

**MITSUBISHI ELECTRIC  
HYDRONICS & IT COOLING SYSTEMS S.p.A.**

IT COOLING

DATA CENTER COOLING

# RC for IT COOLING

**THE MILESTONE OF GREEN DATA CENTER  
COOLING TECHNOLOGY**



# RC approach for perfect data center cooling

THE FUTURE OF DATA CENTERS BRINGS BOTH ADVANCED TECHNOLOGIES AND EXPONENTIAL DATA EXCHANGE THAT STRONGLY INCREASES HEAT LOADS PER SQUARE METER.

STRUCTURAL LIMITS RESULT IN HIGHER AND HIGHER POWER DENSITIES AFFECTING THE DEVELOPMENT AND DESIGN OF SERVER ROOMS.

## KEY FEATURES OF MODERN DATA CENTERS:

### HIGH FLEXIBILITY

Data centers require scalable design to:

- ✓ Manage different heat loads for different areas
- ✓ Manage an increasing heat load over time
- ✓ Accomodate new areas to be cooled



### GREAT SCALABILITY

Data center design changes rapidly in terms of:

- ✓ Shape & architecture
- ✓ Computing capacity
- ✓ New technologies, always adopting the latest rack and server solutions
- ✓ Heat dissipation



Energy efficiency is crucial in data centers that require the latest cooling technologies to ensure the reliability and high performance of these critical applications.

Server usage in both upgraded and newly designed data centers will, over time, lead to increasingly higher performance that will eventually result in higher density power loads.

The data center environment is critical and requires a guarantee of reliability, device safety, and modularity.

Preparing for the modular infrastructure evolution, the IT room has several standards, classifications, and certifications to comply with.

The key factor that must be continuously improved is energy efficiency to cope with more demanding OPEX requirements, and the global footprint, which greatly affects CAPEX.

Virtualisation, Cloud Computing, and Internal Redundancy also greatly contribute to server room development with many powerful and concentrated servers creating racks exceeding

40kW in less than one square meter (or 10 square feet). Cooling such loads is a serious challenge for the air conditioning industry and only solid technological innovations backed by R&D and experienced staff can provide the right solutions.

The answers lie in the use and combination of the most sophisticated technologies such as MAGNETIC LEVITATION and FULL ELECTRONIC MODULATION cooling equipment.

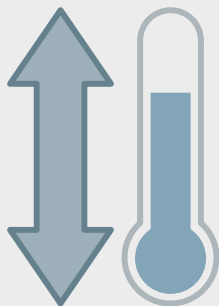
As a race car needs an experienced driver, high tech components require superb design capacities as well as a deep understanding of the application's requirements.

RC range of IT COOLING solutions includes state of the art, efficient, and reliable cooling technologies for ICT environments.

## INCREASING HEAT LOADS

The growth of microprocessor performance leads to the growth of power generated density.

Besides this, progressive diffusion of incoming virtualisation and blade servers characterised by increasing power in limited volumes, leads to the unrelenting growth of loads which consequently increases thermal power per m<sup>2</sup>.



## RELIABLE OPERATION

Redundancy is the typical way to increase uptime. In facing the cooling problems only smart solutions can avoid the disaster of shut-down while limiting CAPEX and OPEX. Reliability must look at a full 360° view.



# BUILDING AN ENHANCED MODEL FOR TOP DATA CENTER EFFICIENCY

Built on the profound experience of both the Climaveneta and RC, the new RC IT Cooling solutions merge the best technologies of the two brands with the top quality approach of Mitsubishi Electric to ensure:



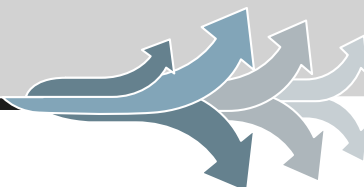
## RC IT COOLING BEST PRACTICES

Extensive research in this application has resulted in some best practices, which are a must for an efficient data center.

RC for IT COOLING solutions are designed to perfectly fit with this approach.

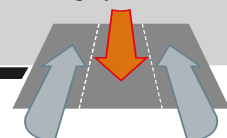
## Optimised air flow management

Optimised air flow design, directing cold air through the raised floor to form cold aisles in front of the rack air intake.



## Hot and cold aisles

Hot & cold aisles address layout air-flow to the servers to ensure a constant temperature. Working conditions become more stable and the efficiency of the whole cooling system increases.



## HIGHEST EFFICIENCY AND REDUCED OPERATING COSTS

The growing energy demand in modern data centers implies that every energy improvement allows for a significant reduction in OPEX (operating costs). In infrastructures working 24 hours per day, 365 days per year, over an average of 10 years, this accounts for the largest proportion of overall costs.

RC IT Cooling solutions put great efforts on the use of high quality components such as the EC PUL (polymeric ultralight) fans and the full DC inverter technology applied both on the compressors and fans.



## INCREASED KW/SQUARE METER

It is well-known that set loads in technological applications are rapidly increasing. The expansion in data exchange in generating heat loads that are usually localized in specific areas called hot spots.

This means that air conditioning systems are required to be more and more performing, even if space available is still the same. In this sense, RC for IT Cooling range ensures the best power/footprint ratio in the market.



## COMPLETE COOLING PACKAGE

RC for IT Cooling range features 360° versatility, both a s concerns capacities, as well as configurations. Perimeter air conditioners, together with close-coupled solutions ensure effective cooling for low-medium and high density areas. Data center infrastructures and PDU solutions complete the range providing customers a complete cooling package for your data center.

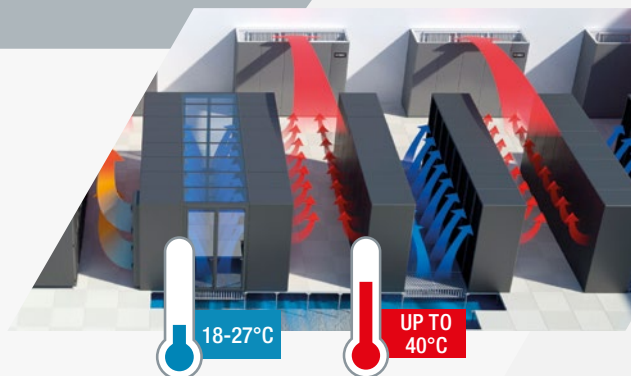


## UNITS FOR HIGH TEMPERATURE ENVIRONMENTS

The need for higher efficiency levels and reduced TCO values have led to increasing temperatures (up to 27°C) of intake airflows directed to the IT equipment (ASHRAE, 'Thermal Guidelines for Data Processing Environments'), thus increasing supply air temperatures.

RC Close control units have been designed to manage such air suction temperature up to 40°C. Available both as Dual Fluid (DF) and Free Cooling (FC) versions, NEXT air conditioners optimize the primary water circuit performance even with high temperature fluids.

The chiller's efficiency and the free cooling operation are therefore maximized also when outdoor temperatures are high.



## TOTAL RELIABILITY AND EXTENDED LIFE CYCLE

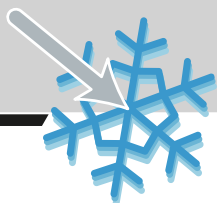
Reliability is key when it comes to IT infrastructures. In all these applications, an interruption in the cooling supply may seriously compromise the technical equipment operation, causing unexpected shutdowns.

RC's approach to cooling dependability goes beyond the unit's accurate and sturdy design. It also involves several devices and functions that maximise unit's uptime in case of emergency circumstances such as power supply outage.



### Localised cooling

Dedicated localised cooling directly targets hot spots as well as integrating the hot & cold aisle.



### Highest efficiency with water cooled systems

Optimised hydronic solutions for HPAC combine energy efficiency with flexible performance and utmost reliability.



# MEASURING EFFICIENCY TO IMPROVE IT

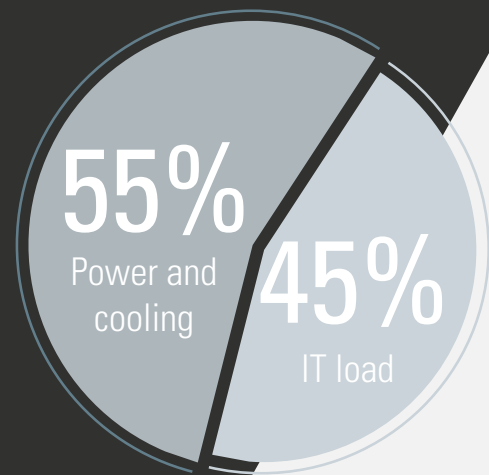
The awareness of data center requirements and the commitment to improve their energy efficiency has led to the development of dedicated indices for these applications.

All RC IT Cooling solutions are developed to optimise these metrics, allowing for a transparent evaluation of the real benefits offered by our approach to HD.

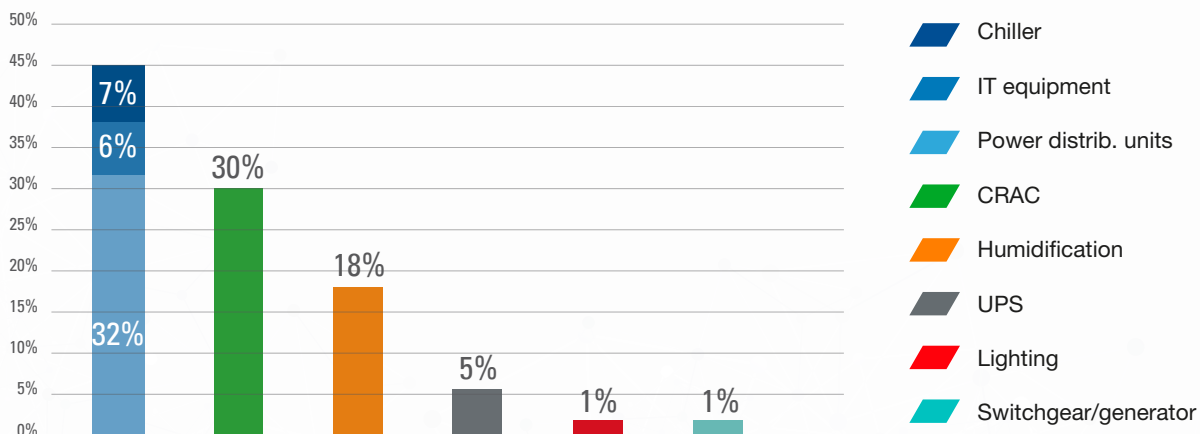
## DATA CENTER COOLING & POWER LOAD CONSUMPTION

Power and cooling represent the lion's share of the energy consumed in a data center, although they are not directly linked with the value adding operations of the data center.

Accurate measurements of heat loads are the essential base for highly efficient green data center design.

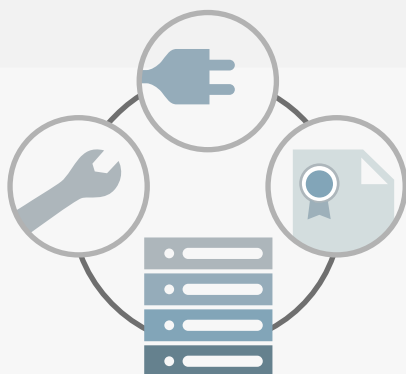
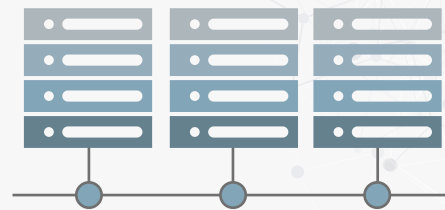


## DATA CENTER POWER CONSUMPTION BY APPARATUS



## CAPEX Capital Expenditure

A data center is a valuable asset for a company. All expenses relating to the infrastructure, especially high-tech solutions, remain within the company by adding value and extending the life span of the data center.

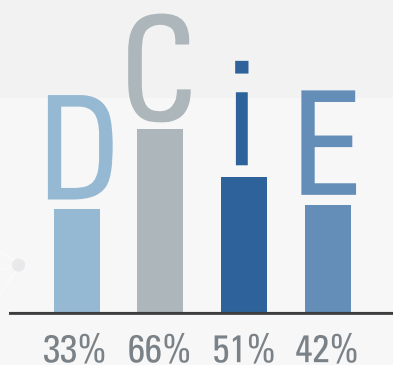
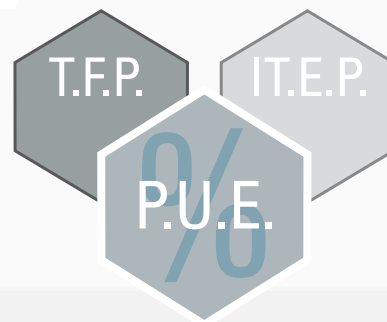


## OPEX Operating Expenditure

Running costs of a data center operating 24 hours a day, 365 days a year for an average of 10 years, are crucial for those who must manage it. Even a small saving becomes very significant over time. This justifies even very high initial investments and justifies an anticipated system refurbishment, aimed at improving their efficiency.

## PUE Percentage of effectiveness = Total Facility Power / Equipment Power

PUE considers the overall energy efficiency of the data center, measured as the ratio between total absorbed power and the power needed by the servers. As only energy used to transfer data creates value for the data center, a ratio close to 1 would represent the condition of optimum efficiency. Most data centers have a PUE between 2 and 3, excellent values are between 1,2 and 1,5.



## DCiE = 1/PUE x 100

Reciprocal of PUE, DCiE shows the % of power absorbed by IT infrastructure, compared to the overall data center consumption.

Values close to 33% are usual for traditional data centers. DCiE of 66% reflects a very high energy efficiency.

# DEDICATED APPROACH FOR HIGHLY EFFICIENT DATA CENTERS

RC IT Cooling solutions are adaptive cooling systems based on actual data center heat load requirements (kW/rack).

Designed to achieve unparalleled efficiency performance and total reliability, the wide range of high precision solutions provides customers with the answer for every kind of data center.

## LOW

### Density Zone

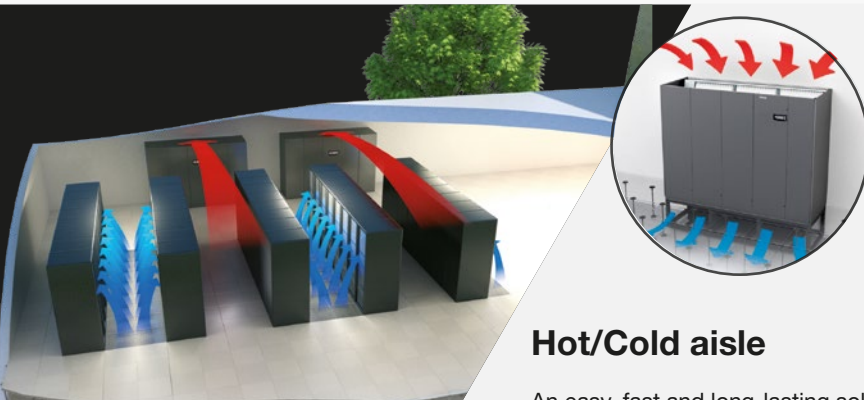
< 5 kW/rack



## MEDIUM

### Density Zone

10 - 20 kW/rack



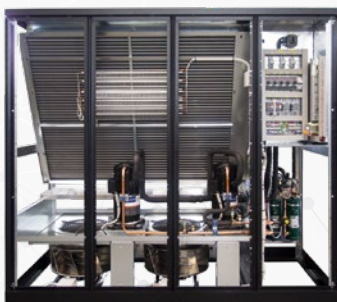
### Hot/Cold aisle

An easy, fast and long-lasting solution; the hot & cold aisle is the basic and essential concept that drives the layout of all data centers.

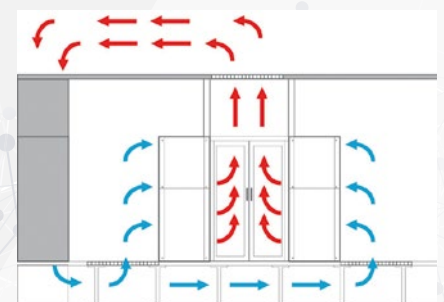
### Aisle Containment

AISLE CONTAINMENT prevents the HOT & COLD air from mixing in the upper section of the racks, guaranteeing homogeneous air flow.

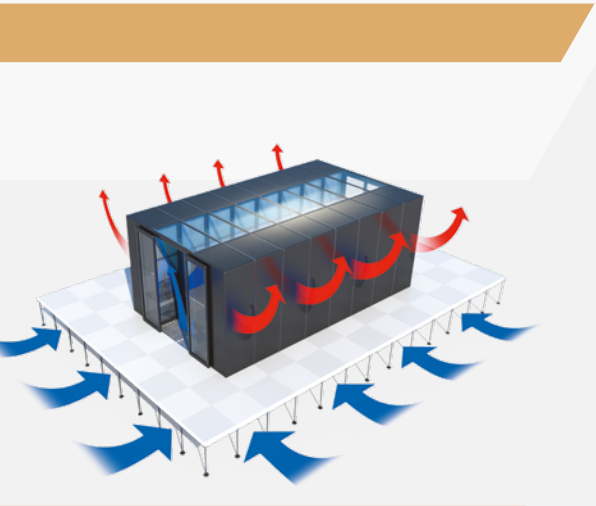
- ✓ No mixing between Hot & Cold air streams in order to avoid energy waste.
- ✓ Additional 15% energy saving depending on the data center layout.



- ✓ Through the raised floor, air can be easily delivered exactly where required (in front of the rack) allowing easy management of redundant cooling units.
- ✓ Flexible design, providing maximum freedom in accommodating new rack distribution or even major infrastructure changes.
- ✓ Lowest CAPEX allows more investment in more productive equipment.







- ✓ Quick and easy solution with low initial investments.
- ✓ Complete integration with existing perimeter CRAC units.
- ✓ Immediate energy benefits.

## HIGH

### Density Zone

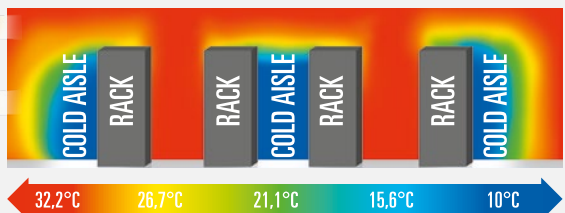
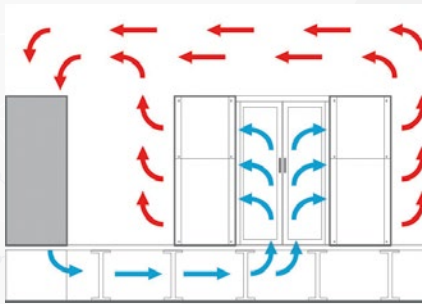
> 25 kW/rack

### Aisle Containment + Localised Cooling to manage hot spots

CCD (RC for IT Cooling Door) & CRC (RC for IT Cooling Rack Cooler) guarantee ideal integration to manage HOT SPOTS caused by new blade servers, providing extra local cooling exactly where it is needed.



- ✓ Extra cooling only where required.
- ✓ Direct expansion inverter type or Chilled water system for complete cooling system flexibility.
- ✓ Modulating Air flow thanks to EC high efficiency fans. The fans adapt to the thermal load detected by sensors positioned in the hot and cold aisle. This increases efficiency and reduces air stratification.
- ✓ Perfectly compatible with most racks and ready for extension of the cooling system.



## LOW

## Density Zone

&lt; 5 kW/rack



## HOT/COLD AISLE

Data centers are specifically designed to create hot and cold aisles. Cold air is delivered through the floor or ducts exactly where it is needed and hot air returns to the HPAC units, thus improving the set point and the overall energy efficiency of the system.

## THIS SYSTEM ALLOWS:

- ✓ High efficiency
- ✓ Perfect redundancy
- ✓ Quick and easy expansion
- ✓ Low initial investment

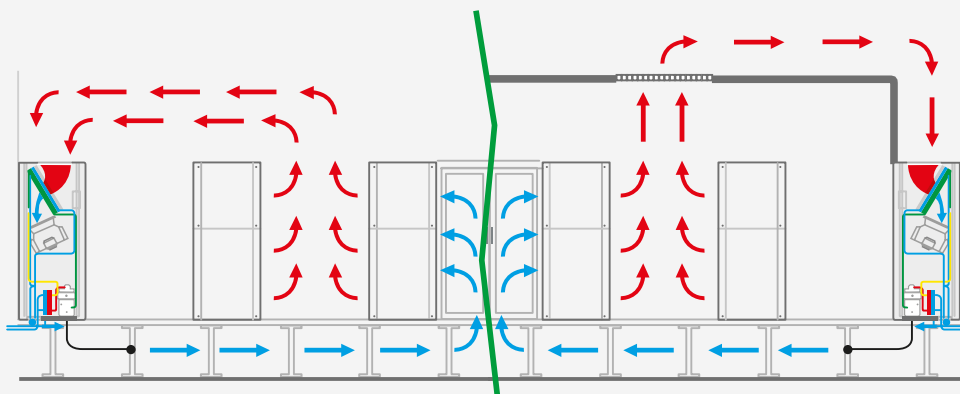
## HOT AND COLD AISLE CONFIGURATION

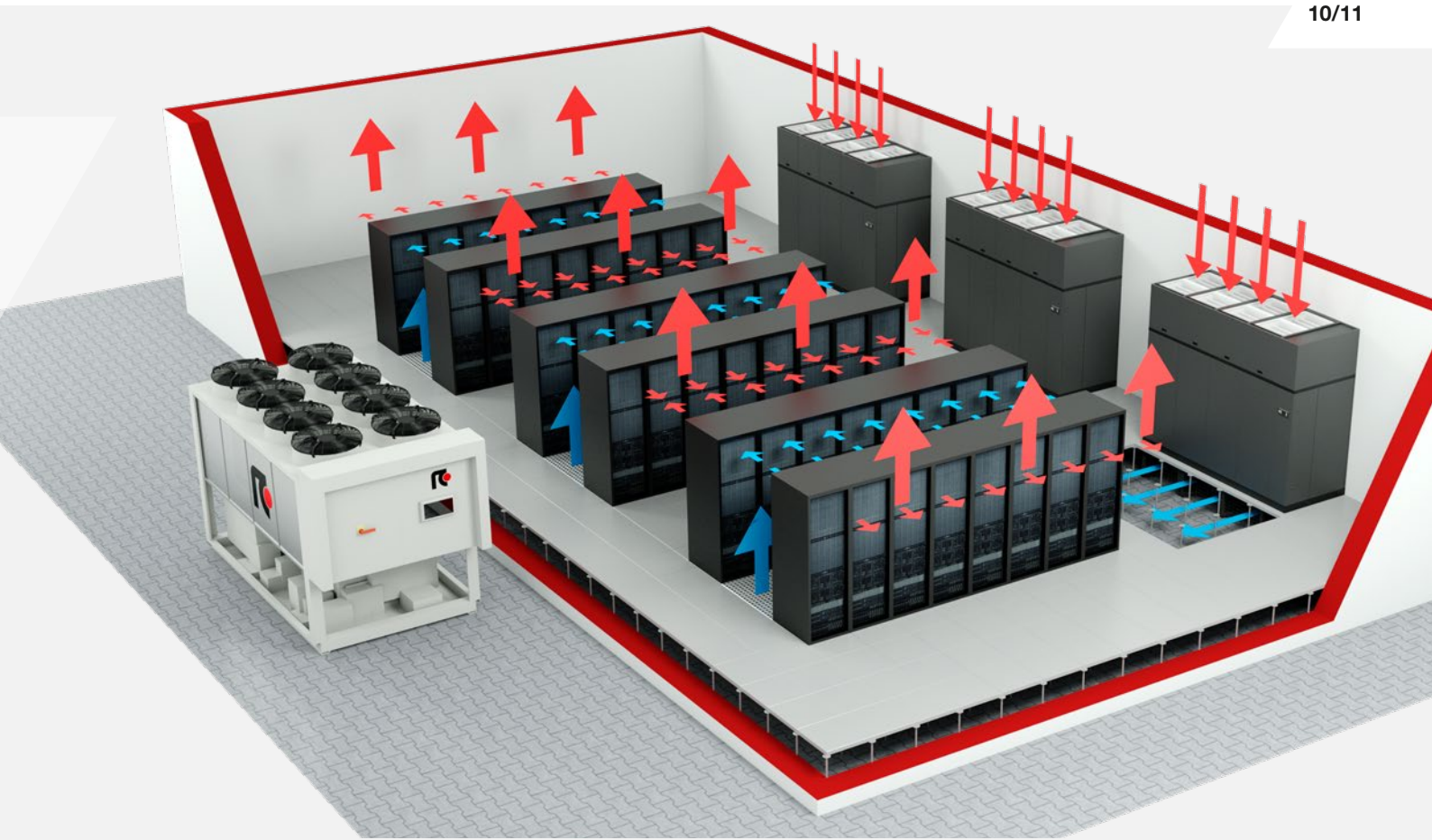
The hot and cold aisle solution overcomes the limits of a traditional approach where cooling aims to maintain stable room conditions, forgetting to focus on the racks requirements.

In the last decade the data center design has dramatically changed. Years ago data center design was not driven by heat loads, so server distribution in the room was driven by other needs leading to only one reference room temperature. This used to be from 18°C to 24°C and it was an accepted standard throughout the world. As soon as server heat generation increased, it became clear a more rational distribution of heat was necessary; this resulted in the Hot & Cold Aisle concept.

The arrangement of rack servers according to this logic allows delivery of cold air-flow exactly where it is needed - i.e. typically in front of the racks, greatly reducing the chances of cold and hot air mixing. This system increases the efficiency of the cooling system by 20% if compared to traditional layouts.

On the other hand, this new concept requires two levels of temperatures to be properly defined. The optimisation of these temperatures leads to greatly improved working conditions.





## CLOSE CONTROL AIR CONDITIONERS

### Constant air flow and pressure management systems

NEXT LEGACY air conditioners are located along the walls.

This essential concept drives the layout of the majority of data centers.

Through the raised floor, air can be easily delivered exactly where required, creating hot and cold aisles within the data center.

- **NEXT LEGACY** Direct expansion air conditioners
- **w-NEXT LEGACY** Chilled water close control units air conditioners
- **i-NEXT LEGACY** Direct expansion air conditioners with full DC inverter technology.



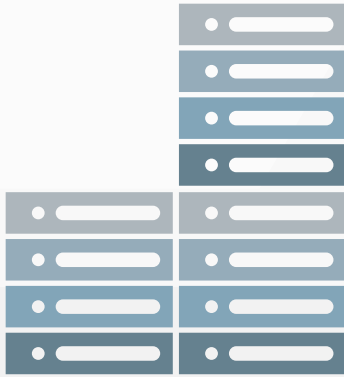
## EVAPORATIVE COOLING SYSTEM

- ✓ Variable air flow and cooling capacity
- ✓ Fully aluminium structure (20 years warranty against corrosion)
- ✓ Low pPue index: 1,025
- ✓ Modular units



**MEDIUM****Density Zone**

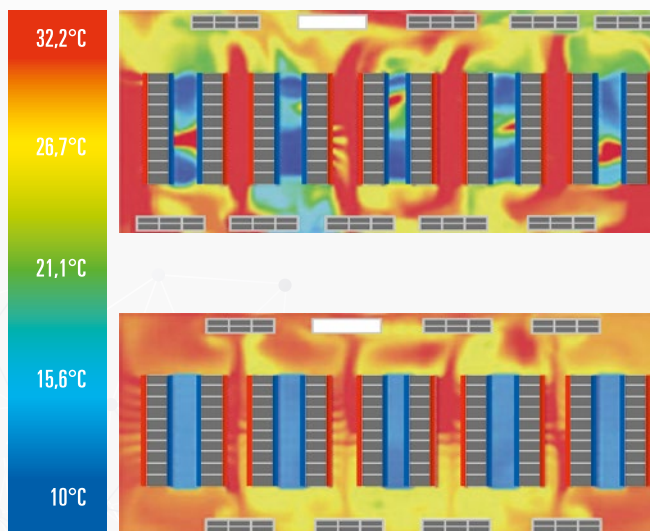
10 - 20 kW/rack

 **AISLE CONTAINMENT**

When hot and cold aisles are not enough to prevent air mixing, Aisle Containment ensures a perfect and homogeneous airflow to the server inlet.

**THIS SYSTEM ALLOWS:**

- ✓ significant improvement in efficiency
- ✓ tight control of conditioned air feeding the servers
- ✓ the addition of more servers in less volume

 **AISLE CONTAINMENT**

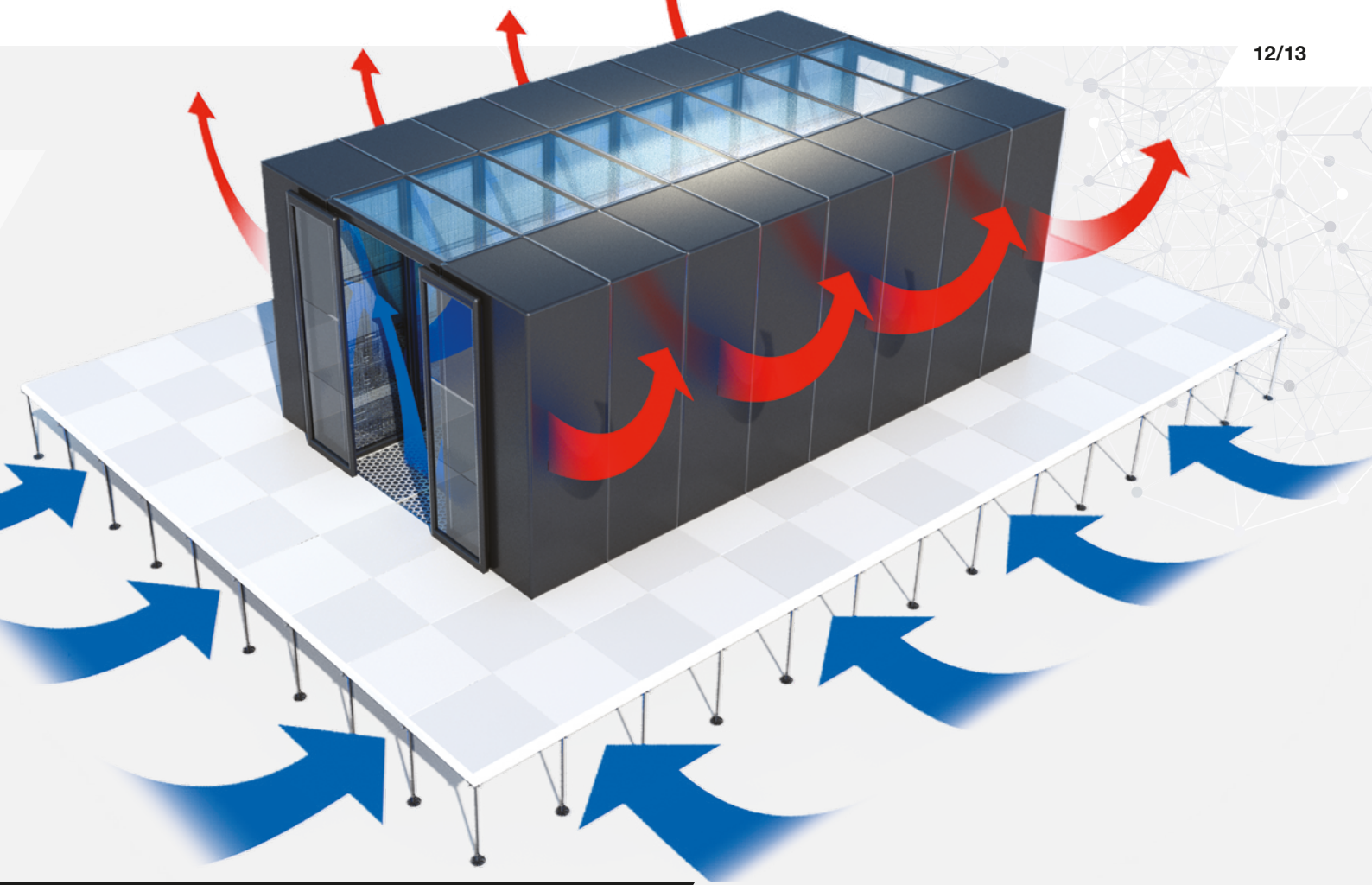
The image above shows an excellent example of the advantages in terms of hot and cold flow separation obtained through aisle containment.

In medium/high density applications the presence of hot and cold aisles is not enough to prevent the mix of supply and return air.

This mix results in air flow with a temperature that reduces the performance of the data center. If such air goes to the servers and it is warmer than expected the servers may stop working due to overheating.

If mixed air goes to the cooling system and it is cooler than air coming out from the servers, heat exchange is reduced and then global efficiency is affected.

Therefore it is necessary to provide a physical separation for the two airflows. This is achieved by using aisle containment, which is a simple and cost effective solution: it guarantees the servers are fed with the cold air and the cooling system is more efficient.



## RC for IT COOLING AISLE CONTAINMENT

The decision regarding the use of aisle containment needs to be analyzed on project to project basis as it is affected by different factors such as: room dimensions, shape, heat load and density, cooling technology, redundancy provisions and more.

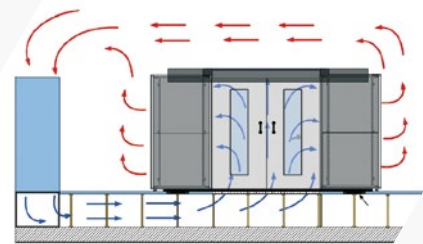
In practice RC for IT Cooling package provides two methods for aisle containment:

- 1 **Cold Aisle Containment**, which provides tight control to the cold air feeding the servers.
- 2 **Hot Aisle Containment**, which confines hot discharge air from servers to one zone.

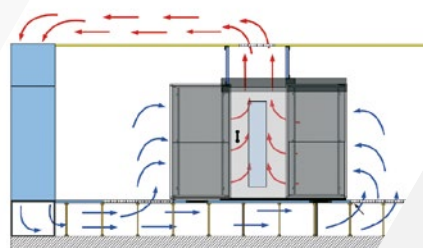
Both the Hot and Cold Aisle Containment Systems provided by RC for IT Cooling represent the perfect solution to:

- ✓ **Increase energy efficiency** thanks to a complete separation of hot and cold air streams
- ✓ **Easily expand your data center** if required by the layout of the environment
- ✓ **Perfectly integrate with different cooling technologies:**
  - Inverter
  - In row units / Enclosure units
  - Cooling door units
- ✓ **Optimise the available space**
- ✓ **Adapt easily with or without raised floor design**

### COLD AISLE containment



### HOT AISLE containment



**HIGH****Density Zone**

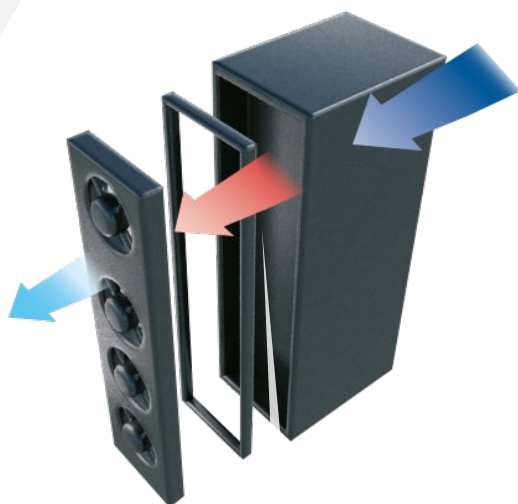
&gt; 25 kW/rack

**AISLE CONTAINMENT + LOCALISED COOLING**

This solution must accommodate the most critical heat load densities. Here hot-spots cannot be avoided without RC for IT COOLING's localised air conditioners which are the best answer for dealing with hot spot management, providing extra local cooling exactly where it is needed.

**THIS SYSTEM ALLOWS:**

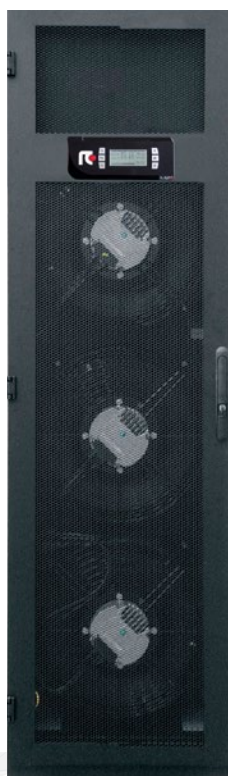
- ✓ Maximisation of the internal capacity of the infrastructure
- ✓ Elimination of hot spots
- ✓ Minimum floorspace occupancy

**CLOSE-COUPLED SOLUTIONS FOR HIGH DENSITY RACKS****COOLSIDE DOOR LEGACY****Close-Coupled Solution For High Density Racks**

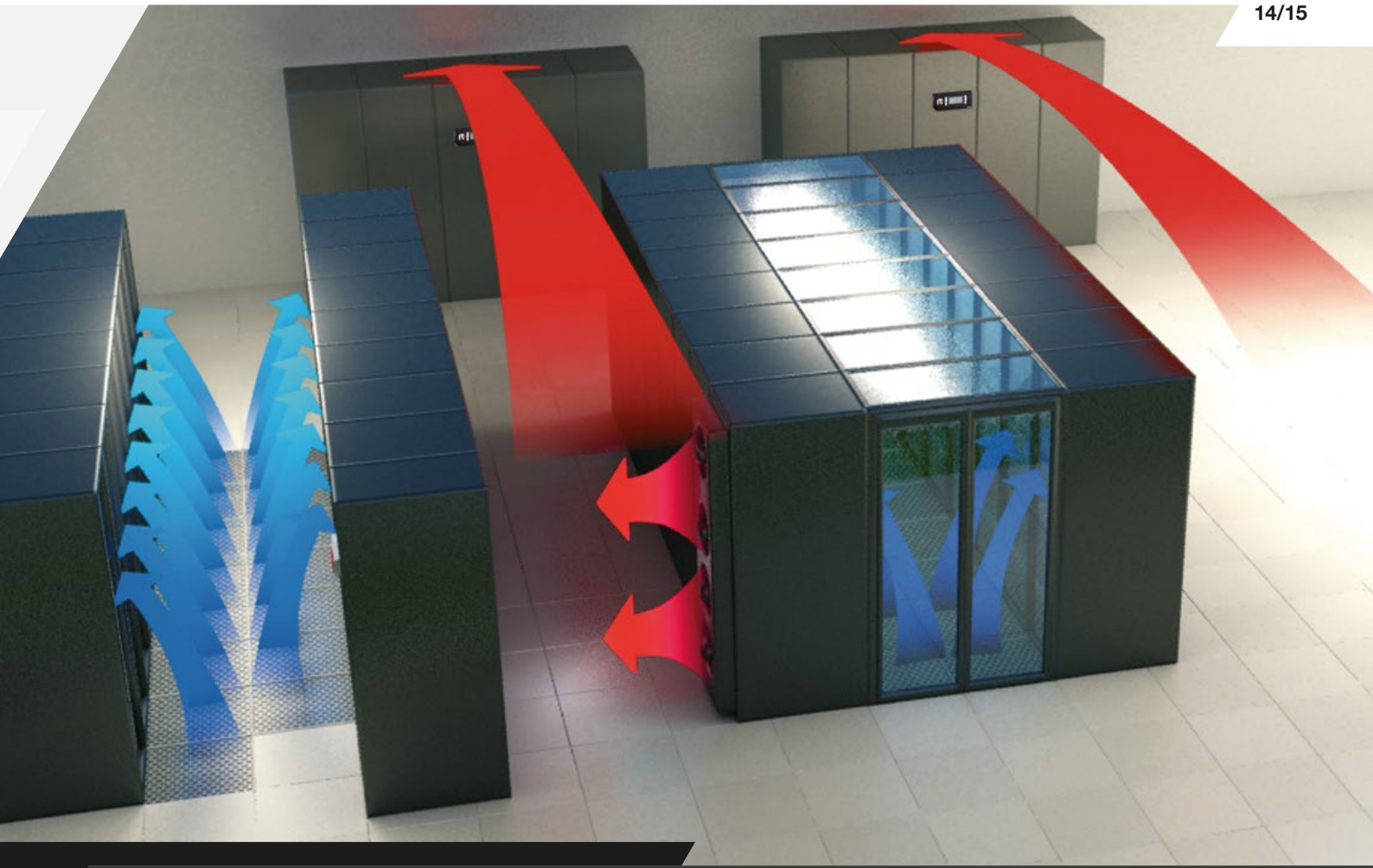
32 - 36 °C

43 - 50 °C

20 - 25 °C



- ✓ **Additional cooling capacity** thanks to chilled water coil available in both single & double circuit
- ✓ **Zero footprint**
- ✓ **Adaptable for almost all racks**
- ✓ **Top energy efficiency** with electronically controlled fans modulated to actual needs
- ✓ **Dynamic air stratification management**  
Tight control of the rack temperatures thanks to 8 independent sensors
- ✓ **Flexible connections** From the top and from the bottom depending on the customer's choice and on raised floor availability
- ✓ **Ready to operate** with latest generation chillers featuring **magnetic levitation** and **free-cooling** technologies.



## COOLSIDE LEGACY Rack Cooling Solutions



- ✓ Large savings due to the limited air volume, scalability & modularity
- ✓ Optimal solution for single rack
- ✓ 100% redundancy



### COOLSIDE DX: Direct Expansion

- ✓ DC inverter compressor
- ✓ New generation EC brushless fans
- ✓ Capacity from 4,7 to 68,3 kW

### COOLSIDE DF: Dual Fluid

- ✓ DC inverter compressor
- ✓ Double coil
- ✓ Capacity from 4,5 to 16,7 Kw

### COOLSIDE ROW DX: Direct Expansion with integrated compressor

- ✓ Installation within the row; do not require underfloor plenum, ducts or false-ceilings
- ✓ DC inverter compressor integrated within the air conditioner
- ✓ Capacity from 14 to 39 kW

### COOLSIDE CW: Chilled Water

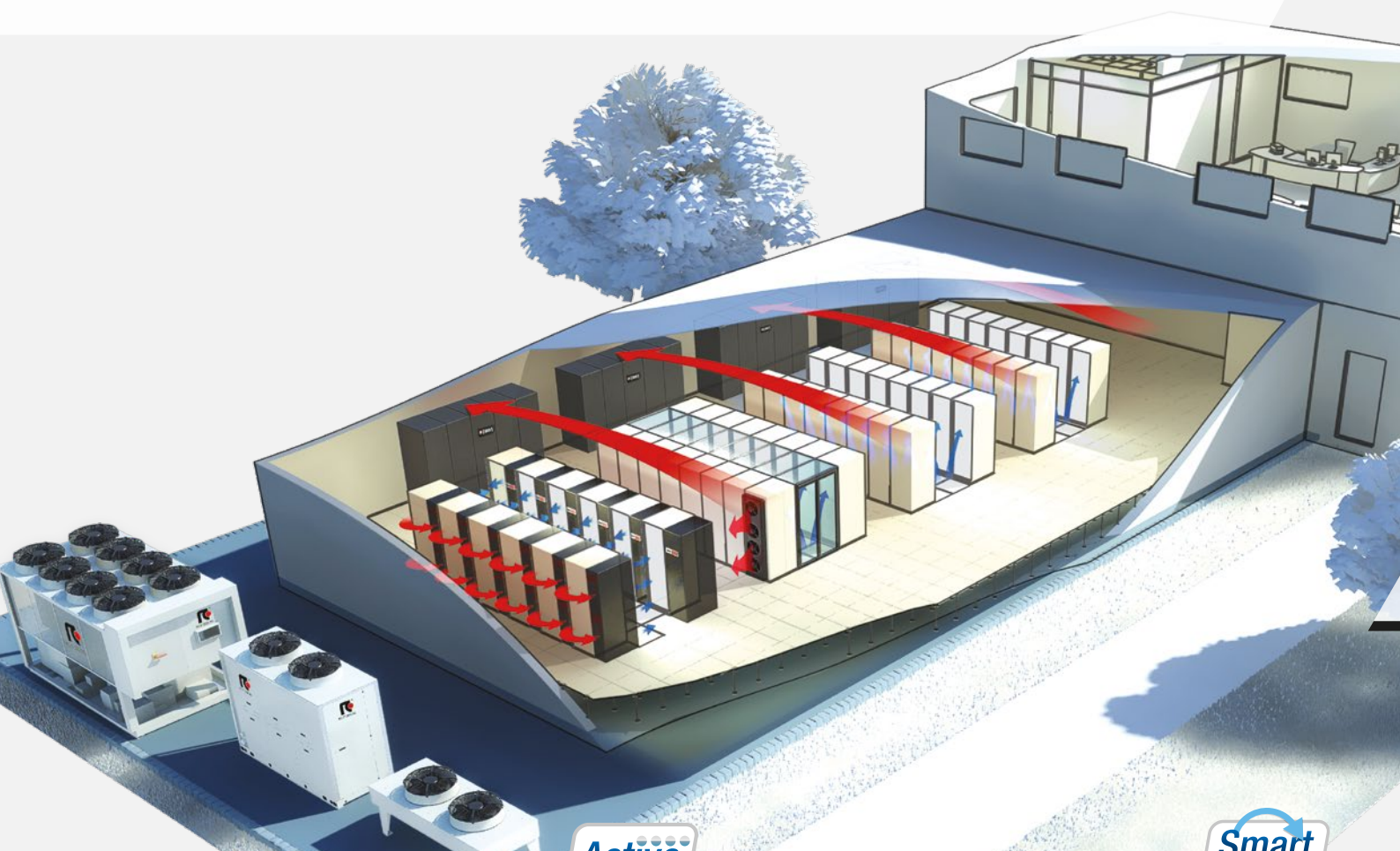
- ✓ New generation EC brushless fans
- ✓ 3-way modulating valve
- ✓ Capacity from 16 to 74,7 kW

### COOLSIDE FC: Free Cooling

- ✓ DC inverter compressor
- ✓ New-generation EC brushless fans
- ✓ Capacity from 4,6 to 17,5 kW
- ✓ 60% of the year in the free cooling Mode

# ADVANCED TECHNOLOGIES FOR EFFICIENT DATA CENTERS

RC IT Cooling leadership in data center cooling systems is backed by 50 years of experience in the smart integration of premium technologies for complex IT cooling projects.



## ACTIVE REDUNDANCY



A real active redundancy achieved through the adoption of innovative EC PUL fans together with Inverter DC brushless compressors (on direct expansion units) and an advanced algorithm for balancing the heat loads among the units (including those units that usually remain in stand-by).

## SMART THERMAL ENERGY MANAGEMENT



An innovative heat recovery system which allows RC for It COOLING units to synergistically match both the cooling requirements of the data center with the heating requirements inside the building, by moving the heat from the data center to other areas inside the building.





**1 / MAGNETIC LEVITATION**

An extended range of chillers with magnetic levitation centrifugal compressors from 200kW, both air source and water source, available also in free cooling and evaporative free cooling versions, to deliver the highest efficiency in every application.

**2 / ACTIVE FREE COOLING**

An advanced free cooling system available both as direct and indirect free cooling (no glycol), to exploit the outdoor air to cool the data center.



**3 / GREEN HFO REFRIGERANTS**

Following the vast experience in using green refrigerants, RC IT Cooling has already employed extensively green HFO refrigerants such as HFO1234ze in many ranges, in order to continue to be at the forefront of green best practices.

**4 / ADAPTIVE SET POINT**

An advanced algorithm instantaneously detects the real thermal loads of indoor units and conveys this information to chiller, to select the most efficient operating mode.



**5 / EVAPORATIVE COOLING**

The latest AHR solution with 2-stage indirect adiabatic free-cooling section. pPUE down to 1,025.

**6 / X-TYPE SYSTEM**

The revolutionary double stage design applied to the heat exchangers in order to achieve top level efficiency and pPUE levels down to 1,07.

**7 / SHR=1**

Additional full sensible cooling capacity

**8 / AISLE CONTAINMENT**

A significant improvement in efficiency thanks to a tight control of the conditioned air feeding the servers and to the addition of more servers in less volume.



**9 / ELECTRONIC EXPANSION VALVE**

The Electronic Expansion Valve allows ultimate compressor working conditions in order to achieve the most efficient performances and to avoid dangerous downtimes.

**10 / EC FANS**

**NEW GENERATION EC FANS**

The high efficiency EC fan reduces both noise levels as well as energy consumption, and assures a variable air flow at part loads. Operational costs are reduced by -15% if compared to traditional EC-Fans, and 25% if compared to plug fans.

**EC FANS ALSO IN THE REMOTE CONDENSERS**

The use of EC technology even on the remote condenser fans assures a further average reduction of noise levels by 10%, together with a strong energy consumption reduction by 45% when compared with traditional condensers with AC technology.

**11 / ELECTRONIC INVERTER DRIVEN COMPRESSOR**

Modulating the cooling capacity results in a major increase of energy efficiency: EER can rise from the typical 2,7 to 5,2 and more!

Redundant unit will not be a dead investment as it will be on duty at extremely partialised loads thus granting cooling capacity with greater efficiency.

i-NEXT LEGACY represents the ultimate MILESTONE in data center cooling, providing a FULLY ELECTRONICALLY CONTROLLED air conditioners.



# RC IT COOLING RANGE

## A complete cooling package to make your ICT environment run at peak efficiency

### CLOSE CONTROL AIR CONDITIONERS



#### NEXT LEGACY Direct expansion close control air conditioners

- ✓ High efficiency
- ✓ Active Redundancy system
- ✓ Quick and Easy expansion of the cooling system

#### ON / OFF



##### b-NEXT DX / t-NEXT DX

Air cooled direct expansion air conditioners  
From 6 to 143 kW

##### t-NEXT DF DX

Air cooled direct expansion air conditioners with Dual Fluid system - From 10,3 to 149 kW

##### b-NEXT DW / t-NEXT DW

Water cooled direct expansion air conditioners  
From 7,8 to 156 kW

##### t-NEXT DF DW

Water cooled direct expansion air conditioners with Dual Fluid system - From 7,8 to 156 kW

##### t-NEXT FC DW

Water cooled direct expansion air conditioners with Free Cooling system - From 7,8 to 157 kW

#### INVERTER



##### i-NEXT DX

Air cooled direct expansion air conditioners with full DC inverter technology  
From 9 to 129 kW

##### i-NEXT DF DX

Air cooled direct expansion air conditioners with Dual Fluid system with full DC inverter technology - From 9 to 141 kW

##### i-NEXT DW

Water cooled direct expansion air conditioners with full DC inverter technology - From 9,7 to 141 kW

##### i-NEXT DF DW

Water cooled direct expansion air conditioners with Dual Fluid system with full DC inverter technology - From 9,7 to 150 kW

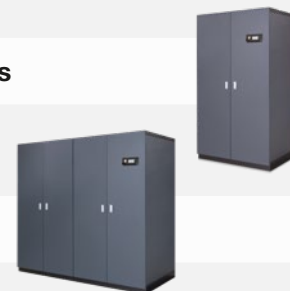
##### i-NEXT FC DW

Water cooled direct expansion air conditioners with Free Cooling system with full DC inverter technology - From 9,7 to 141 kW

#### NEXT LEGACY Direct expansion close control air conditioners for laboratories

##### i-NEXT MTR PRECISE

Direct expansion air conditioners with inverter technology - From 11 to 16,6 kW



#### w-NEXT LEGACY Chilled water close control units

##### w-NEXT S

Chilled water air conditioners - From 6,7 to 213 kW

##### w-NEXT 2 S/K

2-Section chilled water air conditioners - From 57,8 to 227 kW

##### w-NEXT HD S/K

Chilled water air conditioners for high density  
From 15,3 to 183 kW

##### w-NEXT DF

Chilled water air conditioners with double chilled water coil  
From 13,3 to 163 kW

##### w-NEXT2 DF

2-Section chilled water air conditioners with double chilled water coil  
From 63,5 to 243 kW

#### NEXT LEGACY close control air conditioners for high temperatures, high delta T

##### NEXT-X-TYPE

Chilled water air conditioners with X-type coil technology - From 49,3 to 173 kW



#### Close Control Units with Displacement Air Delivery

##### t-NEXT DL DX

Air cooled direct expansion air conditioners  
From 7,6 to 42,6 kW

##### i-NEXT DL DX

Air cooled direct expansion air conditioners with full DC inverter technology - From 16,2 to 40,5 kW

##### w-NEXT DL DX

Chilled water air conditioner technology  
From 11,6 to 41,3 kW



## AIR CONDITIONERS FOR HIGH DENSITY RACKS AND BLADE SERVERS

### Close-coupled air conditioners



- ✓ Maximalization of the internal capacity of the infrastructures
- ✓ Elimination of hot spots
- ✓ Minimum floorspace occupancy

#### COOLSIDE DX

Direct Expansion Rack Cooler unit  
From 4,7 to 68,3 kW

#### COOLSIDE CW

Chilled Water Rack Cooler unit  
From 16 to 74,7 kW

#### COOLSIDE DF

Dual Fluid Rack Cooler unit  
From 4,5 to 16,7kW

#### COOLSIDE FC

Free Cooling Rack Cooler unit  
From 4,6 to 17,5 kW

#### COOLSIDE ROW DX

Direct Expansion Rack Cooler unit with integrated compressor  
From 14 to 39 kW

## REMOTE CONDENSERS AND DRY COOLER

- ✓ Optimised to be combined with close control air conditioners
- ✓ High capacity sensitive cooling

#### Air cooled remote condenser

Motocondensing unit with inverter compressors

Dry cooler

Moto drycooling unit with inverter compressors



## 2-STAGE INDIRECT EVAPORATIVE COOLING SYSTEM FOR LARGE DATA CENTERS

- ✓ Variable air flow and cooling capacity
- ✓ Fully aluminium structure (20-year warranty against corrosion)
- ✓ Low pPUE index: 1,025
- ✓ Modular units

## DATA CENTER INFRASTRUCTURE

#### ✓ RACKS

High quality cabinets for the protection and housing of servers



#### ✓ Aisle Containment

Aisle Containment solutions for high density applications



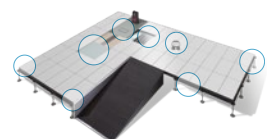
#### ✓ PDUs

Premium Rack Power Technology



#### ✓ Raised Floors

Raised floor solutions for high efficiency data centers



## CHILLERS

- ✓ Reduced pPUE
- ✓ Optimized for High Delta T operation
- ✓ Reduced pump costs
- ✓ ADAPTIVE SET POINT: Smart communication between indoor and outdoor units
- ✓ Compliant with the strictest best practice in data center design

Sturdy and resilient

Optimised for set point 20°C

Active redundancy function available



### Air Cooled Chillers

R HFO



#### NR-Z

Chillers with scroll compressors  
From 39 to 885 kW



#### i-FR (1+i)-Z

Chillers with screw compressors and inverter technology  
From 567 to 1273 kW



#### i-NR-Z

Chillers with screw compressors and inverter technology  
From 32 to 129 kW



#### TRCS2-Z

Chillers with oil-free inverter compressors  
From 220 to 1324 kW



#### FR-Z

Chillers with screw compressors  
From 145 to 1710 kW



#### TRCS2 HFO-Z

Chillers with oil-free inverter compressors and HFO refrigerant  
From 339 to 1017 kW

High efficiency

Widest cooling capacity range

Active redundancy function available



### Water Cooled Chillers

R HFO



#### NR-W-Z

Chillers with scroll compressors  
From 38 to 398 kW



#### FRCS3-W-Z

Chillers with oil-free inverter compressors  
From 241 to 1949 kW



#### FR-W-Z

Chillers with screw compressors  
From 124 to 1693 kW



#### TRCS2 HFO-Z

Chillers with oil-free inverter compressors and HFO refrigerant  
From 340 to 1364 kW



#### i-FR-W (1+i)-Z

Chillers with screw compressors and inverter technology  
From 468 to 1637 kW



#### TR-W-Z

Chillers with oil-free inverter compressors  
From 246 to 4191 kW

FROM THE PROFOUND EXPERIENCE OF BOTH THE RC AND CLIMAVENETA BRANDS, TOGETHER WITH THE TOP-QUALITY STANDARDS OF MITSUBISHI ELECTRIC, A COMPLETE LINE OF CHILLERS SPECIFICALLY DESIGNED FOR IT COOLING ENVIRONMENTS.



UTMOST RELIABILITY

100% FREE COOLING at 12°C

ADAPTIVE SET POINT

**Air Cooled Chillers**



**NRCS-FC-Z**

Chillers with scroll compressors and free-cooling technology  
From 41 to 477 kW



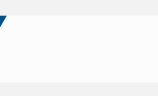
**FR-FC-Z**

Chillers with screw compressors and free-cooling technology  
From 332 to 1450 kW



**TRCS-FC-Z**

Chillers with oil-free compressors and free-cooling technology  
From 302 to 1693 kW



**FR-EFC-Z**

Chillers with screw compressors and evaporative free-cooling technology  
From 329 to 1441 kW



**TRCS-EFC-Z**

Chillers with oil-free compressors and evaporative free-cooling technology  
From 300 to 1682 kW

**CONTROL, SUPERVISION AND OPTIMISATION SYSTEMS**

✓ **Supervision and Monitoring Systems**

The ultimate solutions for supervision, remote monitoring, service, and preventive maintenance

✓ **FWS3 / FWS3000**

remote monitoring systems

✓ **RC Cloud - Cloud based remote monitoring system**

✓ **WS3000**

Remote monitoring system for service and proactive maintenance

✓ **Control Systems**

✓ **DATA MANAGER 3000**

Specialized group control for Data Center air conditioners



✓ **Optimisation systems**

✓ **ClimaPRO\_DCO**

Data Center Optimisationsystem  
Data Center IT COOLING system

optimiser for real time, smart management of energy indexes for the single units and the entire plant room.



✓ **Human Machine Interfaces**

✓ **KIPLink**

Control interface for smart phones and tablets



# “EXPERIENCE IS BY FAR THE BEST PROOF”

Sir Francis Bacon  
British Philosopher (1561-1626)

## proRZ

Munich, Germany

proRZ is one of the main German general contractors, which realizes and optimizes data centers of any size, focusing on the fulfilment of individual requirements.

**Cooling Capacity:**

1800 kW

**Installed machines:**

2x High-efficiency free cooling  
Air cooled unit with magnetic levitation centrifugal compressors  
14x Chilled water air conditioners

## WIIT Tier IV

2014 Milan, Italy

WIIT is an Italian company focused on Private and Hybrid continuative services, it is one of the main players in Europe and Worldwide among the most specialized players in application management and critical application as disaster recovery and business continuity.

**Cooling Capacity:**

700kW

**Installed machines:**

12X Close Control Air Conditioners with downflow air delivery equipped with BLDC scroll compressors  
18x Remote condensers



## FastWeb Tier IV

2014 Milan, Italy

Fastweb, a telecommunications operator, decided to build a new data center offering the highest level of security possible to its clients.

**Cooling Capacity:**

2800 kW

**Installed machines:**

4x High-efficiency Air cooled unit with magnetic levitation centrifugal compressors.



## Unipol Tier IV

2015-2016 Bologna, Italy

Unipol is the second largest insurance group on the Italian market and the first in Non-Life business, classified among the top ten in Europe.

**Cooling Capacity:**

2300 kW

**Installed machines:**

4x High-efficiency Air cooled unit with magnetic levitation centrifugal compressors



for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.



## MITSUBISHI ELECTRIC HYDRONICS & IT COOLING SYSTEMS S.p.A.

Head Office: Via Roma 5 - 27010 Valle Salimbene (PV) - Italy

Tel +39 (0) 382 433 811 - Fax +39 (0) 382 587 148

[www.rcitcooling.com](http://www.rcitcooling.com)

[www.melcohit.com](http://www.melcohit.com)