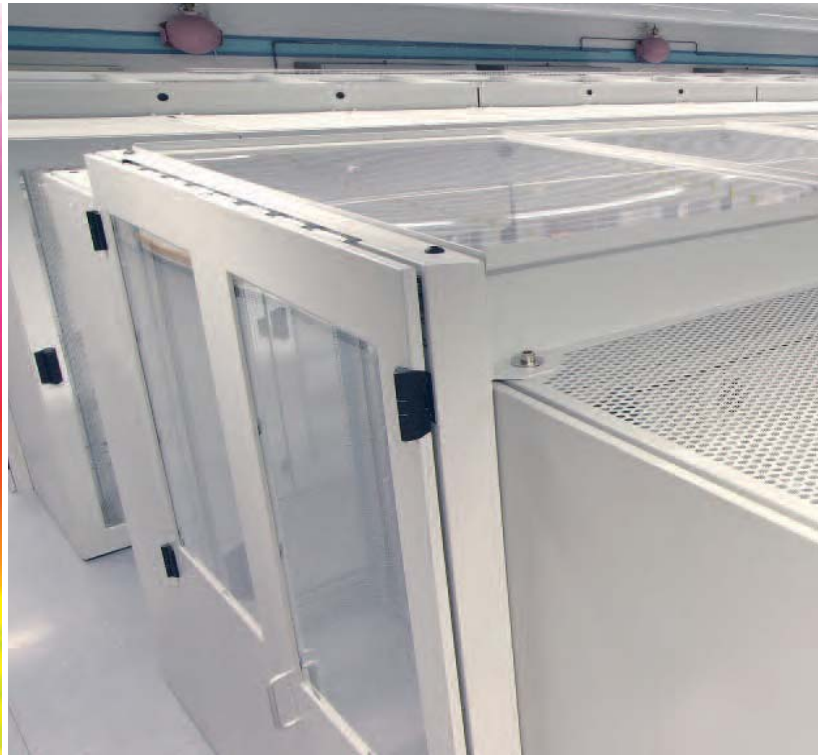
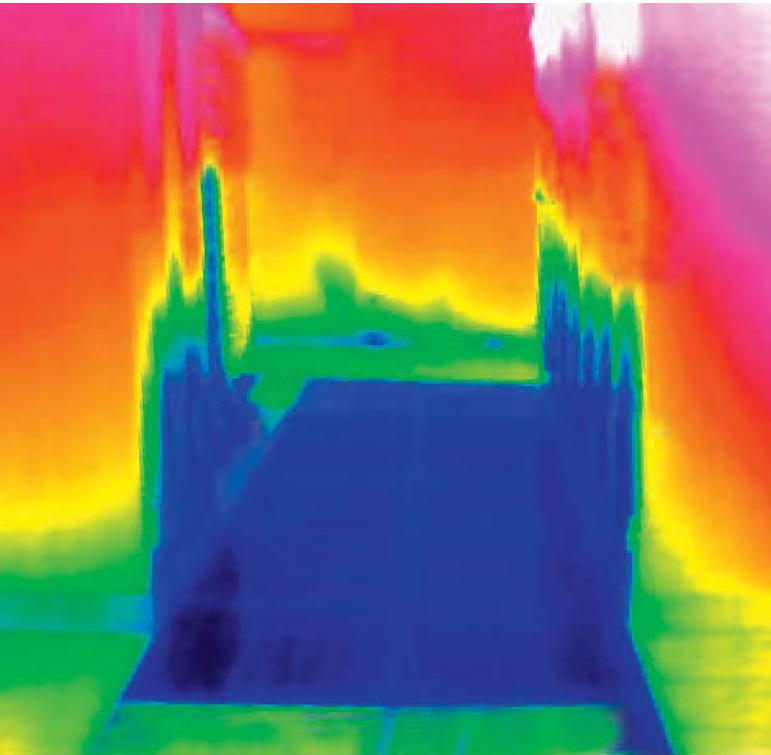


## Knürr CoolFlex®

*Energy-efficient use of existing cooling power in data centers,  
with new installations or as installation-friendly upgrades for all brands.*



## Knürr CoolFlex®

### Cold aisle containment in data centers for energy-efficient cooling for servers in racks

#### The challenge – heat loads

Heat loads in data centers are constantly on the rise.

Thermal management is now often overburdened with trying to effectively remove heat loads. However structural conditions often mean that a changeover to a water cooling system cannot be simply or immediately implemented.

Thermal management equipment is therefore often already working at its full capacity, and consequently consumes enormous amounts of energy. Consider also – energy requirements rise logarith-

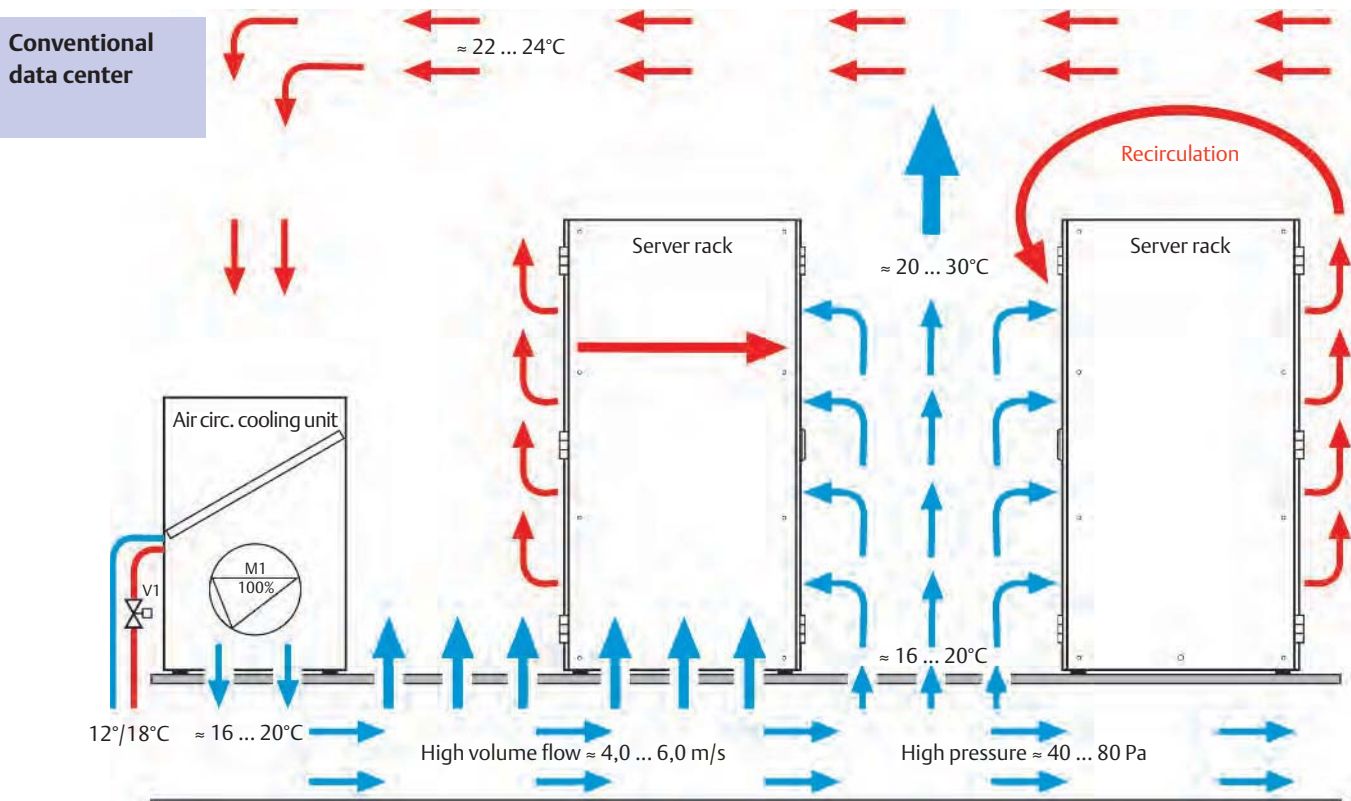
mically with capacity! Of course you could always donate more space to servers, i.e. install fewer servers in the rack or put fewer racks in your server room. Needless to say, these options entail both costs and structural restrictions.

#### The smart way is Knürr CoolFlex®

One future-proof and cost-effective option is to constantly separate the cold air zone from the warm air zone. This “Cold Aisle Containment” ensures that the cold air flowing through the raised floor is channelled through the cabinets.

Special feature: as a result all installed servers are provided with consistent cold air over the entire height of the cabinet.

This containment means that the usual heat mixing on the data center ceiling no longer has any effect on the cold aisle, and hot air short cuts are no longer possible. This significantly improves cooling efficiency, resulting in the reduction of cold air required. This in turn then means that energy costs also fall considerably!



## The Knürr CoolFlex® principle

essentially means a constant separation of cold zones and warm zones, and incorporates the following factors:

- Raised floor sealing: Cable entries in the cabinets can be effectively sealed with Koldlok® brush systems; perforated panels are only used in the cold zone
- Cabinets sealing with trims and 19" blanking panels
- Customised cold aisle containment using standard components – compatible with all manufacturer cabinets.

Cold aisle containment produces a consistent temperature over the entire height of the cold aisle. This significantly reduces the air speed intake, and the air temperature intake can be increased (20 - 25°C).

This, of course, has advantages for both the operator and the environment (lower energy costs for driving fans in the CRAC equipment, suitable air temperature intake for servers, more pleasant working conditions).

The higher intake air temperature also allows the inflow water temperature to be increased, which results in further energy savings. Plus, higher inflow temperatures provide more time for cooling through free cooling.

### The Knürr CoolFlex® has two basic variants:

- Upgrade (with Knürr and competitor racks)
- New installations (package with racks and other products)

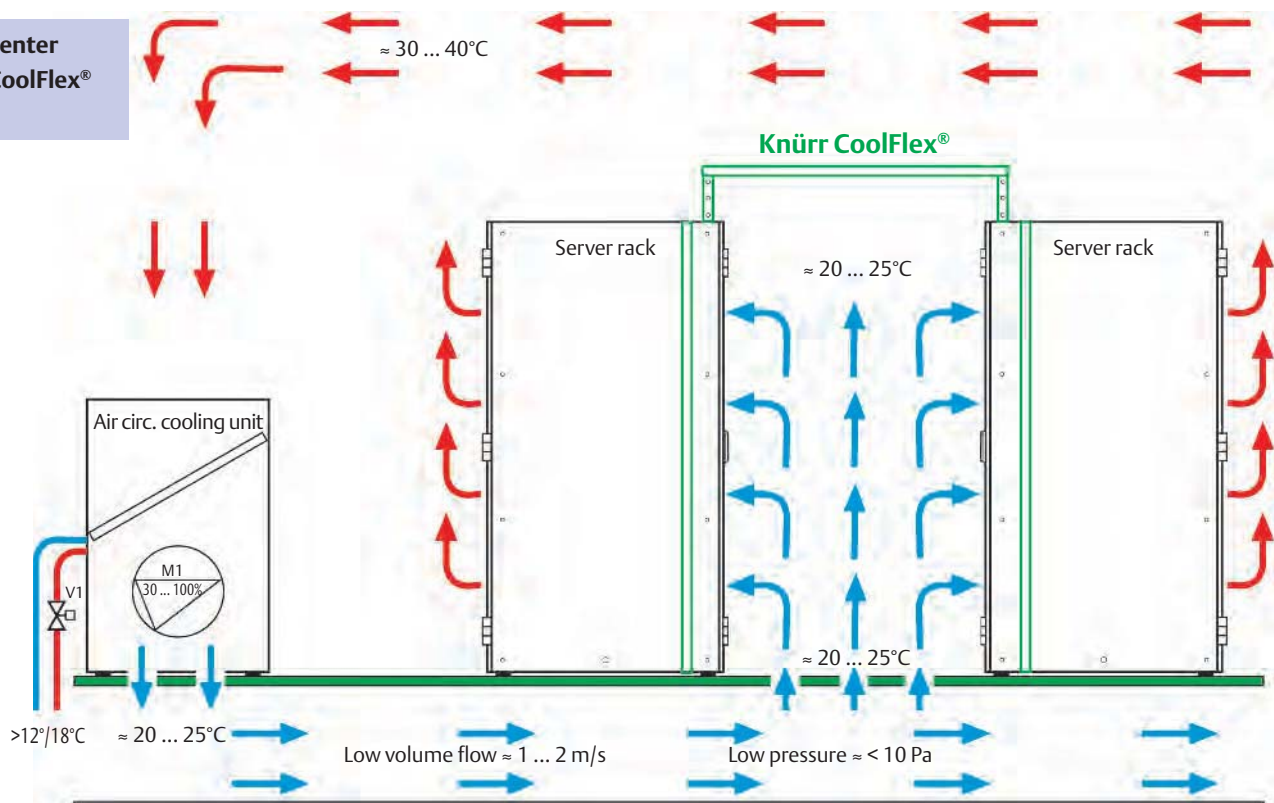
### The CoolFlex® Package

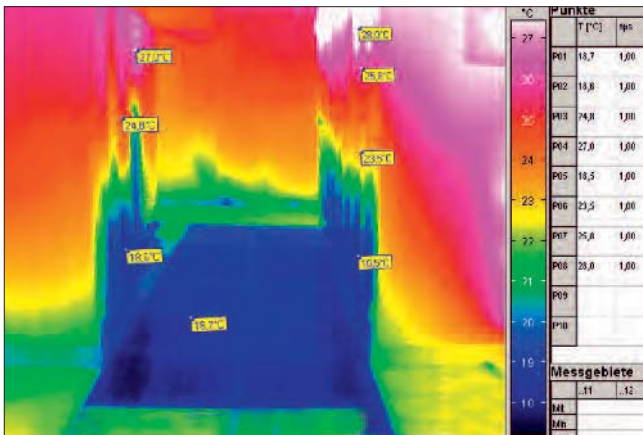
features various products and services:

- Knürr CoolFlex®
- Products for sealing the raised floor and rack
- On-site measurements
- Solution planning
- Design and construction planning
- On-site installation
- Thermal assessment



Data center with CoolFlex® in use





**Thermography:**

The thermal image camera takes two pictures at the same time and therefore shows an instantaneous exposure of the local thermal situation.

**Thermography:**

Cold aisle example in a classic data center.

capacity temperatures above 30°C can often be generated in the cold aisle with the recirculation of the warm air out of the warm aisle and into the cold aisle.

**Air circulation equipment**

When Computer Room Air Conditioning units (CRAC) are operated at full load, their efficiency decreases! At a speed of 50% or less, CRAC units can be operated several times more energy-efficiently. To date data centers have usually been equipped with n+1 cooling units. However as most CRAC units are bought early in the life of a DC it often makes sense to buy 2n. CRAC units can then be operated at a lower speed, more efficiently. The procurement costs are often amortised quickly, due to the significantly reduced energy costs. Changing the number of CRAC units from n+1 to 2n not only produces much lower energy costs – it also provides improved redundancy, and therefore reliability for the entire data center.

Emerson Network Power offers a well-tuned and tested total package: Knürr with its server rack platforms and CoolFlex® cold aisle containment; Liebert with regulated air circulation equipment.

**Our experience**

“Every data center is different!” With the Knürr CoolFlex® we provide individual, customised solutions. Using standard Knürr components cost are kept as low as possible.

**Energy-saving**

Knürr CoolFlex® saves “tonnes” of energy costs, and therefore makes a massive contribution to environmental protection.

In conventional data centers (DCs), high volumes of cold air, which must be below 18°C in places, are blown from the raised floor into the cold aisle. The reason for this is that the cold and warm air in the DC frequently mix (especially when

a DC reaches its full capacity). Many DC operators therefore increase the volume flow and reduce the intake air temperature, until the desired temperature is achieved in the cold aisle. This consumes huge amounts of energy. The result: at the bottom of the cold aisle there is a temperature of 16 - 20°C; at the top there is a temperature of 22 - 30°C. At a DC’s full

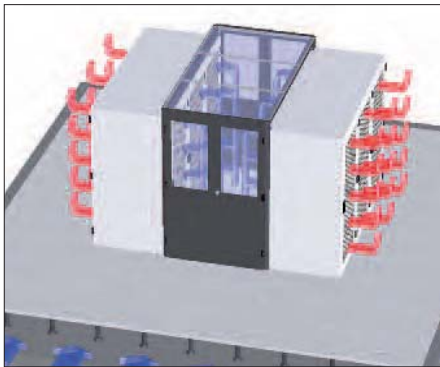
*Better work conditions*

	Conventional DC	DC with CoolFlex®
Raised floor	<ul style="list-style-type: none"> <li>■ High pressure</li> <li>■ High volume flow</li> <li>■ Low temperatures</li> </ul>	<ul style="list-style-type: none"> <li>■ Lower pressure</li> <li>■ Lower volume flow</li> <li>■ Pleasant temperature</li> </ul>
Cold aisle	<ul style="list-style-type: none"> <li>■ High volume flow (storm)</li> <li>■ High temperature differences (cold at bottom, warm at top)</li> </ul>	<ul style="list-style-type: none"> <li>■ More pleasant, lower volume flow</li> <li>■ Pleasant temperature</li> </ul>
Warm aisle	<ul style="list-style-type: none"> <li>■ Pleasant to high temperature</li> </ul>	<ul style="list-style-type: none"> <li>■ Somewhat increased temperature</li> </ul>
All other areas	<ul style="list-style-type: none"> <li>■ Pleasant temperature</li> </ul>	<ul style="list-style-type: none"> <li>■ High temperature</li> </ul>

# Knürr CoolFlex® – strong points



1 SON20135



1 LUF20236



2 LUF20245



3 LUF20254

- Increased cooling capacity to maximise the use of existing data centers
- Life extension of the conventional data center by several years
- Cost-effective solution
- Higher Delta T and therefore more cooling power with thermal management system airflow remaining constant
- Predictable cooling capacity for each cold aisle; can be adjusted by modifying or replacing perforated floor plinths
- Scalability with the aid of additional cooling (e.g. water cooling or cooling with cooling agent)
- Double doors and sliding doors with automatic door closers

## 1 Service

- Solution consulting, calculation, simulation
- Easily upgradeable (regardless of existing server cabinet run)
- Integration into new building (especially with regard to the cooling requirements of very varied data centers)
- Temperature and volume flow measurement, and on-site measurements
- Installation

## 2 Top covers

are transparent in the standard option, so that the room's lighting is used. Halogen-free Plexiglas is used to keep the thermal load as low as possible. With more detailed fire prevention regulations, laminated safety glass can be used as required by the project. The top covers are easy to remove for servicing.

## 2 The cross braces

are used for sealing areas off and precise positioning, and also provide stability as tilt restraint.

## Blanking elements

close off the areas between racks with different heights.

## 3 Door systems and safety/security

Double doors or sliding doors can be chosen for the front, and close with automatic door closers. In the event of an emergency, the cold aisle can be quickly exited by simply pushing the doors open. The doors can be fitted with glass or Plexiglas windows.

## Early fire detection

and extinguishing: Knürr CoolFlex® does not cause any disadvantages for most of the early fire detection systems on the market. On the contrary! In conventional DCs the mixing of cold and warm air can cause delays in alarm systems. With regard to fire extinguishing, various systems must be considered when installing the Knürr CoolFlex®.



3 LUF20246

Emerson Network Power is a consistent global technology leader and recognised expert that helps to secure business-critical processes, and by doing so contributes to a “business-critical continuity”.

A series of the most diverse applications, including the tried, tested and proven Knürr rack system solutions and the thermal management connected with them, ensure the required network stability with the highest technological adaptability at the same time.

Knürr system solutions in the world of information and network technology are part of an adaptive Emerson Network Power architecture, which flexibly adjusts to all changes concerning security/safety, high-density and all associated capacities. Companies profit in a sustainable and long-term way from the high IT availability, operative flexibility and impressive reduction in investment and operating costs.

Knürr AG is recognised around the world as one of the leading developers, manufacturers and distributors of rack and enclosure platforms in the indoor and outdoor area, including all relevant active/passive components of 19” structures and the technologies connected with them.

Knürr is certified in accordance with EN ISO 9001 and the EN ISO 14001 standard. Knürr’s quality management continuously guarantees the highest level of quality in all areas of the company.

### Emerson Network Power

The global leader in enabling business-critical continuity

- AC Power Systems
- Connectivity
- DC Power Systems
- Embedded Power
- Integrated Cabinet Solutions
- Outside Plant
- Power Switching & Controls
- Precision Cooling
- Services
- Site Monitoring
- Surge & Signal Protection
- Rack & Enclosure Systems

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