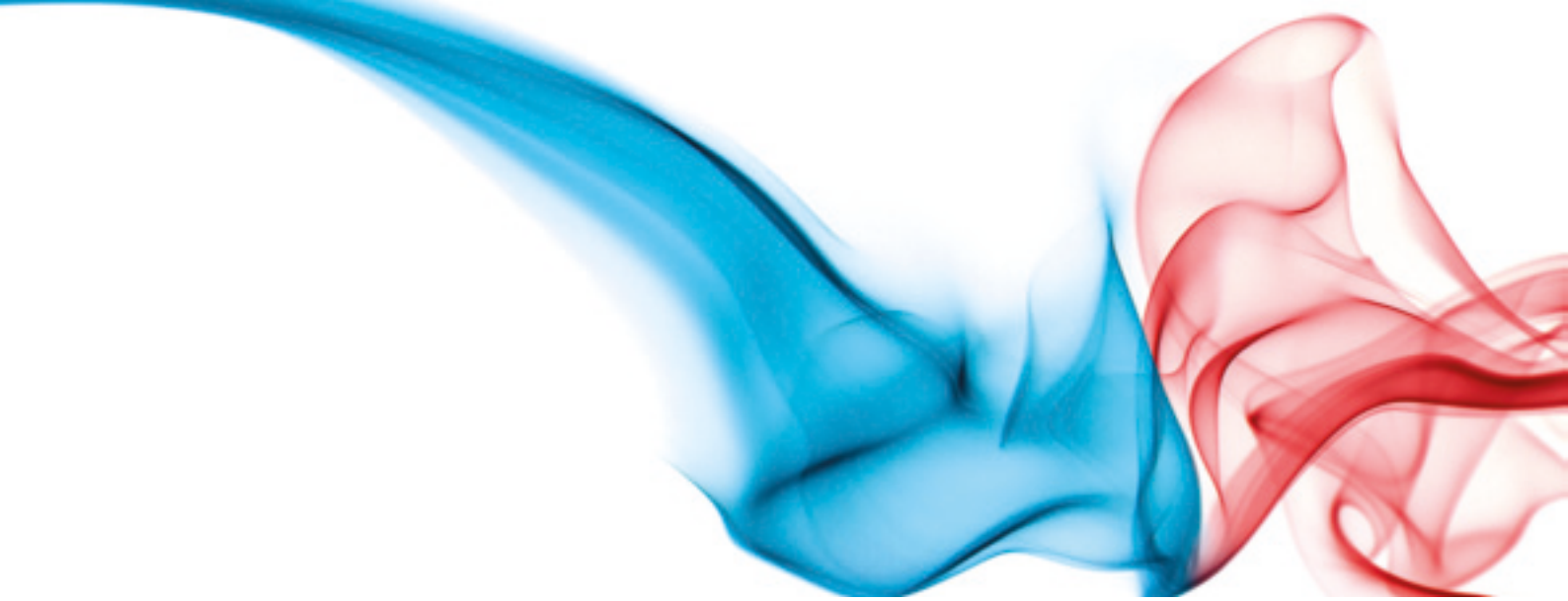
Precision Cooling for
Business-Critical Continuity™

Liebert® HPM from 4 kW to 100 kW

Efficient Direct Expansion Cooling for Data Centers

With R410A Refrigerant

EMERSON
Network Power



Whether a data center houses three or 200 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.

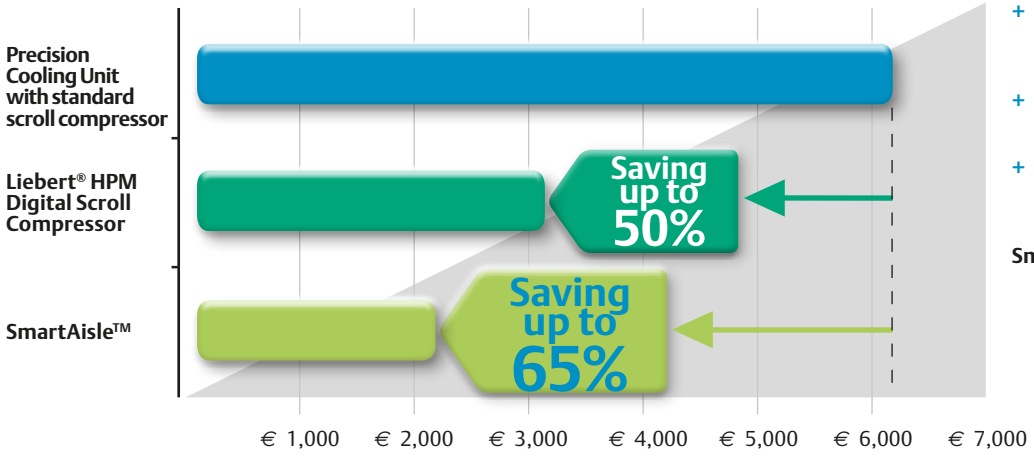
- **Emerson Network Power delivers innovative solutions through 12 Centers of Expertise**, distinct areas of breakthrough products and services that help determine what is needed in relation to the application. Supported by a global network in more than 150 countries, backed by local service and support 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.

- **The Liebert® HPM 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.** Liebert® HPM incorporates Emerson Network Power's breadth of cooling expertise in a unique range of cabinet air coolers designed to ensure performance and reliability. The Liebert® HPM range comes complete with EC Fans as standard, thus ensuring top energy efficiency. The complete unit design has furthermore been optimized with enhanced heat exchangers, delivering a high level of overall efficiency and cooling capacity.
In addition, the Liebert® HPM 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 the Liebert® HPM with a 50 kW unit (inclusive of Digital Scroll) consuming as little as a 10 kW unit, thus delivering advantageous energy savings.

Liebert® HPM designed for the lowest air resistance

Liebert® HPM Technology Delivers Energy Savings of up to 65%



Liebert® HPM Digital Scroll
+ **EC Fan**
  Increased motor efficiency
+ **EXV**
  Minimized condensing temperature & enhanced evaporation
+ **Humidifier**
  SHR*=1 eliminating need for humidifier
+ **COP* & SHR***
  Liebert® HPM has higher COP* & SHR* at modulated capacity

SmartAisle™
The Liebert® HPM's patented software allows modulation of fan speed and cooling capacity, meeting the necessary airflow at the required server temperature, while conserving Watt usage.

Data Center Set Point: 24°C - 50 rH% Energy Cost: 0.12/kWh A 20 kW Unit equipped with Digital Scroll working at 80% heat load

Annual savings achieved by the Liebert® HPM, complete with the most advanced technologies in the market (Digital Scroll Compressor, Electronic Expansion Valve, EC Fan) as standalone and integrated with cold aisle containment, compared to Precision Cooling units fitted with standard scroll.

Key Benefits Achieved with Liebert® HPM Scroll

Securing IT Investments
Digital Scroll technology delivers increased performance with a greater return on investment while at the same time reducing the demand on energy usage.

Targeted Cooling
Digital Scroll provides the necessary level of cooling by adjusting its delivery according to the heat load, thus ensuring constant, precise temperature levels.

Scalable Architecture
the Liebert® HPM's scalable architecture adapts to increases in data center density and size, regulating its performance to respond to evolving demands.

Unique Technology
the Digital Scroll technology guarantees protection for IT infrastructure with maximized energy savings.

**COP: coefficient of performance SHR: sensible heat ratio*

Integrated with SmartAisle™, the Liebert® HPM is the ideal response to data center cooling demands and maximizing capital investment.

R-410A refrigerant

Designed for R410A Refrigerant

digital scroll

Copeland Digital Scroll Technology: the best solution in terms of variable cooling capacity

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

ECfan

EC Fans for optimized airflow distribution

ErP2015

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

ee energy efficiency

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

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

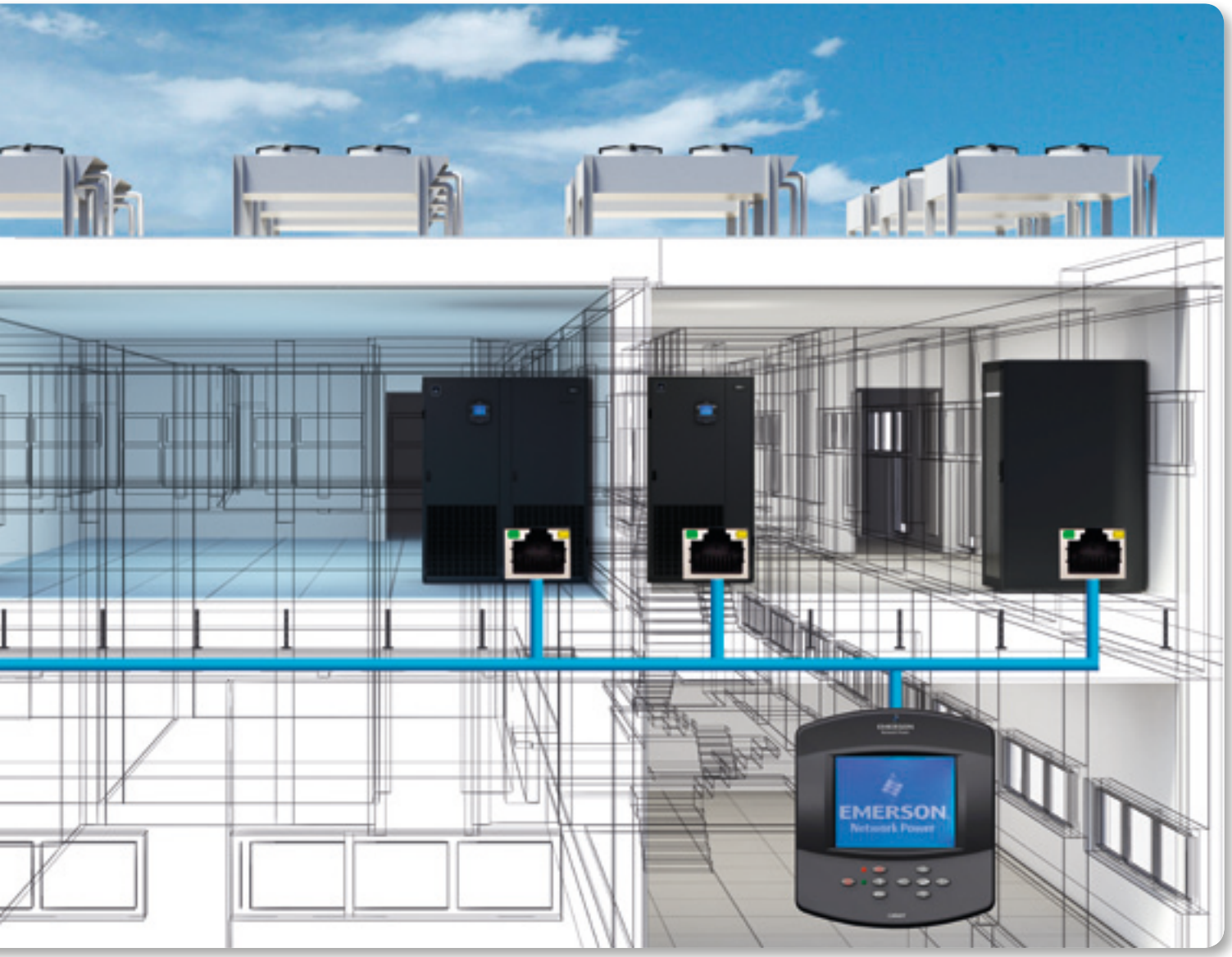
24x7 services

Emerson Network Power supports customers with an extensive service offering, guaranteeing availability and total peace of mind 24/7

Constant Cooling Control - Liebert® iCOM® control drives the Liebert® HPM to the highest efficiency levels. The iCOM® device, featuring a unique control algorithm ensuring top reliability in all conditions, manages the operation of the Liebert® HPM units.

Liebert® HPM 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® HPM 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 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® manages the reduction of fan speed whenever operation at full capacity is not required.

Smart mode is a control algorithm developed for SmartAisle™ 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.



Unit to Unit Communication
iCOM® directly connects with the facility network (Ethernet) and enables communication between multiple Liebert® HPM units for synchronized operation, guaranteeing higher reliability and precision cooling room control.

Liebert® HPM's integration in the SmartAisle™ configuration achieves energy savings of up to 65%

	Standard unit Traditional Approach	Digital Unit Traditional Approach	With Cold Aisle Containment	With SmartAisle™
Compressor	61.1%	35.4%	30.3%	27.2%
Condenser	4.9%	4.9%	4.9%	4.9%
Evaporator Fan	18.6%	9.7%	6.8%	2.1%
Humidifier	15.4%	1.2%	1.2%	1.2%
Total	100%	51.2%	43.2%	35.4%
Total Saving		Saving 49%	Saving 57%	Saving 65%

Integration with SmartAisle™*, Emerson Network Power's cold aisle containment solution, can achieve an energy saving of up to 65% higher than other manufacturers' cooling units with standard technology. The intelligent control of the Digital Scroll compressor capacity together with accurate fan speed management, driven by cold aisle conditions, guarantees increased savings.*

1

SmartAisle™ Cold Aisle Containment

The physical separation of cold and warm air zones using SmartAisle™ technology. Aisle Containment ensures that the cold air distributed through the raised floor is delivered directly to IT cabinets.
The SmartAisle™ containment solution also incorporates enhancements in cooling efficiency which can be achieved using the following equipment:

- Cable entry sealing systems
- Cabinet sealing with trims and blanking panels
- High airflow perforated floor tiles with up to 85% perforation.

2

iCOM® with SmartAisle™ Control Logic

A cooling unit with SmartAisle™ control logic ensures the correct airflow, air temperature and humidity required by IT equipment. Dynamic fan speed and cooling capacity control further provide maximum cooling efficiency.

3

Liebert® HPM

Liebert® HPM's Digital Scroll compressor delivers the exact level of required air temperature while the EC Fans manages the desired airflow. This ensures that only the necessary kilowatts of input power are used to cool the IT load. Units which include the Alco Electronic Expansion Valve, are able to further increase overall system efficiency by reducing the condensing temperature during cooler seasons and at the same time preserving the SHR*.

4

Liebert® HPA

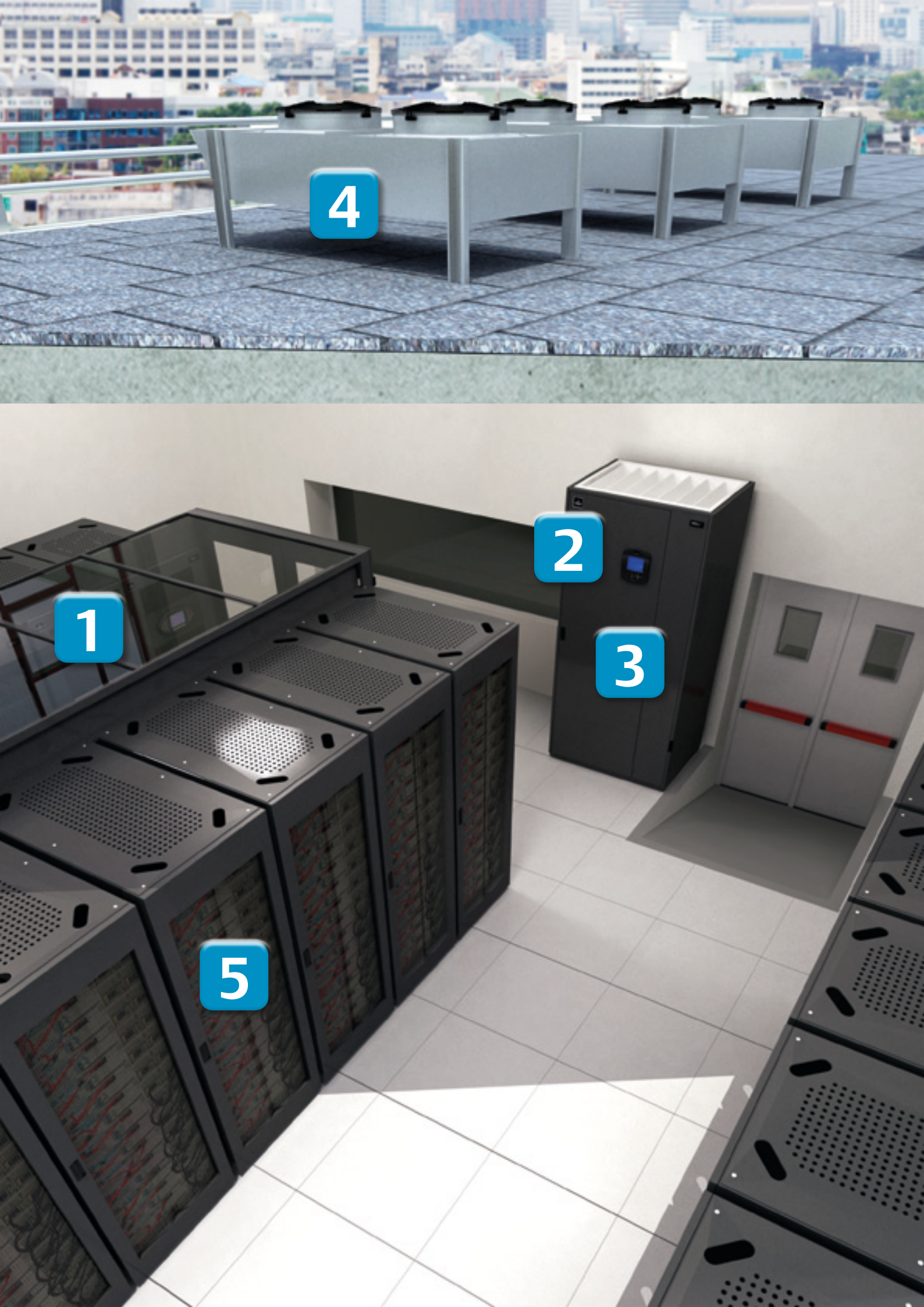
Liebert® HPA is a remote air cooled condenser for room-based precision cooling units which is equipped with variable fan speed control, specifically developed for Digital Scroll units. This solution maximizes system efficiency and minimizes, annual energy consumption.

5

Racks & Integrated Cabinets

Emerson Network Power's Knürr server racks allow for flexible installation of accessories, as well as a complete cable management system. The server rails guarantee simplified installation of all types of 19" servers and related accessories.

*SHR: sensible heat ratio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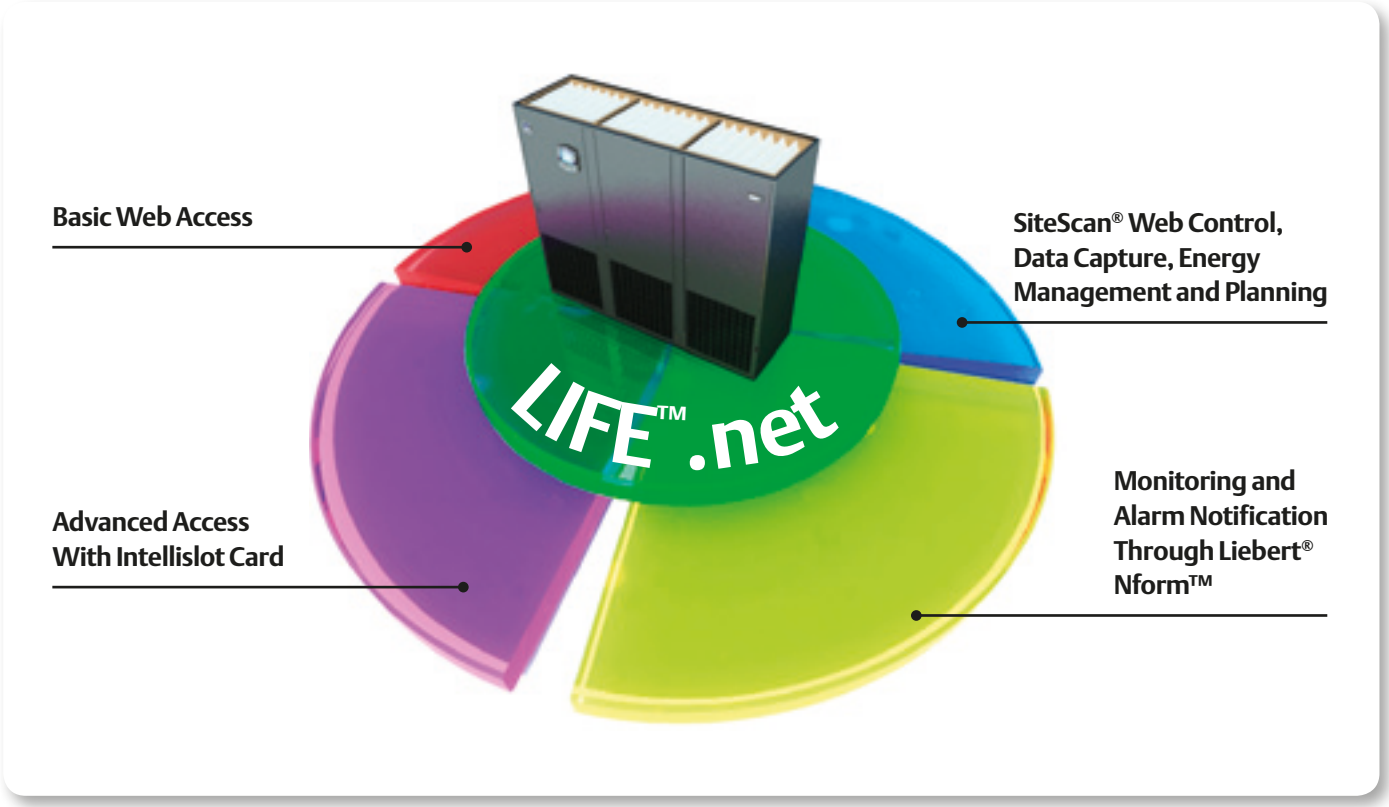
Liebert® HPM: Remote Monitoring Service and Connectivity

- **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 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® 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® HPM 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® HPM 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® HPM to provide centralized monitoring of the distributed equipment. Utilizing the SNMP and Web technologies integrated in each Liebert® IntelliSlot communication card, Liebert® Nform™ 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 ever-moving 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® HPM Application Scenarios

Liebert® HPM Downflow

Downflow units are ideal for raised floor installation environments which are commonly found in data center applications.
The Downflow unit optimizes performance in all such applications, delivering the highest efficiency of the Liebert® HPM range, which can be further maximized with Digital Scroll.

Suitable for:
- Raised Floor
- SmartAisle™

Liebert® HPM Upflow

Upflow units are designed for use in applications with top directed air distribution, including or excluding ducting systems. The inclusion of EC Fans means that the Liebert® HPM Upflow is able to deliver the highest External Static Pressure (ESP), while limiting power input and maximizing output. This combination allows the Liebert® HPM to deliver optimized cooling requirements, while at the same time providing the most suitable airflow and ESP to meet individual installation requirements.

Suitable for:
- Ducted Applications
- Application with limited raised floor air distribution capabilities or where raised floor is not available
- Technical rooms

Liebert® HPM Displacement

Displacement units take their name from the displacement effect. It consists of the stratification of cold air in the lower section of the room, and hot air in the upper section. This is achieved by delivering cooled air at a very low speed. The displacement effect considerably contributes to system efficiency. The Liebert® HPM Displacement unit is best suited to small applications where scalability and capacity growth are key.

Suitable for:
- Application without raised floor
- Technical rooms
- Small data rooms with cooling installed opposite racks

Liebert® HPM Cooling Configurations

Liebert® HPM Air Cooled

Air cooled direct expansion units optimize condensing temperature in the simplest installation configurations and with minimized site impact.

Liebert® HPM Water Cooled

The Liebert® HPM Water Cooled is the ideal configuration for leveraging the digital benefits of applications with significant distances between internal and external units, or those with variations in geodetic height.

Liebert® HPM Dual Fluid Air Cooled

Ideal for chilled water based applications which transition between Air Conditioning and Precision Cooling, the Liebert® HPM Dual Fluid Air Cooled configuration, offers efficient direct expansion cooling that works as redundant cooling for chilled water coils.

Liebert® HPM Dual Fluid Water Cooled

This cooling configuration perfectly adapts to any installation layout, therefore chillers and dry coolers can be placed wherever necessary on the site.

Liebert® HPM Freecooling

For all applications where efficiency is a prime objective, the Liebert® HPM offers the possibility of leveraging the Freecooling effect for the longest period of time, as a result of its enhanced coil distribution. The flexibility of the Liebert® HPM Freecooling configuration ensures the highest energy savings and efficiency in variable working conditions including DX mode.

Liebert® HPM Range and Performance

		Single Circuit					
Room Unit Model		**D1E**	**D1G**	**D2E**	**D3A**	**D3G**	**D4E**
Condenser Model		HCR24	HCR24	HCR43	HCR43	HCR43	HCR59
Total gross cooling capacity	kW	15.8	17.4	23.9	29,0	34.9	44.1
Net sensible cooling capacity	kW	13.9	15.9	20.5	25.2	33.0	40.4
SHR* at full load		0.92	0.95	0.92	0.92	0.98	0.96
SHR* at 80% load		1.00	1.00	1.00	1.00	1.00	1.00
Net sensible EER at full load		3.2	3.1	3.0	3.1	3.4	3.2
Net sensible EER at 80% load		3.4	3.2	3.1	3.1	3.4	3.2
Airflow	m^3/h	4.200	4.930	5.750	7.080	9.540	11.230
Max. ESP	Pa	400	380	190	200	400	320
Sound pressure level at 2 meters in f.f. conditions	dB(A)	48.8	49.2	50.0	55.4	55.8	57.4
Minimum net sensible capacity during modulation	kW	3.2	4.1	5.1	6.2	8.6	9.9
Internal Unit Dimensions (W x D)	mm	750 x 750	750 x 750	750 x 750	1000 x 850	1750 x 850	1750 x 850
External Unit Dimensions (W x D)	mm	1112 x 1340	1112 x 1340	1112 x 1340	1112 x 2340	1112 x 2340	1112 x 2340
Weight Internal Unit	kg	240	250	270	415	570	600
Weight External Unit	kg	75	75	92	92	92	102
Airflow Delivery (downflow, upflow, displacement/frontal)		D, U, F*	D, U, F*	D, U, F*	D, U, F*	D, U*	D, U*

"Performance at 24°C 50%
Nominal ESP 20 Pa
External Temperature 35°C
System able to work at up to 40°C external temperature with condenser models as shown; higher ambient operating temperatures available with alternative condenser selections.
Internal Unit Height 1950 mm; External Unit Height 907 mm"
**SHR: sensible heat ratio D: downflow U: upflow F: frontal*

Liebert® HPM Range and Performance

		Double Circuits				
Room Unit Model		**D3F**	**D4H**	**D5D**	**D7L**	**D8F**
Condenser Model		2 x HCR24	2 x HCR33	2 x HCR43	2 x HCR43	2 x HCR51
Total gross cooling capacity	kW	36.3	45.1	58.4	65.2	81.3
Net sensible cooling capacity	kW	34.0	41.5	49.4	53.4	71.0
SHR* at full load		0.97	0.96	0.90	0.87	0.93
SHR* at 80% load		1.00	1.00	1.00	0.95	1.00
Net sensible EER at full load		3.4	3.2	3.0	2.8	2.7
Net sensible EER at 80% load		3.6	3.4	3.2	3.1	2.8
Airflow	m^3/h	9.490	11.370	12.910	13.470	20.020
Max. ESP	Pa	400	310	200	150	120
Sound pressure level at 2 meters in f.f. conditions	dB(A)	56.0	58.3	58.7	58.5	67.4
Minimum net sensible capacity during modulation	kW	3.5	4.2	4.8	5.3	6.8
Internal Unit Dimensions (W x D)	mm	1750 x 850	1750 x 850	1750 x 850	1750 x 850	2550 x 890
External Unit Dimensions (W x D)	mm	2 x (1112 x 1340)	2 x (1112 x 1340)	2 x (1112 x 2340)	2 x (1112 x 2340)	2 x (1112 x 2340)
Weight Internal Unit	kg	580	585	620	645	950
Weight External Unit	kg	2 x 75	2 x 80	2 x 92	2 x 92	2 x 93
Airflow Delivery (downflow, upflow, displacement/frontal)		D, U*	D, U*	D, U*	D, U*	D*

"Performance at 24°C 50%
Nominal ESP 20 Pa
External Temperature 35°C
System able to work at up to 40°C external temperature with condenser models as shown; higher ambient operating temperatures available with alternative condenser selections.
Internal Unit Height 1950 mm; External Unit Height 907 mm"
**SHR: sensible heat ratio D: downflow U: upflow F: frontal*

Liebert® HPM Range and Performance

		Single Circuit								
Model		**S1E**	**S1G**	**S2E**	**S2G**	**M2H**	**M3A**	**M3G**	**M4E**	**M5B**
Sel. Condenser		HCR24	HCR24	HCR43	HCR43	HCR43	HCR43	HCR43	HCR59	HCR76
Total gross cooling capacity	kW	15.6	17.4	23.1	25.0	24,6	28.8	35.1	43.8	50.7
Net sensible cooling capacity	kW	13.8	15.6	19.9	21.5	22.5	25.5	33.8	40.0	45.2
SHR*		0.93	0.95	0.90	0.92	0.96	0.94	1.00	0.96	0.94
Net sensible EER		3.3	3.1	3.1	3.0	3.3	3.1	3.5	3.3	3.0
Airflow	m^3/h	4.200	4.930	5.200	5.750	6.340	7.080	9.540	11.230	12.250
Max. ESP	Pa	400	380	280	190	300	200	400	320	260
Sound pressure level	dB(A)	48.8	49.4	52.7	50.0	54.1	55.4	55.8	56.5	57.1
Internal Unit Dimensions (W x D)	mm	750 x 750	750 x 750	750 x 750	750 x750	1000 x 850	1000 x 850	1750 x 850	1750 x 850	1750 x 850
External Unit Dimensions (W x D)	mm	1112 x 1340	1112 x 1340	1112 x 1340	1112 x 1340	1112 x 2340	1112 x 2340	1112 x 2340	1112 x 2340	1112 x 3340
Weight Internal Unit	kg	240	250	260	270	425	430	580	600	620
Weight External Unit	kg	75	75	92	92	92	92	92	102	136
Airflow Delivery (downflow, upflow, displacement/frontal)		D, U, F*	D, U, F*	D, U, F*	D, U, F*	D, U, F*	D, U, F*	D, U*	D, U*	D, U*

"Performance at 24°C 50%
Nominal ESP 20 Pa
External Temperature 35°C
System able to work at up to 40°C external temperature.
Internal Unit Height 1950 mm; External Unit Height 907 mm"
**SHR: sensible heat ratio D: downflow U: upflow F: frontal*

More than 35,000 organizations in 70 countries depend on our Business - Critical Continuity™ Promise: your IT infrastructure stays up to support your Business!

Liebert® HPM Range and Performance

		Double Circuits						
Model		**M3F**	**M4H**	**M5C**	**M5D**	**M7L**	**L8F**	**L9H**
Sel. Condenser		2 x HCR24	2 x HCR33	2 x HCR43	2 x HCR43	2 x HCR43	2 x HCR51	2 x HCR76
Total gross cooling capacity	kW	34.5	45.3	49.8	57.9	66.7	80.1	96.8
Net sensible cooling capacity	kW	33.2	41.6	44.6	49.2	53.0	69.6	78.7
SHR*		1.00	0.96	0.95	0.90	0.85	0.94	0.88
Net sensible EER		3.5	3.1	3.1	3.0	2.7	2.7	2.6
Airflow	m^3/h	9.490	11.370	12.240	12.910	13.470	20.020	21.100
Max. ESP	Pa	400	310	250	200	150	120	70
Sound pressure level	dB(A)	56.0	56.2	57.3	58.7	60.0	67.4	66.7
Internal Unit Dimensions (W x D)	mm	1750 x 850	1750 x 850	1750 x 850	1750 x 850	1750 x 850	2550 x 890	2550 x 890
External Unit Dimensions (W x D)	mm	2 x (1112 x 1340)	2 x (1112 x 1340)	2 x (1112 x 2340)	2 x (1112 x 2340)	2 x (1112 x 2340)	2 x (1112 x 2340)	2 x (1112 x 3340)
Weight Internal Unit	kg	590	600	635	650	670	950	1000
Weight External Unit	kg	2 x 75	2 x 80	2 x 92	2 x 92	2 x 92	2 x 93	2 x 136
Airflow Delivery (downflow, upflow, displacement/frontal)		D, U*	D, U*	D, U*	D, U*	D, U*	D*	D*

*"Performance at 24°C 50%
Nominal ESP 20 Pa
External Temperature 35°C
System able to work at up to 40°C external temperature.
Internal Unit Height 1950 mm; External Unit Height 907 mm"*

**SHR: sensible heat ratio D: downflow U: upflow F: frontal*

Emerson Network Power

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
- iCOM® control featured

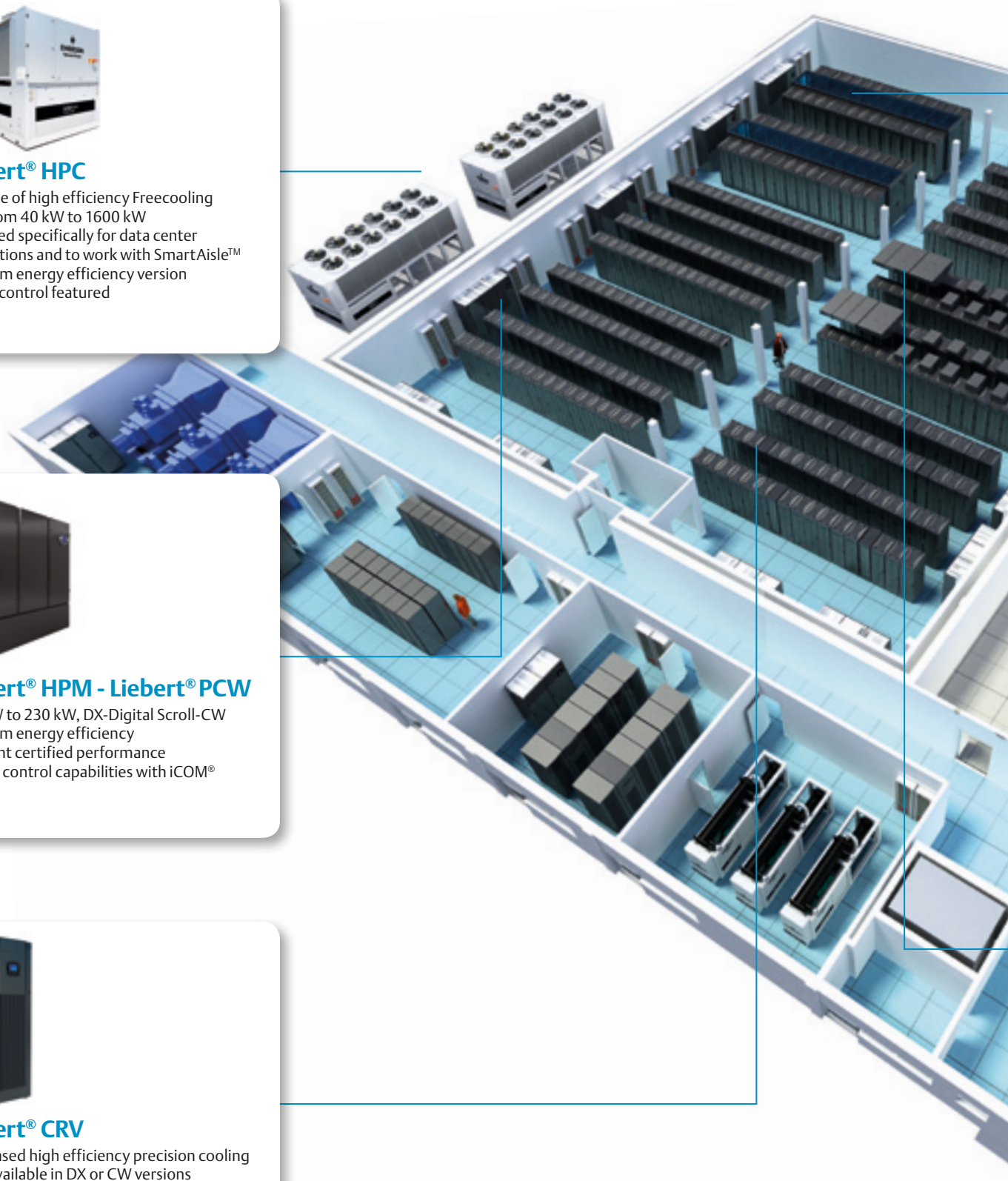
Liebert® HPM - Liebert® PCW

From 4 kW to 230 kW, DX-Digital Scroll-CW

- Premium energy efficiency
- Eurovent certified performance
- Unique control capabilities with iCOM®

Liebert® CRV

- Row-based high efficiency precision cooling units available in DX or CW versions
- Decoupled control for airflow and cooling capacity
- Modulating cooling capacity with digital scroll
- iCOM® control with remote rack sensors



SmartAisle™

- Aisle containment
- Provides highest energy efficiency
- Works with any Liebert® cooling unit

Liebert® XD

- Refrigerant based high density cooling installed close to the server
- Hot spot management for up to 30 kW per rack
- On-demand upgrade with plug and play
- High efficiency and 100% sensible cooling

Service

Emerson Network Power supports Business-Critical Continuity™ with the largest global services organization in the industry and a service offering dedicated to entire critical infrastructure, delivering:

- Design, installation and startup
- Warranty service
- Preventive maintenance
- 24/7 remote monitoring
- Emergency service
- Site audits

Service contracts

Regular service of business critical infrastructure provides uptime assurance and reduces the total cost of ownership over the life of equipment.
A service contract ensures that infrastructure is regularly maintained in order to avoid unexpected, costly downtime. Emerson Network Power service contracts cover all technologies and can be tailored to suit individual business needs.

LIFE™.net

Maximized system availability via real-time diagnosis and resolution of operating anomalies

- 24-hour real-time monitoring by expert engineers
- Monitoring and trending of system data
- Diagnosis through expert data analysis allowing effective proactive maintenance and prevention of future anomalies
- Alarm notification
- On-site corrective maintenance dispatching

Ensuring The High Availability Of Mission-Critical Data And Applications.

About Emerson Network Power

Emerson Network Power, a business of Emerson (NYSE:EMR), delivers software, hardware and services that maximize availability, capacity and efficiency for data centers, healthcare and industrial facilities. A trusted industry leader in smart infrastructure technologies, Emerson Network Power provides innovative data center infrastructure management solutions that bridge the gap between IT and facility management and deliver efficiency and uncompromised availability regardless of capacity demands. Our solutions are supported globally by local Emerson Network Power service technicians.

Learn more about Emerson Network Power products and services at www.EmersonNetworkPower.com

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Emerson Network Power
The global leader in enabling *Business-Critical Continuity™*

- AC Power
- Connectivity
- DC Power
- Embedded Computing
- Embedded Power
- Infrastructure Management & Monitoring
- Outside Plant
- Power Switching & Controls
- Precision Cooling
- Racks & Integrated Cabinets
- Services
- Surge Protection