

AdvancedTCA climate control solutions

Features



One of the major challenges posed by AdvancedTCA systems is heat management. The ATCA specification defines a heat loss of 200 W per slot. This means that a single ATCA shelf with 14 populated slots already has a maximum total heat loss of 2.8 kW, and the heat loss in an enclosure with three populated systems may therefore rise to more than 10 kW. Moreover, with clock frequencies likely to rise to the upper two-figure GHz range in the near future, the current methods of air cooling will struggle or even be completely unable to deal with the heat loss arising. In order to find a suitable solution, we need to face up to this situation now.

As one of the leading manufacturers of climate control solutions, Rittal offers holistic concepts, from CPU cooling, to shelf cooling, through to complete rack cooling with an output of up to 12 kW.

Shelf cooling

For the majority of applications, air cooling is the preferred option. A distinction is made between push cooling and pull cooling. In push cooling, axial or diagonal fans press cold air into the system. In pull cooling, fans draw hot air out of the system. Due to the confined space and integration density, the pressure losses caused by ATCA

cards are very high. Standard axial fans in a push or pull configuration are less suitable, because they can cave in as the back-pressure rises. By contrast, radial fans specialise in these types of applications, although the throughput is slightly lower in free air.



ATCA specifies heat losses of up to 200 W per front board and 30 W per rear board, which translates into approximately 3 kW for a fully populated shelf with 14 boards.



The four high-capacity RiCool fans from Rittal with 320 m³/h ensure optimum climatic conditions. Including IPMB interface.

The redundancy and hot-swap features ensure reliability, even in the event of a fan failure (FRU). Replaceable dust filter in the air inlet zone.

CPU cooling

Cooling fluids benefit from the physical property of having a specific thermal capacity several times higher than air. As a result, it is possible to design very small cooling systems with a maximum cooling

capacity and position them directly at the point of origination (e.g. processors). This helps to minimise the threat of hotspots which dramatically shorten the service life of electronics.



Liquid connection – via simple insertion. When the card is inserted, board cooling is automatically integrated into the cooling circuit.



Reliable discharge of 70 % of heat loss. Up to 250 W per cm² at the hotspot.



Rapid board exchange without hose couplings. Horizontal distributor integrated into the shelf.

Rack cooling

For the climate control of fully configured enclosures, there are several factors which need to be taken into account: The even distribution of chilled air, full accessibility to the 482.6 mm (19") level, plus the investment safeguards of on-demand expandability and remote

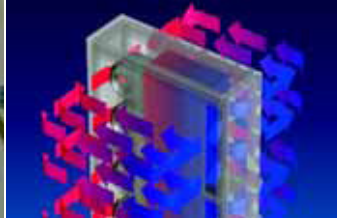
monitoring facilities. It should be possible to optimise the cooling output to the actual demand. Fully configured enclosures with ATCA systems can often push air cooling systems to their limits. Instead, complex air/water solutions are needed.



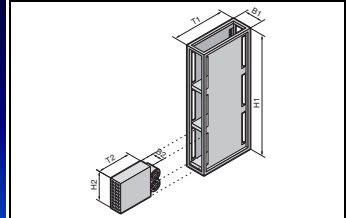
LCP (Liquid Cooling Package)



The Rittal LCP (Liquid Cooling Package) solves the problem of high heat losses with scalable cooling via air/water heat exchangers as a climate control enclosure on the side panel of a rack.



Individual ATCA shelves, as well as fully configured enclosures, can be cooled according to output.



Modular, upgradable and temperature-neutral cooling concept. 12 kW cooling output, with three cooling modules supported per cooling rack.



CCP (Compact Cooling Package)



CCP is a full climate control package comprising:

- **Controller-managed 19" air/water heat exchanger**
- **Rack-mounted fan module**
- **300 mm deep 19" enclosure**
- **and an optional recooling unit**

Technical specifications:

- 482.6 mm (19"), 260 mm, 1 U rack-mounted heat exchanger
- PWM-controlled fans
- Cooling unit can be controlled via a processing unit (PU)
- System availability of 99.999 %



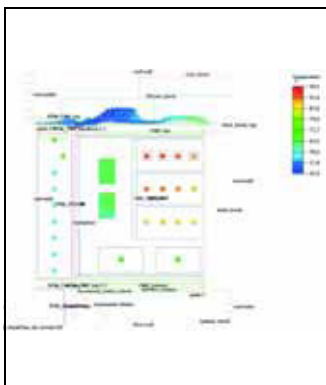
CCP can be configured and adapted individually to match specific application needs. It provides for effective and affordable cooling of the boards installed in vertically mounted electronics racks, and is

- Remains available even in case of a fan failure or temperature deviations (55°C for 96 h)
- Hot swap-compatible fan units
- Fully wired and tested

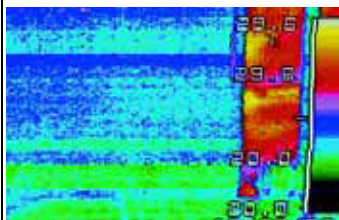


supplied with a robust controller and sensors for automatic and reliable control of the system.

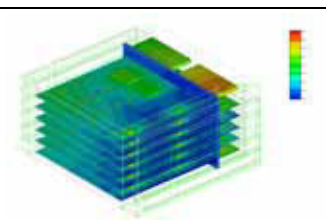
- Suitable also for altitudes up to 1800 metres above sea level
- Low noise (sound power level 6.0 bels; 2 fan units @Stand-airair)
- Supports IPMI and CMC-TC protocols



CFD (Computational Fluid Dynamics)



With the aid of CFD, climate control solutions may be optimised even before the first prototype has been built.



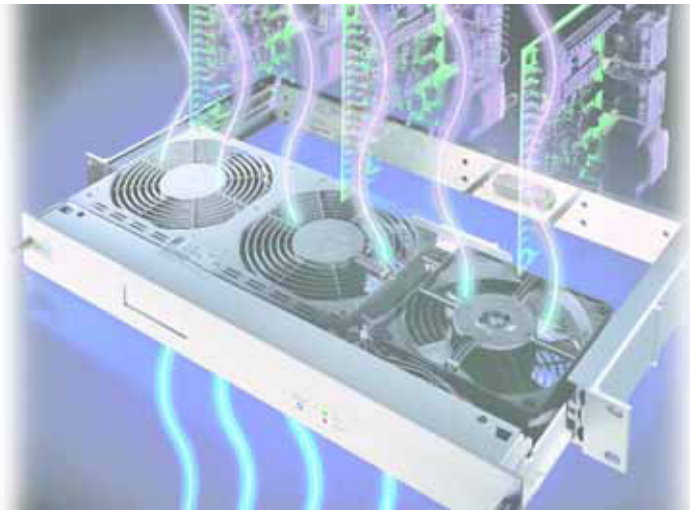
The Rittal portfolio of services includes:

- Visualisation of temperature variations
- Visualisation of air flows
- Localisation and elimination of hotspots

- Targeted optimisation of climate control
- Positioning of temperature sensors and smoke alarms

Subrack climate control

Features



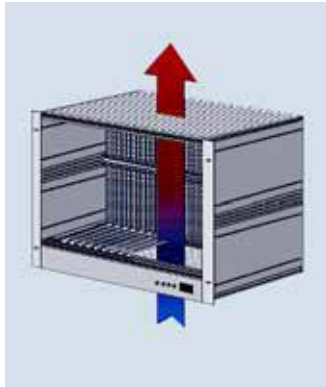
Heat shortens the service life of equipment leading to failure, and also diminishes the high performance of electronics.

The problem lies in high heat losses and compact installation spaces. For this reason, effective heat dissipation is vital to ensure long service life and operational reliability.

As well as the components shown below, Rittal system climate control also offers a range of other 482.6 mm (19") cooling systems and rack-mounted fans.

System climate control, see from page 628.

3.5 B Subrack climate control



Vertical ventilation



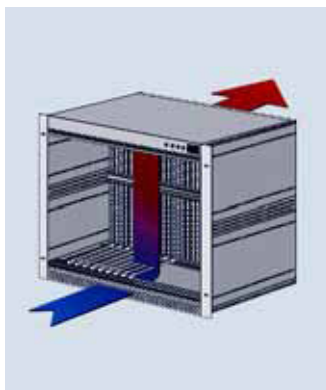
Rack-mounted fans are installed below the subrack in the enclosure. This ensures permanent air circulation to prevent the formation of hotspots.



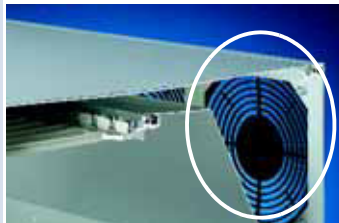
Fans are installed directly in the subrack, below or above the PCBs, with the aid of fan mounting plates, thereby preventing heat accumulation.



AC and DC fans in various output categories, can be retrofitted.



Diagonal cooling



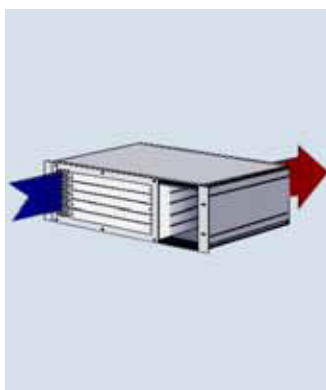
The **air baffle plate** in combination with . . .



. . . the **air block panel** ensures targeted air routing inside the subrack.



RiCool high-capacity fan for heat losses of 700 W or more.



Front and rear panels for ventilation – also available in an EMC version.



Rear panels with cut-outs for the installation of 80 or 120 mm fans.



A **finger guard or EMC shielding plate** may be used to cover the fan cut-outs.