# Liebert® PCW

Cool the Cloud









Whether a data center houses three or 1000 IT racks, deployment of new technologies with high power densities are impacting the power and cooling systems that business-critical servers and communications devices depend on for their performance and reliability.

- The critical infrastructure systems from Emerson Network Power allow customers to respond to changes in density, capacity and availability while achieving greater operating flexibility, higher system availability and lower total costs of ownership.
- Emerson Network Power delivers innovative solutions through 12 Centers of Expertise. distinct areas of breakthrough products and services that help determine what is needed in relation to the application. Supported by a global network in more than 150 countries, backed by local service and support from more than 2,000 certified professionals, **Emerson Network Power** is uniquely positioned to provide systems and integrated solutions wherever our customers are located.

Emerson Network Power understands the challenges

- of setting up the right infrastructure to support business-critical data center operations and helps respond to any demand by providing innovative solutions, allowing customers to concentrate on their business requirements.
- Liebert® PCW for data centers using chilled water as cooling fluid typically range from 200 kW up to 4-6 MW. The overall solution encompasses the cooling unit as well as direct freecooling and Freecooling Chillers, delivering the best efficiency to ensure data center reliability and availability.





Liebert® PCW:
Precision
Cooling
Technology
Serving
the Cloud.
Energy efficiency,
improved
performance and
reduced operating
costs are the main
goals for data
centers today.

The evolution of virtualization technologies

has enabled data center managers to maximize resource allocation and agility by consolidating multiple applications onto a single server. The maturity of virtualization technology has facilitated the development of robust, virtualized network architectures - "clouds"- where resources are leveraged to provide on-demand, at-scale access to a variety of abstract IT resources.

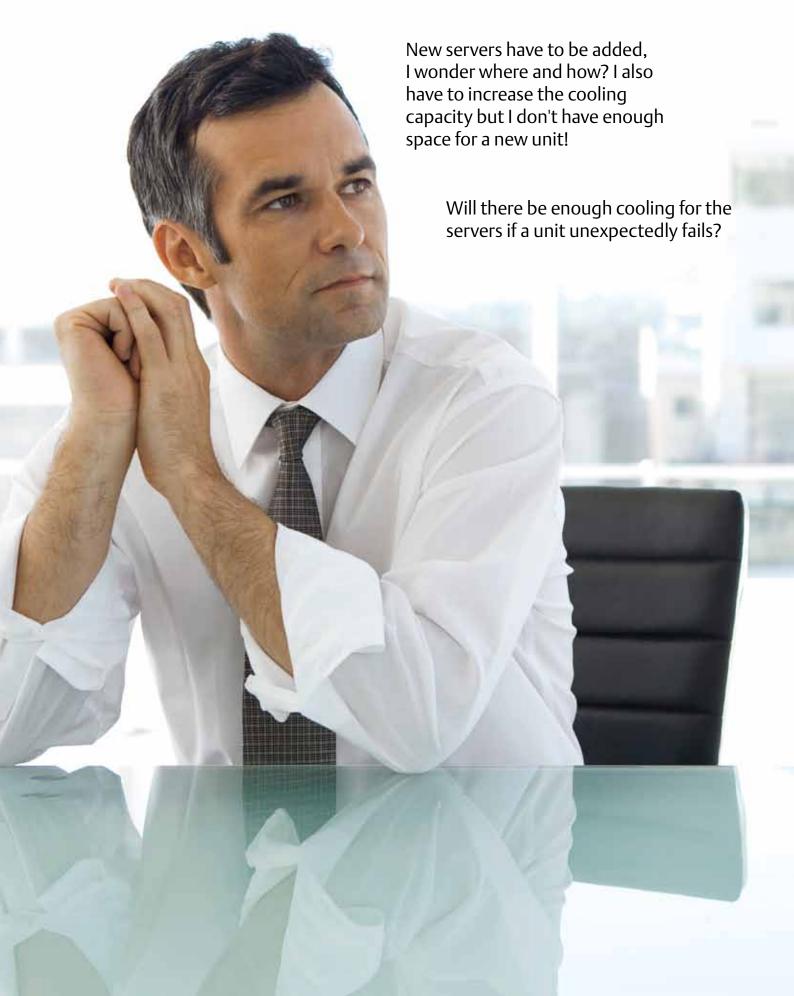
perspective, the ability
to scale infrastructure
resources to support rapid
growth whilst ensuring
business efficiency, is
critical. Because the cloud's
virtualization technology
facilitates a dynamic
computing environment
within a "static" foundation
(the server), rapid changes
in computing load translate
to substantial increases in

power consumption and the need for adequate heat dissipation. If not managed adequately, this can place additional stress on the data center's infrastructure, resulting in an increased risk of system failures. Recognizing vulnerabilities of existing facilities before embarking on a cloud deployment gives the opportunity to potential cloud computing adopters to strengthen critical systems.

Maintaining optimum availability is essential.

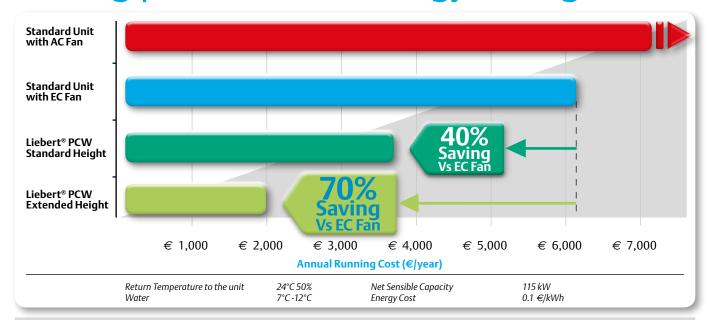
Increased rack densities coupled with high computing loads may result in "hot spots" which have the potential to impact the availability of virtualized servers, if not managed correctly. For this reason enterprises must ensure that critical systems are backed up with adequate cooling support optimized for virtualized, high-density environments.

This data center is running too hot... or is it colder than needed and that's why the bills are so high?





# Liebert® PCW: Cloud-Ready Precision Cooling for Maximum Energy Saving



#### **Key Features**

Unique integrated aerodynamic design to reduce fan power consumption

New coil design with enhanced efficiency

New high efficiency filters, providing class F5 filtration, as well as up to half the pressure drop of the more commonly used G4 (allowing improved filtration for increased performance )

New Liebert® EC Fan 2.0

### **Standard Height Configuration**

Larger coil and filters to further reduce pressure drop

Fans located on the raised floor

### Extended Height Configuration

40% Saving Vs EC Fan

70% Saving Vs EC Fan

The impressive energy saving performance achieved by Liebert® PCW is maintained when it forms part of an integrated data center solution. The Liebert® PCW's unique, cutting-edge technology delivers the cooling capacity required by the servers to ensure business continuity. Today's IT infrastructures, facing dynamic heat loads, have to rely on trustworthy cooling solutions, performing at their best whatever the circumstances.

Liebert® PCW, as part of the SmartAisle™ cooling solution, is the best response to data center cooling demands and minimizing operating costs.



Liebert®PCW Sets a New Standard in Energy Efficiency Amongst Chilled Water Data Center Applications. All Components Have Been Optimized to Provide an Extremely Efficient Solution Both for Conventional Computer Rooms and for Infrastructures Facing the Challenges of Modern IT 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.



#### Liebert® EC Fan 2.0

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



#### Unit Aeraulic Design - A New Way to Look at Aerodynamics

Liebert® PCW, the ultimate novelty in precision cooling design, 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.



#### Cooling and Power Energy Meters - Only What Is Measured Can Be Controlled

Measurement is key to control. The accurate metering provided by Liebert® PCW gives users the advantage of controlling the cooling capacity, the 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.



#### **Ultrasonic Humidifier - The Efficient Humidification Technology**

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



#### iCOM™ Control - When Smart Means Efficient

Smart mode is a control algorithm developed for Smart Aisle<sup>TM</sup> applications (Cold Aisle containment) meeting the cooling and airflow needs of the servers without wasting a single Watt on unnecessary cooling or air movement.



## Freecooling Chillers & Supersaver - Optimizing System Efficiency

Freecooling Chillers take advantage of low external temperatures to chill water. The Supersaver Evolution functioning mode enables the use of Freecooling to be maximized. Whenever possible the system will automatically raise water temperatures as thermal loads fall, aligning cooling capacity with demand, thus increasing system efficiency and Freecooling time.



# Whatever the Site Characteristics, Choose the Liebert® PCW to Meet Your Needs



# Site **Characteristics**

# **Large and Medium**

Data Center **Data Center** with raised Floor with raised Floor (>600mm) (<600mm)

# **Small**

**Data Center** without Raised Floor

No space constraints

- Fans cannot be installed under the raised floor
- No height limits
- Fans cannot be installed under the raised floor
- Height limits

Liebert® PCW **Extended Down** 

Liebert® PCW Extended **Up - Downflow** 

Liebert® PCW **Downflow** 

Liebert® PCW Extended **Up - Downflow** 

Liebert® PCW **Downflow** 

Liebert® PCW Extended **Up - Upflow** 

Liebert® PCW **Upflow** 

**Market standard:** Non-extended unit with EC Fan

Conventional technology: unit with AC Fan

Liebert® PCW patented technology puts it at the forefront of data center precision cooling solutions in terms of efficient performance and reduced operational costs.



## **Technical**

Technical / UPS Room

**Service** 

Service Corridor





Liebert® PCW Extended Up - Frontal Air Delivery Liebert® PCW Extended Up - Back Air Delivery

Liebert® PCW Upflow



### Liebert® PCW Extended Down

Large and medium data centers are normally provided with a raised floor with at least 600 mm clearance. This is the ideal application for this unit, reducing operating costs by up to 70% if compared to a non-extended standard market solution with EC Fans.

### ■ Liebert® PCW Extended Up Downflow

For those sites with space constraints (raised floor height lower than 600 mm) but without any limit to the height of the roof (more than 3 m), **Liebert® PCW Extended Up** in Downflow air configuration is the ideal solution, reducing operating costs by up to 50%.

## Liebert® PCW Extended Up Upflow

Liebert® PCW Extended Up Upflow achieves the same performances as the Downflow version, when a raised floor is not available. It is the perfect solution for UPS or technical rooms.

#### ■ Liebert® PCW Extended Up frontal air delivery

Whenever the floor-mount precision cooling unit is to be installed inside a UPS or a technical room, the **Liebert**\* **PCW Extended Up** with frontal air delivery offers the best performance leading to a 50% reduction in operating costs.

#### Liebert® PCW Extended Up back air delivery

If the service corridor is the only available space to install the floor-mount unit, **Liebert® PCW Extended Up** back air discharge is the recommended configuration to overcome the space constraints and achieve a reduction of up to 50% in operating costs.

#### ■ Liebert® PCW Downflow

This is the ideal configuration for sites where the floor is raised by at least 600 mm, and the ceiling is at least 2.5 m high. The Liebert® PCW Downflow operates more efficiently when compared with a conventional EC Fan unit, as it achieves a 40% saving in operating costs.

### Liebert® PCW Upflow

Where there is no raised floor and the ceiling is at least 2.5 m high, the **Liebert® PCW Upflow** is the ideal solution to cut operating costs by up to 40%.

Liebert® iCOM™
is a Control software
in Continuous
Evolution. The
iCOM™ Device,
Featuring a Special
Control Algorithm
Ensuring Top
Reliability in
All Conditions,
Manages the
Operation of the
Liebert® PCW units.

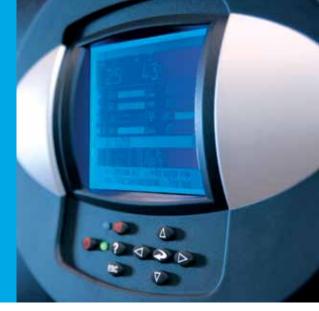
The floor-mount and Freecooling Chiller unit communicate with each other through the Supersaver Evolution functioning mode which enables the two systems to be balanced and deliver the best performance.

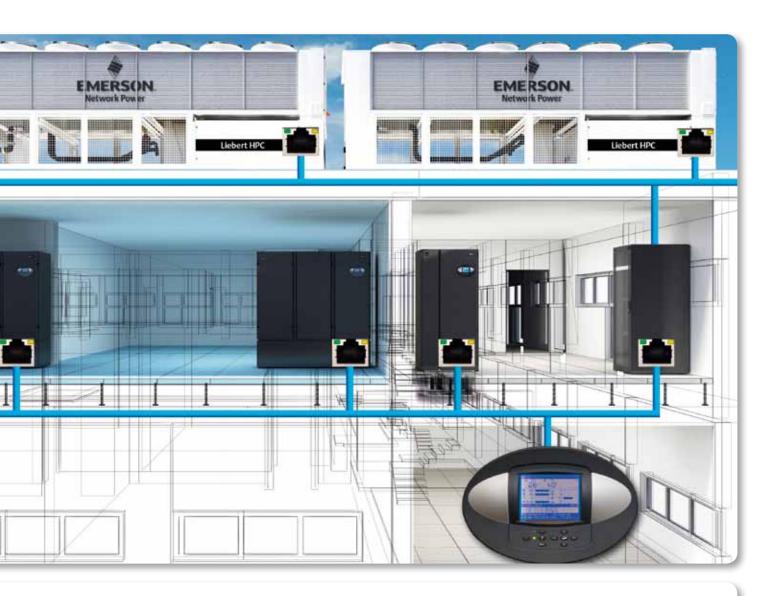
#### **Unit to Unit Communication**

iCOM $^{\text{TM}}$  directly connects with the facility network (Ethernet) and enables communication between multiple Liebert $^{\otimes}$  PCW units for synchronized operation, guaranteeing higher reliability and precision cooling room control.

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

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





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 functions according to the square-cube law, so that having five units running at 80% instead of four at 100%, means the energy used by the additional unit is cut by 50% and the total energy used by the entire group by 36%. iCOM $^{TM}$  manages the reduction of fan speed whenever operation at full capacity is not required.

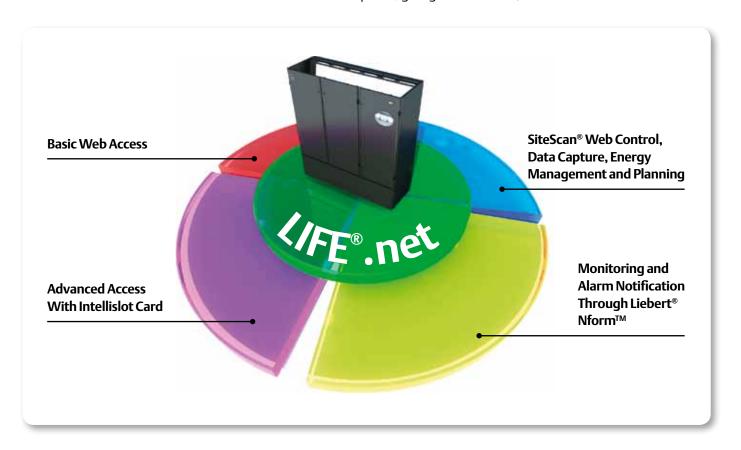


# Liebert® PCW: Remote Monitoring Service and Connectivity

### Chloride LIFE®.net Remote Monitoring and Diagnostic Service

It is essential that your critical cooling system is maintained in an optimum state of readiness at all times. With Chloride LIFE®. net remote monitoring and diagnostics, Emerson Network Power Services monitor and prevent possible alarm conditions. This 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<sup>TM</sup> 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

The Liebert® PCW system can be fitted with a Liebert® IntelliSlot Web Card allowing full advantage to be taken of the Ethernet network and remote monitoring from your computer desktop, network operations center or any network access simply utilizing a standard web browser. A standard web browser, via HTTP protocol or Network Management System software via SNMP protocol, can be used to access the unit information.

Monitoring Integration with Existing Building Management System

If required, Liebert® PCW may be integrated with an existing Building Management System, while the IntelliSlot 485 Cards provide Modbus RTU and Modbus TCP compatibility. SCADA support is completed through the Bacnet over IP card.

■ Liebert® 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. Liebert® 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 Liebert® IntelliSlot communication card, Liebert® Nform<sup>™</sup> centrally manages alarm notifications and provides an intuitive interface to access critical status information. Liebert® 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.

Liebert SiteScan® Web Control, Data Capture, Energy Management and Planning

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

#### Liebert SiteScan® Web does it all

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

Liebert 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: Simplifies Installation for Real Operational Efficiency

### Adjustable Legs

The legs of the Liebert® PCW 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 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.



# Liebert® PCW: Chilled Water Systems

# Smart

Equipment description	Freecooling Chiller, room cooling units and aisle containment.
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 of Emerson Network Power Solutions	Smart Aisle™: Top efficiency as a result of dedicated solutions to take advantage of higher working temperatures (maximized Freecooling)     Increased system efficiency as a result of Supersaver Evolution functioning mode (intelligent communication between Liebert® HPC 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 of Emerson Network Power Solutions	Liebert® PCW provides the highest net sensible capacity for all working conditions. 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



The Liebert® PCW is the ideal precision cooling unit for data centers facing the challenges of of cloud computing. The system adapts perfectly to the dynamics of the data center environment, in response to heat load changes typically seen in a cloud computing application.



**ECO Air** 

Equipment description	Chiller with Freecooling, room cooling units and air channels
Room Set Point	24°C 50% (once the 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	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 of Emerson Network Power Solutions	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	A) Same chilled water system is used both for cooling the data center as well as for comfort cooling B) Hot climate where the external temperatures rarely goes below 5°C
Application constraints	Reduced efficiency due to low water temperatures (no Freecooling)     Reduced efficiency due to unecessary dehumidification (SHR<1)
Benefits of Emerson Network Power Solutions	Liebert® PCW provides the highest net sensible capacity for all working conditions.
Existing Data Center	Simple retrofit



# Liebert® PCW Configurations

25 kW-220 kW

## **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 solution 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.



25 kW-220 kW

# Extended UP Unit (Downflow or Upflow)

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.





25 kW-220 kW

## **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%.



25 kW-150 kW

# **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.



# Liebert® PCW Configurations

25 kW-220 kW

# **Extended UP Unit (frontal air delivery)**

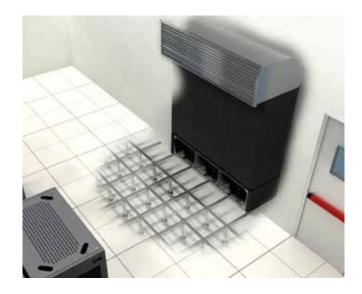
In the event that the UPS room or the technical room are the only available locations for installing to the floormount unit, the frontal discharge configuration is the most suitable, taking the air at a higher temperature from the top of the unit, and delivering cooled air through the front.



25 kW-220 kW

# 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: Top Performer

Standard Height - LEGACY (Single Circuit Units)													
Unit	PH025	PH030	PH035	PH040	PH045	PH060	PH070	PH080	PH095	PH100	PH110	PH145	PH170
Total Gross Capacity [kW]	30.1	40.0	44.8	56.0	60.1	80.1	95.0	115.1	105.8	130.1	160.2	189.3	221.0
Net Sensible Capacity [kW]	25.7	32.7	42.2	44.3	48.7	68.7	81.0	93.7	100.2	111.6	122.8	145.6	171.5
Power Input [kW]	0.79	1.56	2.63	1.65	1.33	2.43	2.95	4.41	3.60	4.41	5.22	6.69	8.59
Net Sens EER	32.5	21.0	16.0	26.8	36.6	28.3	27.5	21.3	27.8	25.3	23.5	21.8	20.0
Airflow [m³/h]	6450	8150	13400	10500	11550	17450	20550	23200	27600	28600	28400	34000	40700
Water temperatures Air to the unit	7°C – 12° 24°C 50%												

Standard Height - ECO (Single Circuit Units)													
Unit	PH025	PH030	PH035	PH040	PH045	PH060	PH070	PH080	PH095	PH100	PH110	PH145	PH170
Total Gross Capacity [kW]	20.1	24.7	25.9	32.6	37.9	49.7	58.3	68.8	71.7	83.3	97.3	128.7	151.8
Net Sensible Capacity [kW]	19.4	23.7	25.1	31.6	36.9	48.2	56.5	66.3	69.0	80.3	91.5	121.4	143.7
Power Input [kW]	0.65	0.98	0.85	0.96	1.01	1.53	1.77	2.49	2.73	3.00	3.48	6.30	8.07
Net Sens EER	29.8	24.2	29.5	32.9	36.5	31.5	31.9	26.6	25.3	26.8	26.3	19.3	17.8
Airflow [m³/h]	6000	6900	8700	8700	10500	14700	17100	19000	24850	25000	25000	34000	40700
Water temperatures Air to the unit	10°C − 15 24°C 50%												

Standard Height - SMART (Single Circuit Units)													
Unit	PH025	PH030	PH035	PH040	PH045	PH060	PH070	PH080	PH095	PH100	PH110	PH145	PH170
Total Gross Capacity [kW]	20.9	25.6	26.9	33.9	39.3	51.5	60.4	71.4	74.3	86.3	100.7	133.3	157.2
Net Sensible Capacity [kW]	20.3	24.6	26.1	32.9	38.3	50.0	58.6	68.9	71.6	83.3	97.2	127.0	149.1
Power Input [kW]	0.65	0.98	0.85	0.96	1.01	1.53	1.77	2.49	2.73	3.00	3.48	6.30	8.07
Net Sens EER	31.2	25.1	30.7	34.3	37.9	32.7	33.1	27.7	26.2	27.8	27.9	20.2	18.5
Airflow [m³/h]	6000	6900	8700	8700	10500	14700	17100	19000	24850	25000	25000	34000	40700
Water temperatures Air to the unit	20°C − 26 35°C 30%												

<b>Unit Dimension</b>	15												
Unit	PH025	PH030	PH035	PH040	PH045	PH060	PH070	PH080	PH095	PH100	PH110	PH145	PH170
Width [mm]	850	850	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

# Liebert® PCW Extended: Top Performer

Extended Hei	_															
Version			Exte	nded D	OWN						Ex	tended	UP			
Unit	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH2
Total Gross Capacity [kW]	51.2	80.1	95.1	179.0	124.6	173.2	214.7	253.7	51.2	80.1	95.1	119.0	124.6	173.2	214.7	253
Net Sensible Capacity [kW]	44.9	70.0	82.9	89.8	109.9	134.8	159.6	188.0	44.6	69.5	82.4	89.3	108.9	133.5	158.3	185
Power Input [kW]	1.32	1.53	2.07	1.93	2.58	3.84	4.74	5.39	1.55	2.01	2.63	2.39	3.51	5.10	6.03	7.5
Net Sens EER	34.0	45.8	40.0	46.5	42.6	35.1	33.7	34.9	28.8	34.6	31.3	37.4	31.0	26.2	26.3	24.
Airflow [m³/h]	11500	17650	21000	19500	28000	30800	34500	40400	11500	17650	21000	19500	28000	30800	34500	404
Water temperatures Air to the unit	7°C – 12 24°C 50															
Extended Hei	ght - E	co (s	ingle	Circu	ıit Un	its)										
Version			Exte	nded D	OWN						Ex	tended	UP			
Unit	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH2
Total Gross Capacity [kW]	35.8	51.9	63.7	76.9	87.2	116.2	138.4	162.9	35.8	51.9	63.7	76.9	87.2	116.2	138.4	162
Net Sensible Capacity [kW]	34.5	50.7	61.9	72.6	84.6	111.8	128.2	150.6	34.3	50.3	61.4	72.2	83.7	110.6	129.9	148
Power Input [kW]	1.31	1.19	1.79	1.85	2.55	3.69	4.50	5.39	1.54	1.55	2.29	2.31	3.48	4.92	5.79	7.2
Net Sens EER	26.3	42.6	34.6	39.2	33.2	30.3	28.5	27.9	22.3	32.5	26.8	31.3	24.1	22.5	22.4	20.
Airflow [m³/h]	11500	16100	20000	19500	28000	30800	34500	40400	11500	16100	20000	19500	28000	30800	34500	404
Water temperatures Air to the unit	10°C – 24°C 50			,	,						,			,	,	
Extended Hei	ght - S	MAR <sup>*</sup>	Γ (Sin	gle C	ircuit	Unit	s)									
Version		Extended DOWN									Ex	tended	UP			
Unit	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH2
Total Gross Capacity [kW]	37.1	53.7	66.0	79.6	90.4	120.3	143.3	168.3	37.1	53.7	66.0	79.6	90.3	120.3	143.3	168
Net Sensible Capacity [kW]	35.8	52.5	64.2	77.8	87.8	116.6	138.8	163.2	35.6	52.1	63.7	77.3	86.8	115.4	137.5	161
Power Input	1 31	1 10	1 70	1 95	2.55	3 60	4 47	5.07	154	1 55	2 20	2 21	3 /18	1 02	5.76	7 7

Unit	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201
Total Gross Capacity [kW]	37.1	53.7	66.0	79.6	90.4	120.3	143.3	168.3	37.1	53.7	66.0	79.6	90.3	120.3	143.3	168.3
Net Sensible Capacity [kW]	35.8	52.5	64.2	77.8	87.8	116.6	138.8	163.2	35.6	52.1	63.7	77.3	86.8	115.4	137.5	161.1
Power Input [kW]	1.31	1.19	1.79	1.85	2.55	3.69	4.47	5.07	1.54	1.55	2.29	2.31	3.48	4.92	5.76	7.23
Net Sens EER	27.3	44.1	35.9	42.0	34.4	31.6	31.1	32.2	23.1	33.6	27.8	33.5	24.9	23.5	23.9	22.3
Airflow [m³/h]	11500	16100	20000	19500	28000	30800	34500	40400	11500	16100	20000	19500	28000	30800	34500	40400
Water temperatures Air to the unit	20°C − 2 35°C 30															

<b>Unit Dimensio</b>	ns															
Version			Exte	nded Do	OWN						Ex	tended	UP			
Unit	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201	PH046	PH066	PH081	PH091	PH111	PH136	PH161	PH201
Width [mm]	1200	1750	2050	2050	2550	2550	2950	3350	1200	1750	2050	2050	2550	2550	2950	3350
Depth [mm]	890	890	890	890	890	890	890	890	890	890	890	890	890	890	890	890
Height [mm]	1970 + 600	2570	2570	2570	2570	2570	2570	2570	2570							

# Liebert® PCW: Top Performer

Standard Height - LEGACY (Double Circuits Units - One Circuit Running)												
Unit	PH040	PH060	PH080	PH110	PH145	PH170						
Total Gross Capacity [kW]	34.3	57.0	73.5	91.7	109.0	130.1						
Net Sensible Capacity [kW]	32.4	53.9	68.6	86.4	102.3	121.5						
Power Input [kW]	1.91	3.05	4.87	5.28	6.69	8.55						
Net Sens EER	17.0	17.7	14.1	16.4	15.3	14.2						
Airflow [m³/h]	10500	17450	23200	28400	34000	40700						
Water temperatures	7°C – 12°C											

Standard Heig	Standard Height - ECO (Double Circuits Units - One Circuit Running)											
Unit	PH040	PH060	PH080	PH110	PH145	PH170						
Total Gross Capacity [kW]	23.6	39.6	50.2	65.8	85.4	101.6						
Net Sensible Capacity [kW]	22.4	37.6	47.3	62.0	78.7	93.0						
Power Input [kW]	1.17	1.97	2.85	3.78	6.69	8.55						
Net Sens EER	19.1	19.1	16.6	16.4	11.8	10.9						
Airflow [m³/h]	8700	14700	19000	25000	34000	40700						
Water temperatures Air to the unit	10°C − 15°C 24°C 50% RH											

Standard Heig	Standard Height - SMART (Double Circuits Units - One Circuit Running)												
Unit	PH040	PH060	PH080	PH145	PH170								
Total Gross Capacity [kW]	24.5	41.1	52.0	68.3	88.6	105.4							
Net Sensible Capacity [kW]	23.3	39.1	49.1	64.5	81.9	96.8							
Power Input [kW]	1.17	1.97	2.85	3.78	6.69	8.55							
Net Sens EER	19.9	19.8	17.2	17.1	12.2	11.3							
Airflow [m³/h]	8700	14700	19000	25000	34000	40700							
Water temperatures Air to the unit	20°C − 26°C 35°C 30% RH												

Unit Dimensions												
Unit	PH040	PH060	PH080	PH110	PH145	PH170						
Width [mm]	1200	1750	2050	2550	2950	3350						
Depth [mm]	890	890	890	890	890	890						
Height [mm]	1970	1970	1970 1970		1970	1970						

# Liebert® PCW Extended: Top Performer

Extended Hei	xtended Height - LEGACY (Double Circuits Units - One Circuit Running)													
Version		Extended DOWN							Extended UP					
Unit	PH046	PH066	PH091	PH136	PH161	PH201	PH046	PH066	PH091	PH136	PH161	PH201		
Total Gross Capacity [kW]	44.1	70.5	80.6	117.4	133.9	155.8	44.1	70.5	80.6	117.4	133.9	155.8		
Net Sensible Capacity [kW]	40.4	63.7	71.8	108.2	122.0	142.6	40.1	63.2	71.3	106.9	120.7	140.4		
Power Input [kW]	1.64	1.97	2.07	3.93	4.74	5.35	1.89	2.47	2.55	5.19	6.03	7.55		
Net Sens EER	24.6	32.3	34.7	27.5	25.7	26.7	21.2	25.6	28.0	20.6	20.0	18.6		
Airflow [m³/h]	11500	17650	19500	30800	34500	40400	11500	17650	19500	30800	34500	40400		
Water temperatures Air to the unit		7°C − 12°C 24°C 50% RH												

Extended Heig	Extended Height - ECO (Double Circuits Units - One Circuit Running)													
Version		Extended DOWN					Extended UP							
Unit	PH046	PH066	PH091	PH136	PH161	PH201	PH046	PH066	PH091	PH136	PH161	PH201		
Total Gross Capacity [kW]	32.0	47.2	57.3	85.3	96.9	113.0	32.0	47.2	57.3	85.3	96.9	113.0		
Net Sensible Capacity [kW]	30.4	45.7	55.3	81.4	92.2	107.7	30.1	45.3	54.8	80.2	90.9	105.5		
Power Input [kW]	1.56	1.51	2.01	3.93	4.67	5.27	1.86	1.91	2.51	5.13	5.97	7.47		
Net Sens EER	19.5	30.3	27.5	20.7	19.7	20.4	16.2	23.7	21.8	15.6	15.2	14.1		
Airflow [m³/h]	11500	16100	19500	30800	34500	40400	11500	16100	19500	30800	34500	40400		
Water temperatures Air to the unit	10°C – 15° 24°C 50% I													

<b>Extended Heig</b>	Extended Height - SMART (Double Circuits Units - One Circuit Running)														
Version		Extended DOWN						Extended UP							
Unit	PH046	PH066	PH091	PH136	PH161	PH201	PH046	PH066	PH091	PH136	PH161	PH201			
Total Gross Capacity [kW]	33.2	49.0	59.4	88.5	100.6	117.3	33.2	49.0	59.4	88.5	100.6	117.3			
Net Sensible Capacity [kW]	31.6	47.5	57.4	84.6	95.9	112.0	31.3	47.1	56.9	83.4	94.6	109.8			
Power Input [kW]	1.62	1.51	2.01	3.93	4.67	5.27	1.86	1.91	2.51	5.13	5.97	7.47			
Net Sens EER	19.5	31.5	28.6	21.5	20.5	21.3	16.8	24.7	22.7	16.3	15.8	14.7			
Airflow [m³/h]	11500	16100	19500	30800	34500	40400	11500	16100	19500	30800	34500	40400			
Water temperatures Air to the unit	20°C – 26° 35°C 30% I	°C − 26°C °C 30% RH													

<b>Unit Dimension</b>	Unit Dimensions														
Version		Extended DOWN						Extended UP							
Unit	PH046	PH066	PH091	PH136	PH161	PH201	PH046	PH066	PH091	PH136	PH161	PH201			
Width [mm]	1200	1750	2050	2550	2950	3350	1200	1750	2050	2550	2950	3350			
Depth [mm]	890	890	890	890	890	890	890	890	890	890	890	890			
Height [mm]	1970 + 600	1970 + 600	1970 + 600	1970 + 600	1970 + 600	1970 + 600	2570	2570	2570	2570	2570	2570			

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Thermal Management Data Center Infrastructure for Small and Large Applications



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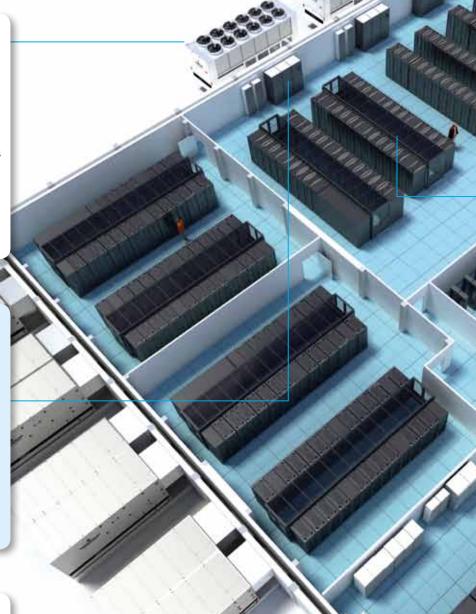
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