



Liebert®

PCW

from 25 to 220 kW

Chilled Water Units Optimizing
Data Center Efficiency



Vertiv™

Vertiv designs, builds and services mission critical technologies that enable the vital applications for data centers, communication networks, and commercial and industrial environments. We support today's growing mobile and cloud computing markets with our portfolio of power, thermal, infrastructure management products, software and solutions, all complemented by our global service network. Bringing together global reach and local knowledge, and our decades-long heritage including brands like ASCO®, Chloride®, Liebert®, NetSure™ and *Trellis*™, our team of experts is ready to take on your most complex challenges, creating solutions that keep your systems running—and your business moving. Together, we're building the future of a world where critical technologies always work.

YOUR VISION, OUR PASSION.

VertivCo.com

Liebert® PCW: For Improved Energy Efficiency, Performance and Reduced Operating Costs

Liebert® PCW is the ideal unit for those data centers using chilled water as cooling fluid and that typically range from 200 kW up to 4-6 MW. The overall solution encompasses the cooling unit as well as direct freecooling, freecooling chillers and/or adiabatic freecooling chillers delivering top-tier system efficiency to ensure data center reliability and availability. Liebert PCW, coupled with our Liebert AFC adiabatic

freecooling chillers, optimizes system control even further and guarantees ultimate system efficiency all year round as a result of its optimized floating water set point. All components and control strategies have been enhanced to provide an extremely efficient solution for both conventional computer rooms and for infrastructures facing the challenges of modern IT applications.





Liebert® PCW designed for the lowest air resistance

Liebert® PCW Sets New Standards in Energy Efficiency Amongst Chilled Water Data Center Applications



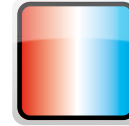
High Efficiency

As a result of the optimized aerodynamic design (minimum internal pressure drops), the new Liebert® EC Fan 2.0 and the new automotive high efficiency filters, Liebert® PCW can perfectly match the server heat load with minimum power consumption. Liebert® PCW also minimizes the running costs of the cooling system.



Cooling and Power Energy Meters

Measurement is key to control. The accurate metering provided by Liebert® PCW gives users the advantage of controlling cooling capacity, power input and all the parameters that simplify the management of the data center, thus ensuring continued infrastructure cooling even in the unlikely event of a unit failure.



Adiabatic Freecooling Chillers & Supersaver

Adiabatic freecooling chillers take advantage of low external temperatures to cool down water. The Supersaver functioning mode maximizes freecooling operation. Whenever possible the system will automatically raise water temperatures as thermal loads fall, aligning cooling capacity with demand, thus increasing system efficiency and freecooling operation.



Liebert® EC Fan 2.0

The new generation of fans are the core of the Liebert® PCW, dramatically reducing the noise level and increasing unit efficiency.



Ultrasonic Humidifier

Liebert® PCW cutting-edge technology allows each of its components to save energy while delivering the cooling performance that data centers need. The infrared and the electrode boiler humidifier are two efficient options made available.



Dual Power Supply

To deliver maximum redundancy thus guaranteeing full flexibility.



Aerodynamic Design

Liebert® PCW- patent granted, presents a unique inner aerodynamic architecture - from the coil angle to the electrical panel - achieving an outstanding competitive advantage and state-of-the-art efficiency.



ICOM™ Control

Smart mode is a control algorithm developed for SmartAisle™ applications (cold aisle containment) meeting the cooling and airflow needs of the servers without wasting a single Watt on unnecessary cooling or air movement.



Fast Start Ramp

A software solution ensuring unit restoration 10 seconds after a power outage.

Liebert® PCW: Simplifies Installation for Real Operational Efficiency

Adjustable Legs

Liebert® PCW legs can be easily adjusted to suit the installation positioning requirements, enabling modification in relation to the height of the on-site raised floor level. Any future maintenance action will be timely and simple.

User Friendly Electrical Connections Kit

Liebert® PCW extended solution offers power cables with fast coupling to allow easy connection between the fan and coil modules, reducing installation time.

Water Connections on Demand

Liebert® PCW presents three options for water connection: from the bottom, from the top and from the left of the unit, for a flexible on-site configuration.

Floor Tile Support & Maintenance Kit

Liebert® PCW has specific kits to sustain floor tiles in proximity to the unit. Furthermore, to simplify access to the fans during installation and replacement, the Liebert® PCW maintenance kit facilitates servicing, reducing repair time and possible downtime. The kit has also been specifically designed and tested to provide support for the fans during replacement.



Vertiv™ ICOM™ Control to Ensure Top Reliability Under Any Conditions

SUPERSAVER: Continuous Dynamic Optimization of Chilled Water Systems

The floor-mount units and adiabatic freecooling chillers communicate with each other through the Supersaver functioning mode which enables complete coordination between the two systems, thus delivering top-tier performances.

Unit to Unit Communication

The ICOM™ Control directly connects with the facility network (Ethernet) and enables communication between multiple Liebert® PCW units for synchronized operation, guaranteeing higher reliability and precision cooling room control.

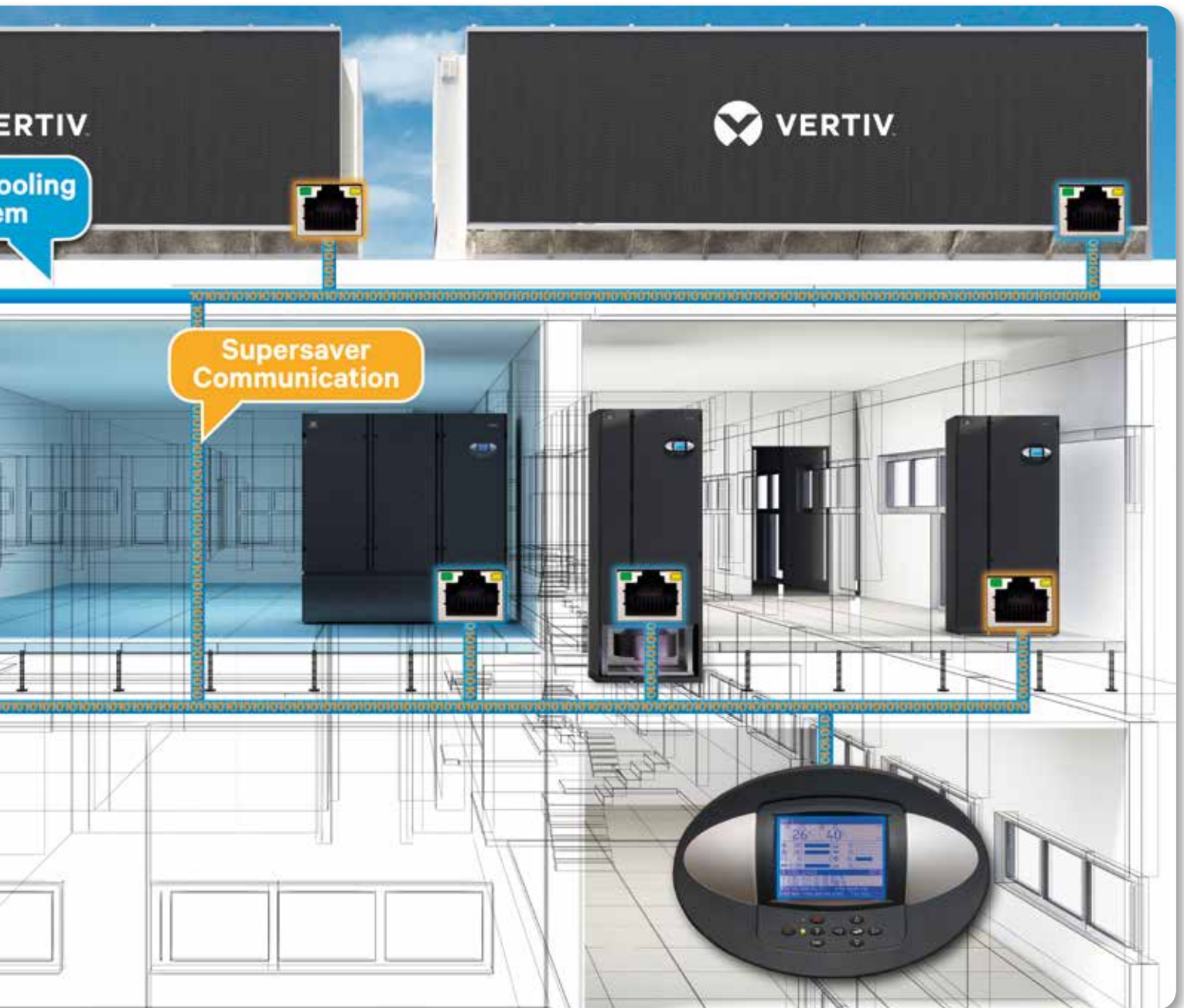
Flexibility in Adapting to Different Sites

Liebert PCW offers different control strategies to best suit legacy design applications as well as those with separation between the cold and hot aisle.

Solutions Optimizing the Applications

Liebert PCW can offer solutions to reduce the starting time to ensure the best cooling continuity.





Liebert® PCW units with graphic display may be centrally monitored and controlled with the optional wall mounted display. The display allows access to the unit via the Network, making coordination between the Liebert® PCW units within the same room possible as a result of the integrated Ethernet connection. The self

monitoring of redundant units alternates standby positions and gives priority to possible hot spots. The high-level supervision of multiple units allows them to work together as a single system to optimize room temperature and humidity. This is of particular importance when the EC Fan is considered. EC fan power

consumption is exponential. Having five units running at 80% instead of four at 100%, means that the energy used by the additional unit is cut by 50% and the total energy used by the entire group by 36%. ICOM™ manages the reduction of fan speed whenever operation at full capacity is not required.

Liebert® PCW: Remote Diagnostic and Preventive Monitoring Services

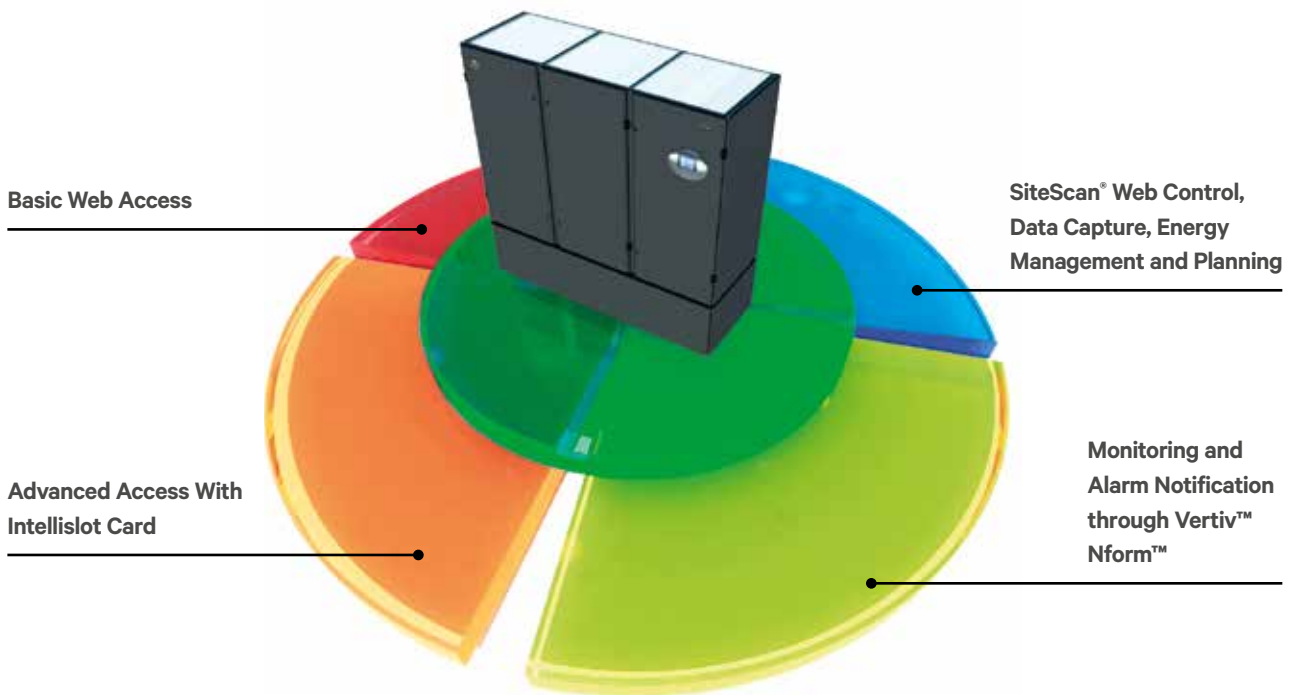
Vertiv™ LIFE™ Services: Remote Diagnostic and Preventive Monitoring

It is essential that your critical cooling system is maintained in an optimum state of readiness at all times.

Our services monitor and prevent possible alarm conditions.

Allows effective proactive maintenance and fast incident response, giving customers complete security and peace of mind. Service center engineers are permanently on hand to provide immediate fault analysis and appropriate corrective action.

The customer will be informed about the status of the installation through detailed reporting providing valuable information on unit functioning and trends over any selected period of time.



Basic Web Access

Basic operational information can be made available through the monitoring feature offered by the ICOM™ Control over Ethernet. A web browser is the only requirement needed for the unit to communicate directly with the local or remote web interface.

Monitoring and Control Through Existing Network Via your Web Browser

Liebert IntelliSlot® Unity-DP™ Card
The Liebert IntelliSlot Unity Card (IS-UNITY-DP) provides ground fault isolated RS-485 Modbus, BACnet IP and Modbus IP network connectivity to Building Management Systems for unit monitoring and management. Also, it provides ground fault isolated 10/100 base-T Ethernet connectivity for unit monitoring and management. The supported management interfaces include: SNMP for Network Management Systems, HTTP for Web page viewing, SMTP for e-mail and SMS for mobile messaging. The card supports IP and 485 protocols simultaneously.

Monitoring Integration with Existing Building Management System

If required, Liebert® PCW may be integrated with an existing Building Management System, while the IntelliSlot Unity Card provide Modbus RTU and Modbus TCP compatibility. SCADA support is completed through the Bacnet over IP card.

Nform™ Software Centralized Management

As business grows, critical equipment infrastructure expands, thus the need for centralized management of any equipment is key to business success. Connecting to equipment in the distributed critical space is only part of the monitoring challenge. Nform™ leverages the network connectivity capabilities of Liebert® PCW to provide centralized monitoring of the distributed equipment. Utilizing the SNMP and Web technologies integrated in each IntelliSlot communication card, Nform™ centrally manages alarm notifications and provides an intuitive interface to access critical status information. Nform™ allows critical system information to be readily available to support personnel wherever they are, increasing responsiveness to alarm-event conditions, thus allowing IT organizations to maximize their system availability.

SITESCAN® WEB CONTROL, DATA CAPTURE, ENERGY MANAGEMENT AND PLANNING

For customers who require extensive management of critical system equipment spanning multiple locations in an ever-moving global enterprise, SiteScan® Web will centrally manage critical equipment and give the power to move beyond the event responsive service paradigm.

SiteScan® Web does it all

- Real-Time Monitoring and Control
- Event Management and Reporting
- Data Analysis and Trending
- Building Management Integration

SiteScan® Web is a comprehensive critical system management solution dedicated to ensuring reliability through graphics, event management and data export. The standard Web interface allows users easy access from anywhere, anytime.



Liebert® PCW: Chilled Water Systems

Given a specific amount of heat load, there can be different ways to approach a system design. Ideally, it is best to start from the server needs in terms of airflow and temperature, while considering the separation of the cold and hot aisle and

only subsequently start to design the most appropriate Liebert® PCW unit. The results will be that the chilled water loop nominal water temperatures can be increased thus increasing freecooling operation.

Together with with our adiabatic freecooling chillers and the dynamic optimization of the chilled water loop, chilled water system annual efficiency is maximized even further and new efficiency levels can be reached.

SMART

Equipment description	Adiabatic freecooling chillers, room cooling units, aisle containment and dynamic optimization of chilled water system.
Room Set Point	22°C 50% in front of the servers
Water/Glycol	18°C - 24°C
Where it is most commonly applied	A) All climates B) Data center cooling separated from air conditioning
Application constraints	- Mandatory hot and cold aisle configuration - Chillers must be dedicated due to high working temperatures
Benefits	- SmartAisle™: Top efficiency as a result of dedicated solutions taking advantage of higher working temperatures (maximized freecooling) - Increased system efficiency as a result of Supersaver functioning mode (intelligent communication between Liebert® AFC and Liebert® PCW)
Existing Data Center	Simple retrofit in the case of hot and cold aisle separation



ECO WATER

Equipment description	Chiller with freecooling and room cooling units
Room Set Point	24°C 50%
Water/Glycol	10°C - 15°C
Where it is most commonly applied	A) Data center cooling separated from air conditioning B) Cold and medium climates to take advantage of Freecooling benefits
Application constraints	- Mandatory use of glycol solutions to avoid chiller freezing
Benefits	Liebert® PCW provides the highest net sensible capacity for under any working condition. Increased system efficiency as a result of the Supersaver Evolution functioning mode (intelligent communication between Liebert® HPC and Liebert® PCW)
Existing Data Center	Simple retrofit



ECO AIR

Equipment description	Chiller with freecooling, room cooling units and air channels
Room Set Point	24°C 50% (once direct freecooling is in operation, supply set point 22°C 50%)
Water/Glycol	10°C - 15°C
Where it is most commonly applied	A) Cold and medium climates to exploit freecooling benefits
Application constraints	<ul style="list-style-type: none"> - No indication when the cold and warm seasons are too humid or too dry, thus reducing possibility of increased use of direct freecooling - Being in contact with both external and internal conditions, external events (fire, smoke, pollution) can compromise internal operation of data center
Benefits	Economizer function allows perfect control of temperature and humidity, optimizing the energy benefit of this type of system
Existing Data Center	Extremely complex retrofit due to air channels



LEGACY

Equipment description	Chiller without freecooling and room cooling units
Room Set Point	22°C 50%
Water/Glycol	7°C - 12°C
Where it is most commonly applied	<p>A) Same chilled water system is used both for cooling the data center as well as for comfort cooling</p> <p>B) Hot climate where the external temperatures rarely goes below 5°C</p>
Application constraints	<ul style="list-style-type: none"> - Reduced efficiency due to low water temperatures (no freecooling) - Reduced efficiency due to unnecessary dehumidification (SHR<1)
Benefits	Liebert® PCW provides the highest net sensible capacity under any working conditions.
Existing Data Center	Simple retrofit



Enhanced Freecooling Mode with Liebert® PCW High Chilled Water Delta T

The Liebert® PCW with high chilled water delta T has been designed to maximize freecooling operation, as well as granting a proper supply air temperature to the servers.

The design considers a water regime of 20°C / 32°C, with airflow of 35°C on the return side and a supply air temperature between 24°C and 25°C.

This system leverages on freecooling almost all year round with a solution granting the complete separation of the external and internal ambient, thus significantly reducing the overall system power consumption.

Additionally, the increased delta T reduces the water flows, thus saving energy also on the pumping system and allowing for the sizing of any part related to the water flow.

This system can be optimized even further when integrated with the Liebert® AFC, our adiabatic freecooling chillers and optimized for water regimes from +20° C to +32° C.

This new operating point represents a new challenge for the internal air conditioning units: water speed is greatly reduced and the heat exchange factor differs significantly with respect to past applications.

Liebert® PCW high chilled water delta T has been developed to provide an efficient answer to these new challenges: its ad hoc coil design best suits water and glycol operations and its top door grill exploits the entire coil surface, thus optimizing the overall heat exchange.





Liebert® PCW with High Chilled Water Delta T

Liebert® PCW Configurations

Extended Down Unit

Liebert® PCW Extended Down with fan modules installed in the raised floor, delivers optimum energy efficiency (70% saving compared to standard market solutions with EC Fan). The system is shipped in two parts, fans module and coil module. This enables a shorter lead time on the fans module and optimizes installation time. Adjustable legs are provided in order to tailor the installation to different raised floor heights.



Extended Up Unit (Downflow)

Liebert® PCW Extended Up delivers up to 50% in energy savings compared to a traditional chilled water unit, even if fans are installed above the raised floor. Moreover, in the event of a demand for increasing density, Liebert® PCW responds with a higher capacity (up to 20% more) in the same time frame, without requiring the purchase of an additional unit.



Downflow Unit

This is the most common configuration on the market, with a unique level of energy efficiency when compared to the standard market solutions with EC Fan. Liebert® PCW Downflow is 2 m high, with coil and fan sections and it achieves energy savings of up to 40%.



Upflow Unit

Upflow units are the ideal solution for applications with air distribution from the top of the unit, even with no ducting system. The presence of a Liebert® EC Fan 2.0 means that Liebert® PCW can deliver the highest External Static Pressure (ESP) whilst limiting power input.



Extended Up Unit (frontal air delivery)

In the event that the UPS room or the technical room are the only available locations for installing to the floor-mount unit, the frontal discharge configuration is the most suitable, taking the air at a higher temperature from the top of the unit, and delivering cooled air through the front.































































Extended Up Unit (back air delivery)

When the site design excludes the presence of water connections inside the data center, the Liebert® PCW with back air discharge is the ideal solution for managing these conditions, as the cooling unit is located outside the room, delivering the cold air through the rear of the fan module using the raised floor.



Liebert® PCW - Standard Height

UNIT	PH025	PH030	PH035	PH040	PH045	PH060	PH070	PH080	PH095	PH100	PH110	PH145	PH170
NET													
Capacity Single Circuit Unit [kW]	27.6	30.4	34.7	44.7	49.7	68.8	80.2	86.5	94.2	105.8	121.4	145.8	172.9
NET SENSIBLE													
Capacity Double Circuit Unit [kW]*	-	-	-	30.1	-	50.3	-	60.3	-	-	80.5	96.5	115.0
POWER INPUT													
[kW]	0.92	1.01	1.16	1.39	1.26	2.29	2.63	2.75	3.54	3.42	3.87	5.13	6.75
AIRFLOW RANGE													
[m³/h]	2500 - 10500	2500 - 10500	3400 - 13200	3400 - 12800	3900 - 11500	5700 - 24000	6700 - 25800	6700 - 25300	9400 - 37300	9400 - 36400	9400 - 34700	9400 - 37400	11000 - 45800
SPARE CAPACITY													
[%]	35%	35%	20%	20%	20%	25%	20%	20%	20%	25%	25%	15%	15%
UNIT DIMENSIONS													
Width [mm]	844	844	1200	1200	1750	1750	2050	2050	2550	2550	2550	2950	3350
Depth [mm]	890	890	890	890	890	890	890	890	890	890	890	890	890
Height [mm]	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970	1970
UNIT CONFIGURATIONS													
 Down Flow UP - Fans Over the Raised Floor  Up Flow  Frontal  Downflow Down - Fans in Raised Floor	             	             	             	             									
OPERATING MODES													
Legacy	24°C 40-45% RH; 7°C - 12°C												
ECO	27°C 35- 40% RH; 10°C - 15°C												
SMART	37°C 30-35% RH; 20°C - 25°C												

*with one circuit running

Liebert® PCW - Extended Height

UNIT	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201
NET SENSIBLE								
Capacity Single Circuit Unit [kW]	44.8	74.5	84.2	109.4	116.4	145.7	164.5	204.0
NET SENSIBLE								
Capacity Double Circuit Unit [kW]*	37.7	63.3	-	78.4	-	105.8	117.2	142.7
POWER INPUT								
[kW]	1.41	2.05	2.33	3.09	3.48	4.05	4.47	5.99
AIRFLOW RANGE								
[m³/h]	3800 - 14400	7100 - 27500	7600 - 28700	7600 - 28000	10800 - 41600	10800 - 40400	10800 - 41700	13100 - 52700
SPARE CAPACITY								
[%]	15%	25%	20%	15%	20%	20%	20%	20%
UNIT DIMENSIONS								
Width [mm]	1200	1750	2050	2050	2550	2550	2950	3350
Depth [mm]	890	890	890	890	890	890	890	890
Height [mm]	1970 +600	1970 +600	1970 +600	1970 +600	1970 +600	1970 +600	1970 +600	1970 +600
UNIT CONFIGURATIONS								
Down Flow UP - Fans Over the Raised Floor								
Up Flow								
Frontal								
Back								
Downflow Down - Fans in Raised Floor								
OPERATING MODES								
Legacy	24°C 40-45% RH; 7°C - 12°C							
ECO	27°C 35- 40% RH; 10°C - 15°C							
SMART	37°C 30-35% RH; 20°C - 25°C							

*with one circuit running

Liebert® PCW: For High Chilled Water Delta T - Extended Height

UNIT	PH51W	PH50W	PH60W	PH70W
NET SENSIBLE				
Capacity Single Circuit Unit [kW]	113.0	135.3	152.1	173.1
NET SENSIBLE				
Capacity Double Circuit Unit [kW]*	-	93.9	106.8	120.8
POWER INPUT				
[kW]	5.53	5.59	6.19	7.42
AIRFLOW RANGE				
[m³/h]	15000 - 47500	15000 - 47500	15000 - 50000	19000 - 60200
SPARE CAPACITY				
[%]	25%	20%	15%	20%
UNIT DIMENSIONS				
Width [mm]	2550	2550	2950	3200
Depth [mm]	1050	1050	1050	1050
Height [mm]	2350+600	2350+600	2350+600	2350+600
UNIT CONFIGURATIONS				
Downflow Down - Fans in Raised Floor				
OPERATING MODES				
Enhanced Freecooling Mode	35°C 30% RH; 20°C - 32°C			

*with one circuit running

Thermal Management Data Center Infrastructure for Small and Large Applications



■ Liebert® HPC

Wide range of high efficiency Freecooling Chillers from 40 kW to 1600 kW

- Designed specifically for data center applications and to work with SmartAisle™
- Premium energy efficiency version
- Unique control capabilities with the ICOM™ Control



■ Liebert® PDX - Liebert® PCW

Available from 5-220 kW

- Premium energy efficiency
- Eurovent certified performance
- Unique control capabilities with the ICOM™ Control
- Liebert® EconoPhase™ available for the direct expansion system



■ Liebert® EFC

Indirect evaporative freecooling unit leveraging on data center know-how. Available from 100 to 350 kW

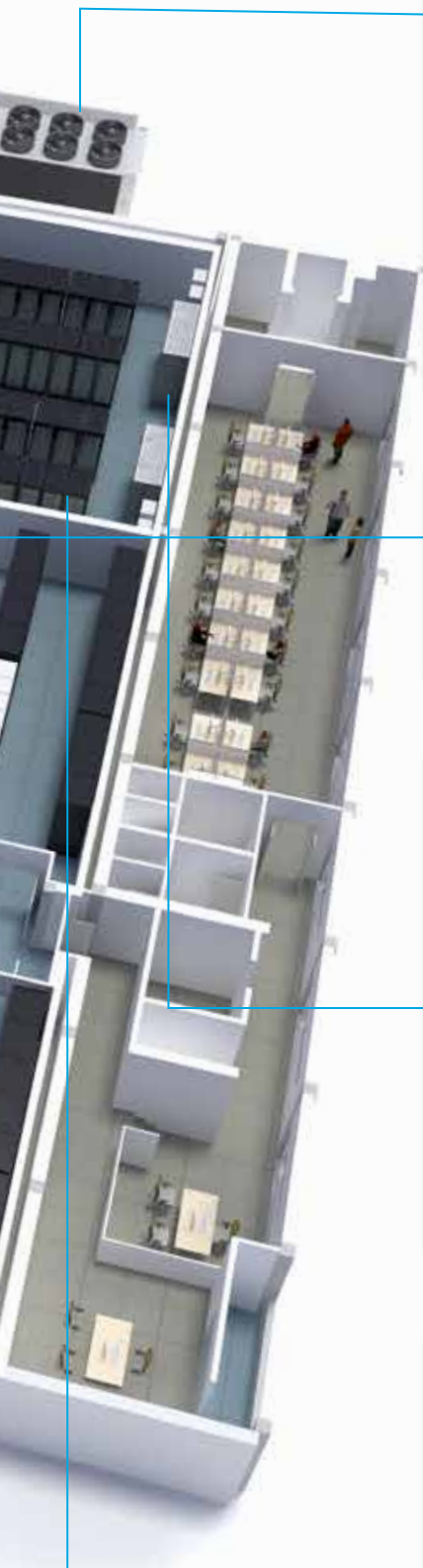
- Unique control capabilities optimizing water and energy costs
- Substantial reductions and savings in terms of electrical infrastructure



Trellis™ Platform



Trellis platform is a real-time infrastructure optimization platform that enables the unified management of data centre IT and facilities infrastructure. The *Trellis* platform software can manage capacity, track inventory, plan changes, visualize configurations, analyze and calculate energy usage, and optimize cooling and power equipment. The *Trellis* platform monitors the data center, providing a thorough understanding of system dependencies to help IT and facilities organizations keep the data center running at peak performance. This unified and complete solution, delivers the power to see the real situation in your data center, make the right decision and take action with confidence.



■ Liebert® AFC

The Adiabatic Freecooling Chiller available from 500-1450 kW

- Integrated adiabatic pad system
- High freecooling capacity
- 100% compressor back up
- Available both in multi-scroll and screw versions

■ SmartAisle™

- Aisle containment
- Provides highest energy efficiency
- Works with any Liebert Thermal Management unit



■ Liebert® CRV

Row-based high efficiency cooling units available from 10-60 kW in DX and CW versions

- Full airflow and cooling capacity modulation to match server load and to save energy
- Best footprint capacity with the highest efficiency
- Six different control modes to ensure greater flexibility



■ Liebert® DCL

Closed loop rack cooling

- Two different architectures:
 - Closed Loop
 - Hybrid Loop
- Multiple combinations for up to 4 server racks
- Dual CW coil version for redundancy

SERVICE

Vertiv™ supports entire critical infrastructures with the largest global service organization and an extensive service offering, enhancing network availability and ensuring total peace of mind 24/7. Our approach to servicing critical infrastructure covers all aspects of availability and performance: from single power and thermal management equipment to entire mission-critical systems.

The most comprehensive insurance for business protection can be obtained with a service program from Emerson Network Power which includes access to LIFE™.

VERTIV™ LIFE™ SERVICES

Vertiv LIFE Services provides remote diagnostics and preventive monitoring service for UPS and thermal management equipment. Vertiv LIFE Services delivers increased uptime and operational efficiency by enabling continuous monitoring of your equipment, expert data analysis and field engineering expertise. Through the data transferred from your equipment via Vertiv LIFE Services, our remote service experts gain the real-time insight and information needed to quickly identify, diagnose, and resolve any irregularities that may arise in operation, ultimately taking responsibility for your critical assets 24/7.



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