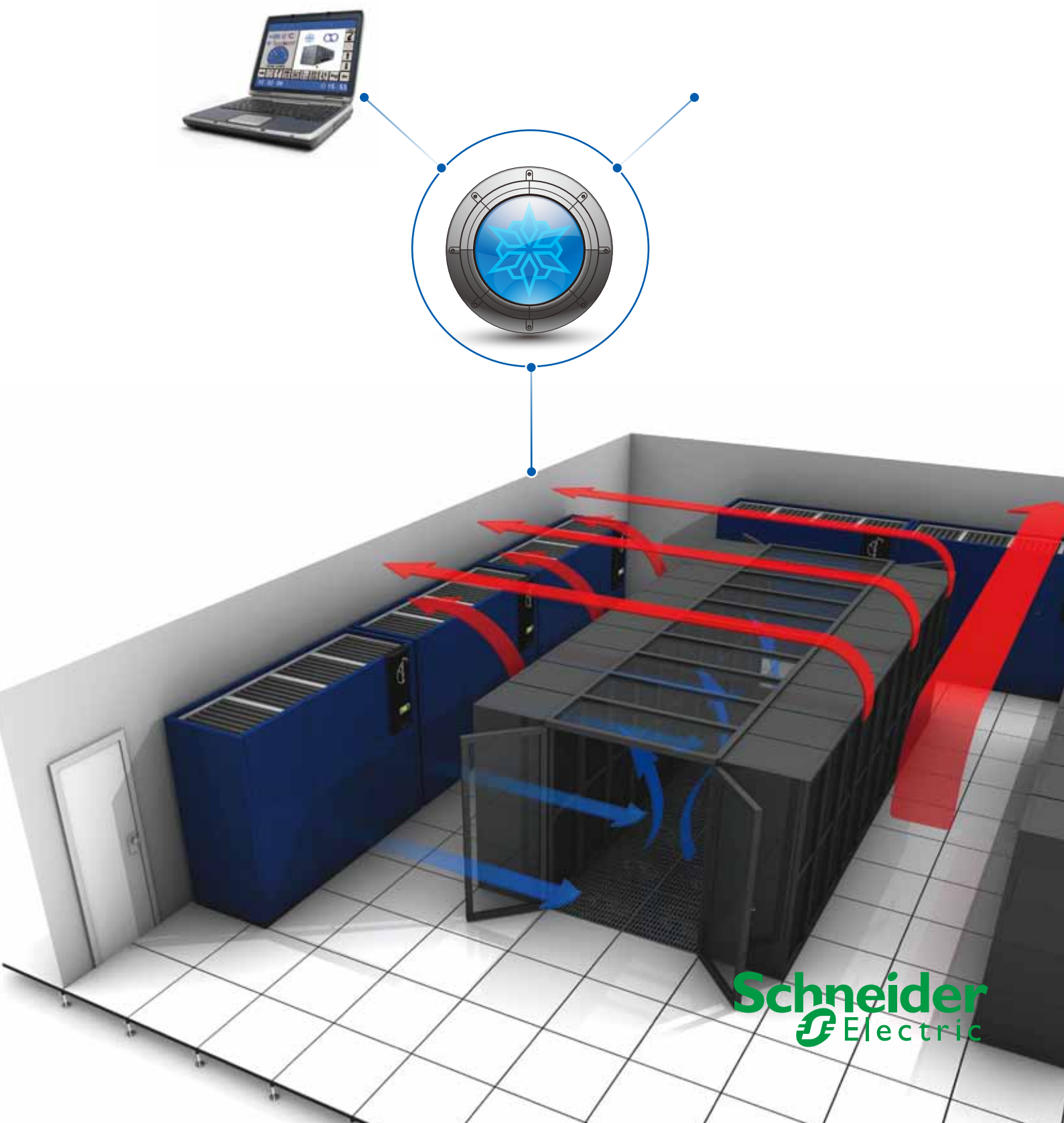
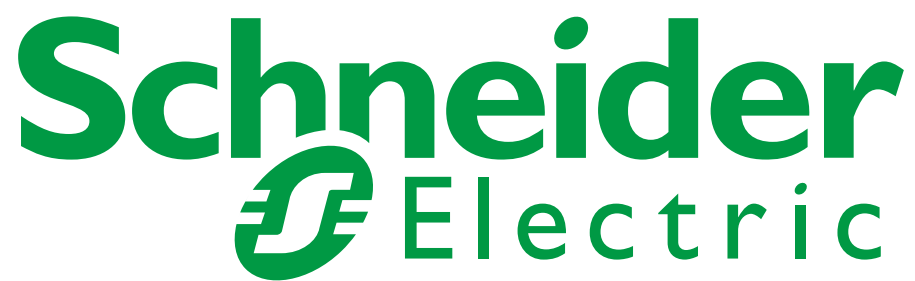


施耐德電機

製冷整體解決方案







Security

A fundamental requirement for each Data Center is that of guaranteeing service continuity and, therefore, total infrastructural reliability. This is achieved thanks to the design and implementation of conditioning systems which are intrinsically dependable and feature redundancy.

System reliability is based on several basic considerations such as:

- not using water or refrigerant in the proximity of the servers
- a double source of cooling and electrical power

The type of design depends on the level of reliability required and may refer to an International standard (e.g. TIER).

安全性

對每個資料中心的一個基本要求是，保證服務的連續性和基礎結構的可靠性。製冷系統的設計和實施使得這一要求成為可能，因為其本質可靠，並形成了適當水準的備份。

系統可靠性是基於以下幾個基本因素，例如：

- 不要在伺服器附近使用水或製冷劑
- 製冷和電力雙源

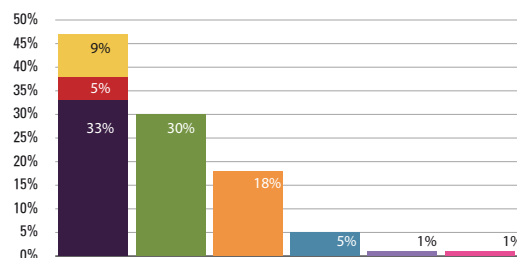
設計類型取決於所要求的安全水準，還可參考國際標準例如TIER。



Efficiency and Sustainability

Data Centers are a critical element regarding service continuity and energy consumption and represent one of the elements with the highest energy consumption within the electrical chain.

The objective is therefore to optimize the Power consumption in a Data Center



operation of this infrastructure, reducing energy consumption, maximizing efficiency and minimizing CO₂ emissions into the atmosphere.

In order to ensure that the conditioning system provides increased flexibility and significant improvement of energy indicators (e.g. PUE), it is important that the structure presents a significant level of efficiency not only at nominal loads but that it also optimizes efficiency at partial loads (which represent a greater number of operating hours).

因此我們的目標就是要優化這一基礎結構的運行，減少能源消耗、最大化效率、減少二氧化碳排放量。

要使冷卻系統能提供更大的靈活性和顯著的能源消耗指標（比如PUE），需要其結構不僅在額定負荷時有顯著效率水準，而且在部分負荷時也能優化效率（意味著更多運營小時）。

Modularity & Flexibility

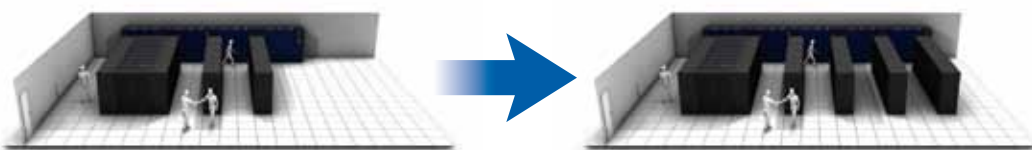
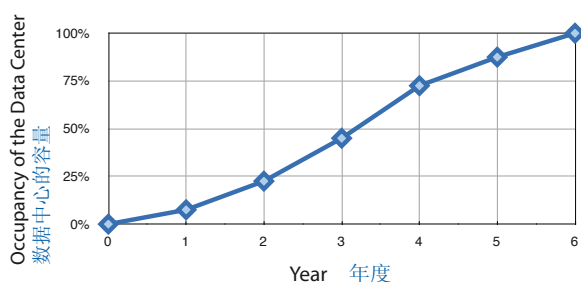
New server technology has introduced an increased level of modularity in the growth of the infrastructure, adapting to the needs of the client and incorporating upgrades carried out over time due to the evolution of IT technology (changes which are difficult to predict long term).

Conditioning solutions must therefore allow for modular planning and integration within the existing system and adapt automatically to the new load conditions of the room.

模組化和靈活性

新的伺服器技術已介入基礎結構增長的日益模組化，以適應客戶的需求和促進由於資訊科技發展導致的更新換代。

相應地，製冷方案應該允許設計模塊化並與存在的系統相容，並能自動地與室內新的負荷條件相適應。



Lean Infrastructure

A simple Lean infrastructure, with a contained number of elements and uncomplicated plant work, creates significant advantage in terms of management costs. This can be achieved by using conditioning systems which can be implemented over time.

精益結構

一個簡單的基礎結構，卻含有許多的元素和不複雜的工廠工作，在管理費用方面創造了重要的優勢。通過使用空調系統可以達到上述效果。

Simplified Maintenance

Another important element which influences operating costs and system reliability is that of system maintenance. A structure which allows simple maintenance is based on consolidated, tested and reliable systems and represents an indisputable advantage of simplified system management.

簡化維護

影響運行費用和系統可靠性的另外一個重要因素是系統的維護。易於維修的結構是建立在經過測試的、可靠的、綜合系統上，代表著簡化系統管理不可爭辯的優勢。



OPEX



Operating Expense

Reduced management and operating costs signify a real competitive advantage within the Data Center market.

The conditioning system counts for around 40% of the total on-site energy absorption.

Alongside reducing energy costs, it is also important to reduce maintenance costs and adjustment costs due to "natural" changes in the IT system.

運行費用

降低管理和運行成本意味著在資料中心市場上極具競爭優勢。

空調系統占現場能量吸收總數的40%。

除了減少能源消耗，還必須設法減少維修成本和由於IT系統不可避免的改變而導致的重新配置成本。

CAPEX



Initial Investment

To improve Data Center efficiency in terms of cost, it is necessary to reduce the initial investment in the system by encouraging the infrastructure to grow with the actual requirements made over time.

An increase in the effectiveness of a conditioning system allows all of the auxiliary systems to be precisely "sized" without extra cost due to the excess power installed.

Such optimization of the CAPEX can be achieved by the use of a conditioning system which can be simply implemented and which lends itself to modular design and use, adapting to the actual on-site requirements.

初始投資

為提高資料中心在成本方面的效率，有必要減少系統初始投資，保證基礎結構能長期隨實際需要而簡單增加。

空調系統效率的增加要求所有的輔助系統都精確到位以避免由於任何過剩利用電裝配而產生額外費用。

上述資本開支優化可以通過使用一種空調系統而實現；該空調系統宜於簡單安裝，並置放於模組化設計和使用中，能快速、低成本地適應不斷變化的現場要求。



Certificates

Solutions which are integrated within such sensitive and critical systems must be designed and developed through extensive testing in state of the art laboratories.

Air conditioning solutions based on the use of perimeter units has evolved over recent years and are now able to cool high density loads to such a degree as to obtain TÜV certification.

This solution has been certified for dissipating thermal loads of up to 40kW/rack and has been classed as an efficient, effective and modular solution.

證書

如此敏感和關鍵的系統解決方案必須在最先進的實驗室經過廣泛測試來設計和發展。

基於使用週邊機組的空調解決方案已發展了近十年，現在已獲得TUV認證能製冷高密度負荷。

該解決方案被認證可散熱負荷達40KW/RACK, 被歸類為一種高效、有效的和模組化的解決方案。

Total Supervision

Data Centers are complex environments; providing complete systems composed of integrated elements guarantees compatibility, a single source of responsibility and strategic integration of a regulation system.

There is therefore a departure from an operating logic for each single element and a move towards a situation where all of the operating parameters can be optimized (both energy and operational) through integrated logics (internal units, distribution systems and external units).

The cooling system must then be able to communicate with the various BMS.

完全監控

資料中心是複雜的環境，提供包含集成元素的完整系統，保證管理系統的兼容性和整合性。

這是一個從單一元素的傳統邏輯向通過綜合邏輯（內部單位、分配制度和外部單位）來優化（能源和運行兩方面）所有參數的局勢轉變的過程。

製冷系統還必須可以和各種各樣的樓宇管理系統交流。



Active Floor®



Technical Data - Dati Tecnici			
Power Supply - Alimentazione		V/ph/Hz	220/1+N/50
N. fans / motor - N. ventilatori / motori			1/ E.C.
Airflow - Portata Aria	max	m³/s	1,38
	nominal	m³/s	0,8
	min	m³/s	0,53
Power Consumption - Potenza assorbita	max	kW	0,38
	nominal	kW	0,05
Dimensions - Dimensioni			
Height - Altezza	mm		230
Length - Lunghezza	mm		600
Width - Larghezza	mm		600



Active Floor® is a flexible and modular system for cooling Data Centers with medium and high density loads.

Integrated within a modular access floor in front of the intake section of the rack, the Active Floor® fits exactly into a modular access floor panel measuring 600mm x 600mm.

The cold air produced by the Close Control perimeter units is directly channelled to the source of the thermal load thanks to the advanced adjustment of the direction of the air flow. The Active Floor® creates a high density bubble of air which is maintained at a constant temperature along the whole intake section of the rack, guaranteeing operation at the nominal design conditions. The air flow varies according to the actual thermal load and is detected by two sensors placed on the discharge section of the servers.

The Active Floor® minimizes energy absorption thanks to the use of fans with electronically commutable motors.

This solution may be used both in stand-alone applications as well as with perimeter Close Control units equipped with underfloor pressure control.

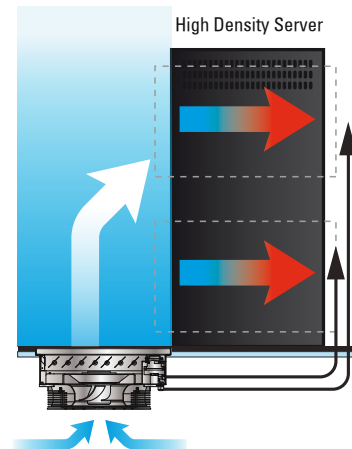
The Active Floor® guarantees optimum operation of high density equipment for loads installed in each module of up to 25 kW and up to 40 kW with solutions featuring the two modules certified by TÜV.

智慧地板送風系統

活化地板是一種用於製冷中、高密度負荷資料中心的靈活的、模組化系統。

在機架進風口前部與模組化高架地板相整合，優力活化地板很適合放置於600毫米X600毫米模組化面板中。

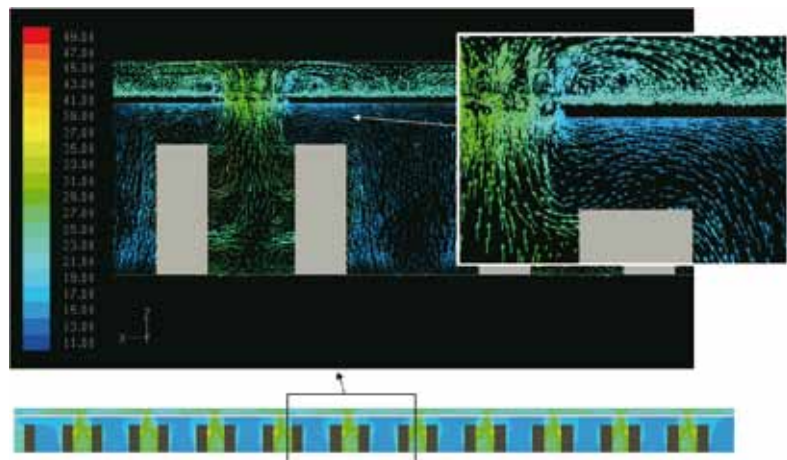
由於具有先進的風流向調節，精密控制週邊機組產生的冷空氣直接導向熱負荷源。活化地板產生高密度空氣泡，並在機架進風區域保持恆溫，保證了額定設計狀況下的運行。氣流根據實際熱負荷而變化，並被放置在服務器出風口區域的兩個感應器探測。



活動地板採用變速換向電子馬達驅動風扇以減少能源消耗。

該解決方案即可適用於單機，也可以適用於地板下裝備有壓力控制的外圍機組。

該活化地板可保證每個模組可達25Kw負載和40Kw的高密度設備運行最優化，是具有兩個經TUV認證的模組解決方案。



AFPS

自動壓力控制系統

The AFPS automatically controls the pressure underneath the floor, optimizing efficiency and effectiveness of the conditioning of the server room for their entire lifetime.

This control module ensures that the nominal pressure underneath the floor is maintained and manages the fan speed in all operating conditions.

The system is composed of the following key elements:

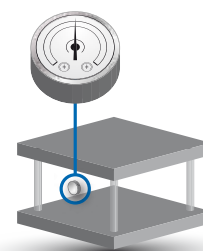
- Precision air conditioning units featuring EC modulating fans and dedicated software
- Underfloor pressure detection system with anti-fouling system

AFPS自動控制地板下麵的壓力，優化機房空調的效率和成效。

這種控制模組保證地板下的額定壓力被維持，並管理所有運行條件下風扇的速度。

AFPS 由以下關鍵因素組成：

- 裝配電子換向模組風扇和精密軟體的精密空調
- 帶防汙系統的地板下壓力探測系統



► Airflow Management According to Occupancy of the Room 根據房間佔用情況管理氣流

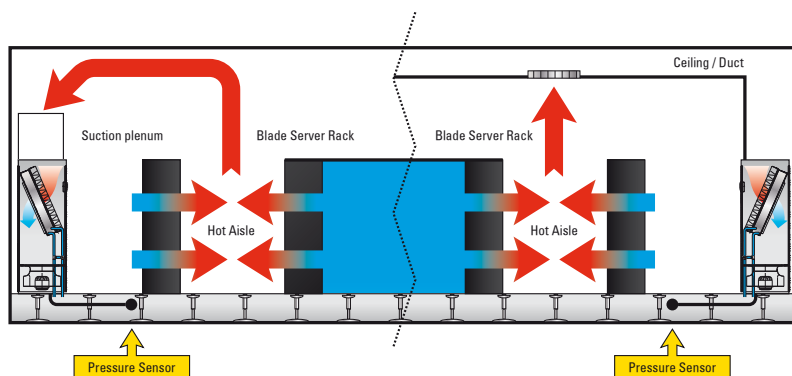


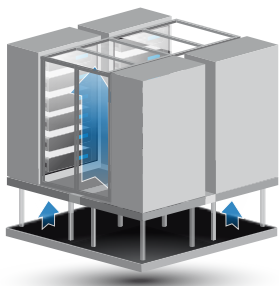
The system maintains a constant pressure underneath the floor even during standard and emergency maintenance, thus avoiding the creation of hot spots. This system is also able to automatically adapt to the addition of new equipment and increases in the thermal load of the room.

The system integrates both with chilled water and direct expansion air conditioning units. Thanks to the LAN management of all of the information generated by the various air conditioning units, a network of underfloor pressure detectors is created, ensuring precise and timely monitoring in all operating conditions.

該系統在正常和緊急維修時保證地板下有恒定的壓力，從而避免產生局部熱點。該系統還能自動適應房間內新設備和熱負荷的增加。

該系統與冷凍水和直接膨脹空調機組相融合。由於有局域網管理所有空調機組產生的資訊，地板下的壓力探測網路得以被創建，以保證任何運行條件下都能正確、及時地進行監控。





Cool Pool

The “Cool Pool” is obtained by physically separating the hot and cold air flows within the Data Center. This configuration prevents the cold and hot air mixing, avoiding the air re cycling of air in the upper section of the server, guaranteeing homogeneous air flow at the suction section of the server.

This compartmentalization can be achieved by closing the lateral access doors and using a transparent roof fixed on top of the racks.

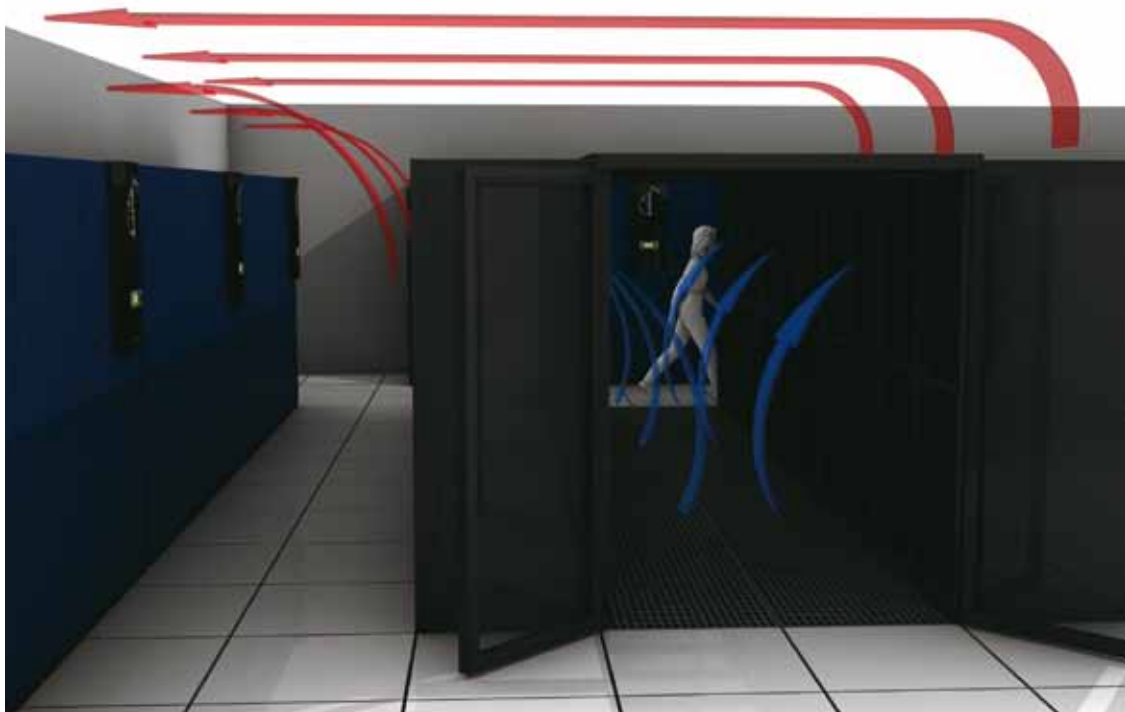
The Cool Pool is a simple and effective solution since it offers the designer the possibility of a modular approach which permits the number of racks to be extended over time by easily adapting the compartmentalization, allowing heat loads of up to 15 kW per rack and reaching 40 kW when combined with an Active Floor*.

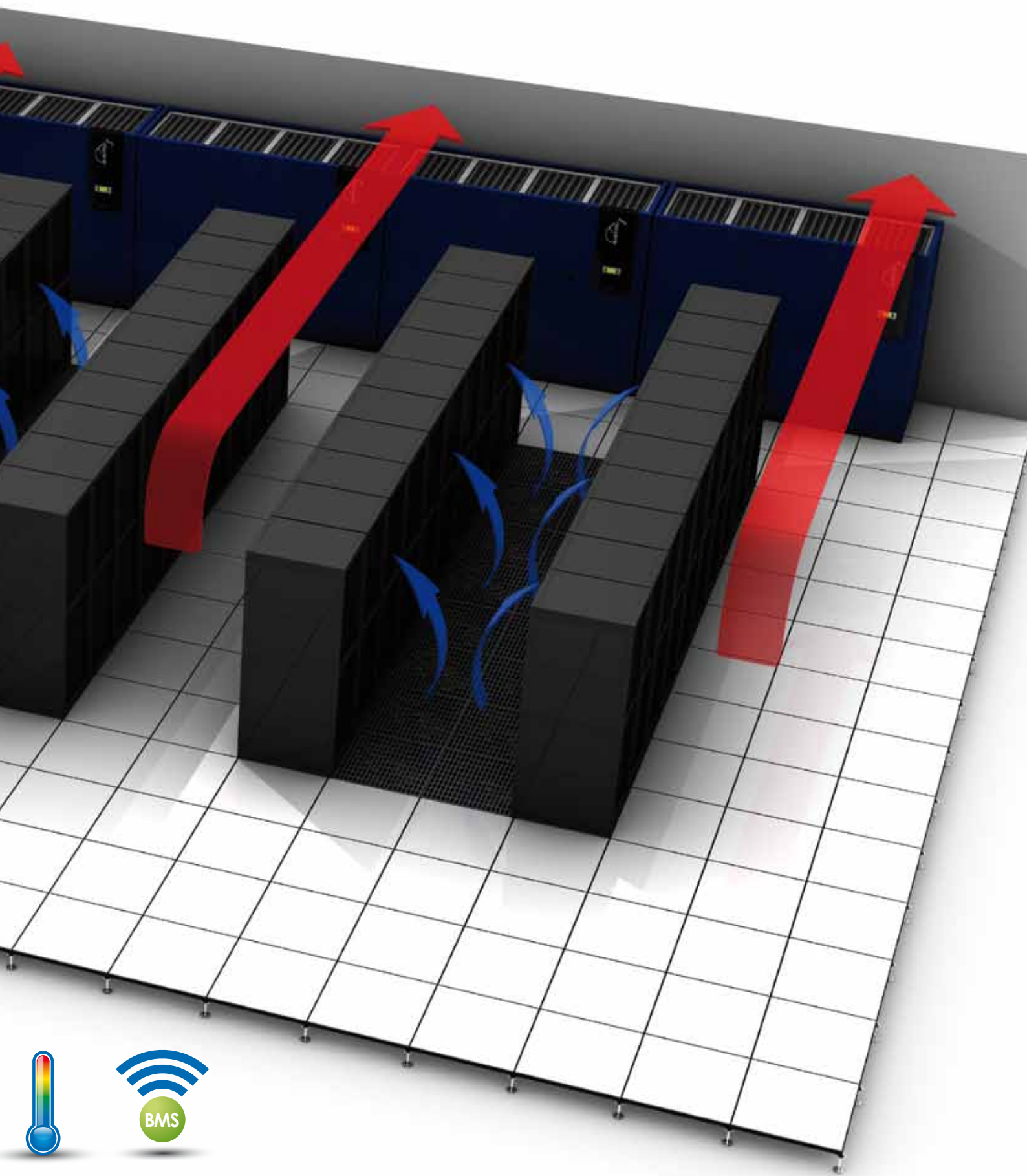
氣流遏制

物理上將資料中心的熱、冷氣流分開就形成了“氣流遏制”。此裝置防止冷、熱空氣的混和，避免了服務器上部空氣的回風，保證了伺服器進風口區域同質的氣流。

這種隔斷可以通過關閉門側入口和在機架頂部安裝一個透明頂板來實現。

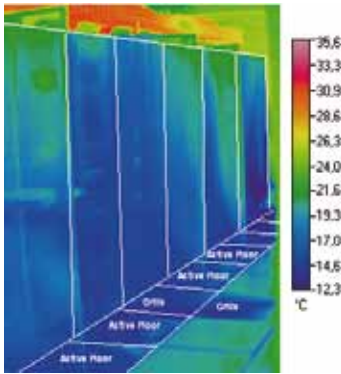
氣流遏制是一個簡單而有效的解決方案，它提供了模組化的可能性，能很容易適應隔斷並允許機架數量增加，熱負荷可達每機架15KW，與活化地板結合時可達40KW。





善用其效 盡享其能

Make the most of your energy



Active Floor®

Active Floor® is a cooling system designed for medium and high density Data Centers (up to 40 kW/Rack) which allows automatic modulation of the air flow based on the actual thermal load of the single racks.

This solution allows cooling to be optimized in all operating conditions avoiding the creation of hot spots in particularly critical areas and at the same time always ensuring that a minimum amount of absorbed power is available for cooling.

Regulation of the air flow issued by the modules interacts indirectly with the underfloor pressure control which is managed by the AFPS of the perimeter units.

Thanks to its low energy consumption, the Active Floor® can be connected to a UPS power supply line, maintaining the air temperature at the intake section of rack even in emergency conditions and in the event of a breakdown.

In the event of a failure of the fans, sufficient air flow is guaranteed to control the temperature at a higher regime (the same operation as a traditional grille).

The use of air in a cooling system guarantees an intrinsic level of safety, avoiding the issue of fluids such as water or refrigerant being near electronic equipment.

Due to the fact that it is able to be inserted in the most common types of modular access floor available on the market, the Active Floor® provides a high degree of modularity and flexibility without occupying a large amount of space in rooms housing IT equipment.

The Active Floor® modules are easily installed even after a site has been opened if the loads are higher than those which can be met by a traditional solution, representing an investment which changes over time depending on the actual on-site needs.

The performance of the Active Floor® has been certified by an thorough testing procedure carried out by TÜV and has been proved by several installations in Data Centers all over the world.

智慧地板送風系統

活化地板是為中、高密度資料中心（40Kw以上/Rack）設計的，允許氣流在單機實際熱負荷基礎上自動模組化。

此方案允許製冷在任何運行條件下都優化，避免了單個關鍵區域熱點的產生，同時保證製冷過程吸收最小的能源。

模組化導致的氣流規範與由週邊機組AFPS 管理的地板下壓力控制相互間接影響。

由於能量消耗低，即使在緊急情況下或斷電時，活化地板可以連接到UPS 電源來保持機架進風口區域的空氣溫度。

即使風扇不能運作，由於有寬的波段（與傳統格柵同樣運作），充足的氣流也可以被保證以控制溫度。

在製冷系統中使用空氣保證了內在安全，避免了液體如水或冷媒進入電子設備。

由於活化地板易於置放於市場上多種模組化高架地板中，活化地板提供了高度模組化和靈活性，而不佔據電腦設備室太多空間。

活化地板很容易被安裝，即使現場已經被打開，而且負荷比傳統解決方案要高；它代表了一種能根據現場實際需求隨時更改的投資。

活化地板的性能已經過TUV測試程序所認證，並已在全世界多家數據中心被安裝。



Cool Pool

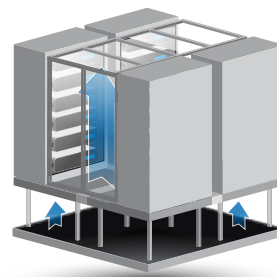
The use of the “Cool Pool” solution results in significant improvement of the distribution of the cooling capacity generated by the perimeter units since it allows the air flow to be channelled directly to the suction section of the racks. By physically separating the volumes of air within the Data Center, the cooling capacity generated by the perimeter units is only used to cool the air in the cold corridor, thus avoiding problems arising due to the recycling of hot air which could cause unwanted superheating of the racks.

The Cool Pool is a simple and effective solution which offers the possibility of a modular approach and the extension of the number of racks in a row over time, easily adapting the compartmentalization.

氣流遏制

“氣流遏制”方案的運用導致對外圍機組產生的製冷容量分配的重大改進，因為“氣流遏制”使得氣流直接導向機架空氣進風口區域。通過物理上將資料中心的氣流隔開，週邊機組產生的製冷容量僅用於製冷冷通道裡的空氣，避免了熱空氣迴圈引起的不必要的機架高溫。

“氣流遏制”是使模組化和機組增加成為可能的一種簡單和有效的方案，能很容易地適應隔斷。



Combining the Cool Pool with the AFPS system guarantees the direct management of the air flow within the cold aisle and optimizing it depending on the variation in load.

The Cool Pool can be integrated with the most common anti-incendiary devices available on the market without affecting their operation in the event of an emergency.

The use of access doors introduces a further level of safety in terms of access control for co-location Data Centers.

將“氣流遏制”與AFPS系統相結合保證了對冷通道氣流的直接管理，並根據負荷變化進行優化。

“氣流遏制”可以與市場上最普遍的防火設施相融合，不影響其緊急情況下的運作。

