VERTIV™

Liebert®

PDX
from 15 to 120 kW

Direct Expansion Solution for Small and Medium Data Centers

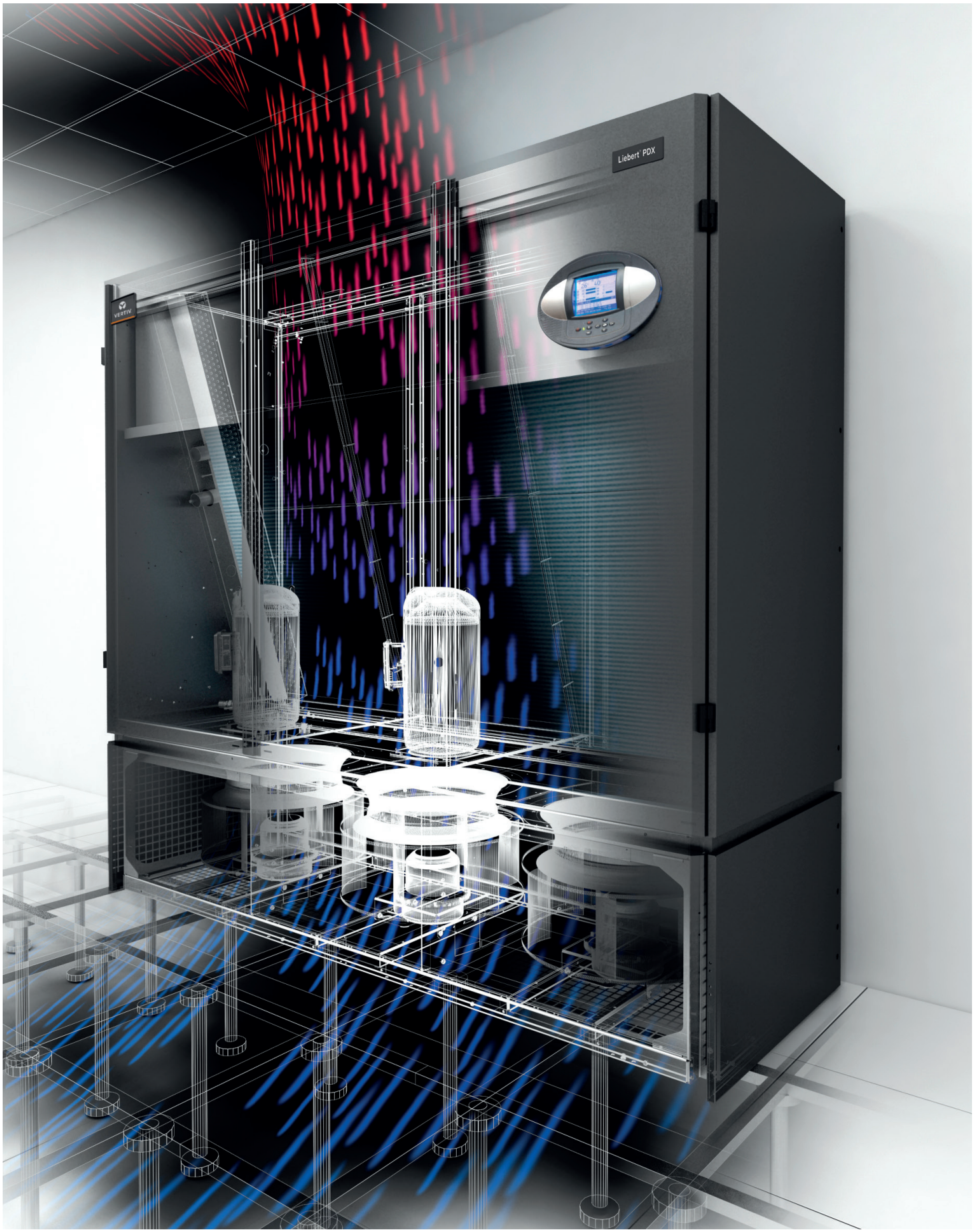
Vertiv™

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

The Liebert® PDX direct expansion cooling unit is equipped with the most advanced industry technology, guaranteeing precise cooling of data centers and server rooms.

It comes complete with R410A refrigerant which allows the unit to reach significant levels of efficiency. The Liebert PDX range also includes new generation Liebert EC Fans 2.0, thus ensuring top energy efficiency. The complete unit design has furthermore been optimized with enhanced heat exchangers, delivering high levels of overall efficiency and cooling capacity. In addition, Liebert PDX also includes unique Digital Scroll technology, making it the ideal, scalable cooling system able to expand with evolving business needs. The Digital Scroll modulating capability greatly contributes to the efficiency levels reached by Liebert PDX with a 50 kW unit (inclusive of Digital Scroll) consuming as little as a 10 kW unit, thus delivering advantageous energy savings.



Liebert PDX designed for ultimate energy efficiency

Liebert® PDX Key Features

R410A Refrigerant

Designed for R410A Refrigerant.

Copeland Digital Scroll Technology

The best solution in terms of variable cooling capacity.

Precise Temperature Control

Digital Scroll based technology allows for close monitoring and control of room temperature.

Liebert® EC Fan 2.0

The new generation of Liebert EC Fan 2.0 is the core of the Liebert PDX, significantly minimizing noise levels and increasing the efficiency of the unit.

Electronic Expansion Valve

This valve is designed to constantly optimize the refrigeration circuit's performance in order to achieve the highest efficiency also at partial load. The relevant valve management software is also embedded in the unit's Vertiv™ ICOM™ control function.

Vertiv ICOM Control - When Smart Means Efficient

Smart mode is a control algorithm developed for Vertiv SmartAisle™ containment applications, meeting the cooling and airflow needs of the servers while ensuring only necessary kilowatts are invested in targeted cooling.

European ErP 2015 Directive

Precision cooling floor mount products comply with the European ErP 2015 Directive requirements, respecting environmental commitments while reducing operating costs.

Energy Efficiency

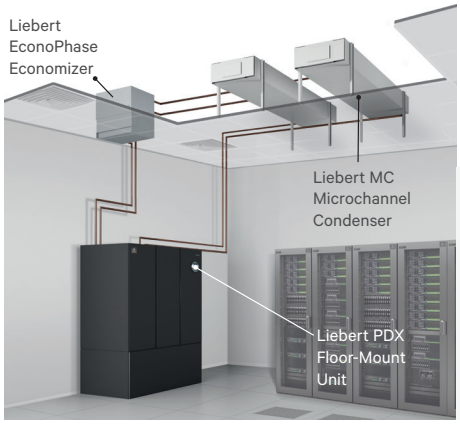
First-class energy efficiency achieved through the combination of market leading technologies.

Ultrasonic Humidifier - The Efficient Humidification Technology

Liebert PDX 's cutting-edge technology allows each of its components to save energy while delivering the required data center cooling performance. The infrared and electrode boiler humidifier are two efficient options made available.

Freecooling Modes for Optimizing System Efficiency

- Fresh Air/Direct Freecooling
- Water/Indirect Freecooling
- Liebert EconoPhase™ Pumped Refrigerant Economizer.



The Liebert EconoPhase pumped refrigerant economizer is compatible with the Liebert PDX and Liebert MC to improve thermal management and control, while drastically cutting energy costs and lowering pPUE.

Heat Load Monitoring

Continuous monitoring of heat load ensures that only necessary kilowatts are invested in targeted cooling, thus conserving energy.

24x7 Service Offering

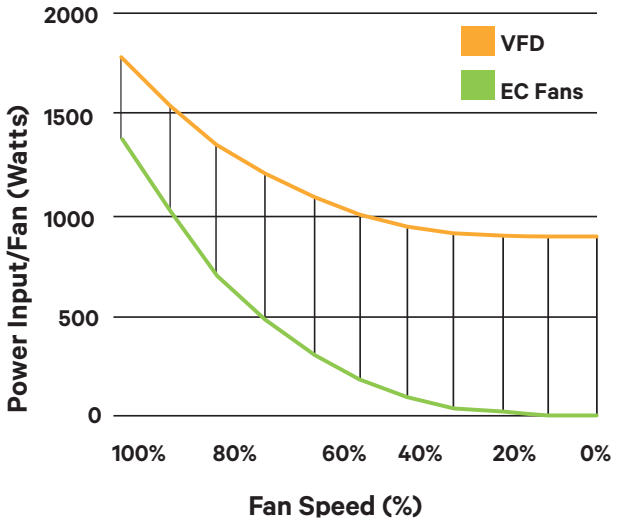
Vertiv supports customers with an extensive service offering, guaranteeing availability and total peace of mind 24/7.

Liebert® MC: The New Condensing Technology

Liebert® MC new microchannel condensers are ideally designed to match the outstanding performances of Liebert PDX. The highly efficient Liebert MC unit directly communicates with Liebert PDX units via the integrated Vertiv™ ICOM™ Control, providing significant advantages in terms of condenser management. The Liebert MC can thus be managed through the Liebert PDX Vertiv ICOM control allowing the complete coordination of unit and condenser settings status and alarm conditions. The possibility of selecting silent functioning modes at defined times (i.e. during the night or the weekend), through the unit control, further ensures full operating flexibility.

High Efficiency at Full and Partial Load Conditions

Liebert MC microchannel condensers, equipped with EC fans, deliver a 20% increase in unit efficiency at full load, when compared to a standard condenser adopting the Variable Frequency Drive (VFD). Efficiency levels are further optimized at partial load where the EC Fans require a lower power input, thus reducing energy consumption and guaranteeing top-tier performances.



For specific environments in which microchannel condenser use is limited, Liebert HCR base condensers are available.

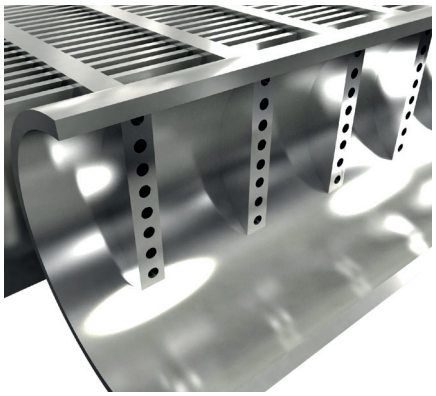
Liebert® MC: Enhancing Efficiency Levels

Microchannel Condensing Coil:

The full aluminum coil ensures enhanced efficiency levels also during the mechanical cooling mode.

New generation EC Fans:

The new generation EC Fans guarantee the highest efficiency at full and at partial load, ensuring also extremely silent operations.



Microchannel Aluminum Coils

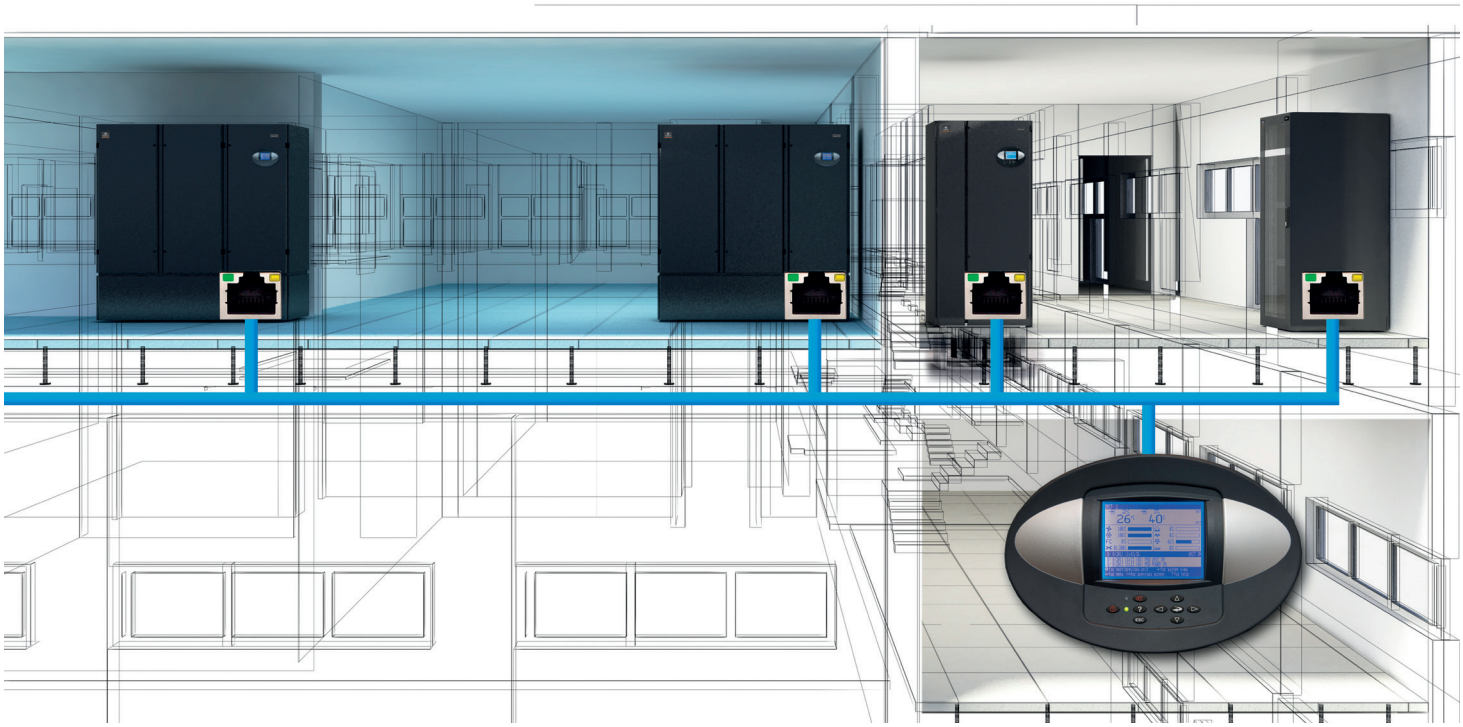
Vertiv™ ICOM™ Control Drives Liebert® PDX to the Highest Efficiency Levels

The Vertiv™ ICOM™ device features a unique control algorithm designed to manage the operation of the Liebert® PDX units, ensuring top reliability in all conditions. Liebert PDX units with the Vertiv ICOM control 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 Liebert PDX 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 optimizing room temperature and humidity. This is of particular importance for EC fans. EC fan power consumption is exponential. Having five units running at 80% instead of four at 100% will lower the total energy used by the entire group by 36%. Vertiv ICOM manages the reduction of fan speed whenever operation at full capacity is not required. Liebert PDX digital modulates both fans and compressors thus increasing the entire system's efficiency. Efficiency is in turn further increased as a result of Liebert PDX's ability to share the heat load among installed units, guaranteeing ideal cooling levels while minimizing consumption.

Unit to Unit Communication

Vertiv ICOM directly connects with the facility network (Ethernet) and enables communication between multiple Liebert PDX units for synchronized operation, guaranteeing increased reliability and precision cooling room control.

Smart mode is a control algorithm developed for Vertiv SmartAisle™ containment applications, meeting the exact cooling and airflow needs of the servers, investing only necessary kilowatts in targeted cooling.



Liebert® PDX: Remote Diagnostic and Preventive Monitoring Services

Vertiv™ LIFE™ Services Remote Diagnostic and Preventive Monitoring

Proactive equipment maintenance reduces downtime and extends equipment life which in turn maximizes return on investment and increases system availability. Vertiv supports entire critical infrastructures with an extensive service offering, guaranteeing network availability and total peace of mind 24/7. Our approach to servicing critical infrastructure covers all aspects of availability and performance, from single units to entire mission critical systems, providing customers with tailored services to meet their individual business needs. Vertiv's service program is designed to ensure that your critical Thermal Management system is maintained in an optimum state of readiness at all times. Vertiv LIFE Services enable 24/7 Remote Diagnostic and Preventive Monitoring providing early warning of Thermal Management units conditions and out of tolerances. This allows proactive maintenance and remote trouble shooting minimizing the risk of downtime and optimizing Mean Time Between Failures and First Time Fix Rate, granting total peace of mind.

Basic Web Access

Basic operational information can be made available through the monitoring feature offered by the Vertiv 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

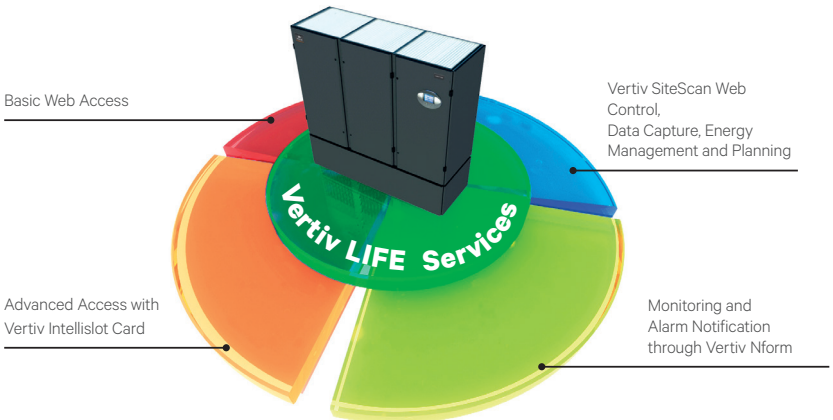
The Liebert® PDX system can be fitted with a Vertiv IntelliSlot® Unity Card allowing full advantage to be taken of the Ethernet network and remote monitoring from your computer desktop, network operations center or any network access simply utilizing a standard web browser. A standard web browser, via 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 PDX may be integrated with an existing Building Management System, while the Vertiv IntelliSlot Unity Card provides Modbus RTU and Modbus TCP compatibility. SCADA support is completed through the Bacnet over IP card.

Vertiv 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. Vertiv Nform leverages the network connectivity capabilities of Liebert PDX to provide centralized monitoring of the distributed equipment. Utilizing the SNMP and Web technologies integrated in the IntelliSlot communication card, Vertiv Nform centrally manages alarm notifications and provides an intuitive interface to access critical status information. Vertiv 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.



Vertiv 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, Vertiv SiteScan Web will centrally manage critical equipment and give the power to move beyond the event responsive service paradigm.

Vertiv SiteScan Web does it all

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

Vertiv 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® PDX - Scroll Specifications

SINGLE CIRCUIT											
Model		**PX015**	**PX021**	**PX025**	**PX031**	**PX033**	**PX041**	**PX045**	**PX059**	**PX047**	**PX051**	**PX057**
Total Gross Cooling Capacity	kW	13.9	19.1	25.0	30.1	34.2	40.41	44.6	57.3	46.28	53.1	59.0
Net Sensible Cooling Capacity	kW	13.4	18.2	23.2	26.5	28.7	35.8	39.1	45.1	43.8	50.0	54.6
SHR		1.00	1.00	0.98	0.94	0.90	0.93	0.93	0.82	1.00	1.00	0.98
Net Sensible EER		4.37	3.93	3.53	3.21	3.09	3.51	3.33	2.99	3.70	3.47	3.40
Airflow	m³/h	4462	5672	6792	7752	7944	10000	10900	11200	14500	15800	16300
Max. ESP	Pa	250	250	250	220	180	250	100	80	300	300	300
Dimensions (W x D)	mm	844 x890	844 x 890	844 x 890	844 x 890	844 x 890	1200 x 890	1200 x 890	1200 x 890	1750 x 890	1750 x 890	1750 x 890
Height (H)	mm	1970	1970	1970	1970	1970	1970	1970	2570	1970	1970	1970
Weight	kg	290	300	320	340	340	452	456	593	620	621	675
Number of Capacity Steps		1	1	1	1	1	1	1	2	1	1	2
Aiflow Delivery Down Flow UP - Fans Over the Raised Floor Up Flow Frontal Downflow Down - Fans in Raised Floor												
Cooling Version: Air Cooled Water Cooled Dual fluid (Chilled water + DX Air Cooled) Dual fluid - Chilled water + DX Water Cooled Freecooling EconoPhase												

DOUBLE CIRCUITS											
Model		**PX044**	**PX054**	**PX062**	**PX068**	**PX074**	**PX092**	**PX082**	**PX094**	**PX104**	**PX120**
Total Gross Cooling Capacity	kW	44.8	55.1	62.5	66.1	74.8	92.5	85.7	94.5	106.5	123.9
Net Sensible Cooling Capacity	kW	42.3	51.2	55.6	62.2	62.9	72.2	78.4	84.9	91.7	100.7
SHR		0.99	0.99	0.95	0.98	0.90	0.82	0.97	0.96	0.92	0.86
Net Sensible EER		3.79	3.53	3.35	4.08	3.09	2.93	3.60	3.38	3.10	2.95
Airflow	m³/h	12500	15500	16300	18500	17600	17950	24000	26000	27000	27000
Max. ESP	Pa	300	200	200	300	80	180	250	150	100	100
Dimensions (W x D)	mm	1750 x 890	1750 x 890	1750 x 890	2550 x 890	1750 x 890	1750 x 890	2550 x 890	2550 x 890	2550 x 890	2550 x 890
Height (H)	mm	1970	1970	1970	1970	1970	2570	1970	1970	1970	1970
Weight	kg	638	642	680	887	680	776	901	901	901	954
Number of Capacity Steps		2	2	2	2	2	2	2	2	2	4
Aiflow Delivery Down Flow UP - Fans Over the Raised Floor Up Flow Frontal Downflow Down - Fans in Raised Floor											
Cooling Version: Air Cooled Water Cooled Dual fluid (Chilled water + DX Air Cooled) Dual fluid - Chilled water + DX Water Cooled Freecooling EconoPhase											

Performances at 24°C 50% - 45°C condensing temperature - Nominal ESP 20 Pa

Liebert® PDX - Digital Scroll - Vertiv™ SmartAisle™

SINGLE CIRCUIT

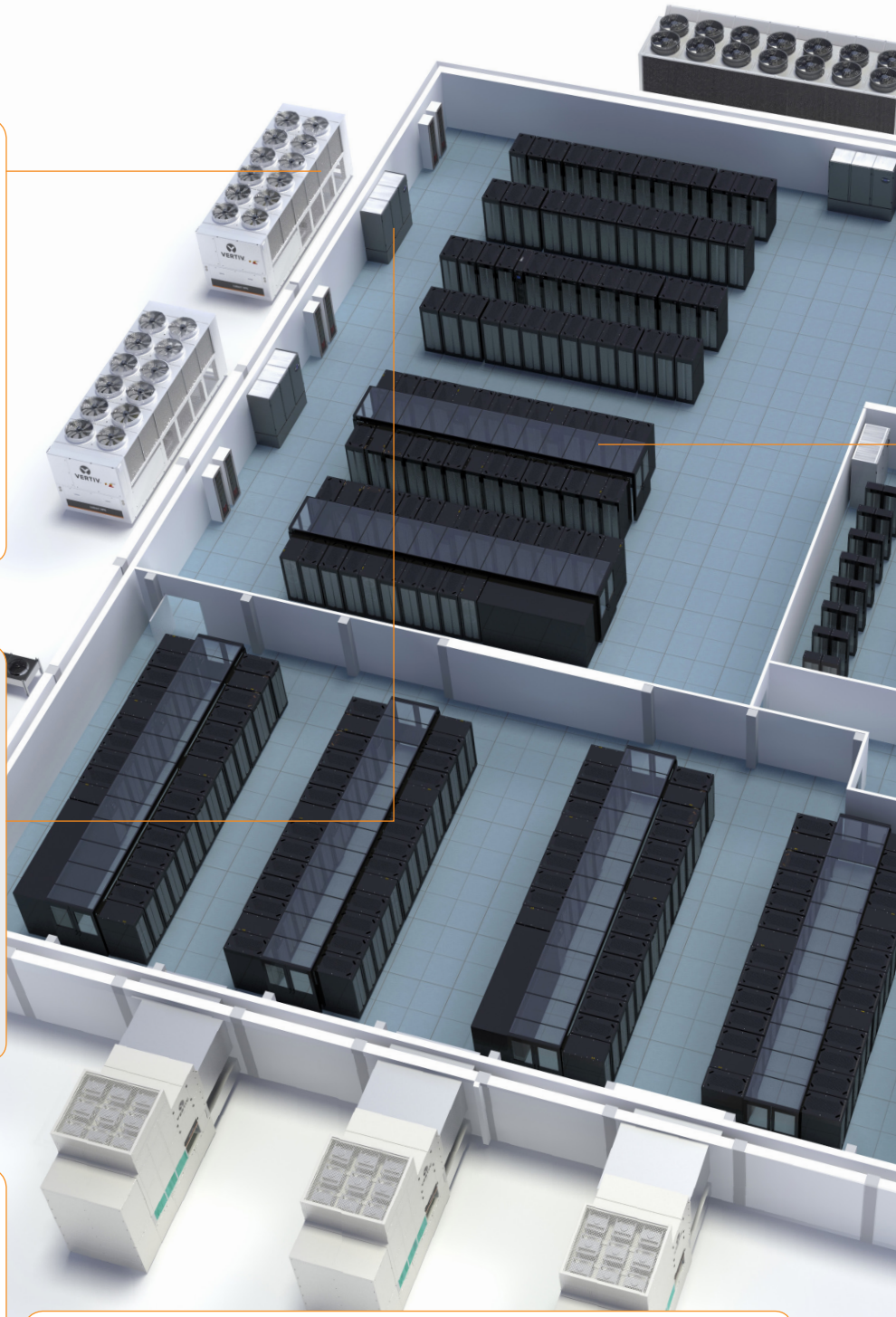
Model		PX021	PX025	PX031	PX033	PX041	PX045	PX059	PX047	PX051	PX057
Total Gross Cooling Capacity	kW	24.9	32.4	37.8	41.9	50.3	55.4	68.8	63.0	67.4	74.6
Net Sensible Cooling Capacity	kW	24.1	31.1	36.0	39.9	48.4	53.0	66.4	60.5	64.3	71.3
SHR		1.00	1.00	0.98	0.94	0.90	0.93	0.93	1.00	1.00	1.00
Net Sensible EER		4.79	4.65	4.24	4.18	4.62	4.36	4.35	4.58	4.53	4.37
Airflow	m³/h	5672	6792	7752	7944	10000	10900	11200	14500	15800	16300
Max. ESP	Pa	250	250	230	200	250	100	80	300	300	300
Dimensions (W x D)	mm	844 x890	844 x 890	845 x 890	844 x 890	1200 x 890	1200 x 890	1200 x 890	1750 x 890	1750 x 890	1750 x 890
Height (H)	mm	1970	1970	1970	1970	1970	1970	2570	1970	1970	1970
Weight	kg	300	320	340	340	452	456	593	635	637	675
Minimum Nominal Capacity Modulation		1	20%	20%	20%	20%	20%	25%	25%	25%	25%
Aiflow Delivery Down Flow UP - Fans Over the Raised Floor Up Flow Frontal Downflow Down - Fans in Raised Floor											
Cooling Version: Air Cooled Water Cooled Dual fluid (Chilled water + DX Air Cooled) Dual fluid - Chilled water + DX Water Cooled Freecooling EconoPhase											

DOUBLE CIRCUITS

Model		PX044	PX054	PX062	PX068	PX074	PX092	PX082	PX094	PX104	PX120
Total Gross Cooling Capacity	kW	61.0	72.8	80.4	90.1	94.5	113.3	111.8	126.3	133.4	153.4
Net Sensible Cooling Capacity	kW	59.0	69.3	76.6	87.5	89.8	109.3	106.6	120.1	126.5	146.5
SHR		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Net Sensible EER		5.19	4.80	3.28	5.60	4.34	4.38	4.46	4.33	4.35	4.22
Airflow	m³/h	12500	15500	16300	18500	17600	17950	24000	26000	27000	27000
Max. ESP	Pa	300	200	200	300	80	180	250	150	100	100
Dimensions (W x D)	mm	1750 x 890	1750 x 890	1750 x 890	2550 x 890	1750 x 890	1750 x 890	2550 x 890	2550 x 890	2550 x 890	2550 x 890
Height (H)	mm	1970	1970	1970	1970	1970	2570	1970	1970	1970	1970
Weight	kg	638	642	680	887	680	776	931	931	931	954
Minimum Nominal Capacity Modulation		10%	10%	10%	10%	10%	10%	12,5%	12,5%	12,5%	12,5%
Aiflow Delivery Down Flow UP - Fans Over the Raised Floor Up Flow Frontal Downflow Down - Fans in Raised Floor											
Cooling Version: Air Cooled Water Cooled Dual fluid (Chilled water + DX Air Cooled) Dual fluid - Chilled water + DX Water Cooled Freecooling EconoPhase											

Performances at 37°C 24% - 45°C condensing temperature - Nominal ESP 20 Pa - Fan over the floor

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 Vertiv™ SmartAisle™
- Premium energy efficiency version
- Unique control capabilities with the Vertiv ICOM™ Control.

Liebert PDX
Liebert PCW

Available from 5-220 kW

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

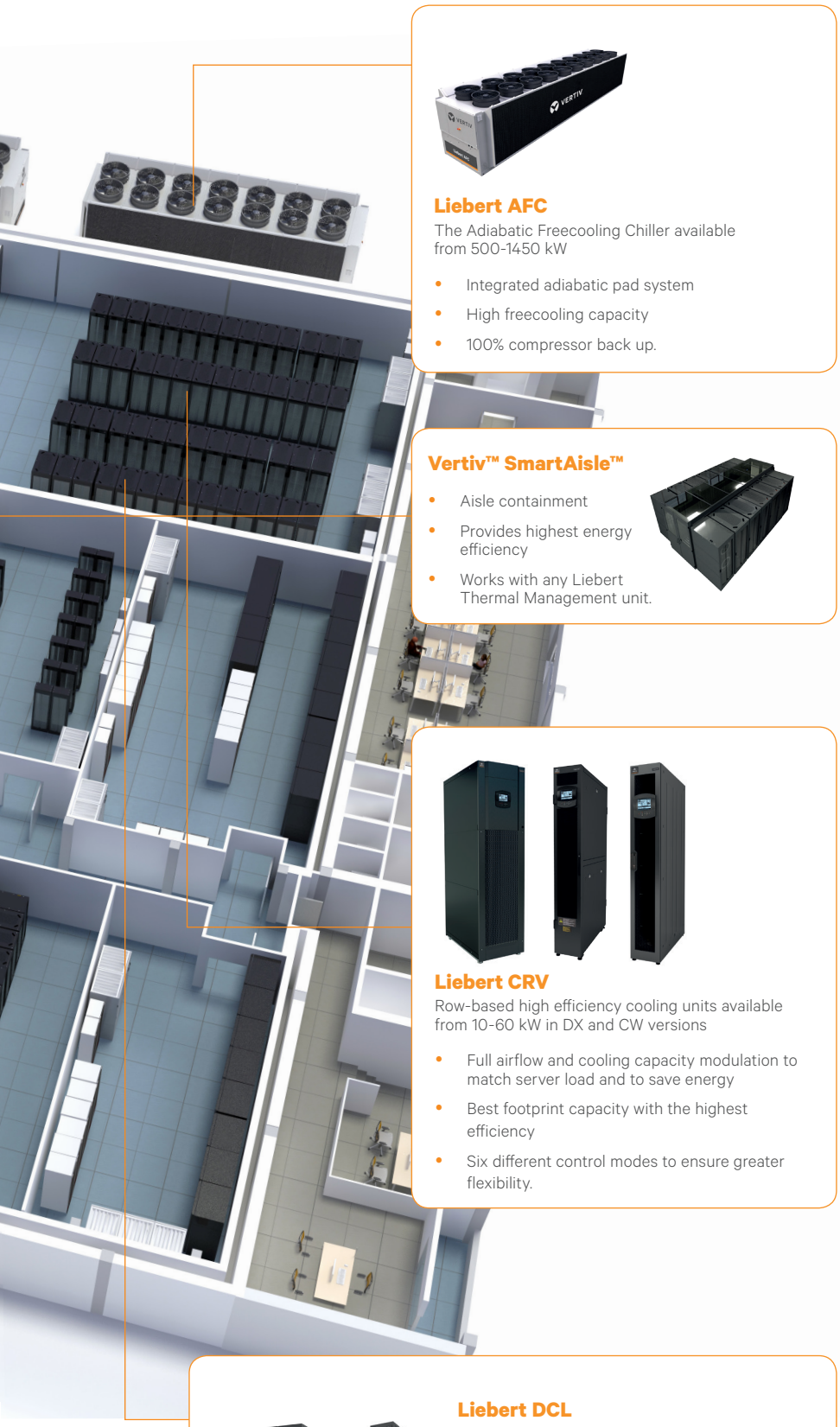
Liebert EFC

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.

Vertiv™ *Trellis*™ Platform

Vertiv's *Trellis*™ platform is a real-time infrastructure optimization platform that enables the unified management of data centre IT and facilities infrastructure. The Vertiv *Trellis* platform software can manage capacity, track inventory, plan changes, visualize configurations, analyze and calculate energy usage, and optimize cooling and power equipment. The Vertiv *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.

Vertiv™ 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.

SERVICES

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 Vertiv which includes access to Vertiv LIFE™ Services.

VERTIV™ LIFE™ SERVICES

Vertiv LIFE Services provides Remote Diagnostics and Preventive Monitoring 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 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.

VertivCo.com | **Emerson Network Power Limited,** George Curl Way, Southampton, SO18 2RY, VAT Number: GB188146827

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