Thermoelectric Cooler

The powerful thermoelectric climate control unit in a lightweight design is the most energy-efficient solution for command panels and small enclosures, producing energy savings of more than 60% compared with conventional systems. Ideal for precision applications thanks to its low-vibration design. Heating function included: Automatic changeover between heating and cooling function facilitates precise temperature control to +/– 1 K.

Benefits at a glance:

- 80 watts cooling and heating output with state-of-the-art Peltier technology
- Low-maintenance thanks to an elementary unit layout
- High operating ratio (EER >1) thanks to optimum interplay between all components
- Maximum possible protection for your electronics, floating change-over fault signal contact in case of overtemperature
- Minimal physical size and mass compared with other systems in this sector
- Large voltage range from 100 – 240 V (AC) and 24 V (DC)
- Up to 5 units may be connected in parallel

Thermoelectric Cooler

Simple assembly

Internal mounting
- When internally mounted in the enclosure, the unit only protrudes by a few millimetres, and therefore does not interrupt either the aesthetic appearance or freedom of movement on command panels and support arm systems

External mounting
- Its low weight also allows it to be externally mounted on simple aluminium rear panels or blanking panels

Flexibility
- May be mounted either horizontally or vertically

Ideal for command panels and support arm systems
- The Thermoelectric Cooler is distinguished by its low-vibration operation and minimal weight

Effective control

- Energy-efficient control with pulse width modulation and innovative soft start function ensures a constant enclosure temperature and a long service life of the Peltier elements and fans.
- The PID control ensures optimum activation of the Peltier elements and fans. The speed and output are adjusted to the ideal operating points via pulse width modulation, and in this way ensure maximum energy efficiency.

Operated via PC software

- The software is available to download from the Rittal homepage. Connect using the enclosed standard USB cable (type A/type B)
- Parameterisation (e.g. setpoints and alarms)
- Monitoring (including current temperatures, fan speeds, capacity utilisation, status display with error messages, operating hours).
- Master/slave settings
  - Parallel connection and networking of multiple devices for additional cooling output using a master/slave adaptor
  - Safety circuit (redundant design)
  - Evaluation (logging of temperature variations, error counters, min./max. temperatures)

Blue e+ wall-mounted cooling units

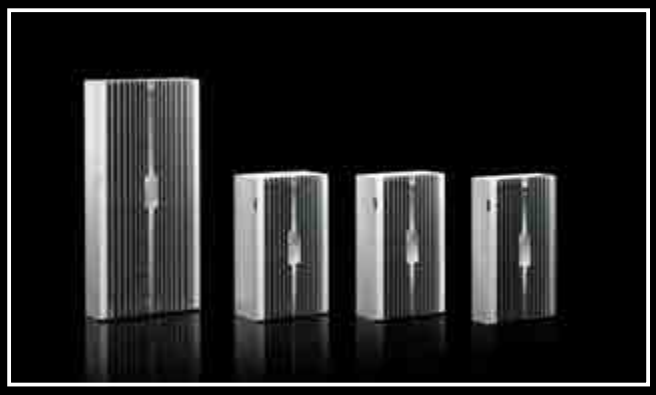
Sustainable technology for every application
A cooling unit that's at home in any environment. Blue e+ units are ideal for all industries and environments.

Choose from a range of efficient solutions covering all requirements and applications:
- A wide output range covering all cooling requirements from 0.3 kW – 5.8 kW
- Sheet steel version for all typical industry applications
- Stainless steel and chemical versions for challenging ambient conditions
- Maritime version for dynamic applications e.g. on board ships
- Robust outdoor version with anti-vandalism features
- International approvals and multi-voltage capability for worldwide use

Blue e+ wall-mounted cooling units

Blue e+ S wall-mounted cooling units 0.3 kW – 1 kW

- Blue e+ S cooling units with tried-and-tested Blue e+ technology are the world's most energy-efficient cooling units. This means they reduce the carbon footprint of your machines and systems. Available in a brand new design with a host of smart functions.



Blue e+ wall-mounted cooling units 1.6 kW – 5.8 kW

- Available in sheet steel and stainless steel versions

Blue e+ wall-mounted outdoor cooling unit 1.5 kW – 5.0 kW

- The high protection rating of IP 56 / UL type 12/3R/4 and a temperature range of -30 °C to 60 °C provides optimum protection in challenging environments. The cooling unit can be mounted in three different ways (external mounting, partial internal mounting and full internal mounting).

Blue e+ wall-mounted cooling units, chemical 1.6 kW – 5.8 kW

- A special component coating provides optimum protection in contaminated environments – ideal for applications where sulphuric acid may be present in aerosol form.

Blue e+ wall-mounted cooling units, maritime applications 1.0 kW – 2.5 kW

- With a more stable compressor attachment, these cooling units achieve vibration levels to DNV-CG-0339 (Class A), making them suitable for dynamic applications, e.g. on board ships.

Blue e+ wall-mounted cooling units

Blue e+ boasts one-of-a-kind technology, an extended service life for installed components thanks to reduced temperature fluctuations, as well as global usability and integration into the IoT. Its revolutionary energy efficiency is achieved with ingenious hybrid technology, featuring two parallel cooling circuits that can operate independently or in tandem, depending on the temperature difference. The technology draws on the symbiotic power of a passive and an active cooling circuit. Two circuits operating in perfect harmony and adapting to the ambient conditions for maximum efficiency.

The Rittal Blue e+ product family is by far the most efficient generation of cooling units worldwide, streaks ahead of its competitors, with average energy savings of 75%. These are measurable results verified by countless customer tests and references.

At a glance:

Blue e+ for maximum efficiency

- Revolutionary energy efficiency with innovative hybrid technology
  - Two parallel cooling circuits operating independently or in tandem, depending on the temperature difference
  - Passive climate control: Heat pipe cooling circuit (dissipates heat from the enclosure as soon as the ambient temperature drops below the setpoint).
  - Active climate control: Compressor cooling circuit with speed-controlled components for targeted cooling
- Inverter control ensures a constant temperature inside the enclosure to prolong the service life of the components
- This technology has been proven to achieve average energy savings of 75%

One for all

- Unique multi-voltage capability for maximum flexibility
- Global usability with country-specific licences
- Flexible use across a broad temperature range from -20 °C to +60 °C (-30 °C to +60 °C for outdoor cooling units)

Reliability means sustainability

- The high protection rating of IP 55 / IP 56 for outdoor cooling units provides added peace of mind
- More reliable, with integral condensate evaporation as standard from 0.3 kW
- Faster, thanks to short delivery times and dependable worldwide availability of products and spares
- More efficient servicing at a reduced cost, thanks to predictive maintenance

Blue e+ is designed to make your work as easy as possible

- Handy tools for faster design and parametrisation (RiTherm software, Scan & Service app and Quick Finder)
- Planning is a breeze, thanks to uniform square mounting cut-outs for all installation types (external mounting and full internal mounting, partial internal mounting from 1.6 kW)
- Easy access for servicing and maintenance plus simple replacement of components helps keep maintenance work to a minimum

Harry Brot

Impressive energy savings of 60% were achieved in just five months, equivalent to an annual saving of 884 kWh, or € 230 per annum for each cooling unit.

https://betop.friedhelm-loh-group.com/experience/cool-when-the-heat-is-on.html

Hansgrohe SE

“Rittal promised energy savings of 60%, and in fact we are currently achieving an impressive 61% in real-life operation. To be honest, we were pleasantly surprised by the results.”

Johannes Kopf, Head of Industrial Engineering Projects at Hansgrohe

https://betop.friedhelm-loh-group.com/experience/no-mere-drop-in-the-ocean.html

Blue e+ cooling units for IT applications

Let innovative hybrid technology take the energy efficiency of your rack cooling to a whole new level. An active cooling circuit with speed-controlled components provides demand-based cooling. As soon as the ambient temperature drops below the set level, the integral heat pipe takes over climate control of the rack with passive cooling. This will unlock huge energy savings. The Blue e+ series of cooling units has the perfect solution for all scenarios, be it production facilities, network distribution in small plant rooms or cooling small server applications.

Blue e+ cooling units for IT applications

Blue e+ IT roof-mounted cooling unit

The use of Blue e+ technology makes this bundle ideally suited to the requirements of energy-efficient cooling of IT racks. In combination with the IoT interfaces, it supports communication with various systems as well as monitoring and energy management.

Bundle comprised of the following individual components:
- Roof-mounted cooling unit 3185.730
- IoT interface 3124.300
- Temperature sensor 3124.400
- Connection cable 7030.091
- Nylon loop cable holder 7111.350

Blue e+ IT wall mounted cooling unit

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Bundle comprised of the following individual components:
- Wall-mounted cooling unit 3187.930
- IoT interface 3124.300
- Temperature sensor 3124.400
- Connection cable 7030.091
- Nylon loop cable holder 7111.350

Air duct for Blue e+ IT wall-mounted cooling unit

- For supplying cold air in front of the 482.6 mm (19") level
- One air duct for different enclosure depths
- Mounting in the bottom 3 U of the 482.6 mm (19") level

Blue e wall-mounted cooling units

Generation Blue e
Permanent energy savings
with Rittal cooling units.

Top design and top performance with a host of assembly benefits. The Rittal platform strategy with system-wide mounting cut-outs to fit cooling units and air/air heat exchangers allows easy adaptation to the required cooling output, even retrospectively.

Benefits at a glance:

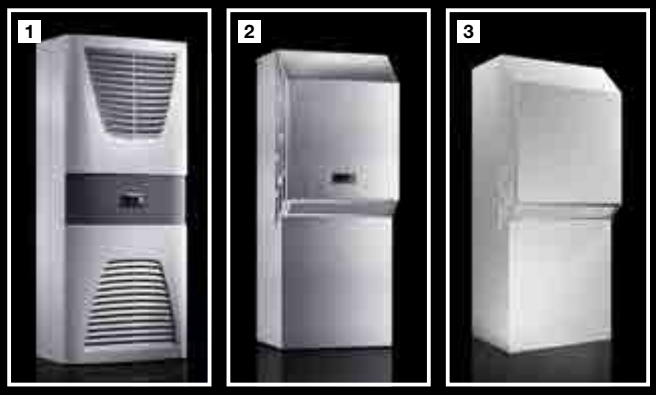
- Energy savings of up to 45%
- Smart control with Comfort controller, icing protection and motor monitoring
- Eco-mode control: The evaporator coil fan cuts out as necessary, depending on the enclosure internal temperature
- Longer service life of components in the enclosure and cooling units, because efficient components such as fans and compressors run at their optimum operating point
- The integral electric condensate evaporation system means that condensate evaporates and dissipates to the ambient air via the external fan
- The hydrophobic RiNano coating prevents the accumulation of dirt deposits on the condenser, thereby extending maintenance intervals and ensuring a constant long-term cooling output

Blue e
wall-mounted cooling units

1 TopTherm Blue e
- Overall cooling output 0.3 – 4 kW
- May be linked to the IoT interface via the Blue e IoT adaptor

2 TopTherm Blue e, NEMA 4X
- Overall cooling output 0.5 – 2.5 kW
- Protection category NEMA 4X
- May be linked to the IoT interface via the Blue e IoT adaptor

3 TopTherm Blue e, UL Type 3R/4
- Overall cooling output 0.5 – 2.5 kW
- Protection rating UL Type 3R/4, 12
- Suitable for outdoor siting
- May be linked to the IoT interface via the Blue e IoT adaptor



Flexible wall mounting

Practical and stylish
- Determination of the mounting cut-out depends on the mounting option – either external, internal or partial internal mounting. This makes optimum use of the space available.
- With external mounting, openings are only required for air inlet and outlet
- The enclosure surface containing the cut-out for partial or full internal mounting is stabilised by the divided internal case construction
- Additional internal or external mounting kits are not required

Compatible platform strategy

Flexible output
- Just 5 mounting cut-outs for 8 different output categories provide investment security and facilitate easy adaptation of the cooling output to the ambient conditions and the installed heat loss

Rittal platform strategy
- TopTherm air/air heat exchangers are also compatible with the mounting cut-outs

Integral components

Electrical condensate evaporator
- Condensate arising inside the enclosure or on the evaporator coil of the cooling unit is effectively evaporated. The evaporator device inside the cooling units has a very high evaporation output (several litres per day). This is achieved thanks to the principle of direct evaporation.

Hydrophobic RiNano coating
- The condenser with standard hydrophobic RiNano coating ensures a longer, constant cooling output and eliminates the need for filter media in many areas

Blue e roof-mounted cooling units

Generation Blue e
Permanent energy savings
with Rittal cooling units.

Cooling units keep the enclosure internal temperature at a constant level.
The air routing meets individual requirements. Two separate circuits prevent the ingress of dust into the enclosure. Rittal Blue e roof-mounted cooling units: Top design and top performance with a host of assembly benefits and sophisticated air routing. Superb performance plus cost-cutting design.

Benefits at a glance:

- Super-efficient in terms of performance and energy consumption
- Wide output range from 500 to 4000 W
- Three-phase cooling units support multiple voltages as standard
- Uniform, performance-related, system-wide mounting cut-outs
- Targeted, individual air routing
- Electrical condensate evaporation and hydrophobic RiNano coating

Important:

- Avoid overloading the roof plate by using stays (with VX25 system accessories)

Blue e
roof-mounted cooling units

Flexibility of roof mounting

Cut your costs
- All three-phase cooling units are suitable for a voltage range of 400 V, 50 Hz and 460 V, 60 Hz without rewiring. No need for expensive additional transformers.

Flexible output
- Just 3 mounting cut-outs for 6 different output categories provide investment security and facilitate easy adaptation of the cooling output to the ambient conditions and the installed heat loss

Rittal platform strategy
- TopTherm air/water heat exchangers are also compatible with the mounting cut-outs

Optimum flow conditions

Targeted air routing inside the enclosure
- The internal air circulation is targeted and effective: The heated air is extracted centrally. Chilled air is discharged via up to four spigots positioned in the corners of the base plate and may be routed in a controlled manner into the lower enclosure chamber via the optional ducting system. The result is highly effective cooling and the avoidance of air short-circuits. The targeted air circulation inside the enclosure via ducts also prevents the creation of hot-spots.

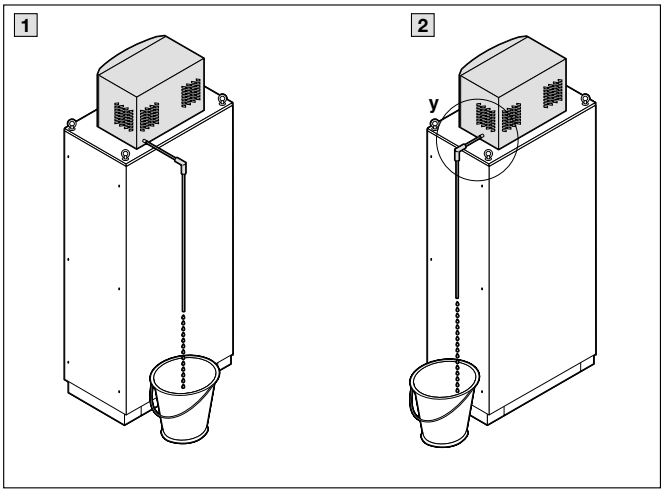
Integral components

Electrical condensate evaporator
- Condensate arising inside the enclosure or on the evaporator coil of the cooling unit is effectively evaporated. The evaporator device inside the cooling units has a very high evaporation output (several litres per day). This is achieved thanks to the principle of direct evaporation.

Hydrophobic RiNano coating
- The condenser with standard hydrophobic RiNano coating ensures a longer, constant cooling output and eliminates the need for filter media in many areas.

Condensate routing

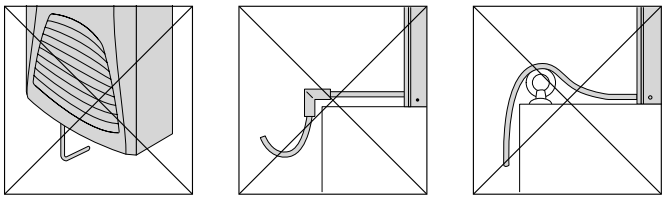
All roof-mounted cooling units have electrical condensate evaporation.
Additional condensate routing is provided merely as an extra safeguard only. Any condensation which forms on the evaporator coil (with high humidity and low enclosure interior temperatures) is routed to the right and/or downwards out of the device via a drain in the evaporator tray. For this purpose, a piece of hose should be connected to one of the two condensate nozzles (1 or 2). **The drain which is not required should be tightly sealed. The condensate must be able to run off freely. If the condensate is to be drained off over a greater distance, then care must be taken to ensure that the hose is free from kinks** and checked for correct drainage. Units with an e-Comfort controller are additionally equipped with a condensate alarm.



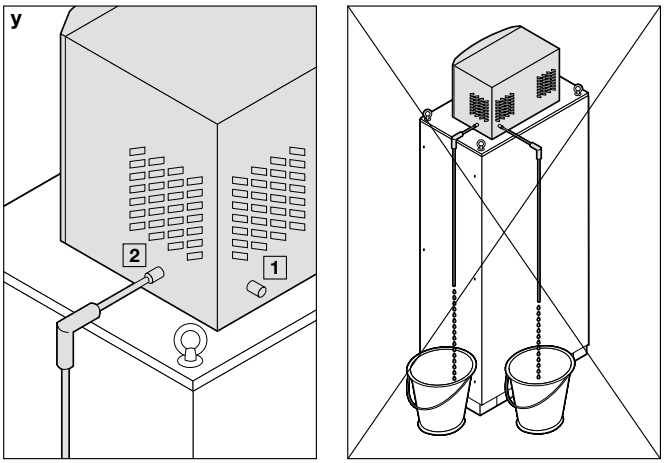
1 Condensate discharge rear

2 Condensate discharge right

Note:
Condensate discharge (wall-mounted units)
For wall-mounted units, a hose should be connected to the condensate nozzle on the bottom of the unit.



The condensate drain pipe should be laid with a gradient, taking care to ensure there are no kinks in the pipe!



Blue e+ roof-mounted cooling unit

Available with 1.3 kW total cooling output

Modular climate control concept

Generation Blue e
Permanent energy savings
with Rittal cooling units.

Less is more! We offer almost limitless application possibilities from just four cooling modules and six door modules. The best cooling technology, complete and ready for use – without having to make mounting cut-outs. The existing sheet steel doors are easily exchanged for climate control doors with cooling modules. These can also be exchanged or upgraded while the system is operational.

Benefits at a glance:

- Modular design – for specific size, cooling power and voltage combinations
- Combination of VX25 climate control door and cooling module
- One item number each for the door and climate cooling module
- May be linked to the IoT interface via the Blue e IoT adaptor

Important:

- A base/plinth is required for operation

Modular climate control concept

Extensive modularity

- Create your individual climate control solution from the climate control door and the cooling module in just a few simple steps
- Choose from different options with different dimensions, cooling outputs and voltages

Infinite possibilities

- Seamless baying and perfect integration. Cooling of a bayed enclosure suite is easily achieved, even under awkward room conditions,such as low ceiling heights.
- No mounting cut-outs are required

Wide range of options

1 Cooling module, 1500 W total cooling output, available with two voltage options

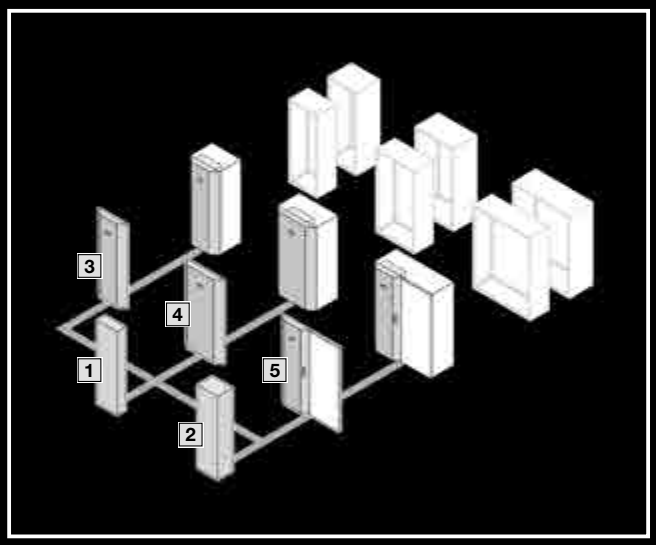
2 Cooling module, 2500 W total cooling output, available with two voltage options

3 Climate control door for installing cooling modules in 600 or 1200 mm wide VX25 enclosures, cooling module on the right, in 1800 and 2000 mm height

4 Climate control door for installing cooling modules in 800 mm wide, 1-door VX25 enclosures, in both 1800 and 2000 mm height

5 Climate control door for installing cooling modules in 1200 mm wide VX25 enclosures, cooling module on the left, in both 1800 and 2000 mm height

Benefit:
For 1200 mm wide VX25 enclosures, the existing hinged door may be used, irrespective of the device position (left or right)



Enclosure heaters

Enclosure heaters are used to prevent the formation of condensation inside the enclosure and maintain a constant minimum operating temperature (e.g. when the system is switched off overnight). Rittal TopTherm heaters, with self-regulating PTC technology, ensure constant heat distribution with outputs in the range of 10 W – 150 W, for those not fitted with a fan and 250 W – 800 W for fan-assisted options. For heaters with fans, a minimum safety clearance of 300 mm at the top must be observed, and the equivalent figure for heaters without fans is 100 mm. In each case the thermal safety clearance to the sides of 60 mm, and 100 mm at the bottom is required.

Fast assembly system:

- Quick-connect terminal for power supply
- Terminal suitable for parallel connection of an additional heater
- Minimal wiring work

Superior efficiency:

- Energy-saving self-regulating PTC technology
- Superior thermal output with an identical construction size
- Constant distribution of heat

Greater flexibility:

- Output range: 10 – 800 W
- Attachment on a 35 mm top hat rail or mounting plate

Enclosure heaters

Fast assembly

- Snap-fastening onto 35 mm support rails EN 50 022
- Direct screw-fastening onto the mounting plate
- Quick-connect terminal for power supply (spring terminal)
- No need for any other terminals
- No wiring required

Energy-efficient design

- PTC technology for constant heat distribution
- Computational Fluid Dynamics (CFD)-assisted design for superior heating performance with the same construction size

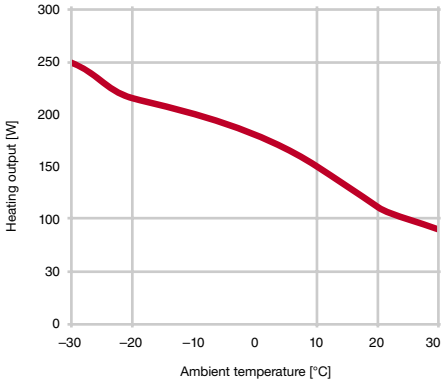
Constant continuous thermal output

- Without fan 10, 20, 30, 50, 75, 100 and 150 W
- Rated operating voltage: 110 – 240 V, AC/DC 50/60 Hz
- With fan 250, 400 and 800 W
- Rated operating voltage: 115 V, 50/60 Hz and 230 V, 50/60 Hz

Self-regulating PTC technology

Energy-efficient PTC technology and design optimisation on the basis of computational fluid dynamics (CFD) permit improved heating outputs from units of the same size compared to the previous product versions.

Heating performance diagram for a PTC heater



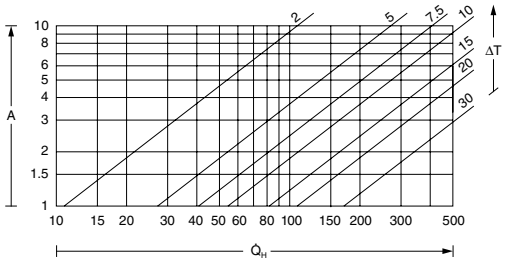
Enclosure heaters

Project management

The required thermal output is calculated from:

$$\dot{Q}_H = A \cdot \Delta T \cdot k$$

Heating performance diagram



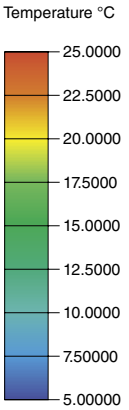
$\dot{Q}_H$ = Thermal output (W)
A = Enclosure surface area to IEC 890 (m^2)
ΔT = Temperature difference (K)
k = Heat transfer coefficient

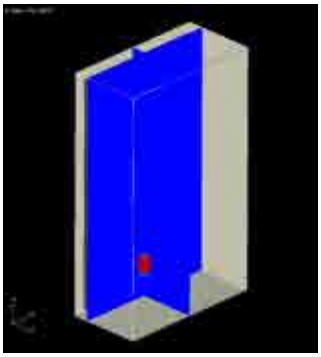
Based on:
Indoor siting, static air,
heat transfer coefficient k = 5.5 W/m^2 K

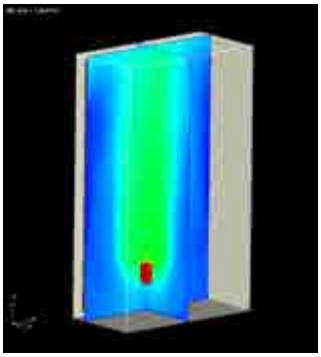
For outdoor siting (moving air):
Double the determined thermal output

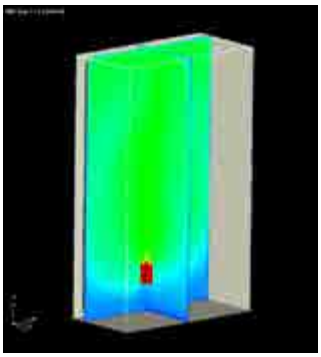
Even temperature distribution

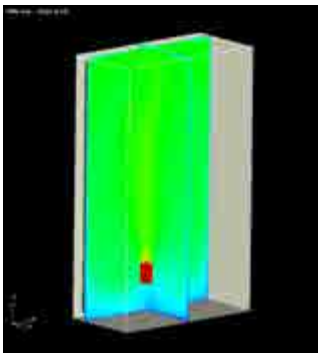
Via a CFD analysis, even temperature distribution in the (empty) enclosure is observed when using a 400 W enclosure heater following a heating period of approx. 30 minutes. According to the CFD analysis, positioning of the enclosure heater in the base area of the enclosure is essential for even temperature control of the enclosure, since those areas located beneath the heater are only minimally warmed.




Start


After 5 minutes


After 15 minutes


After 30 minutes

Cutting carbon emissions the Blue e+ way

More about carbon footprints:

www.rittal.com/CO2Footprint

Rittal – The System.

Faster – better – everywhere.

- Enclosures
- Power Distribution
- Climate Control
- IT Infrastructure
- Software & Services

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