IT COOLING SOLUTIONS

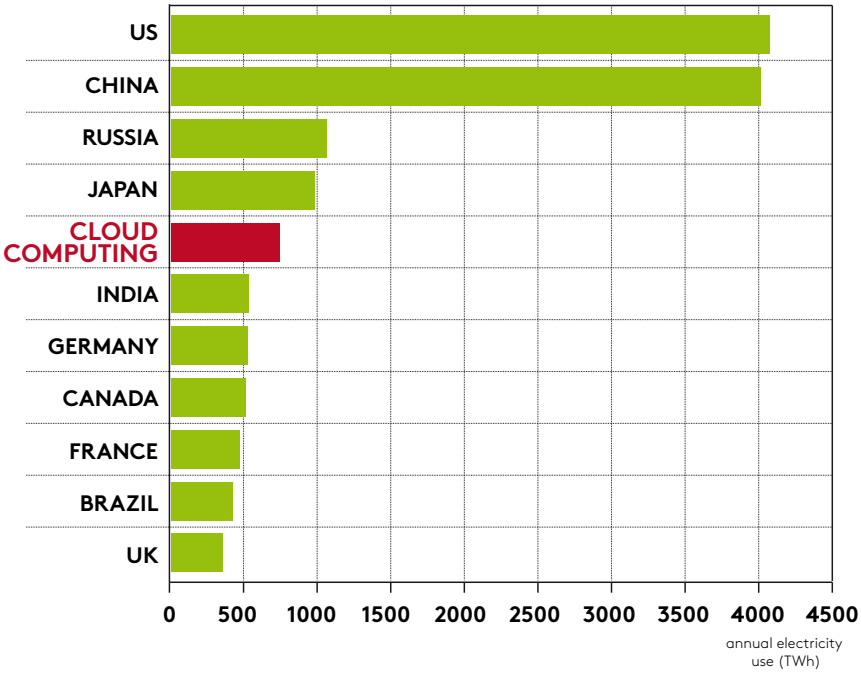
Product overview **2020**

BlueBox by Swegon

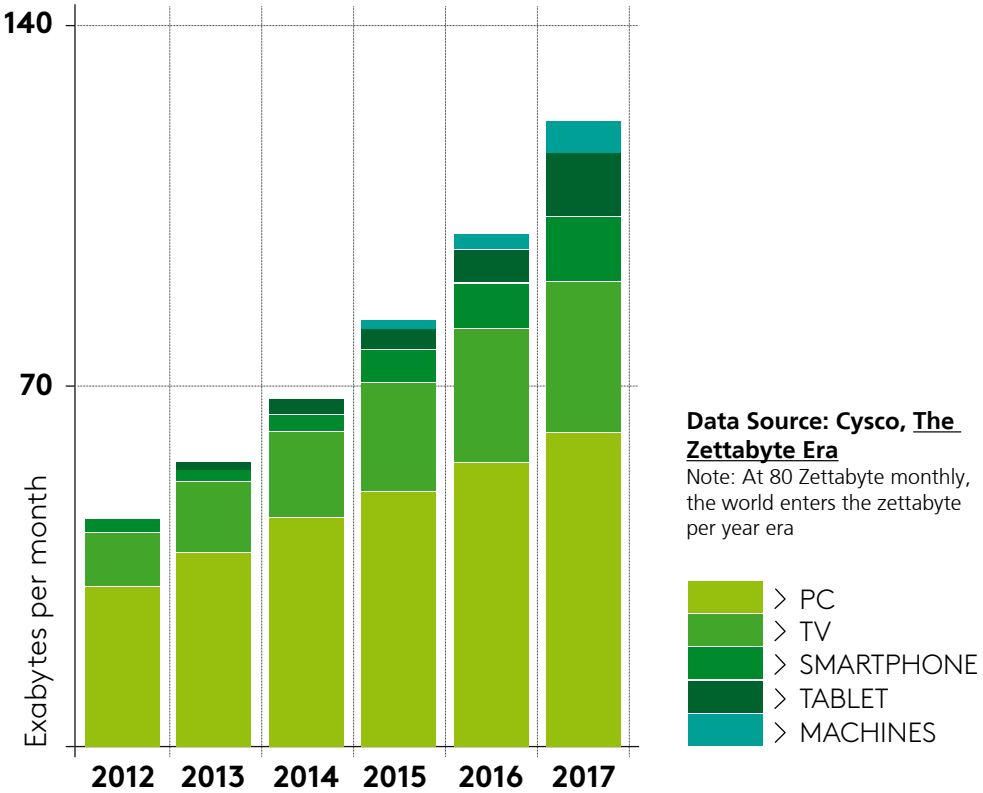
EFFICIENCY ON DATACENTERS

Speaking of energy consumed by data centers as a problem of urgent relevance is necessary because, unlike what one might expect, the share of world energy demand for the operation of the digital world is significant. It is often said that "if the data center were a country, would be equivalent to ..." and the graph is a clear example.

Simultaneously, all forecasts give significant increases in data traffic and the development of new infrastructure in the coming years, and therefore not surprisingly the issue of the reduction of energy expended by the data center is, and probably will continue to be, a key factor for the development of related industry.



Source: Greenpeace International, How clean is your cloud, April 2012
Note: Cloud consumption here includes telecomunication infrastructure, but not the entire ICT ecosystem

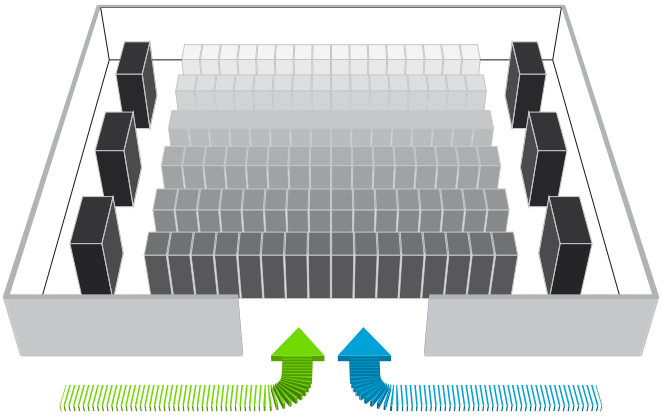


Data Source: Cysco, The Zettabyte Era
Note: At 80 Zettabyte monthly, the world enters the zettabyte per year era

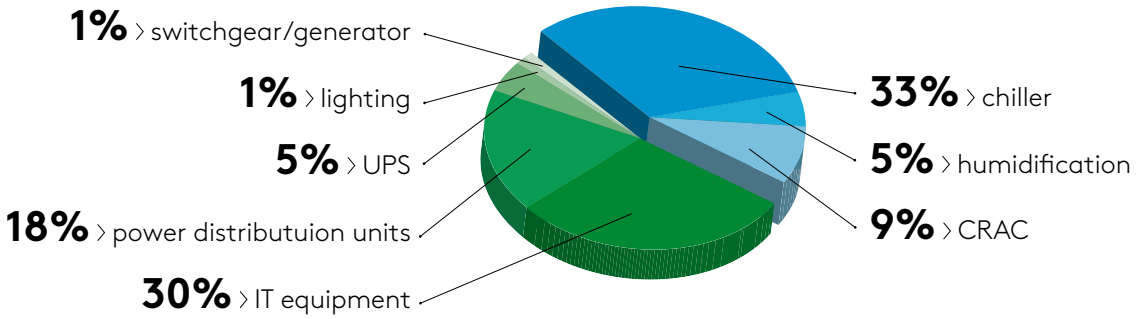
HIGH PRECISION COOLING

It is fundamentally wrong to assume that the electric power expenditure in a data center is only that required to operate IT equipment. In contrast, only a fraction of the total power input is eventually used to feed the server and storage unit.
Lighting, services, ventilation, UPS, etc but especially cooling are the voices that contribute to an increase in power consumption compared to the mere absorption of IT equipment.

And it is clear that, given the preponderance of consumption for removal of the heat generated in the "data halls", the efficiency (ie the amount of energy consumption divided by the cooling output) of cooling systems plays a determining role in the composition of the "pie chart".



IT energy absorbed ▸ **53%** **Cooling** energy absorbed ▸ **47%**



PUE

power usage effectiveness

$$\frac{\textbf{Total} \text{ power consumption}}{\text{Power consumption by } \textbf{IT equipment}}$$

PUE, an acronym for "Power Usage Effectiveness", is one of the most successful metrics in the Data Center industry , as (with all necessary precautions) it can summarize in one simple and manageable figure the state of "health" of the data center in terms of efficient use of its electrical power sources. Maintaining, or obtaining, a low PUE, as close as possible to "1", allows to dedicate most of the electrical energy expenditure to the supply of IT equipment.

pPUE

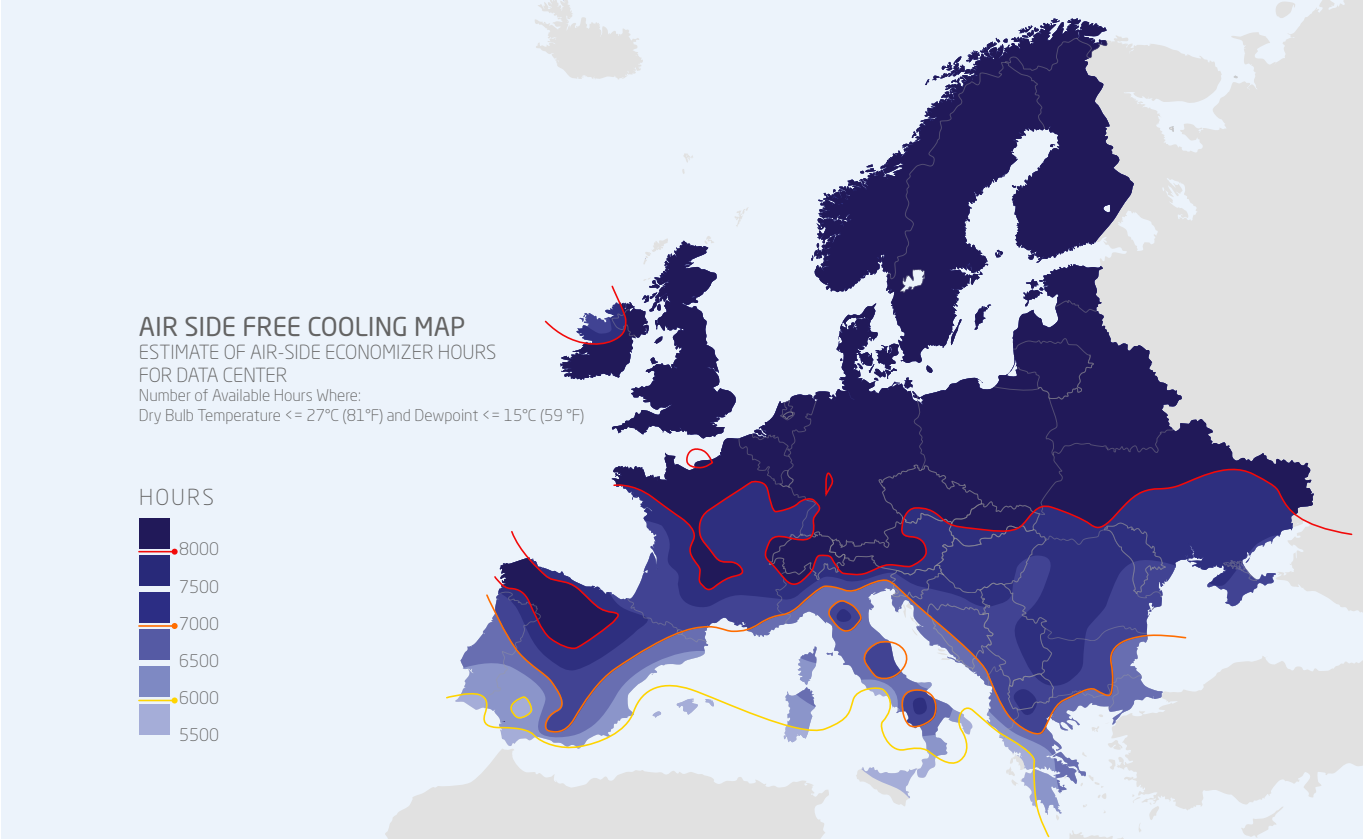
pPUE is basically PUE restricted to a physical or logical boundary. It allows calculation of PUE "restricted" to specific subsystems such as, for example, IT+cooling, or IT+power.

FREE COOLING

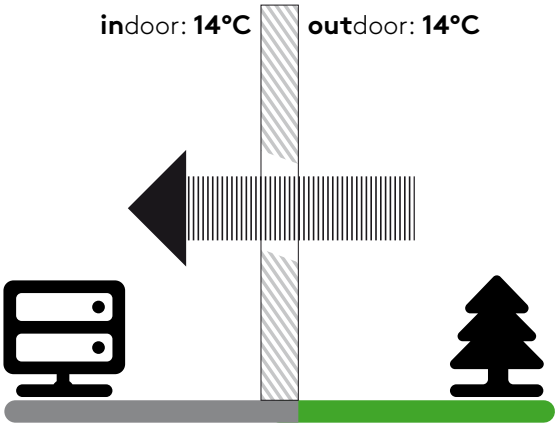
Assuming that nothing is ever completely free, it remains a key concept the idea of using sources of cooling as much as possible cheap and available in abundance.

The concept of "free cooling" takes its start from the consideration that the outside air is, in "classic" cooling systems that use a refrigerant cycle (otherwise called "mechanical cooling"), only used to dissipate the condensation heat of refrigerators.

But, above all because of the geographical location of the data center and the relatively high temperatures of newly designed facilities, direct or indirect use of outside air - when at lower temperatures than Data Center design - involves a considerable energy advantage.

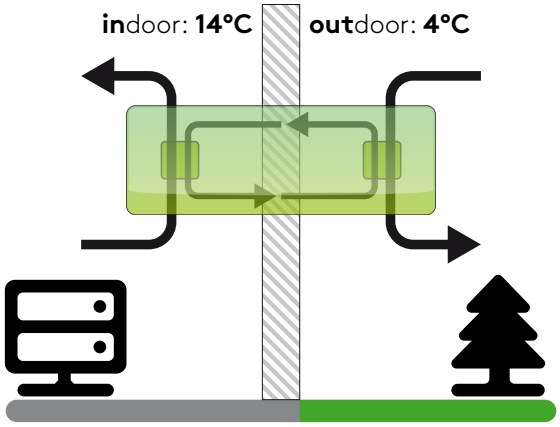


Directfreecooling



Direct means that ambient air is used directly to remove heat load gnerated by IT equipment
Pros: More efficient
Cons: air quality issues, humidity control.

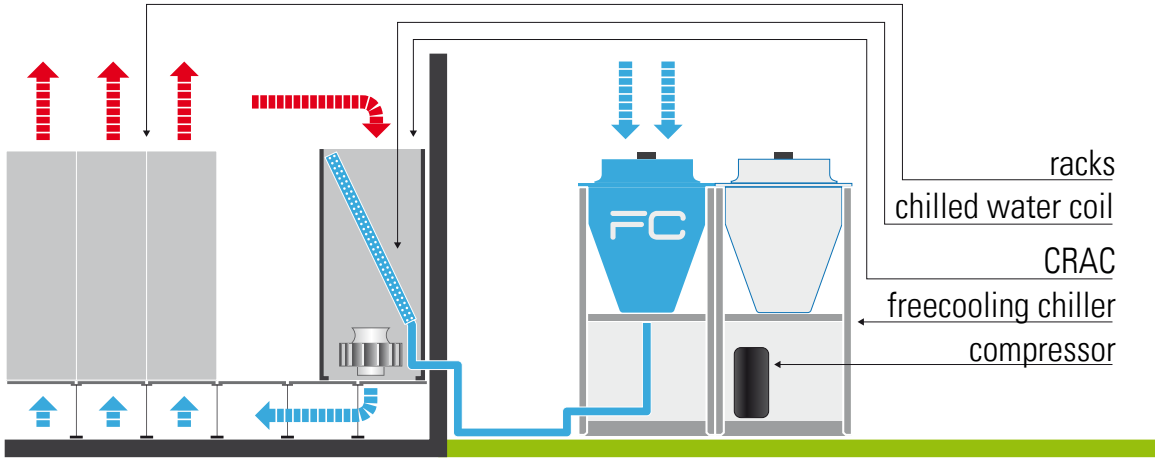
Indirectfreecooling



Indirect means that a heat transfer media is used between ambient air and the Data Center
Pros: physical separation between ambient air and Data Center, no concern for air quality, humidity, security
Cons: less efficient because of two temperature difference gaps.

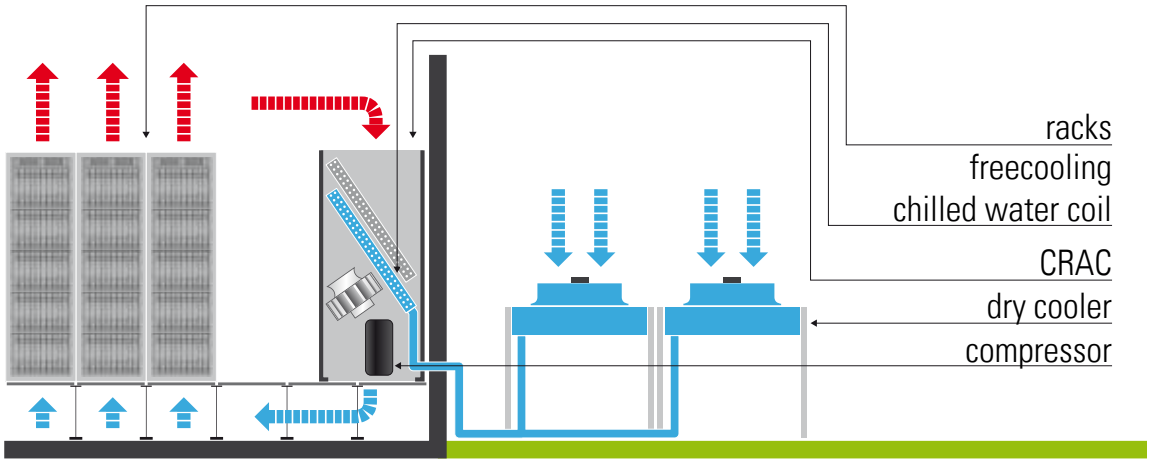
Indirectfreecooling - chilled water system

A chilled water system, with external chillers operating in "free cooling" mode is an extremely versatile and efficient solution for large data centers. Depending on the location and internal design conditions of the data center, it is possible to reduce energy consumption by 30-40% on an annual basis, thus maximizing the total cost of the system (TCO). The possibility of using electronically commuted (EC) fan motors on both internal and external units also guarantees the maximization of energy efficiency even at partial load.



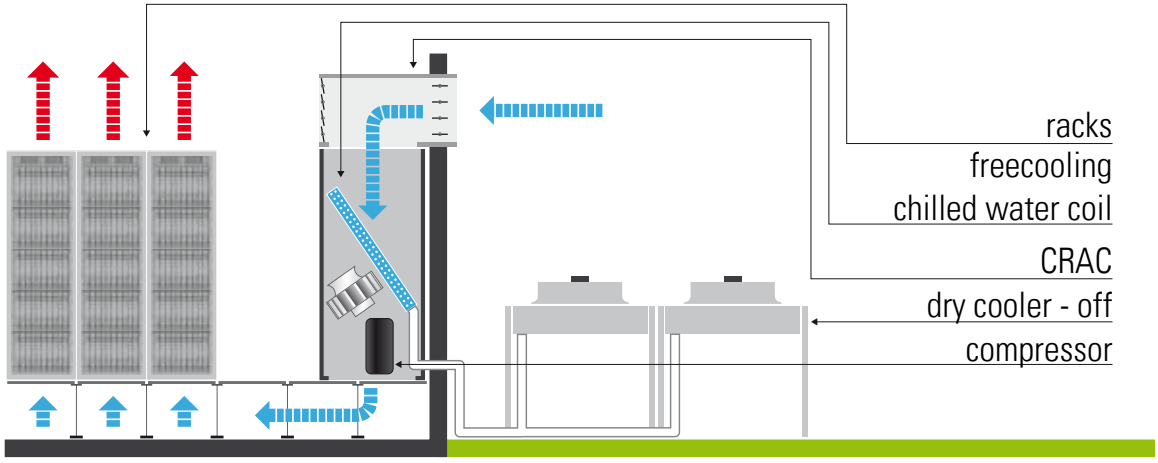
Indirectfreecooling - direct expansion system water condensed

Direct expansion systems equipped with free cooling coils, to be connect with external dry coolers, are an effective and efficient solution for small to medium data rooms, where the installation of large external chiller is problematic and when it is anyway take advantage of favorable climate conditions. Strengths of this solution is the integrated management of mechanical and free cooling and free, allowing throughout the course of the year the minimization of compressor operation and consequent operating costs.



Directfreecooling - direct expansion system air condensed

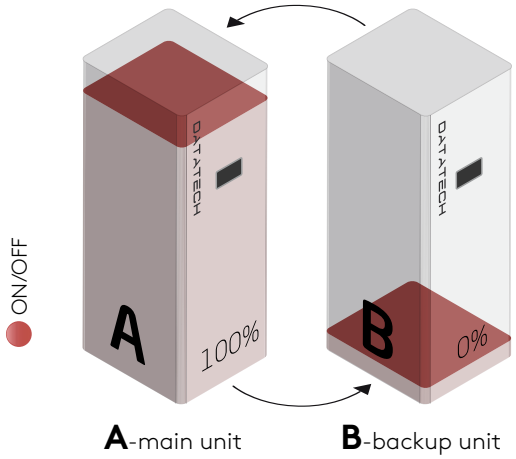
A direct expansion system with direct air free cooling is definitely the most efficient solution as it profits from the most favorable conditions of outside air that may occur during the year. Ideal for rooms with high turnover equipment , where outside air immission is not considered problematic and humidity control inside is not too stringent.



COMPRESSORS
DRIVEN BY INVERTER BRUSHLESS DC

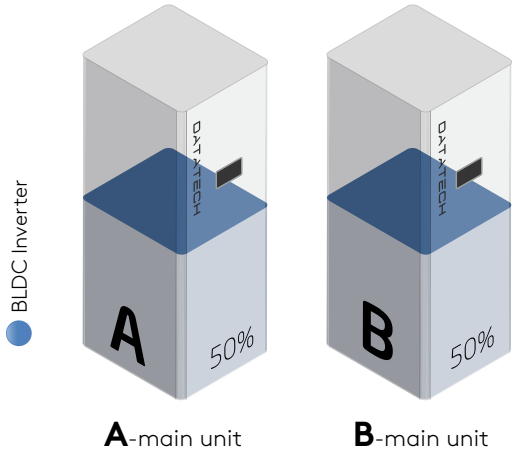
ON CRAC

In addition to being extremely efficient at part load and allow a more precise adjustment of temperature and humidity, the use of variable speed compressors allows to use the reserve units (which normally are on standby, ready to replace the unit which may be malfunctioning) in a very smart way. In fact, by simultaneously operate also reserve units, the cooling system will operate at partial load with an overall lower energy consumption.



DATALINK
primary with secondary unit used only as a backup

EER 3*



SMART DUET
both units used at partial load

EER 4*

ON CHILLER

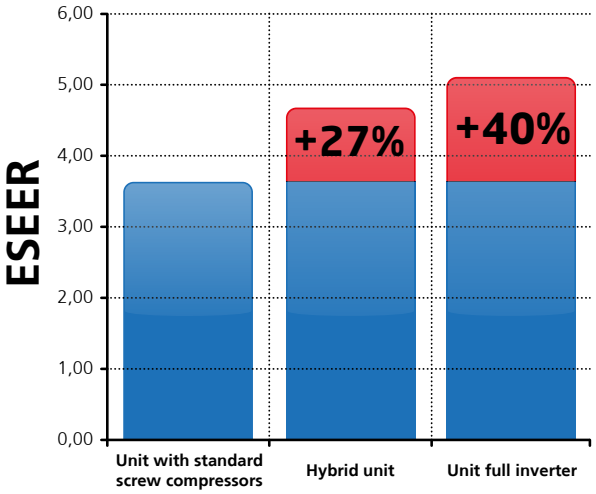
The global effort to increase energy efficiency in buildings and systems is spearheading the development of all those technologies capable of chipping in.

The field of Air Conditioning has developed technologies which achieve the maximum energy saving in partial load conditions.

The technology which more than any other meets the objective of Efficiency Improvement with partial loads is that of the Inverter applied to compressors.
Our units use rotary or brushless scroll compressors, driven by a DC inverter, for residential or light commercial applications.
For higher power applications, our solution is to use dual screw compressors with built-in AC inverter.

For multi-compressor units you can choose between hybrid units, namely a single inverter-operated compressor alongside traditional compressors, or full inverters, having all the compressors driven by an inverter. This allows the customer to find the best compromise between energy efficiency and the cost of the unit.

The use of inverters combined with scroll and screw compressors also achieves the utmost efficiency while maintaining the same operating limits as traditional units.

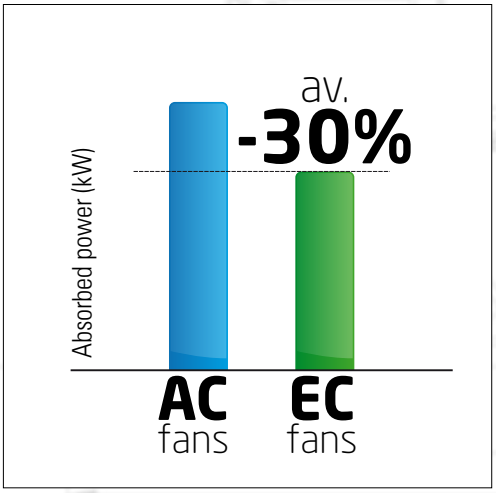


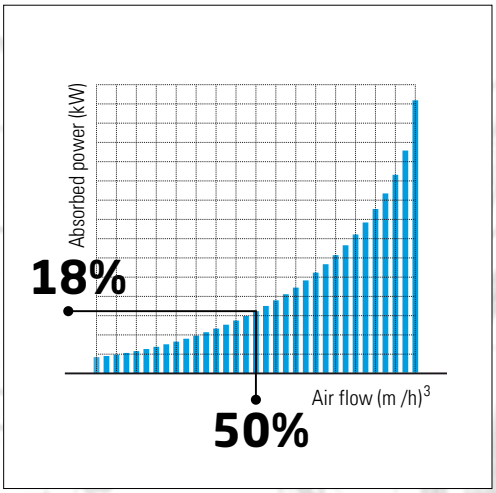
*thermal load 23 kW at 24°C/50% rh internal conditions and 35° outdoor conditions

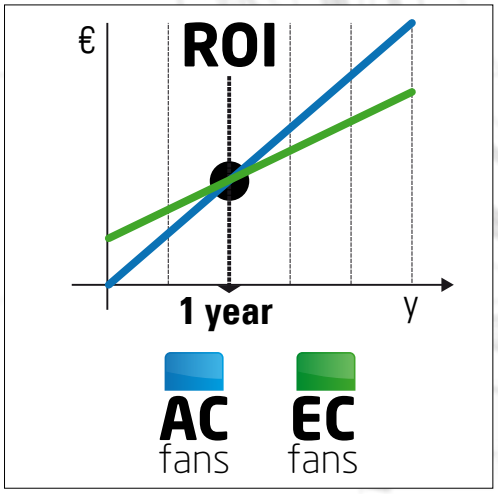
EC FANS

ELECTRONICALLY COMMUTATED BRUSHLESS MOTOR

EC fans are "state of the art" with regard to ventilation within the Data Center. EC - Electronically commuted, in addition to the latest technology of three-dimensional shaping of fan blades in composite material mean reduced energy consumption and noise, self-adaptation to changes in heat load, air volume or static pressure.

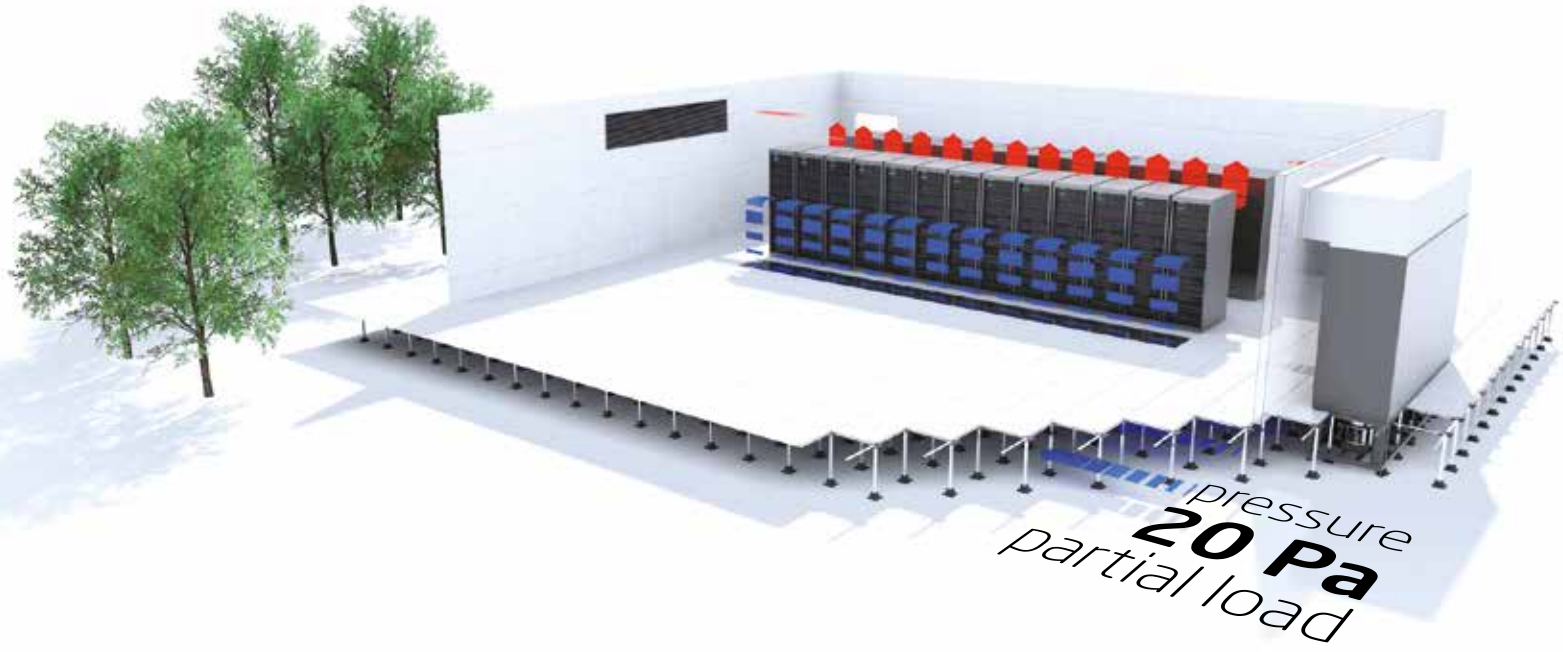


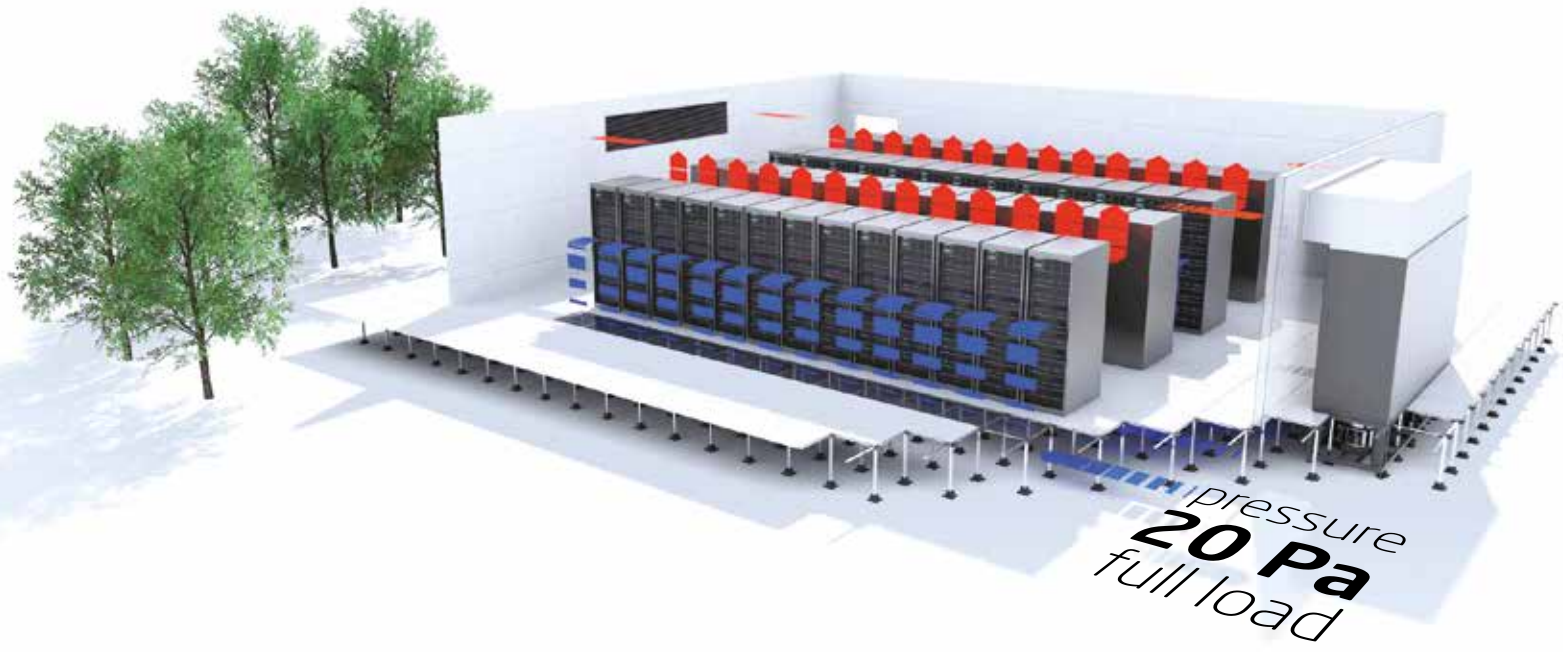




AUTOMATIC CONTROL OF FAN PRESSURE

The automatic control of the fan discharge pressure optimizes the performance of the fans and provides IT equipment only the amount of air it actually needs. Even in the case of partial filling of the Data Room, it will be sufficient to place perforated tiles where necessary, and the air flow rate will be guaranteed.





DEUTSCHE BANK
Frankfurt - Germany
50x Datatech BTD UCW
Supply 5 MW

RELIABILITY ON DATACENTER

The ultimate goal of a data center is ultimately to provide a continuous service, 24/7. For this reason, the reliability of all the systems (power supply, UPS, cooling) must be ensured and, in addition to the quality of the components, it is necessary to provide a certain degree of "redundancy" to all systems, ensuring that the failure of a component does not cause an interruption of the service.

The Uptime Institute has developed the "Tier" classification to describe the reliability level of a data center.
Different levels of "Tier" provide ever increasing levels of redundancy and complexity, with the ultimate goal of drastically reducing the "downtime" of a data center, due to accident or human error.

TIER IV

99.995% availability | **25 minutes** downtime

- Multi-million dollars business
- 2 indipendent utility paths
- Fully redundant (2N + 1)
- Able to sustain 96 hours power outage

TIER III

99.982% availability | **1,6 hour** downtime

- Large company
- Multiple power and cooling paths
- Fault tollerant (N + 1)
- Able to sustain 72 hours power outage

TIER II

99.749% availability | **22,7 hours** downtime

- Medium size business
- Single path of power and cooling
- Some redundancy in power and cooling

TIER I

99.671% availability | **28,8 hours** downtime

- Tipically small business
- Single path of power and cooling
- No redundant components

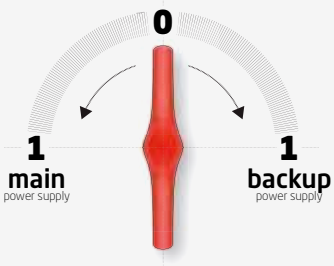
DOUBLE CIRCUIT

Higher "Tier" levels must involve a cooling system that includes at least two routes of delivery. For this reason, it is essential to have cooling units equipped with dual cooling coils and rlevant independent hydraulic circuits.

Double

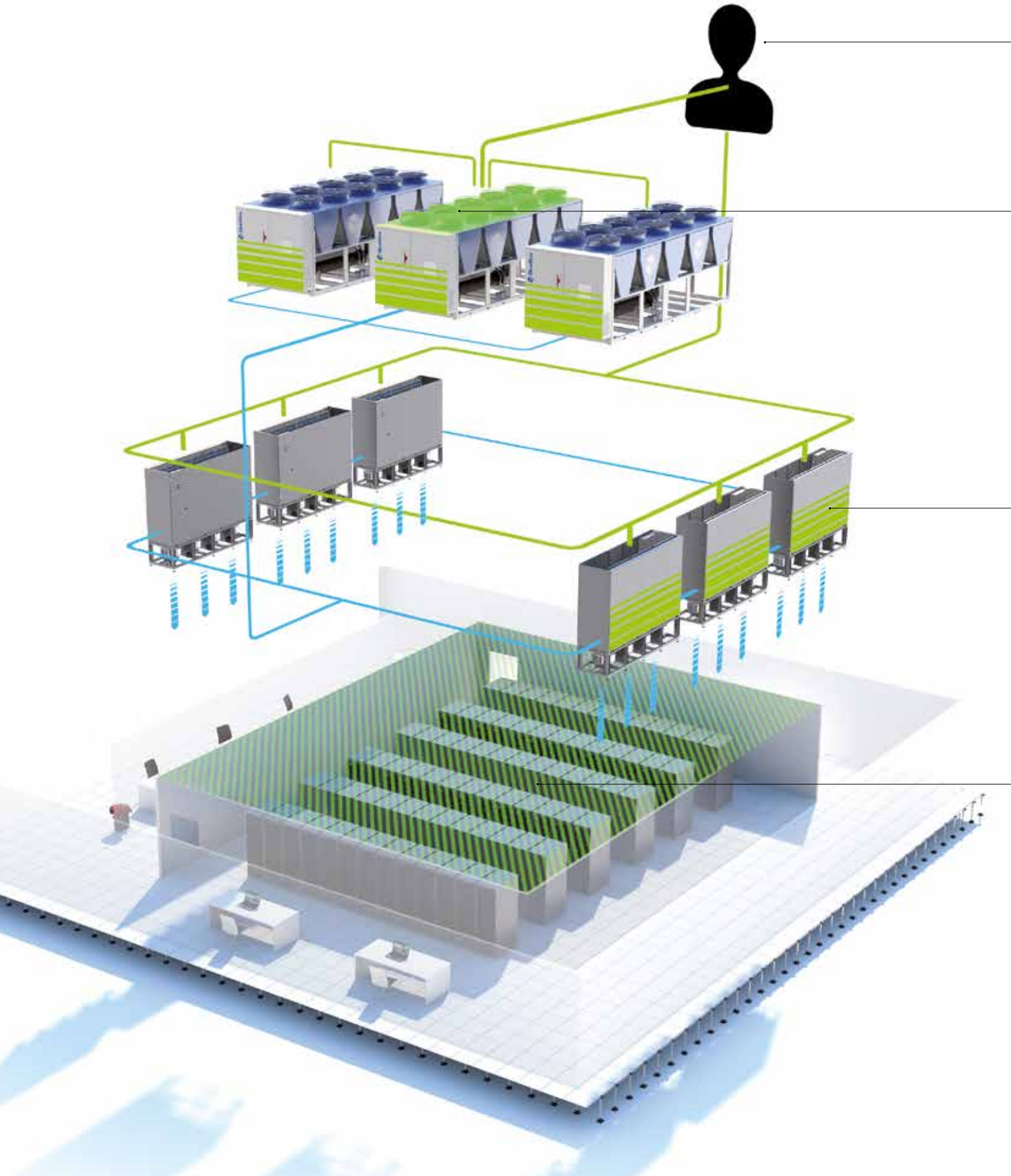
- electrical supply
- heat exchanger
- circuit
- 2 way valve

Double power supply on chiller units with manual or automatic switching.



CONTROLS

Communication and interaction between the system components is essential to maximize the performance of the units and to ensure the best efficiency throughout the operation, continuity of service and optimal control of the thermal load across the data center.



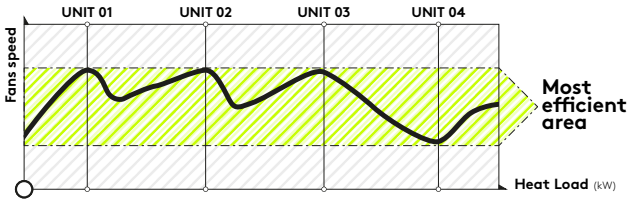
The control platform for IT cooling applications, based on webserver.

- Simple & Immediate Human Machine Interface
- More than 20 years Experience within Data Cooling Requirements
- Unique Software Features
- A Control Continuously Evolving following the Latest Industry Requirements

The local network comprising the external chiller is able to optimize energy consumption, in addition to providing advanced services for the management of redundancy, thermal load, sequencing priority and free cooling.

ROOM LEVEL

CONTINUOUS DYNAMIC OPTIMIZATION



WORK ALWAYS WITH THE **RIGHT NUMBER OF NEEDED UNITS** IN THEIR **MOST EFFICIENCY WORKING POINT**

SERVER LEVEL

AUTOMATIC AIR FLOW MODULATION BASED ON:

REMOTE TEMPERATURE
push the freash air where is needed & control it with smooth and continuous adjustment

REMOTE DELTA PRESSURE
avoid any risk of hot spot optimizing the fan energy consumption

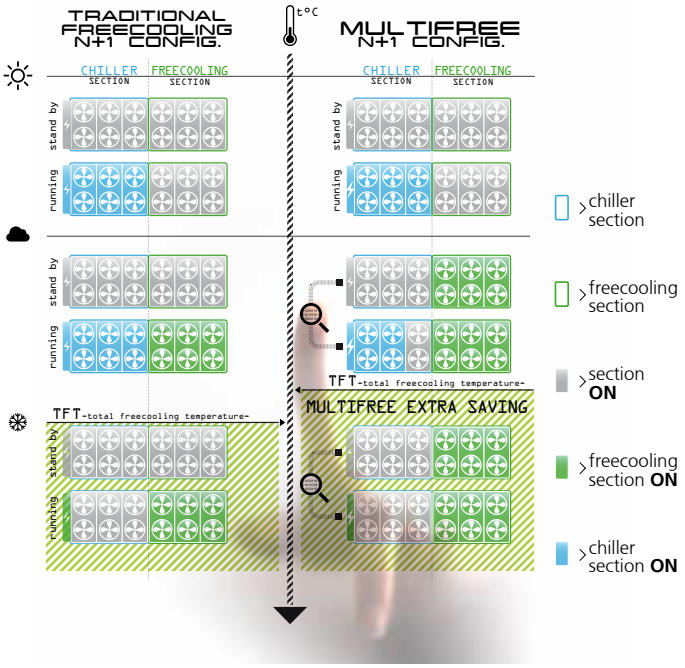
DELTA TEMPERATURE
treat, move and cool only the server's needed amount of air without any waste

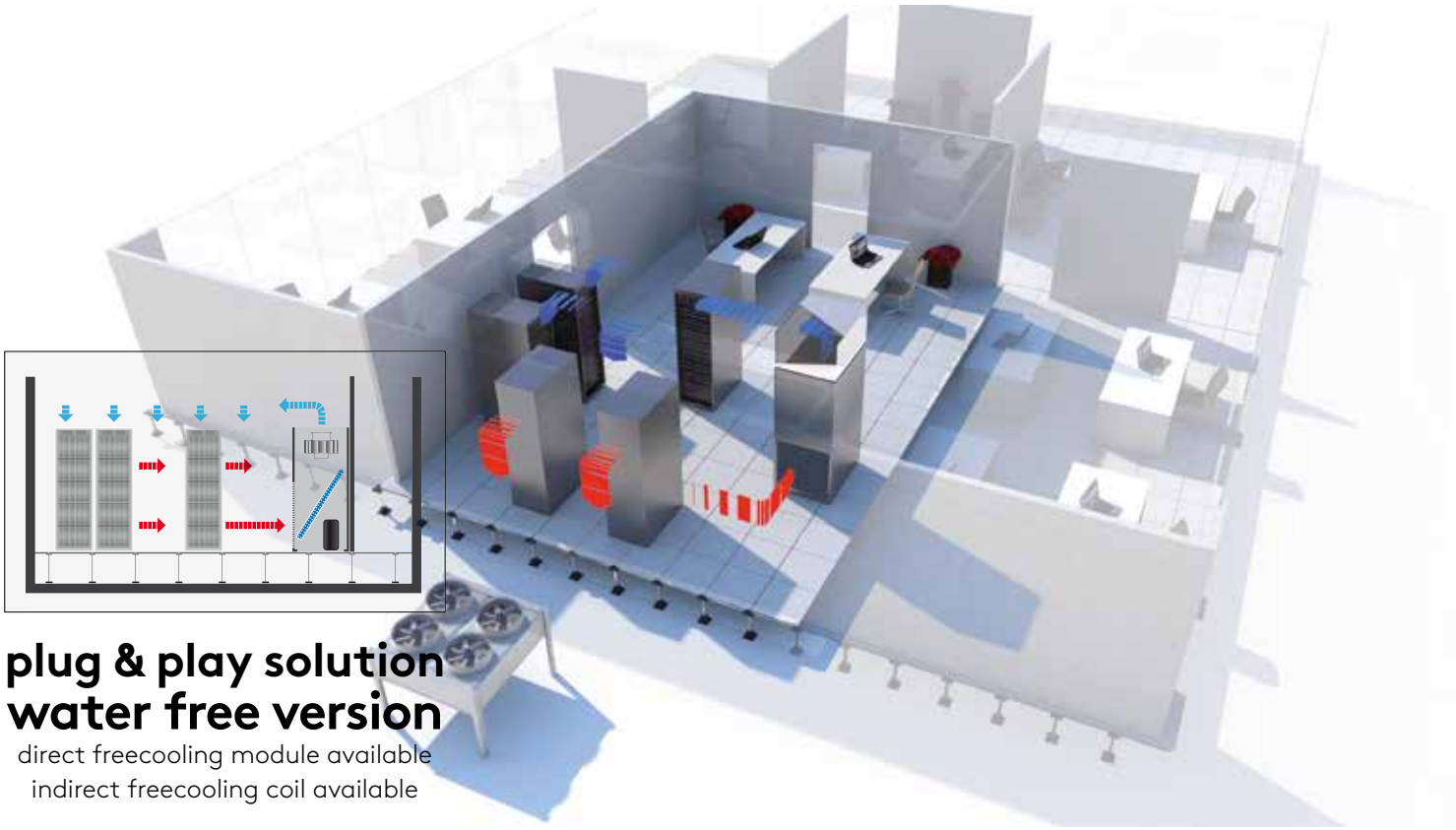
ADVANCED CONTROL FUNCTIONS

› Unit management by integrated web page
› Data logging of all units parameters one month long
› User friendly interface based on visual icons
› RS485 and Ethernet ports as standard

MULTILOGIC FUNCTION
› Up to 32 units (1 Master e 31 Slave) connected to the same hydronic circuit
› Management of units with different logics and priority levels

MULTIFREE FUNCTION
› Maximise the efficiency using the freecooling from stand-by unit in n+1 configuration



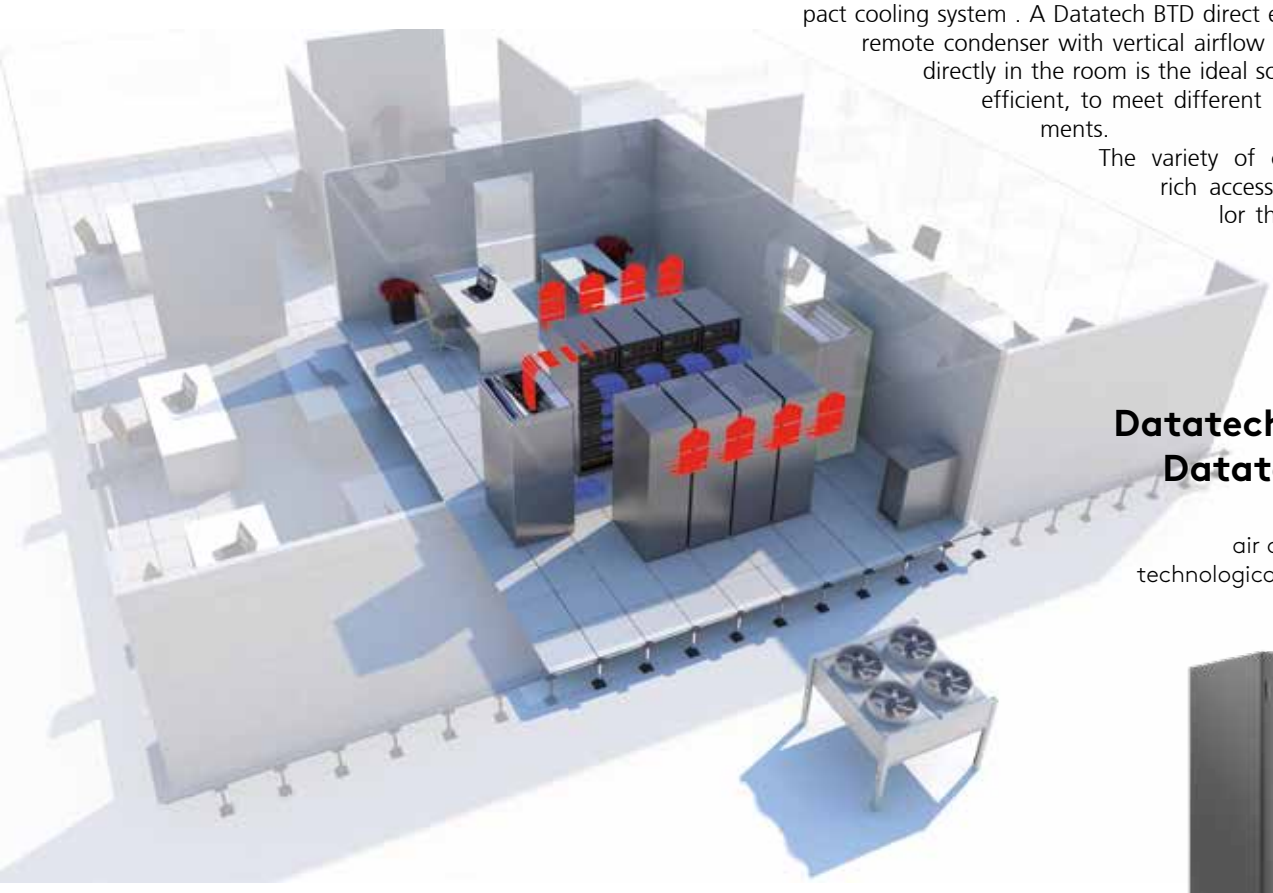


plug & play solution
water free version

direct freecooling module available
indirect freecooling coil available

Characteristic of a server room is the need for a versatile and compact cooling system . A Datatech BTD direct expansion unit with remote condenser with vertical airflow and air distribution directly in the room is the ideal solution, reliable and efficient, to meet different installation requirements.

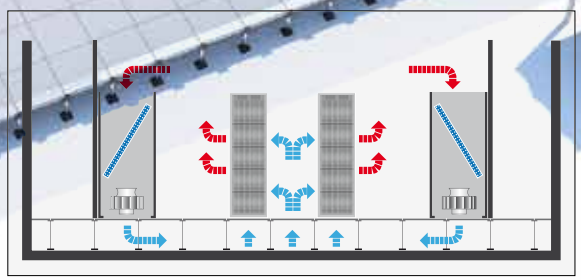
The variety of configurations and rich accessories allow to taylor the best solution for each customer.



Datatech BTD/ED
Datatech BTD+

Precision
air conditioners for
technological environments
6÷104 kW

The medium-sized data center , specifically designed to shelter inside IT equipment and provide a safe and secure environment , able to operate continuously 365 days a year , finds in the combination of indoor chilled water Datatech BTD units plus Tetris FC NG chiller the most energy- efficient and unique solution in the market. The pair of indoor units with airflow under the raised floor , with a typical layout of rows of racks in hot aisle / cold aisle arrangement, with water-cooled chillers and dry coolers can achieve maximum energy performance and the optimization of plant operation during the whole year.



high kW/m² ratio

double water circuit available

Datatech BTD/CW

Precision air conditioners for technological environments

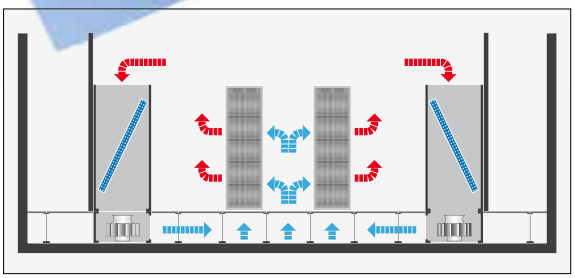
6÷220 kW

Tetris W FC NG

Water cooling freecooling chiller

39÷634 kW

The large, modern data centers, typically large "Colocation Providers" or large institutions require dedicated cooling, high efficiency and high capacity cooling units . The Datatech BTD units with separate fan section, installed below the raised floor, reach the top of the performance in terms of efficiency and cooling capacity per footprint . The coupling to the large Kappa Rev chillers can reach the cooling power needed to remove large amounts of heat that originate within the data center .



optimized for raised floor installation
strict underfloor pressure control

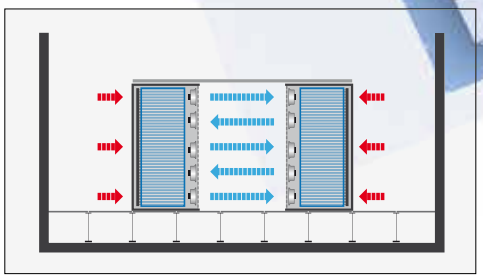
Kappa Sky

Modular chillers for large systems. Inverter compressors with variable Vi ratio. High seasonal efficiency
260÷1360 kW

Datatech BTD/PFW

Precision air conditioners for technological environments with plenum fan
70÷260 kW

Small data centers, despite the name, may require a high power density in the case the so-called "blade" servers are used. A solution based on Coolblade BTD "in-row" cooling units allows to efficiently remove large amounts of heat. A non-negligible advantage of such a solution is the possibility to avoid the distribution of air through the raised floor, thus saving on the initial costs of installation.



high kW/m² ratio minimum footprint

designed for containment solutions

Coolblade BTD

High density cooling system
for technological applications
16÷27 kW

Zeta Rev HEi FC

Free-cooling chillers with inverter compressor.
High seasonal efficiency.
Independent free-cooling section. No-glycole option
36÷96 kW

IT COOLING

Datatech BTD /ED > 6÷104 kW

Precision direct expansion air-conditioners, air cooled or water cooled for technological environments. Available also as DC/FC (Dual Cooling/Free Cooling) version.

Datatech BTD /CW /DW /PFW> 6÷260 kW

Precision chilled water air-conditioners for technological environments available with standard height configuration as well as Plenum Fan (PFW). Available also as DW (Dual Water) version.

Datatech BTD + > 7÷100 kW

Precision direct expansion air-conditioners, air cooled or water cooled for technological environments with brushless DC inverter driven compressors.

Coolblade BTD DX > 12÷25 kW

Direct expansion In Row air conditioners, connectable with inverter driven condensing unit.

Coolblade BTD /CW /DW > 16÷27 kW

Chilled water In Row air conditioners for high density IT aplications.

Coolblade BTD /ED+ > 12÷24 kW

Direct expansion In Row air conditioners air cooled with brushless DC inverter driven compressors.

Coolblade BTD in Rack > 8÷30 kW

Cooling solution for In Rack/In row applications. Available as chilled water and direct expansion versions.

TECHNOLOGICAL

Zeta Rev HE FC > 46÷152 kW

Free-cooling chillers. High seasonal efficiency. Independent free-cooling section. No-glycole option.

Zeta Rev HEi FC > 36÷96 kW

Free-cooling chillers with inverter compressor. High seasonal efficiency. Independent free-cooling section. No-glycole option.

Tetris 2 FC > 122÷518 kW

Modular free-cooling chillers for large systems. Multiple combinations of high-efficiency, low-noise versions. Selectable independent free-cooling module.

Kappa Sky FC > 285÷885 kW

Modular free-cooling chillers for large systems. Inverter compressors with variable Vi ratio. High seasonal efficiency. Selectable independent free-cooling module. No glycole option.

Kappa Rev FC > 353÷1291 kW

Modular free-cooling chillers for large systems. Multiple combinations of high efficiency, low noise versions. Selectable independent free-cooling module.

Kappa V Evo FC > 325÷1178 kW

Compact free-cooling chillers for large systems.

Tetris W Rev FC/NG > 39÷640 kW

Water-source free-cooling chillers for no-glycole applications. Fully integrated management.

Feel good **inside**

Swegon

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