# Cooling Solutions for IT Equipment

SWMCO

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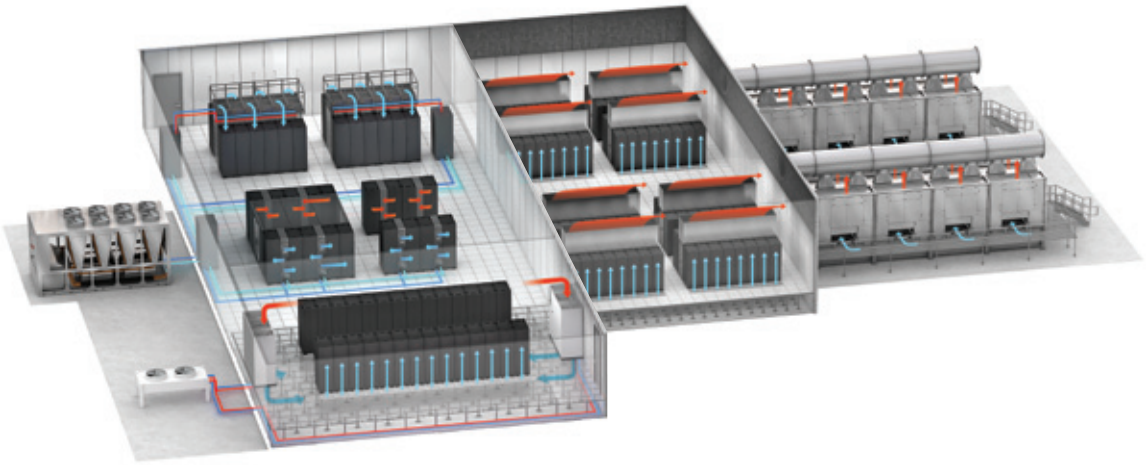
Right-sized systems for every environment, from network closets to data centers



Schneider Electric offers a comprehensive portfolio of solutions for virtually any cooling need in critical IT environments, from network closets and server rooms to data centers of all sizes. Our efficient, flexible, and reliable solutions are easy to install and service, and are readily available worldwide.

# Uniflair LE

## Perimeter Cooling for Medium and Large Data Center Environments

20 kW – 180 kW

Uniflair LE products, perfect for racked and non-racked IT loads, meet the diverse requirements of any data center environment to efficiently provide room-level cooling. When combined with hot or cold aisle containment, these flexible cooling solutions can further improve efficiency and achieve higher densities.

### Reliable

- **Display Interface**
  Clearly shows any malfunctions or alarms with a record of the last 100 events
- **Microprocessor Controller**
  Provides complete reliability of the unit through intelligent controls
- **Continuous Operation**
  Designed specifically for data center environments, operating 24/7/365

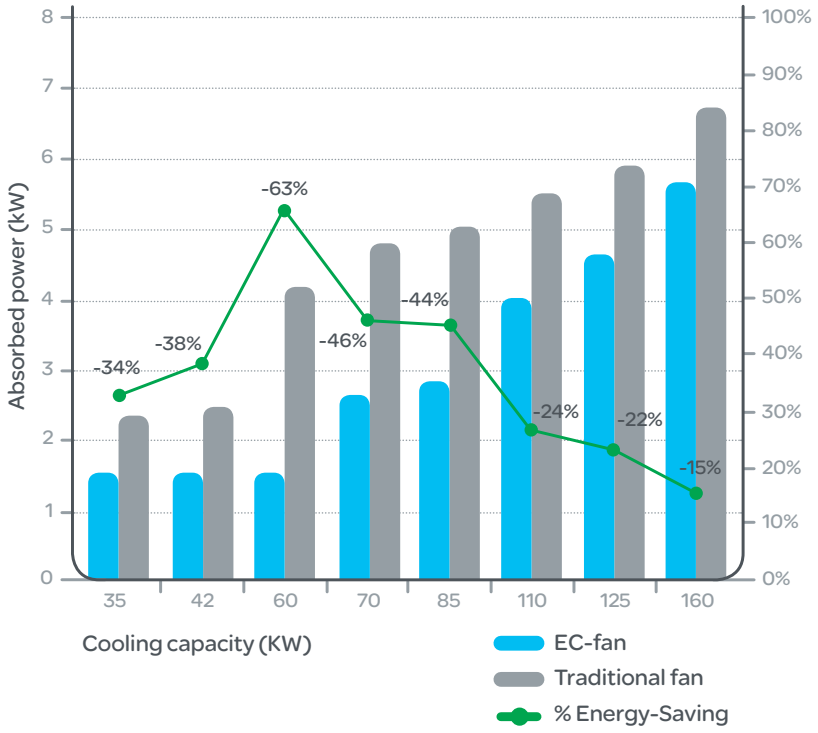
### Efficient

- **Tandem Scroll Compressors**
  Increase efficiency by utilizing an oversized coil for one compressor during part-load operation
- **Economization**
  Utilizes cool ambient air during winter, and automatically changes outdoor heat exchanger set points to eliminate compressor operation during economizer hours (energy saving units)
- **Electronic Expansion Valve**
  Increases coefficient of performance (COP) and energy savings with accurate refrigerant control

### Flexible

- **Multiple Heat Rejection Configurations**
  Available in chilled water, air-cooled, water-cooled, glycol-cooled, twin-cooled, and economizer systems
- **Building Management Systems**
  Designed to work with the most common BMS systems including BACnet and Modbus
- **Complete Front Serviceability**
  Enables all maintenance through front access
- **Automatic Floor Pressurization System (AFPS)**
  Ensures stable airflow pressurization under floor regardless of above-floor changes
- **Multiple Configurations**
  Available in both upflow and downflow air configurations, with options for top, bottom, rear, or front air return (HDCV units available with underfloor fans)

### Electronically Commutated Fans Standard



# Close-coupled Air Conditioners

## InRow Chilled Water/ InRow Direct Expansion

Up to 70 kW/ Up to 37 kW

In today's data centers, traditional cooling approaches involve complex air distribution systems that tend to be unpredictable. With InRow cooling, placing the unit in the row of racks moves the source of cooling closer to the heat load, minimizing air mixing and providing a predictable cooling architecture.

### Reliable

**Predictable**
- Keeps hot air in the hot aisle

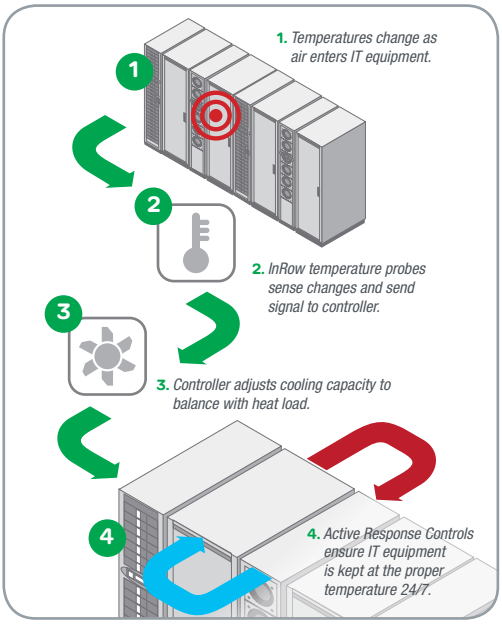
**Redundancy**
- Maintains availability at rack, row, or room level

**Standardized**
- Provides centralized cooling distribution
- Deploys in any environment without modifying design

### Efficient

**Energy**
- Shortens air movement path
- Increases efficiency with variable speed fans
- Employs variable speed compressors (InRow DX)

**Cooling**
- Offers higher cooling capacity due to higher return air temperature
- Controls rack inlet temperature
- Includes integrated active response controls that vary cooling capacity to match IT heat load




### Flexible

**Room Neutral**
- Neutralizes the heat load of IT equipment to adapt to new and existing data center environments

**Quick to Deploy**
- Installs like a rack

**Modular Components**
- Reduces MTTR with hot-swappable assemblies

**Optional High Temperature Operation**
- Integrates easily in data centers using higher supply water temperature

# Close-coupled Air Conditioners

## InRow Pumped Refrigerant

Up to 31 kW

A top concern with cooling an IT environment is the heat removal method. Fear of routing water through the data center limits the cooling systems that can be used. InRow Pumped Refrigerant cooling products, available in overhead or floor-mounted configurations, are energy efficient alternatives when deploying chilled water next to IT equipment is not an option.

### Reliable

**Predictable**
- Requires no minimum loading
- Keeps hot air in the hot aisle

**Redundancy**
- Maintains availability at rack, row, or room level

**Standardized**
- Provides centralized refrigerant distribution
- Deploys in any environment without modifying design

### Efficient

**Energy**
- Shortens air movement path
- Increases efficiency with variable speed fans
- Employs variable speed pumps (RDU)

**Cooling**
- Offers higher cooling capacity due to higher return air temperature
- Controls rack inlet temperature
- Includes integrated active response controls that vary cooling capacity to match IT heat load

### Flexible

**Room Neutral**
- Neutralizes the heat load of IT equipment to adapt to new and existing data center environments

**Space Efficient**
- Eliminates need to reconfigure floor layout with zero white space consumption (InRow OA)

**Modular Components**
- Reduces MTTR with hot-swappable assemblies

Refrigerant Distribution Unit (RDU)

InRow RA

InRow OA

InRow Pumped Refrigerant shown deployed in an existing data center

# Air Distribution

## EcoAisle Containment

Hot and cold air containment systems designed to maximize cooling predictability, capacity, and efficiency at the rack, row or room level.

### EcoAisle minimizes hot and cold air mixing within the IT environment

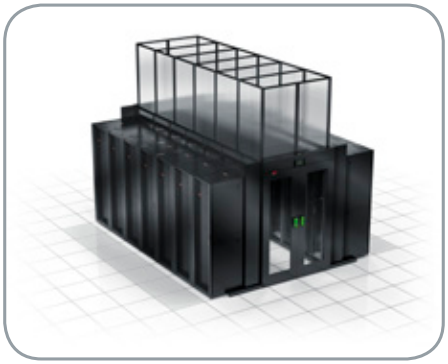
An unpredictable data center environment is common among IT managers. In today's data centers, traditional cooling approaches involve complex air distribution systems that tend to be unpredictable and leave many customers guessing where the cold air goes. With the EcoAisle containment solution, Schneider Electric has taken the guess work out of data center cooling. Deploying a containment solution minimizes air mixing, increases performance and efficiency, and provides a predictable cooling architecture.

### Applications

- Hot Air Containment
- Cold Air Containment

Ceiling Panel

Ducted



# Air Distribution

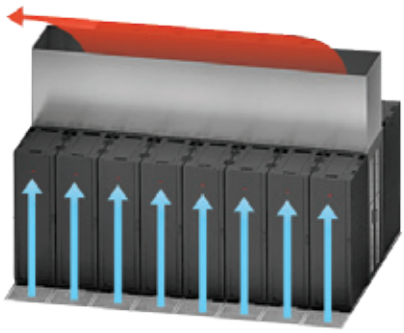
One of the biggest challenges to in cooling IT environments is controlling the movement of air to and from the IT equipment in the space. Consolidation of IT equipment and the drive toward higher rack densities, combined with the variability of cabinet sizes, networking, and other equipment in these environments, makes it challenging for IT and facilities managers to address air distribution issues. Schneider Electric offers a wide range of products that provide containment at the rack or row level to eliminate mixing of air between the hot and cold aisles.

## Thermal Containment

Intelligent air containment solutions that protect critical IT equipment and personnel

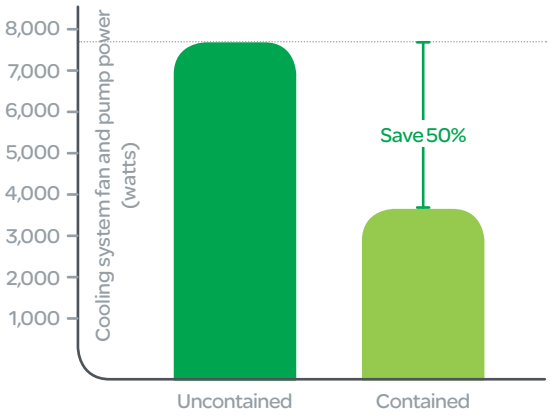
### Aisle Containment

- Flexible ceiling panel or ducted aisle configuration supports hot and/or cold aisle containment (HAC/CAC).
- Automatic drop-out ceiling panels allow fire suppression systems to safely do their job and meet local regulatory codes.
- Integrated high efficiency LED lighting simplifies space planning and reduces operational costs.
- Active Flow control matches cooling system and IT equipment airflow to increase efficiency and reliability.
- Customizable configuration installs in a wide range of applications.



### Rack Containment

- Modular design easily adapts to both the front and rear of the racks and close-coupling cooling units, simplifying installation.
- Scalable open plenum enables capacity sharing to improve cooling system redundancy and utilization.



# Air Distribution

## Rack Air Distribution

Rack air distribution products from Schneider Electric offer ducted and fan-assisted options to improve cold air distribution and heat removal to and from IT equipment racks.

### Fan-assisted Units

Fan-assisted units help overcome hot spots caused by high-density loads and airflow restrictions due to cabling, piping, and restricted airflow paths within racks and raised floors.

**Air Removal Unit (ARU), 1,600 CFM (2,718 m³/h)**

- Eliminates hot spots by removing heat from high density racks
- Maintains server inlet temperatures with automatically adjusting fans
- Offers temperature monitoring and communication

**Side Air Distribution Unit (SADU), 260 CFM (442 m³/h)**

- Directs air up or down the side of the rack, supplying cool air to the inlet of side airflow equipment
- Provides fault tolerance with dual fans

**Air Distribution Unit (ADU), 420 CFM (714 m³/h)**

- Helps maintain rack inlet temperatures by promoting proper airflow from the raised floor to the top of the rack

### Duct Kits

Duct kits direct air within the rack for side airflow equipment, and exhaust ducts direct air to drop ceilings for ducted return systems.

**Side Airflow Duct Kit, for Cisco® Catalyst® and MDS, 1,100 CFM (1,869 m³/h)**

- Directs cool air from the front to the intake of side airflow equipment
- Isolates hot/cold air to ensure proper cooling of side airflow equipment

**Side Airflow Duct Kit for Nexus® 7018, 3,000 CFM (5,097 m³/h)**

- Tested and approved by Cisco for supporting Nexus 7018 Network Switches
- Optimized for cable management with additional clearance on both sides of the switch

**Vertical Exhaust Duct**

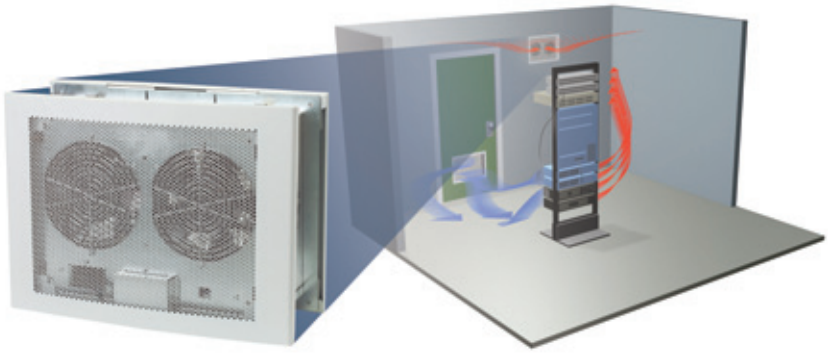
- Eliminates mixing and increases cooling system efficiency with ducted-rack return system
- Mounts to the rear of the rack leaving valuable U space for IT equipment
- Compatible with NetBotz™ environmental sensors for monitoring temperature and humidity

## Room Air Distribution

Simplify cooling to small wiring closets and computer rooms by exhausting hot air from the closet to an adjacent space, allowing conditioned air to enter the space and cool the load.

**Wiring Closet Ventilation Unit**

- Flexible mounting allows for wall or ceiling installation.
- Optional remote notification provides visibility to cooling issues.



# Chilled Water Pre-fabricated Module

## Quickly Deployable Chilled Water Cooling Modules for Large Data Centers

500 kW

These modules deliver complete infrastructure support for turning unoccupied spaces (e.g., former warehouses or manufacturing plants) into highly available, energy-efficient, world-class data centers in just weeks. They also can be deployed to add capacity to some existing data centers.

### Reliable

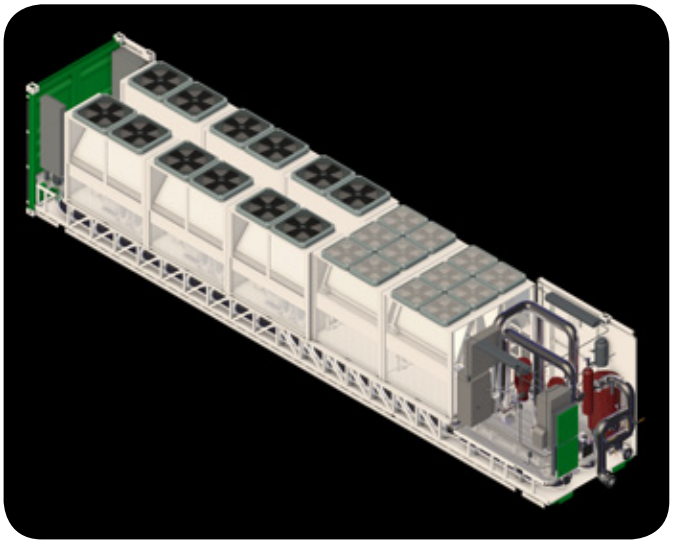
- **Pre-engineered Solution**
  CW modules are pre-tested, pre-wired, and certified for regional compliance to reduce overall data center design and deployment.
- **Thermal Capacity**
  A large amount of chilled water is stored in the module to achieve capacity of up to two minutes.
- **Redundancy**
  Each module includes redundant components such as pumps, as well as a redundant (N+1) chiller.
- **Continuous Operation**
  Chillers are designed to run continuously between -30 °C and 60 °C.

### Efficient

- **Economization**
  Integrated economizers achieve operating expense savings of 20 – 35 percent.
- **Rapid Deployment**
  Installation time is greatly reduced by having the whole chiller plant in one, single footprint.
- **Tandem Scroll Compressors**
  Efficiency is increased by utilizing an oversized coil for one compressor during part-load operation.

### Flexible

- **Two Options for Cooling**
  CW modules can be air-cooled with or without economizers.
- **Modular Solution**
  Modules can be deployed in 500 kW increments to rightsize cooling for increasing IT loads.
- **Supply Chain Optimization**
  Lead times are reduced from months to just weeks compared to a traditional approach.

# Condensers and Fluid Coolers

## Matched Heat Rejection Systems for Room and Close-coupled Cooling Products

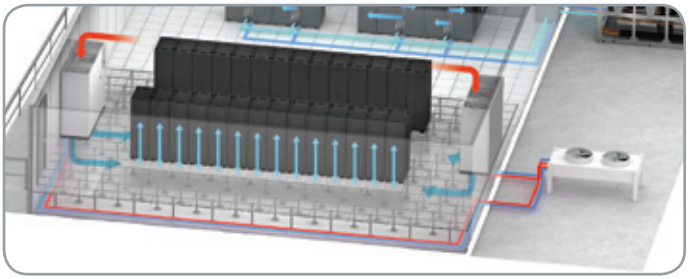
These heat removal systems support and maximize the availability of row and room cooling products to provide a complete solution for a wide range of applications in small to medium data centers.

### Reliable

- **Weatherproof Control Panel**
  Controls are not susceptible to environmental conditions.
- **Factory Tested**
  Control panels are factory wired and tested to ensure proper operation during commissioning.
- **Durable Finish**
  Epoxy-coated powder coat finish for R410A systems or aluminum-embossed finish for R407C systems provide high weather resistance.

### Efficient

- **Direct Drive Fans**
  Fans reduce bearing stress to increase useful life.
- **Variable Speed Axial Fans**
  Axial fans are lower speed, which reduces sound pressure levels and reduces energy consumption during off-peak cooling periods.
- **Economization**
  When the ambient temperature falls below room set-point, perimeter cooling units communicate to the fluid cooler so that outside air can be used to pre-cool the water in the system and reduce or eliminate the need for mechanical cooling.



### Flexible

- **Adjustable Mounting Legs**
  Height of the unit can be easily adjusted.
- **Varying Low Ambient Options**
  Options for -20°C to -40°C ambient temperature ensure unrestricted installation possibilities.
- **Optional Coil Coatings**
  For harsh environments such as coastal regions, optional coil coatings can be applied to decrease the effects of corrosion to metal surfaces.

# EcoBreeze

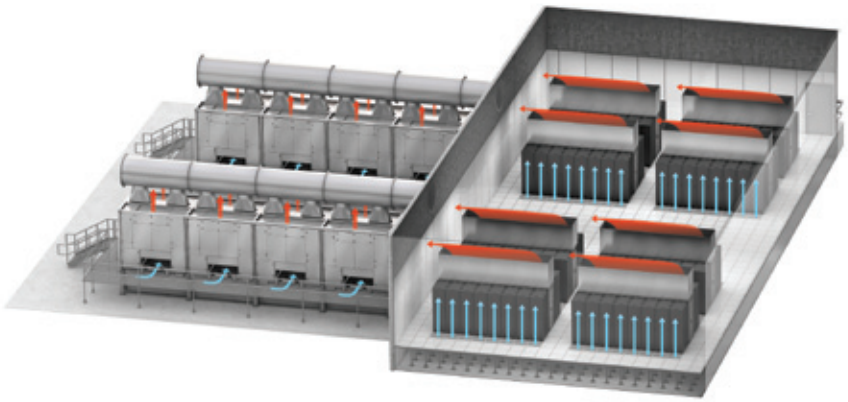
## Modular, Indirect Economizer For Large Data Centers

50 kW – 400 kW

Modular and innovative EcoBreeze units are among the most efficient forms of cooling on the market, maximizing localized climate conditions to increase economization time, and meeting the environmental cooling challenges and energy efficiency requirements that today's data centers face.

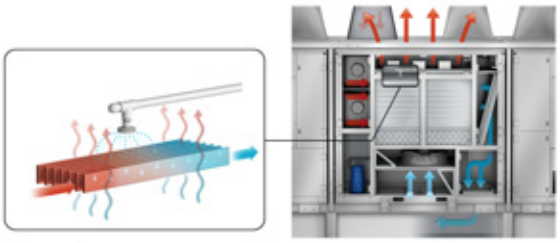
### Reliable

- **Redundancy**
  All modules can operate independently.
- **Supplemental DX Circuit**
  Proportional supplemental R-410a refrigeration circuit can maintain the supply air set point during extremely high ambient conditions.
- **Isolated Airstreams**
  Airborne pollutants and humidity swings are prevented from entering the data center environment.



### Efficient

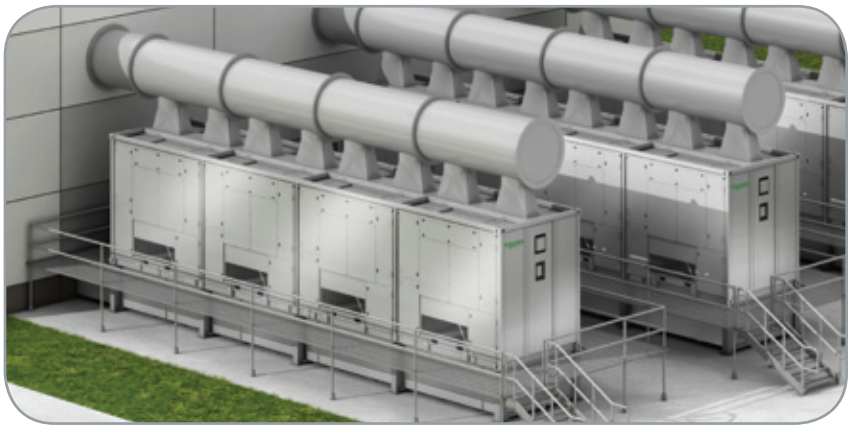
- **Electronically Commutated Fans**
  Data center heat load is matched with fan speeds to provide highest efficiency and reduce total power consumption.
- **Two Forms of Economization**
  Indirect evaporative cooling and air-to-air heat exchange utilize ambient air to cool the data center, reducing operating costs by up to 75 percent.
- **Partial (Mechanical) PUE**
  Economization eliminates the need for compressor operation requiring only fans and pumps to facilitate cooling, achieving partial PUEs as low as 1.05.



EcoBreeze uses evaporative cooling to increase the hours of econimization during warmer temperatures.

### Flexible

- **Modular and Pay-as-you-Grow**
  Design allows the user to add 50 kW modules to the frame as their cooling needs increase.
- **Single Footprint**
  All cooling is done in a single footprint outside the data center, allowing fast and easy deployment as well as eliminating the need for multi-system cooling.
- **Ducted Return/Supply**
  Eliminates cooling equipment inside the white space and allows highly flexible air distribution to and from the data center.
- **Placement**
  Units can be placed on rooftop or adjacent to facility.



# Management Capabilities with Product-specific Controls

## Active Response Controls

Active response controls ensure that servers consistently operate at the desired rack inlet setpoint. As temperatures shift, built-in probes detect changes and send a signal to the controller. The cooling output is continually adjusted to accommodate varying loads, determined by the difference between the setpoint and the actual temperature as well as the airflow for each cooling unit. The fluid valve modulates fluid flow into the cooling coil, keeping equipment at the proper temperature, and saving energy by only consuming the amount required to cool the IT heat load.

## Automatic Floor Pressurization System

Maintaining the right pressure is critical for an efficient air conditioning system, so it must be sustainable for the lifespan of the room and modifiable over time. The AFPS automatically adjusts airflow according to server locations, enabling flexible infrastructure installation.

During routine maintenance, raised floor panels are often removed, reducing airflow and static pressure under the floor. The AFPS eliminates the risk of hot spots that this creates, automatically adjusting airflow from the perimeter units with electronically commutated fans to preserve constant under-floor pressure. The control module manages fan speed to stabilize nominal pressure under the raised floor during all phases of operation, as well as when new equipment is added or when under-floor partition walls break or are damaged.

# StruxureWare for Data Centers Software Suite

UPS units, cooling equipment, and secure power systems from Schneider Electric are core components of any architecture designed for highly critical applications, such as data centers, industry environments, infrastructure, and buildings.

Intelligent energy management of these systems is enabled by Schneider Electric EcoStruxure™ integrated hardware and software system architecture. StruxureWare software applications and suites are a key element of the EcoStruxure architecture. The software helps maximize system reliability and optimize operational efficiency.

StruxureWare for Data Centers software collects and manages real-time information about assets, resource use, and operation status throughout the data center life cycle. This data center infrastructure management (DCIM) software provides full system visibility, allowing managers to monitor information and act quickly in order to optimize data center performance and meet IT, business, and service-oriented goals.

# Online Resources

## Product Showcase Videos

**EcoBreeze Simply Cool**
**Visit** http://tv.schneider-electric.com

**New Data Center in France: Plays it Cool with EcoBreeze**
**Visit** http://tv.schneider-electric.com

**Cooling Capabilities for the Data Center and Beyond**
**Visit** http://tv.schneider-electric.com

**InRow Pumped Refrigerant Cooling System**
**Visit** http://tv.schneider-electric.com

**Market Solutions**
**Visit** http://tv.schneider-electric.com

**Databank a 'Cool' Colocation Facility**
**Visit** http://www.youtube.com/watch?v=I-B6bozP5_M

## Additional Resources

**White Paper #130:**
"Choosing Between Room, Row, and Rack-based Cooling for Data Centers"
**Visit** www.apc.com/wp?an=130

**White Paper #132:**
"Economizer Modes of Data Center Cooling Systems"
**Visit** www.apc.com/wp?an=132

**White Paper #135:**
"Impact of Hot and Cold Aisle Containment on Data Center Temperature and Efficiency"
**Visit** www.apc.com/wp?an=135

**White Paper #153:**
"Implementing Hot and Cold Air Containment in Existing Data Centers"
**Visit** www.apc.com/wp?an=153

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