



Vertiv™ Liebert® AFC

The Inverter Screw Chiller Range
with Low-GWP Refrigerant
from 650 to 2000 kW



Liebert® AFC: The Coolest Solution for a Sustainable Data Center

Today, the new challenges that critical infrastructures must face are increasing, in addition to reliability, service continuity and cost reduction, there is also environmental compatibility. Problems related to pollution, the greenhouse effect and global warming are the main challenges that modern industries face.

Liebert AFC, as a result of its new low global warming potential (GWP) HFO refrigerant and inverter technology, offers an solution, aiming at drastically reducing direct and indirect CO₂ emissions into the atmosphere, and limiting the carbon footprint of the data center.

Liebert AFC has been optimized to have very high levels of efficiency and at the same time ensuring the highest levels of reliability required by modern IT applications. The inverter technology widely used for compressors, pumps and fans allows to reduce energy

consumption and in particular the electrical power required during peaks, allowing to increase the power available for IT equipment.

The inverter driven compressor and the innovative Liebert AFC regulation algorithms ensure accurate control of the fluid delivery temperature to the indoor units under any working condition.

Cooling continuity and reliability are key factors for Liebert AFC and are granted by the Fast Restart functionality which allows for a quick and safe restart after a power failure.

Liebert AFC is a solution that is well suited to the different needs of critical infrastructures as it is an extremely versatile and highly configurable solution. The different options available allow for tailor-made solutions independently of the data center requirements.



Vertiv™ Liebert® AFC Chillers 650-2000kW

At Vertiv we believe that being mindful of product design, development, use, and disposal are important to the longevity of our industry.

Checkout these environmentally conscious features of the Liebert® AFC Chillers:

- Compatible with, low global warming potential (GWP) refrigerants
- Reduce risk of environmental pollution via glycol-free versions.
- Up to 20% lower annual energy consumption compared to fixed screw solutions



Features

How You Benefit

- Inverter driven compressor
 - Low-GWP HFO Refrigerant (R1234ze)
 - Optimized freecooling coils
 - Glycol-Free version
 - Fast restart option
 - Compact Frame
 - Wide operative range from -25°C to +56°C external ambient temperature
 - Adiabatic cooling system
- Low in-rush current and higher part load efficiency, allowing for savings in the electrical infrastructure design and lower running costs.
 - Compatible with refrigerant, R1234ze HFO, a low global warming potential (GWP) refrigerant that drastically reduces direct CO₂ emissions.
 - Increased freecooling capacity and more freecooling hours lead to a better seasonal efficiency and lower operating costs.
 - The possibility of using pure water inside the data center lowers the risk of environmental pollution and grants lower installation costs.
 - Guaranteeing cooling continuity.
 - Possibility to increase the cooling density.
 - Global solution suitable for any climatic condition.
 - Highly efficient adiabatic wet pads humidify air entering the freecooling and condensing coils, thus increasing freecooling operation and mechanical efficiency.





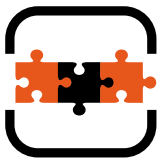
Reduced Carbon Footprint

Vertiv™ Liebert® AFC uses new refrigerants with almost zero impact in the atmosphere. At the same time the improved efficiency leads to a reduction in the electricity consumption and in the CO₂ emissions related to it.



Energy Efficiency

The Vertiv™ Liebert® AFC sets new efficiency standards on the chilled-water cooling systems for data centers. The chiller design combines market leading technologies such as inverter driven components and optimized control algorithm to leverage on efficiency while cutting the running costs.



Flexibility

Vertiv™ Liebert® AFC is designed to perfectly match the configuration and requirements of any data center. This unit is extremely configurable, and the vast number of versions and options combined with the wide operating range makes it an extremely versatile unit that can be used all over the world.



Vertiv™ Liebert® iCOM™ Smart Control

The Liebert® iCOM™ control manages and optimizes the overall system. It is fully-programmable via an advanced and user-friendly touch display and can be linked with common BMS protocols, allowing remote supervision.

Reduced Carbon Footprint for Next Generation Data Centers



- Vertiv™ Liebert® AFC offers a wide choice of refrigerants, from the traditional R134a to low-GWP solutions. R513A allows to have performances similar to traditional refrigerants, but with a more than halved environmental impact. The R1234ze HFO offers a GWP level close to zero.
- Glycol is very important in freecooling units to avoid problems related to freezing, but at the same time it is a pollutant. The Glycol-free versions allow glycol to be contained inside the unit, preventing it from circulating inside the data center. This allows to greatly reduce the risk of environmental pollution and at the same time to reduce installation costs.
- To further reduce the environmental impact, the unit has been designed to have a lower use of electricity, leading to a reduction in CO₂ emissions that are connected to it.

Improved Efficiency, Increased Savings



- The unit has been designed to ensure utmost efficiency in the peak conditions, that together with low in-rush current of the inverter compressor allows to reduce the electrical infrastructure. The reduced peak power increases the availability of the electrical power for IT load.
- The inverter driven technology widely used for the compressor, EC fans and pumps allows to maximize energy efficiency whilst minimizing energy consumption. The inverter screw compressor improves efficiency especially at part loads and in mixed mode, with a significant saving in annual energy up to 20% more compared to a fixed screw solution.
- The freecooling coils have been optimized to use the external ambient air as the primary source of cooling. The full freecooling temperature (or Zero Energy Temperature – ZET) in some models can be higher than 10°C, hence below this temperature the compressors can be switched off. The impact on efficiency is thus significant, as the use of the compressors can be limited only to cover the cooling peak. A redundant sensor can be installed and activated only if the first one breaks or is missing.
- Thanks to the adiabatic pads, external air entering the coils is pre-cooled. This allows the unit to work more hours in freecooling mode thus increasing compressors efficiency and reliability.

Adaptable to Any Critical Infrastructure Design



- Multiple available versions (Chiller - Freecooling - Freecooling Glycol-free) allow to easily adapt to different site conditions, having always the possibility to choose the best combination between efficiency and initial cost.
- In order to offer a solution that can be exploited globally, and therefore both in very cold climates and in warmer ones, Vertiv™ Liebert® AFC has been designed to have a wide operating range. Up to +56°C and down to -25°C external ambient temperature (-20°C for R1234ze).
- The reduced footprint is ensured by the new compact design, 15% more compact than the industry standard.
- Highly configurable is a fundamental requirement for modern critical infrastructures and in this context the wide choice of Liebert® AFC options allows to build a tailor-made solution. Fast restart function for a quick and safe restart after power outage, automatic transfer switch (ATS) on board, several pump configurations compatible with constant and variable flow, coil coating for harsh environments are just some examples.
- The acoustic pollution of the cooling units is a typical problem for critical infrastructures located in city centers or near residential areas, but Liebert AFC low noise and quiet versions guarantee a noise level from 5 to 10 dB lower than the standard models.

Vertiv™ Liebert® iCOM™ Smart Control



- Ready for Teamwork of up to 16 units with optimization based on working conditions, furthermore it allows for advanced control functionalities (sharing sensor's data, standby rotation, cascade operation and rotating master function).
- A virtual display can replicate, through a web browser, all the functionalities of the standard display, either remotely or connecting a laptop on the ethernet port directly to the frontal door.
- Unit power consumptions and cooling gross capacity can be calculated thanks to specific algorithms and the direct communication between the control, sensors and the different devices. This allows the monitoring of the unit energy efficiency through the BMS system.

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.

Vertiv™ Liebert® AFC Operating Modes

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 up to 29°C (inlet water temperature) and 20°C (living water temperature), freecooling will be available up to around 32°C ambient temperature: all year round.

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

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



Adiabatic Mechanical Cooling

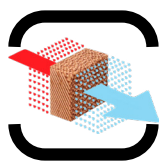
Compressor's efficiency is increased by the adiabatic system.



Safe Mode

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





The Adiabatic System

The Vertiv™ Liebert® AFC range is available:

- from 10 to 20 fans.
- in 3 versions, Chiller, Freecooling and Glycol free.
- with 3 refrigerants: R134a, R513A and R1234ze.



Configurations

The Vertiv™ Liebert® AFC range is available in 3 different configurations:

- predisposition for adiabatic only
- direct flow adiabatic kit (for common centralized recirculation)
- Integrated tank adiabatic kit with recirculation (including the tank/pump system controlled by the unit control).



The Adiabatic Pad

Vertiv™ Liebert® AFC adiabatic pads reduce the temperature of the external air entering the coils that is pre-cooled. This allows the unit to work more hours in freecooling mode thus increasing compressors efficiency and reliability.

Vertiv's Customer Experience Center located in Tognana (Padova - Italy)

The site includes 7 different laboratories and is specifically designed for customers to interact with Thermal Management data center technologies. Labs n.5 and n.6 are dedicated to test and validate Vertiv's chiller range including our latest Vertiv™ Liebert® AFC units.



1 R&D Validation Lab 1



The Research & Development Validation Lab 1 is specifically designed to test floor-mount units and can balance a thermal load of up to 150 kW with a chamber air temperature between 0°C and 60°C.

2 R&D Validation Lab 2



Designed for conditioners belonging to the Telecom sector, the Research & Development Validation Lab 2 includes two different testing chambers: one simulating internal ambient conditions from 0°C to 60°C and the other simulating external ambient conditions from -32°C to 60°C. This validation area can balance a thermal load of up to 100 kW (50 kW in each room).

3 Floor-Mount Validation Lab



The lab is equipped with a highly automated testing chamber, this validation area can balance a thermal load of up to 200 kW and can simulate a test environment within a temperature range of 0°C to 60°C.

4 Evaporative Cooling Innovation Lab



Dedicated area to test the state-of-the-art Liebert EFC - Vertiv's highly efficient indirect evaporative freecooling unit. Testing parameters include IT loads of up to 450 kW and an airflow of up to 120,000 m³ per hour at any external ambient temperature required to simulate typical peak conditions across the EMEA region.

5 Freecooling Chiller Validation Area



The Freecooling Chiller Validation Area is able to balance a thermal load of up to 1600 kW with a chamber air temperature between 20°C and 50°C and chiller water set point between 5°C and 20°C.

6 Adiabatic Freecooling Chiller Innovation Lab



This latest designed lab can test units with cooling capacities up to 1.5 MW with state-of-the-art accuracy in a broad range of working conditions, from -10°C to +55°C, also for adiabatic units.

7 Large Indoor Innovation Lab



This latest designed lab can test up to 400 kW and 100,000 m³/h, with operating conditions between +10°C and 50°C.

Rely on a Higher Level of Service Expertise for Thermal Management in Your Data Center

Who is better prepared to meet the service needs for your thermal management system than the company that pioneered the precision air conditioning market? We're a world leader in research and development of innovative products that protect mission-critical thermal applications and have supported data centers around the world for decades.

After all, there's a vast difference in the expertise necessary to address the comfort cooling needs of a normal building and the thermal management needs of your sensitive and sophisticated data center. An incorrect repair procedure by improperly trained technicians, or the use of non-genuine parts, can have a profound effect on your equipment performance, your data center availability, and your energy costs.

The factory trained and certified technicians of Vertiv know the difference. We are equipped to maximize the performance and efficiency of your thermal management system as no one else can.

Supporting Your Business Around the Globe

We bring our combination of strengths to life on a global scale, ensuring that we're able to serve you wherever you do business. Vertiv has the largest factory-trained service force with more than 2,700 field engineers together with the capability to support you remotely with a comprehensive range of remote Services and Software Solutions. Our service team members are located in virtually every major country across the globe and are backed by more than 330 technical support/response personnel. This means that no matter where you operate, you are covered by the most knowledgeable engineers and technicians available, giving you relief from any concern.



Americas

Manuf. and Assembly Locations **10**
 Service Centers **80+**
 Service Field Engineers **1,600+**
 Technical Support/Response **90+**
 Customer Experience Centers/Labs **5**

Europe, Middle East and Africa

Manuf. and Assembly Locations **10**
 Service Centers **65+**
 Service Field Engineers **650+**
 Technical Support/Response **100+**
 Customer Experience Centers/Labs **5**

Asia Pacific and India

Manuf. and Assembly Locations **4**
 Service Centers **75+**
 Service Field Engineers **1,250+**
 Technical Support/Response **30+**
 Customer Experience Centers/Labs **9**

Vertiv™ Environet™ Alert

provides an easy-to-use monitoring software solution that helps ensure the continuous cooling and power of your critical infrastructure. Get monitoring, alerting and trending at a price that's right for your business. Vertiv Environet Alert is designed to achieve SMB and enterprise goals.

Vertiv™ Critical Insight

is a real-time software platform designed to ensure continuous performance improvement and efficiency for any critical infrastructure. It is a comprehensive web-based critical infrastructure monitoring tool designed to identify and manage key operational behaviours, analyse trending, and manage energy usage. Vertiv Critical Insight is designed to achieve medium and large enterprise goals.

Global Presence

Manuf. and Assembly Locations **24**
 Service Centers **220+**
 Service Field Engineers **3,500+**
 Technical Support/Response **220+**
 Customer Experience Centers/Labs **19**

Notes:

- ¹ 35°C ambient temperature; 20°C fluid outlet temperature; ethylene glycol 30%; power supply 400V/3ph/50Hz;
- ² 20°C fluid outlet temperature; ethylene glycol 30%; power supply 400V/3ph/50Hz;
- ³ 35°C ambient temperature; 20°C fluid outlet temperature; water; power supply 400V/3ph/50Hz;
- ⁴ 35°C ambient temperature; 20°C fluid outlet temperature; 50% Outdoor free. Air relative humidity; ethylene glycol 30%; power supply 400V/3ph/50Hz;
- ⁵ 20°C fluid outlet temperature; 50% Outdoor free. Air relative humidity; ethylene glycol 30%; power supply 400V/3ph/50Hz;
- ⁶ 35°C ambient temperature; 20°C fluid outlet temperature; 50% Outdoor free. Air relative humidity; water; power supply 400V/3ph/50Hz;
- ⁷ The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method. At nominal working conditions; ¹
- ⁸ The value of PWL is calculated in according to ISO 3744 procedure method. At nominal working conditions. ¹
- ⁹ Cooling capacity and efficiency for low noise version are indicated in the product document

