



Liebert®

AFC

from 500 to 1450 kW

The Adiabatic Freecooling Solution  
with Top-Tier Availability



**CERTIFIED  
HVAC-HYGIENE**

Conformity of the device  
Vertiv Liebert AFC with the  
hygiene requirements of the guideline  
VDI 2047-2  
dated 04 April 2017



Validity: 04/2017 – 03/2020

## 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.

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## Liebert® AFC, the Ideal Adiabatic Chilled Water Solution for Top-Tier Data Centers



*Liebert AFC  
adiabatic freecooling multi-scroll version*



*Liebert AFC  
freecooling multi-scroll version*



*Liebert AFC  
adiabatic freecooling screw version*



*Liebert AFC  
freecooling screw version*

**Liebert AFC** combines the outstanding levels of energy efficiency allowed by freecooling together with the endless availability guaranteed by the compressor back up (available both with multi-scroll or screw compressors) and the highly efficient adiabatic wet pad system. The latter humidifies the air entering the freecooling and condensing coils, consequently increasing freecooling operation and mechanical efficiency. The unit is thus designed to guarantee 100% cooling availability even under the most critical conditions such as fluctuating power supplies, limited water availability and high ambient temperatures.

## Liebert® AFC ... Solves IT All!



Ultra Silent  
two versions available



Optimized Water  
Consumption

1.08

Top Energy  
Efficiency Levels  
pPUE down to 1.08

100%

100% Cooling Availability  
Even under extreme conditions

## Liebert® AFC: One Unit, Three Cooling Technologies



### Energy Efficiency

Higher annual efficiency than any other competitor's freecooling chiller, with adiabatic freecooling available all year round and inlet fluid temperature operating limit up to 32°C.



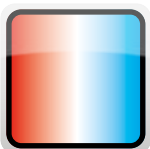
### Variable Primary Water Flow

Control logic available on units with and without primary pumps, which minimizes pumping power and optimizes the fluid working temperatures at partial load conditions.



### New Vertiv™ ICOM™ 7” Touch Display

The Vertiv ICOM Control ensures the intelligent management of units within the dynamic data center environment, while the innovative 7” touch screen display presents advanced graphic functions.



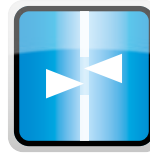
### Supersaver

The Supersaver is the software logic embedded in the Vertiv ICOM Control leveraging on the communication with floor mount units to maximize efficiency at system level.



### VDI Hygiene Certificate

Liebert® AFC, our adiabatic freecooling chiller is in compliance with the general and technical requirements of the Verein Deutscher Ingenieure (VDI), the Association of German Engineers, guideline 2047-2, securing hygienically sound operation of the evaporative cooling systems. Our units are thus evaluated and approved by an independent hygienic institute in order to operate in complete safety.



### Freecooling

Integrated freecooling modules deliver the cooling load required by the data center without the need of compressors.





### Adiabatic Cooling

Highly efficient adiabatic wet pads humidify air entering the freecooling and condensing coils, thus increasing freecooling operation and mechanical efficiency.



### Fast Start Ramp

Fast recovery capacity: if required by the heat load, the unit ensures the restart of all compressors in maximum 70 seconds, following a power restart. The control remains operative without the need of an external single phase power supply.



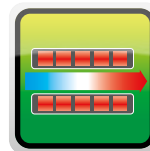
### Ultra Silent

New generation super silent EC fans combined with the sound barrier provided by the adiabatic pads ensure an extremely silent operation.



### Electronic Expansion Valve

Minimized condensing pressure reduces power consumption, thus achieving high efficiency levels.



### Microchannel Condensing Coil

The full aluminum coil ensures extreme efficiency levels during the mechanical cooling mode and minimizes the refrigerant charge.



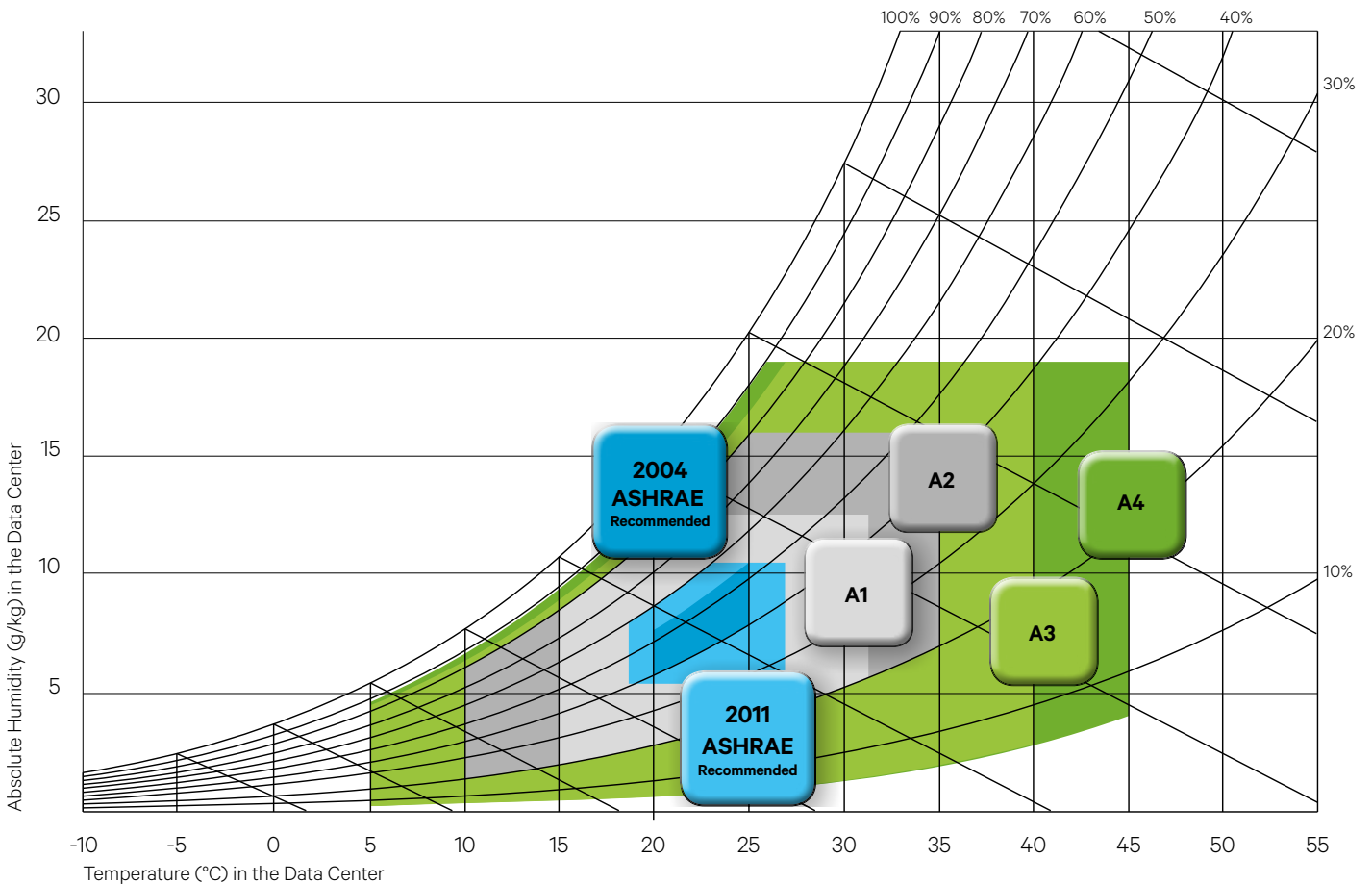
### 100% Compressor back up

Ensure 100% cooling back up, up to 50°C ambient temperature also in the case of a water shortage.

## Data Centers are Heading for New Energy Efficiency Standards, Achievable with Adiabatic Freecooling

Recent market trends have seen an increase in operating temperatures under which new IT equipment operates. This has led to the progress in adiabatic solutions, extending freecooling availability to higher ambient temperatures. Data center designs, in accordance with ASHRAE\* guidelines, have accepted to move out of the recommended envelop to the allowable ranges (A1-A4).

With Liebert® AFC adiabatic freecooling chiller, Vertiv™ meets customer needs, offering a highly efficient solution which maximizes freecooling availability in warmer climates, for longer periods of time and guaranteeing continuous availability even under extreme ambient conditions.



\* The American Society of Heating, Refrigerating and Air Conditioning Engineers establishing guidelines relating to HVAC systems.

## 100% Cooling Availability Under All Conditions

Liebert® AFC has been designed to ensure maximum availability for data centers. A consolidated design and the integration of new technologies have led to the most reliable adiabatic cooler in the market, which provides 100% cooling also during extreme conditions.



### 100% cooling in case of water shortages

No need of big water storage tanks, no need to worry about water shortages. The **compressors back up system** does not require the adiabatic system to be active in order to deliver the full cooling capacity.



### 100% cooling at extreme ambient temperatures

Liebert AFC delivers full capacity **up to 50° C ambient temperature**. When the adiabatic system is active, higher temperatures can be reached without affecting the cooling performance.



### 100% cooling guaranteed in 70 seconds, following a power restart

Featuring Fast Start Ramp, Liebert AFC will restore 100% cooling in just 70 seconds, following a power restart and will ensure the unit's immediate activation. The control, moreover, will keep operating **without the need of an external single phase power supply**.

## All Year Round Adiabatic Freecooling is the Key to Unparalleled Levels of Energy Efficiency

Depending upon ambient temperature and humidity, Liebert® AFC constantly optimizes power and water consumption by combining its three embedded technologies: adiabatic, freecooling and mechanical cooling.

All operating modes deliver high levels of efficiency, relying on the triple adiabatic effect of:

- increasing freecooling capacity
- extending freecooling operation to higher ambient temperatures
- increasing mechanical cooling efficiency.

Moreover, especially when operating at optimized levels of water temperature such as 26°-20°C, freecooling will be available up to around 32°C ambient temperature: all year round.

### Liebert AFC Operating Modes

#### FREECOOLING

Only fans are needed to operate: direct exchange between water and air.



#### ADIABATIC FREECOOLING

The adiabatic system allows freecooling to operate at higher ambient temperatures.



#### HYBRID COOLING

Adiabatic freecooling is the primary cooling source, compressors are used as back up.



#### ADIABATIC MECHANICAL COOLING

Compressor's efficiency is increased by the adiabatic system.



#### SAFE MODE

100% availability also during water shortages; the sole mechanical cooling system will guarantee full load.





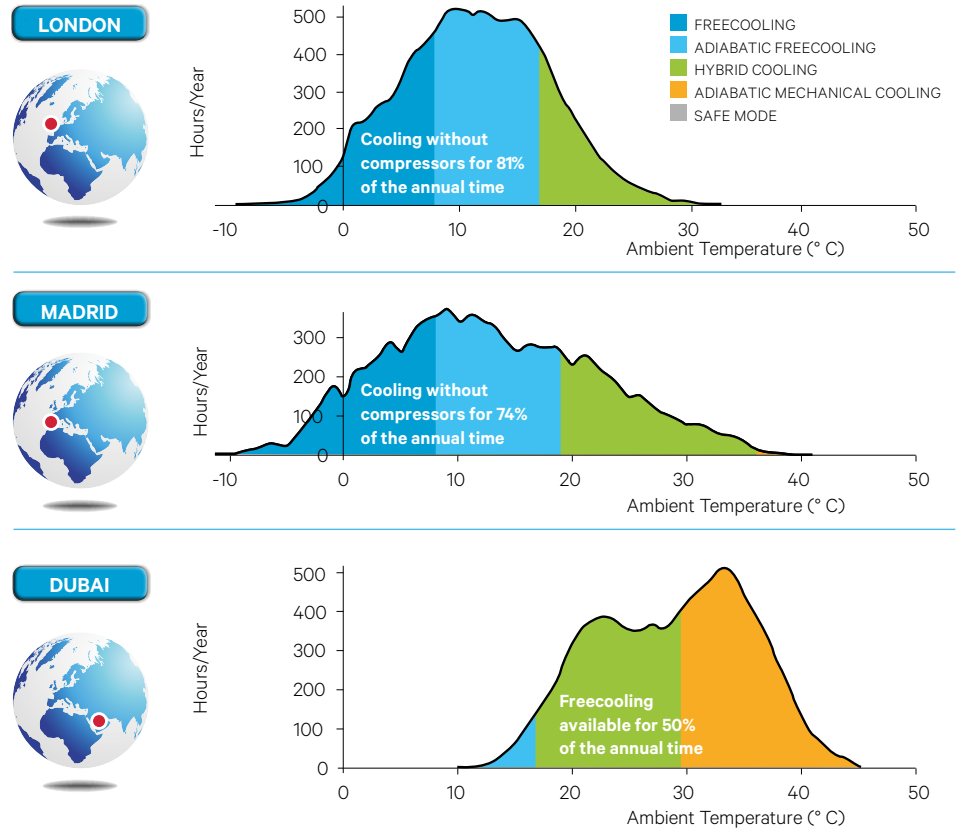
## A New Step Ahead for Mechanical PUE

The Ideal Solution for Any Climatic Condition.

### Annual Simulation of a 1 MW Data Center Tier 4 at Full Load

The graphs show the operating modes of Liebert AFC throughout the year and the resulting cooling system's annual pPUE values for different climatic conditions. The table compares four different cooling system types: starting from the standard air-cooled chiller, up to the adiabatic freecooling chiller with optimized fluid temperatures, which ensures the highest annual efficiency from Northern Europe to the Middle East. Even higher annual efficiency can be achieved with inlet chilled water temperatures up to 32°C.

### Liebert® AFC Operating Modes



CITY	AIR-COOLED CHILLER	STEP 1	STEP 2	STEP 3	ANNUAL SAVINGS (ENERGY + WATER CONSUMPTION)
	CW 12-7 °C	FREECOOLING CHILLER CW 15-10 °C	FREECOOLING CHILLER CW 26-20 °C	ADIABATIC FREECOOLING CHILLER CW 26-20 °C	
London	pPUE 1.21	pPUE 1.17	pPUE 1.09	pPUE 1.06	170,000€
Madrid	pPUE 1.22	pPUE 1.18	pPUE 1.12	pPUE 1.07	175,000€
Dubai	pPUE 1.31	pPUE 1.31	pPUE 1.24	pPUE 1.18	135,000€

pPUE values refer to the complete cooling system: including chillers, air conditioners and pumps.

## The State-of-the-Art Vertiv™ ICOM™ Control: Precise, User-Friendly Information at Unit Level



### 7" TOUCH SCREEN GRAPHIC DISPLAY

- Quick and intuitive
- Monitors the historical trend of key parameters: efficiency, adiabatic water usage, cooling capacity and temperatures
- Straightforward visualization of diagnostics
- Two versions available: **installed** in the unit or in **remote** for indoor installations.

### The Vertiv™ ICOM™ Control features three key distinguishing characteristics

#### Intelligent Energy & Water Management

Monitoring of local temperature and humidity profiles optimizes the unit's operating costs.

#### Advanced Logics to Enhance Savings

Optimized management of compressors and fans maximizes the hybrid mode usage and efficiency.

#### Unceasing Control Operation

Fast restoration capacity: 100% cooling available in 70 seconds.

## Perfect Synchronization at Teamwork Level

The user friendly control exploits the management of energy and water also at teamwork level.

The system collects information from the different units' key parameters and operating modes (adiabatic, freecooling and mechanical cooling) while taking into account water and electricity costs.

The control predictively calculates and then implements the combination which optimizes operating costs.



## Utmost Efficiency Even at the Data Center System Level

When considering the entire data center scenario, involving indoor and outdoor units, the Supersaver becomes the key driver in terms of delivered efficiency at the data center system level.

This software logic, embedded in the control, leverages on the LAN communication between all these units. This is to ensure the perfect coordination of the entire system, thus increasing freecooling operation and consequently leading to superior energy savings.



## Liebert® AFC - Adiabatic Freecooling Chiller - Multi-Scroll Version

STANDARD										ULTRA SILENT								
Model FA0		046	053	059	073	087	102	117	130	046LN	053LN	059LN	073LN	087LN	102LN	117LN	130LN	
<b>Dry Performance - ambient 35°C. adiabatic OFF</b>																		
Cooling capacity <sup>1</sup>	kW	518	573	655	803	948	1113	1275	1414	494	543	630	764	903	1056	1207	1339	
<b>Wet Performance - ambient 35°C. relative humidity 45%. adiabatic ON</b>																		
Cooling capacity <sup>1</sup>	kW	562	622	708	869	1023	1205	1382	1533	540	594	686	835	981	1155	1323	1467	
<b>Wet Freecooling Performance - ambient 20°C. relative humidity 55%. adiabatic ON</b>																		
Freecooling capacity	kW	284	292	355	430	503	580	656	728	248	255	311	376	440	506	571	635	
<b>SOUND LEVEL</b>																		
SPL <sup>2</sup>	dB(A)	73.5	73.5	74	74.5	74.5	74.5	75.0	75	67.5	67.5	68	68.5	68.5	68.5	69.0	69	
PWL <sup>3</sup>	dB(A)	94.7	94.7	95.5	96.3	97	97.6	98.1	98.5	88.9	88.9	89.5	90.3	91	91.5	92.0	92.5	
<b>DIMENSIONS</b>																		
Length	mm	5597	5597	6867	8137	9407	10677	11947	13217	5597	5597	6867	8137	9407	10677	11947	13217	
Depth	mm	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	3043	
Height	mm	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	2669	

## Liebert AFC - Adiabatic Freecooling Chiller - Screw Version

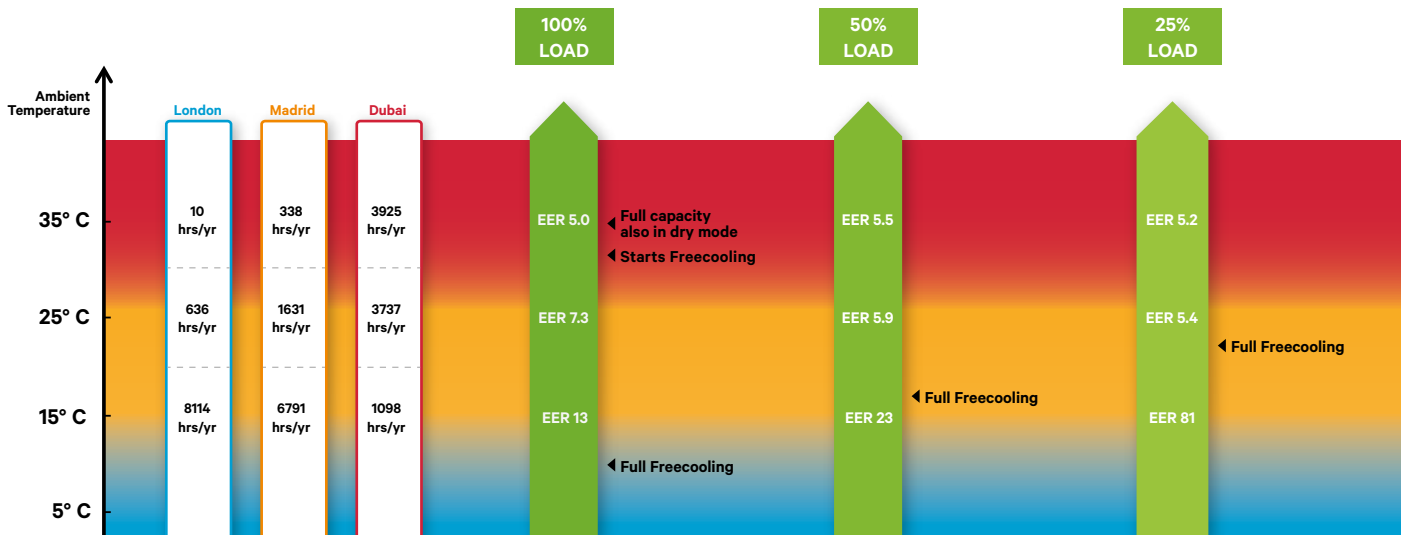
STANDARD						ULTRA SILENT			
Model FA4		102	10X	117	130	102LN	10XLN	117LN	130LN
<b>Dry Performance - ambient 35°C. adiabatic OFF</b>									
Cooling capacity <sup>1</sup>	kW	1113	1113	1282	1453	1061	1061	1222	1387
<b>Wet Performance - ambient 35°C. relative humidity 45%. adiabatic ON</b>									
Cooling capacity <sup>1</sup>	kW	1201	1201	1382	1561	1156	1156	1329	1502
<b>Wet Freecooling Performance - ambient 20°C. relative humidity 55%. adiabatic ON</b>									
Freecooling capacity <sup>1</sup>	kW	584	739	661	739	510	613	577	644
<b>SOUND LEVEL</b>									
SPL <sup>2</sup>	dB(A)	75.5	76	76	76	69.5	70	70	70
PWL <sup>2</sup>	dB(A)	98.6	99.5	99.1	99.5	92.5	93.5	93	93.5
<b>DIMENSIONS</b>									
Length	mm	10861	13397	12127	13397	10861	13397	12127	13397
Depth	mm	3044	3044	3044	3044	3044	3044	3044	3044
Height	mm	2669	2669	2669	2669	2669	2669	2669	2669

1 Performance data calculated at the following conditions: power supply 400V/3ph/50Hz; coolant inlet/outlet temperature 26/20°C; ethylene glycol 30%.

2 Measured at outdoor temperature of 35 °C; 1 m from the unit; free field conditions; according to ISO 3744.

3 Measured at outdoor temperature of 35°C; calculated according to ISO 3744.

## Efficiency at Full and Part Load Condition



EER values for the FA0 Range at the following conditions: adiabatic function active (wet pads mode) and calculated according to the average humidity data obtained from Central Europe locations.

## Liebert® AFC - Freecooling Chiller - Multi-Scroll Version

STANDARD										ULTRA SILENT							
Model FD0		046	053	059	073	087	102	117	130	046LN	053LN	059LN	073LN	087LN	102LN	117LN	130LN
<b>Performance - ambient 35°C</b>																	
Cooling capacity <sup>1</sup>	kW	521	577	660	808	957	1120	1283	1423	497	547	636	769	915	1064	1217	1349
<b>Freecooling Performance - ambient 16°C</b>																	
Freecooling capacity <sup>1</sup>	kW	297	307	372	451	527	606	686	762	256	262	320	387	452	519	586	651
<b>SOUND LEVEL</b>																	
SPL <sup>2</sup>	dB(A)	74.0	74.0	74.5	75.0	75	75.0	75.5	75.5	68.0	68.0	68.5	69.0	69	69.0	69.5	69.5
PWL <sup>3</sup>	dB(A)	94.8	94.8	95.5	96.4	97	97.7	98.2	98.5	88.9	88.9	89.5	90.5	91	91.7	92.2	92.5
<b>DIMENSIONS</b>																	
Length	mm	5597	5597	6867	8137	9407	10677	11947	13217	5597	5597	6867	8137	9407	10677	11947	13217
Depth	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260
Height	mm	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630	2630

## Liebert AFC - Freecooling Chiller - Screw Version

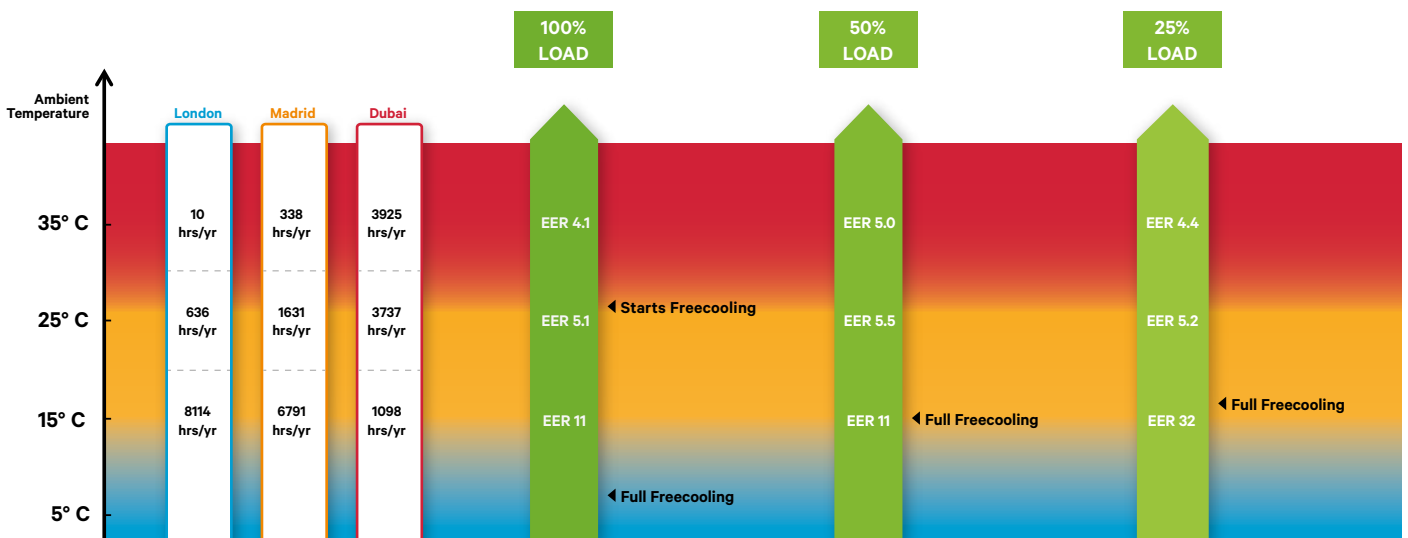
STANDARD					ULTRA SILENT				
Model FD4		102	10X	117	130	102LN	10XLN	117LN	130LN
<b>Performance - ambient 35°C</b>									
Cooling capacity <sup>1</sup>	kW	1123	1123	1294	1465	1073	1073	1236	1402
<b>Freecooling Performance - ambient 16°C</b>									
Freecooling capacity <sup>1</sup>	kW	613	775	694	776	526	665	595	665
<b>SOUND LEVEL</b>									
SPL <sup>2</sup>	dB(A)	75.5	76	76	76	69.5	70	70	70
PWL <sup>2</sup>	dB(A)	98.6	99.5	99.1	99.5	92.5	93.5	93	93.5
<b>DIMENSIONS</b>									
Length	mm	10861	13397	12127	13397	10861	13397	12127	13397
Depth	mm	2260	2260	2260	2260	2260	2260	2260	2260
Height	mm	2669	2669	2669	2669	2669	2669	2669	2669

<sup>1</sup> Performance data calculated at the following conditions: power supply 400V/3ph/50Hz; coolant inlet/outlet temperature 26/20 °C; ethylene glycol 30%.

<sup>2</sup> Measured at outdoor temperature of 35 °C; 1 m from the unit; free field conditions; according to ISO 3744.

<sup>3</sup> Measured at outdoor temperature of 35°C; calculated according to ISO 3744.

## Efficiency at Full and Part Load Condition



EER values for the FDO Range

## 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.



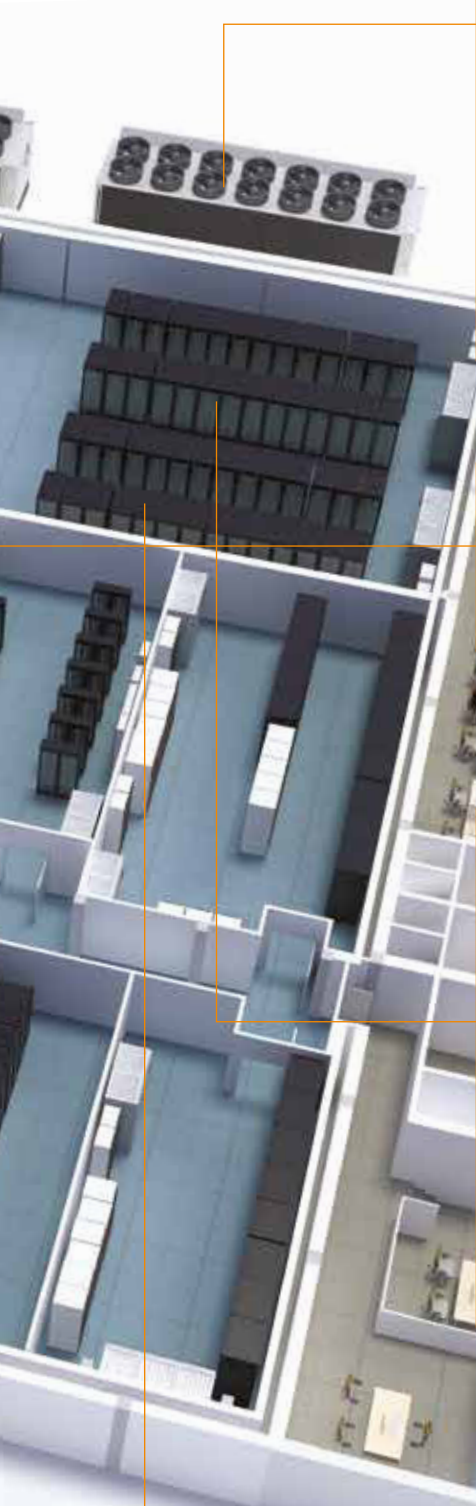
### Liebert EFC

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.



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