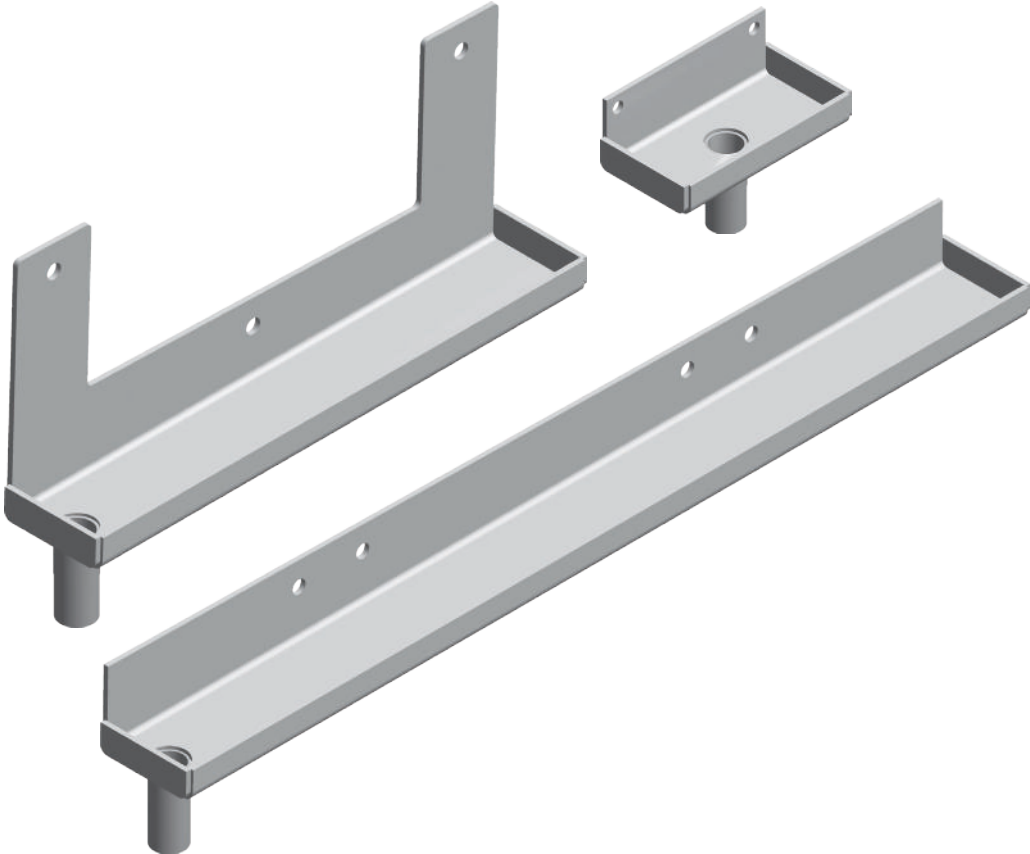
We offer this accessory part for all sizes of our “Standard”, “AC”, “HL” and “LRC” series switch cabinet coolers, as well as for our switch cabinet dehumidifier.





# Condensate Drainage Channels

The condensate drainage channel complements our cabinet cooler program. Condensation can occur at high air humidity in combination with high temperatures. Our special drainage channel copes with this problem. The drainage channel can easily be installed on the control cabinet, using the drilling holes of the cabinet coolers.



# Thermostats & Controllers



## SCC-001-B

The SCC-001-B thermostat works on the basis of a bimetal making contact and does not require its own power supply. Ideally it is interconnected in the current flow to the peltier cooler's power supply. Therefore the cooler is only turned on if the temperature exceeds an adjustable switching point. Thus overcooling of the switch cabinet with switched off electrical loads can be prevented. **Hysteresis: 7 K**



## SCC-002-B

The SCC-002-B hydrostat also doesn't require its own power supply. It has a changeover relay and is the ideal extension to the PSE-001-B switch cabinet dehumidifier. With the SCC-002-B it is possible to only switch on the dehumidifier when the relative humidity in the switch cabinet is high enough to require a dehumidification.



## SCC-003-A

The SCC-003-A controller is specially designed for controlling Peltier coolers. It has 2 setpoint temperatures and automatically switches the cooler to cooling or heating mode. Thus it is possible to keep a switch cabinet within a specific temperature range, regardless of the outside temperature. The supply-voltage is 24 V-DC, the switching-current is 16 A.

**Hysteresis: 1 K**



SCC-001-B



SCC-002-B



SCC-003-A



Photo: JUMO GmbH & Co. KG

# Customized Control Variants

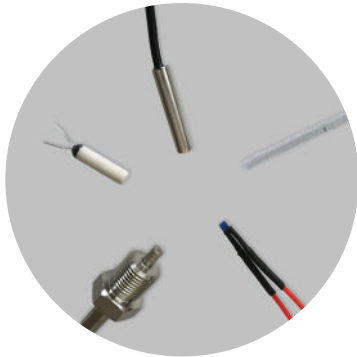
From simple 2-point to PID control: We have a comprehensive range of controllers, relays, power supplies and sensors with control accuracies of up to +/- 0.01 Kelvin. We assess your needs and determine which controls fit your requirements. Then we manufacture your control as an individual component or as an integrated solution.



# Power Supplies

We offer a selection of switching power supplies for DIN rail and screw mounting.





## Temperature Sensors

Discover our wide range of temperature sensors! Our range includes various types, such as Pt100, NTC or thermocouples in various designs, for example in stainless steel, ceramic or screw-in - **always suitable for your requirements.**



## Thermal Insulation

A thermal insulation of the cabinet is especially beneficial, when the internal air has to be cooled below ambient temperature. The heat insulation reduces the transmission heat, e.g. the heat flow back through the control cabinet walls. In this case a smaller, cost-saving cooling unit often is sufficient! Our 1 cm thick insulation material made of polyethylene foam is available as a meter fabric and as a custom cut.



# Laboratory Technology

Correct Measurements require exact temperatures

Laboratories and the measuring- and analysis equipment are generating a variety of challenges for which the peltier-technology offers just the right solution. Only if the sample which shall be analysed is controlled in a highly exact manner in regard to its temperature, a possible contamination of the measurements or results by the influence of temperature can be eliminated. Therefore, Dr. Neumann Peltier-Technik GmbH offers already developed solutions like our Temperature Control Plates and Ice-Point thermostat. Also, thermocyclers, centrifugals, temperature-controlled water quenches, incubators and refractometers often rely on Peltier-technology. The reason for this is the possibility to control the temperature to as exactly as  $\pm 0,01$  K. As an expert in the area of peltier-technology we do not only offer highly- accurate temperature-control devices but are also looking forward to assisting you with the realization of your customized project.

## At a glance: Our laboratory equipment

### **Ice-point thermostat**

- Digitally controlled source of constant temperature (0 degrees Celsius)
- Accurate by  $\pm 0,01$  degrees kelvin
- HF disturbance free – No Triacs or thyristors
- 10mm central drill and 8 additional drills of 7,2 mm for the transport of thermo-oil

### **Temperature-Plate ZTNG-310-A**

- Cooling and heating from -10 to +60 degrees
- Accuracy of  $\pm 1$  degree Celsius
- No refrigerants by the usage of air cooling
- Integrated controls
- Integrated power supply for world-wide use

### **Temperature-Plate ZTNG-100-B**

- Cooling and heating from -50 - +60 degrees Celsius
- Water re-cooling for low-noise and vibration
- External control and monitoring



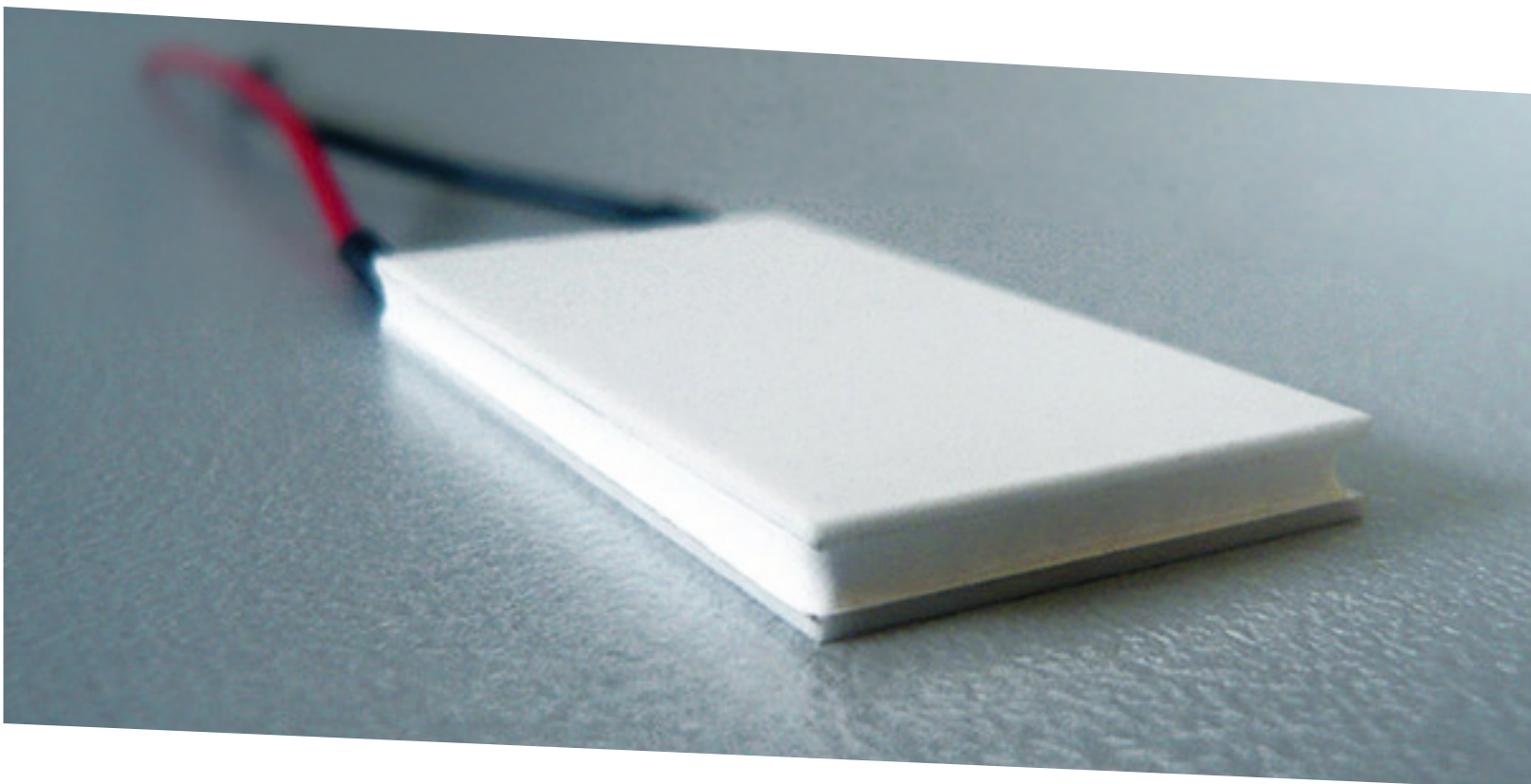
# Cooperation with Meerstetter Engineering

Meerstetter Engineering is a Swiss engineering company specialized in electronics for laser diodes and Peltier elements. The products are used in pharmaceutical and mechanics industries as well as in research laboratories. Meerstetter Engineering offers with excellent know how development services in analogue and digital electronics, FPGA, embedded systems and digital interfaces. Together we can offer the perfect solution for your system.



# Cooperation with Z-Max Japan

We are distribution partners for Peltier modules developed by Z-Max in Japan. They are owner of an own factory in China where they can cut the ceramic ingots and assemble the Thermoelectric modules. This is the reason why they can produce very cost effective and innovative Peltier modules - also with special dimensions. Please don't hesitate to contact us with your idea, we are sure that we can realize it.



# Distributors

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## Germany

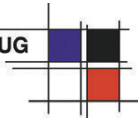
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### Fuhrmeister + Co GmbH Industrie-Elektronik

Stahlschmidtsbrücke 61  
42499 Hückeswagen, Germany  
Tel.: +49-2192-93764-0  
Fax: +49-2192-93764-44  
info@fuhrmeister-gmbh.de  
www.fuhrmeister-gmbh.de

Weber Thermoelectric UG



### Weber Thermoelectric UG

Steinheimer Straße 19  
89407 Dillingen, Germany  
Tel.: +49-9074-92204-28  
Fax: +49-9074-92204-58  
info@weber-thermoelectric.de  
www.weber-thermoelectric.de

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## Denmark

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### Carlo Gavazzi Handel A/S

Over Hadstenvej 40  
8370 – Hadsten, Denmark  
Tel.: +45 89 60 61-00  
Fax: +45 86 98 15-30  
handel@gavazzi.dk  
www.carlogavazzi.com

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## Italy

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# ERACON

### Eracon S.R.L.

C.so Duca degli Abruzzi 81/BIS  
10129 Torino (TO), Italy  
Tel.: +39-349-35967-89  
info@eracon.it

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## Poland

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# ASTAT

### Astat Logistyka Sp. z o.o.

ul. Dąbrowskiego 441  
60-451 Poznań, Poland  
Tel.: +48-61-848-88-71  
Fax: +48-61-848-82-76  
info@astat.pl  
www.astat.pl



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## Sweden

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### **EG Electronics AB**

Fagerstagatan 3  
SE-163 53 Spånga, Sweden  
Tel.: +46 (0)8 759 35 70  
info@egelectronics.com  
www.egelectronics.com

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Belgium, Luxemburg & Netherlands

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### **Serticom B.V.**

Nieuwstraat 116a  
5126 CH Gilze, Netherlands  
Tel.: +31-88-7378-000  
Fax: +31-88-7378-099  
sales@serticom.nl  
www.serticom.nl

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China, Japan, Mongolia, South Korea & Taiwan

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### **Z-MAX Co. Ltd.**

Room 1502, Wealth Commercial Centre,  
No.48, Kwong Wa Street Mongkok,  
Kowloon, Hong Kong  
Tel.: +852-3743-0356  
Fax: +852-2267-8070  
www.z-max.jp

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## Slovakia & Czech Republic

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### **GHV Trading, spol. s r.o.**

Edisonova 2955/3  
61200 Brno, Czech Republic  
Tel.: +420-541-2355-33  
Fax: +420-541-2353-87  
ghv@ghvtrading.cz  
www.ghvtrading.cz

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## Spain

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### **Wöhnelec, S.A.**

Francesc Samaranch, 11, Nau Fons, dreta  
08750 – Molins de Rei (Barcelona), Spain  
Tel.: +34-93-680-15-64  
Fax: +34-93-680-04-39  
wohnelec@yahoo.es  
www.wohnelec.com

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## South Africa

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### **ATI Systems**

159 Galjoen Road  
Wadeville, Germiston  
South Africa  
Tel.: +27-11-3838300  
Fax.: +27-11-8241353  
sales@atisystems.co.za  
www.atisystems.co.za

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## Austria

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**Kälte- und Systemtechnik**

Strassfeld 5  
3441 Freundorf, Austria  
Tel.: +43-2274-44109  
Fax: +43-2274-93027  
office@kustec.at  
www.kustec.at

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## Finland

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**Murri Oy**

Koukkukatu 1  
15700 Lahti, Finland  
Tel.: +358-3-882-4000  
Fax: +358-3-882-4040  
myynti@murri.fi  
www.murri.fi

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## Turkey

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**Deltec Electric & Controls Ltd.**

Soyak Olimpiakent H12-6 Kucukcekmece  
Istanbul / Turkey  
Tel.: +90 212 472 55 00  
Fax: +90 212 472 55 10  
info@deltec.com.tr  
www.deltec.com.tr

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## Liechtenstein, Switzerland

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**HaDoTec GmbH**

Gewerbestrasse 5  
6330 Cham, Switzerland  
Tel.: +41-41-530-32 12  
domenig@hadotec.ch  
www.hadotec.ch

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## Romania

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**SC Marsipo Prod SRL**

Str. Augustin Bunea nr. 8  
Brasov 500299, Romania  
Tel.: +40-268-328-679  
Fax: +40-268-306-457  
www.marsipo.ro

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## Russia

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**NSGate**

41 Kirpichnaya Street,  
105187 Moscow, Russia  
Tel.: +7-495-620-6320  
firm@nsgate.com  
www.nsgate.ru





Dr. Neumann Peltier-Technik GmbH  
Gautinger Str. 45  
82061 Neuried  
Germany

Tel.: +49-89-7248150-0  
Fax: +49-89-7248150-29

[www.dr.neumann-peltier.de](http://www.dr.neumann-peltier.de)  
[info@dr.neumann-peltier.de](mailto:info@dr.neumann-peltier.de)

We reserve the right to technological modifications.  
Version 2.0

