

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 CO_2 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 water temperature up to 29°C (inlet water tempearture) 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 abient temperatures.



Hybrid Cooling

The adiabatic system allows freecooling to operate at higher abient 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 $^{\text{\tiny{TM}}}$ Liebert $^{\text{\tiny{8}}}$ 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.

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.

Welcome Area Welcome Area

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.

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.

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.

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.

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**

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**

Technical Features

R134a Screw Free FH4 Models	cooling Version		065	075	080	090	100	110	125	140	165	180	195
	Cooling capacity	kW	669	754	836	947	1035	1104	1277	1425			
Mechanical cooling performance	Total power input (Premium fans)	kW	156	179	200	229	243	261	302	342			
Standard ΔT version: 1	Unit EER (Premium fans)	-	4.29	4.20	4.18	4.14	4.26	4.24	4.23	4.17			
	Fluid flow	m3/h	107	121	134	152	166	177	205	228			
Total freecooling Standard ΔT version [100% load]: ²	ZET temperature	°C	10.1	8.7	9.6	8.1	8.8	8	8	5.9			
Wet mode cooling performances Standard ΔT version ⁴	Unit EER (Premium fans)		4.91	4.82	4.81	4.75	4.9	4.89	4.85	4.82			
Wet mode total freecooling Standard ΔT version [100% load]: ⁵	ZET temperature	°C	13.4	11.8	12.9	11.1	12.1	11.1	10.9	8.6			
	Cooling capacity	kW	685	772	858	969	1072	1145	1314	1472	1688	1838	1986
Mechanical cooling performance	Total power input (Premium fans)	kW	157	181	202	231	246	264	305	346	393	467	504
High ∆T version: ¹	Unit EER (Premium fans)	-	4.35	4.26	4.25	4.2	4.35	4.34	4.31	4.25	4.29	3.94	3.94
	Fluid flow	m3/h	73	82	92	103	115	122	140	157	180	196	212
Total freecooling High ΔT version [100% load]: ²	ZET temperature	°C	11.4	10	10.9	9.4	10.1	9.3	9.2	7.2	6.9	7.2	6
Wet mode cooling performances High ΔT version: ⁴	Unit EER (Premium fans)		4.97	4.88	4.87	4.81	4.98	4.97	4.93	4.89	4.94	4.5	4.5
Wet mode total freecooling High ΔT version [100% load]: ⁵	ZET temperature	°C	15.1	13.4	14.5	12.7	13.5	12.5	12.4	10.1	9.7	10.1	8.6
	N. of fans		10	10	12	12	14	14	16	16	18	20	20
	Sound Pressure Level - SPL (Premium fans) ⁷	dB(A)	78.4	78.6	78.8	79.0	79.2	79.3	79.7	79.9	80.2	80.6	80.8
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	99.9	100.1	100.8	101.0	101.6	101.7	102.4	102.6	103.3	104.0	104.2
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	72.3	73.0	73.2	73.9	74.1	74.4	75.0	75.8	76.4	77.1	77.7
	Sound Power Level - PWL (Low noise version) 9	dB(A)	93.8	94.5	95.2	95.9	96.4	96.8	97.7	98.5	99.5	100.5	101.1
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865



Technical Features

R134a Screw Chille CH4 Models	er Version		065	075	080	090	100	110	125	140	165	180	195
	Cooling capacity	kW	689	776	861	977	1067	1138	1315	1470			
Mechanical cooling performance	Total power input (Premium fans)	kW	152	175	195	223	237	254	294	332			
Standard ΔT version: ³	Unit EER (Premium fans)	-	4.52	4.43	4.41	4.38	4.49	4.48	4.47	4.43			
	Fluid flow	m3/h	99	112	124	141	153	164	189	212			
Wet mode cooling performances Standard ΔT version: 6	Unit EER (Premium fans)		5.07	5.03	5.05	5.04	5.13	5.13	5.04	5.17			
	Cooling capacity	kW	705	796	884	1000	1102	1178	1353	1516	1740	1894	2046
Mechanical cooling	Total power input (Premium fans)	kW	154	177	197	225	240	257	297	336	382	455	490
oerformance High ΔT version:³	Unit EER (Premium fans)	-	4.58	4.5	4.48	4.44	4.59	4.58	4.55	4.51	4.56	4.16	4.18
	Fluid flow	m3/h	68	76	85	96	106	113	130	145	167	182	196
Wet mode cooling performances High ΔT version: 6	Unit EER (Premium fans)		5.08	5.03	5.04	5.02	5.11	5.10	5.05	5.12	5.3	4.93	4.85
	N. of fans		10	10	12	12	14	14	16	16	18	20	20
	Sound Pressure Level - SPL (Premium fans) 7	dB(A)	77.2	77.4	77.6	77.9	78.1	78.2	78.6	78.9	79.2	79.6	79.9
Sound levels	Sound Power Level - PWL (Premium fans) ⁸	dB(A)	98.7	98.9	99.6	99.9	100.5	100.6	101.3	101.6	102.3	103.0	103.3
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	71.9	72.6	72.8	73.6	73.7	74.0	74.7	75.5	76	76.9	77.4
	Sound Power Level - PWL (Low noise version) 9	dB(A)	93.4	94.1	94.8	95.6	96.0	96.4	97.4	98.2	99.1	100.3	100.8
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865

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R134a Screw Glyc NH4 Models	ol-Free Version		065	075	080	090	100	110	125	140	165	180	195
	Cooling capacity	kW	678	763	848	960	1049	1117	1290	1441			
Mechanical cooling performance	Total power input (Premium fans)	kW	157	181	202	231	245	262	304	344			
Standard ΔT version: 1	Unit EER (Premium fans)	-	4.31	4.22	4.21	4.16	4.28	4.25	4.25	4.18			
	Fluid flow	m3/h	98	110	122	138	151	161	186	207			
Total freecooling Standard ΔT version [100% load]: ²	ZET temperature	°C	8.0	6.3	7.8	6.1	6.9	6.0	6.1	4.2			
Wet mode cooling performances Standard ΔT version ⁴	Unit EER (Premium fans)		4.94	4.84	4.82	4.77	4.92	4.91	4.86	4.83			
Wet mode total freecooling Standard ΔT version [100% load]: ⁵	ZET temperature	°C	9.1	7.1	8.8	6.9	9.6	7	6.9	4.8			
	Cooling capacity	kW	694	782	870	983	1083	1155	1328	1485	1703	1855	2003
Mechanical cooling	Total power input (Premium fans)	kW	159	183	204	233	248	266	307	349	396	470	508
performance High ΔT version:¹	Unit EER (Premium fans)	-	4.37	4.27	4.27	4.22	4.37	4.35	4.32	4.26	4.30	3.94	3.95
	Fluid flow	m3/h	66.6	75	83.5	94.3	103.9	110.9	127.4	142.5	163	178	192
Total freecooling High ΔT version [100% load]: ²	ZET temperature	°C	8.6	6.9	8.2	6.6	7.5	6.6	6.6	4.7	4.7	5.2	3.8
Wet mode cooling performances High ΔT version: ⁴	Unit EER (Premium fans)		5	4.9	4.89	4.83	4.99	4.98	4.95	4.9	4.95	4.5	4.5
Wet mode total freecooling High ΔT version [100% load]: ⁵	ZET temperature	°C	9.8	7.9	9.5	7.6	10.2	7.5	7.5	5.4	5.4	5.9	4.3
	N. of fans		10	10	12	12	14	14	16	16	18	20	20
	Sound Pressure Level - SPL (Premium fans) 7	dB(A)	78.7	78.8	79.1	79.3	79.5	79.6	80.0	80.2	80.4	80.8	81.0
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	100.2	100.3	101.1	101.3	101.9	102.0	102.7	102.9	103.5	104.2	104.4
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	72.4	73.1	73.3	74.1	74.2	74.5	75.1	75.9	76.5	77.2	77.8
	Sound Power Level - PWL (Low noise version) 9	dB(A)	93.9	94.6	95.3	96.1	96.5	96.9	97.8	98.6	99.6	100.6	101.2
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865



R513A Screw Freed FH3 Models	cooling Version		065	075	080	090	100	110	125	140	165	180	195
	Cooling capacity	kW	664	746	830	939	1027	1093	1266	1424			
Mechanical cooling performance	Total power input (Premium fans)	kW	160	185	206	236	250	268	311	354			
Standard ΔT version: 1	Unit EER (Premium fans)	-	4.15	4.04	4.03	3.98	4.1	4.07	4.07	4.02			
	Fluid flow	m3/h	106	120	133	150	165	175	203	228			
Total freecooling Standard ΔT version [100% load]: ²	ZET temperature	°C	10.1	8.8	9.7	8.2	8.9	8.1	8.1	5.9			
Wet mode cooling performances Standard ΔT version ⁴	Unit EER (Premium fans)		4.82	4.7	4.69	4.62	4.77	4.74	4.7	4.68			
Wet mode total freecooling Standard ΔT version [100% load]: ⁵	ZET temperature	°C	13.6	12	13	10.7	11.5	11.3	10.4	7.8			
	Cooling capacity	kW	680	765	853	961	1063	1133	1304	1471	1670	1817	1969
Mechanical cooling performance Standard ΔT version: Total freecooling Standard ΔT version [100% load]: Wet mode cooling performances Standard ΔT version 4 Wet mode total freecooling Standard ΔT version [100% load]: Mechanical cooling performance High ΔT version: Total freecooling Performance High ΔT version [100% load]: Wet mode cooling performances High ΔT version: Wet mode cooling performances High ΔT version: Wet mode total freecooling High ΔT version: Wet mode total freecooling High ΔT version: Sound levels	Total power input (Premium fans)	kW	162	187	208	238	254	272	314	359	407	464	512
	Unit EER (Premium fans)	-	4.21	4.10	4.10	4.03	4.19	4.17	4.15	4.10	4.11	3.91	3.84
	Fluid flow	m3/h	73	82	91	103	114	121	139	157	178	194	210
Total freecooling High ΔT version [100% load]: ²	ZET temperature	°C	11.5	10.1	11	9.5	10.2	9.4	9.3	7.2	7.1	7.4	6.2
Wet mode cooling performances High ΔT version: ⁴	Unit EER (Premium fans)		4.88	4.76	4.76	4.67	4.84	4.81	4.78	4.75	4.76	4.52	4.4
Wet mode total freecooling High ΔT version [100% load]: ⁵	ZET temperature	°C	15.2	13.6	14.7	12.8	13.7	12.7	12.6	10.1	9.9	10.3	8.8
	N. of fans		10	10	12	12	14	14	16	16	18	20	20
	Sound Pressure Level - SPL (Premium fans) ⁷	dB(A)	78.4	78.6	78.9	79.1	79.3	79.4	79.8	80.0	80.3	80.6	80.9
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	99.9	100.1	100.9	101.1	101.7	101.8	102.5	102.7	103.4	104.0	104.3
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	72.4	73.1	73.4	74.1	74.2	74.5	75.2	76.0	76.6	77.1	77.7
	Sound Power Level - PWL (Low noise version) 9	dB(A)	93.9	94.6	95.4	96.1	96.6	96.9	97.9	98.7	99.7	100.5	101.1
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865

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R513A Screw Chille CH3 Models	r Version		065	075	080	090	100	110	125	140	165	180	195
	Cooling capacity	kW	684	770	856	969	1059	1127	1305	1471			
Mechanical cooling	Total power input (Premium fans)	kW	156	180	201	230	244	262	303	344			
Standard ΔT version: ³	Unit EER (Premium fans)	-	4.38	4.27	4.26	4.21	4.33	4.31	4.3	4.27			
	Fluid flow	m3/h	98	111	123	139	152	162	188	212			
Wet mode cooling performances Standard ΔT version: ⁶	Unit EER (Premium fans)		5.05	4.94	4.92	4.86	5.01	4.98	4.94	4.95	5.03	4.77	4.65
	Cooling capacity	kW	700	789	879	993	1094	1167	1344	1517	1723	1874	2036
Mechanical cooling	Total power input (Premium fans)	kW	158	182	203	233	248	265	307	349	395	452	500
performance Standard ΔT version: 3 Wet mode cooling performances Standard ΔT version: 6 Mechanical cooling performance High ΔT version: 3 Wet mode cooling performances High ΔT version: 6	Unit EER (Premium fans)	-	4.44	4.33	4.33	4.27	4.42	4.4	4.38	4.35	4.36	4.15	4.07
	Fluid flow	m3/h	67	76	84	95	105	112	129	146	165	180	195
Wet mode cooling performances High ΔT version: ⁶	Unit EER (Premium fans)		5.11	5	5	4.92	5.08	5.06	5.03	5.02	5.03	4.77	4.65
	N. of fans		10	10	12	12	14	14	16	16	18	20	20
	Sound Pressure Level - SPL (Premium fans) 7	dB(A)	77.2	77.4	77.7	77.9	78.2	78.3	78.7	79.0	79.3	79.6	79.9
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	98.7	98.9	99.7	99.9	100.6	100.7	101.4	101.7	102.4	103.0	103.3
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	72.1	72.8	73.0	73.8	73.9	74.2	74.8	75.7	76.3	76.8	77.5
	Sound Power Level - PWL (Low noise version) 9	dB(A)	93.6	94.3	95.0	95.8	96.2	96.6	97.5	98.4	99.4	100.2	100.9
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865



R513A Screw Glyco NH3 Models	ol-Free Version		065	075	080	090	100	110	125	140	165	180	195
	Cooling capacity	kW	673	755	841	951	1040	1105	1279	1439			
Mechanical cooling performance	Total power input (Premium fans)	kW	161	186	208	238	252	270	313	357			
Standard ΔT version: 1	Unit EER (Premium fans)	-	4.17	4.05	4.05	4.00	4.12	4.09	4.09	4.03			
	Fluid flow	m3/h	96.8	109	121	137	150	159	184	207			
Total freecooling Standard ΔT version [100% load]: ²	ZET temperature	°C	8.1	6.5	7.9	6.2	7.1	6.2	6.2	4.2			
Wet mode cooling performances Standard ΔT version ⁴	Unit EER (Premium fans)		4.84	4.72	4.71	4.63	4.79	4.75	4.72	4.69			
Wet mode total freecooling Standard ΔT version [100% load]: ⁵	ZET temperature	°C	9.2	7.3	9	7.1	9.8	7.2	7	4.9			
	Cooling capacity	kW	689	774	864	974	1074	1144	1317	1483	1684	1833	1984
Mechanical cooling performance	Total power input (Premium fans)	kW	163	188	210	240	256	274	317	362	410	468	516
High ΔT version: ¹	Unit EER (Premium fans)	-	4.23	4.11	4.12	4.05	4.20	4.17	4.16	4.10	4.11	3.92	3.84
11gn ΔI version:'	Fluid flow	m3/h	66	74	83	93	103	110	126	142	162	176	190
Total freecooling High ΔT version [100% load]: ²	ZET temperature	°C	8.7	7.1	8.3	6.7	7.6	6.7	6.7	4.7	4.9	5.4	3.9
Wet mode cooling performances High ΔT version: ⁴	Unit EER (Premium fans)		4.9	4.77	4.78	4.69	4.86	4.82	4.8	4.75	4.76	4.52	4.4
Wet mode total freecooling High ΔT version [100% load]: ⁵	ZET temperature	°C	10	8.1	9.6	7.7	10.4	7.7	7.7	5.5	5.7	6.1	4.6
	N. of fans		10	10	12	12	14	14	16	16	18	20	20
	Sound Pressure Level - SPL (Premium fans) ⁷	dB(A)	78.7	78.9	79.1	79.3	79.5	79.6	80.0	80.3	80.5	80.8	81.1
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	100.2	100.4	101.1	101.3	101.9	102.0	102.7	103.0	103.6	104.2	104.5
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	72.6	73.3	73.5	74.3	74.3	74.6	75.3	76.1	76.7	77.2	77.8
	Sound Power Level - PWL (Low noise version) 9	dB(A)	94.1	94.8	95.5	96.3	96.7	97.0	98.0	98.8	99.8	100.6	101.2
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865

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R1234ze - Inverter -Freecooling FIZ Models	Version		065	075	080	085	095	110	125	140	150
	Cooling capacity	kW	671	735	782	853	960	1106	1258		
Mechanical cooling performance	Total power input (Premium fans)	kW	152	178	182	204	226	267	301		
Standard ∆Tversion: 1	Unit EER (Premium fans)	-	4.4	4.14	4.29	4.17	4.25	4.14	4.18		
	Fluid flow	m3/h	107	118	125	137	154	177	202		
Total freecooling Standard ΔT version [100% load]: 2	ZET temperature	°C	10	9	10.3	9.4	9.8	8	8.1		
Wet mode cooling performances Standard ΔT version ⁴	Unit EER (Premium fans)		5.23	4.87	5.02	4.92	4.95	4.88	4.9		
Wet mode total freecooling Standard ΔT version [100% load]: ⁵	ZET temperature	°C	13.4	12.1	13.8	12.6	13.1	9.5	11.1		
	Cooling capacity	kW	688	754	803	876	987	1149	1295	1432	1586
Mechanical cooling performance High ΔT version:1	Total power input (Premium fans)	kW	153	179	184	206	228	270	304	334	374
	Unit EER (Premium fans)	-	4.49	4.21	4.37	4.26	4.33	4.25	4.26	4.29	4.24
	Fluid flow	m3/h	73	81	86	94	105	123	138	153	169
Total freecooling High ΔT version [100% load]: ²	ZET temperature	°C	11.3	10.3	11.6	10.7	11.1	9.2	9.4	9.6	9.7
Wet mode cooling performances High ΔT version: ⁴	Unit EER (Premium fans)		5.32	4.95	5.11	5.02	5.04	4.98	4.99	4.98	4.92
Wet mode total freecooling High ΔT version [100% load]: ⁵	ZET temperature	°C	15	13.7	15.4	14.2	14.7	12	12.7	12.9	12.9
	N. of fans		10	10	12	12	14	14	16	18	20
	Sound Pressure Level - SPL (Premium fans) 7	dB(A)	78.6	78.9	79.0	79.3	79.5	79.3	79.7	79.8	80.1
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	100.1	100.4	101.0	101.3	101.9	101.7	102.4	102.9	103.5
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	73.2	74.5	74.1	75.1	75.2	74.5	75.0	75.4	76.0
	Sound Power Level - PWL (Low noise version) 9	dB(A)	94.7	96.1	96.1	97.0	97.5	96.9	97.8	98.5	99.4
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865



R1234ze - Inverter - Chiller Versi CIZ Models	on		065	075	080	085	095	110	125	140	150
	Cooling capacity	kW	686	757	804	878	986	1139	1294		
Mechanical cooling performance	Total power input (Premium fans)	kW	147	172	177	198	220	259	296		
Standard ΔTversion: ³	Unit EER (Premium fans)	-	4.68	4.4	4.54	4.44	4.49	4.4	4.44		
	Fluid flow	m3/h	99.1	109	116	126	142	164	186		
Wet mode cooling performances Standard ΔT version 6	Unit EER (Premium fans)		5.52	5.14	5.28	5.2	5.19	5.16	5.17		
	Cooling capacity	kW	707	776	825	901	1013	1181	1332	1468	1625
Mechanical cooling performance	Total power input (Premium fans)	kW	148	173	178	199	221	261	294	323	362
High ΔT version: ³	Unit EER (Premium fans)	-	4.77	4.48	4.63	4.53	4.58	4.52	4.53	4.54	4.49
	Fluid flow	m3/h	68	75	79	87	97	113	128	141	156
Wet mode cooling performances High ΔT version: 6	Unit EER (Premium fans)		5.62	5.23	5.37	5.3	5.29	5.27	5.27	5.24	5.17
	N. of fans		10	10	12	12	14	14	16	18	20
	Sound Pressure Level - SPL (Premium fans) 7	dB(A)	77.3	77.7	77.8	78.2	78.4	78.2	78.5	78.7	79.0
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	98.8	99.2	99.8	100.1	100.8	100.6	101.2	101.8	102.4
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	72.8	74.1	73.7	74.7	74.8	74.1	74.6	75.0	75.6
	Sound Power Level - PWL (Low noise version) 9	dB(A)	94.3	95.6	95.7	96.6	97.2	96.5	97.4	98.1	99.0
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865

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R1234ze - Inverter - Glycol-Free NIZ Models	Version		065	075	080	085	095	110	125	140	150
	Cooling capacity	kW	679	745	792	864	971	1118	1271		
Mechanical cooling performance	Total power input (Premium fans)	kW	153	179	184	206	228	269	303		
Standard ∆Tversion: ¹	Unit EER (Premium fans)	-	4.43	4.16	4.31	4.2	4.27	4.15	4.19		
	Fluid flow	m3/h	97.7	107	114	124	140	161	183		
Total freecooling Standard ΔT version [100% load]: 2	ZET temperature	°C	8	6.7	8.7	7.5	8.1	6	6.3		
Wet mode cooling performances Standard ΔT version ⁴	Unit EER (Premium fans)		5.26	4.89	5.05	4.95	4.97	4.9	4.91		
Wet mode total freecooling Standard ΔT version [100% load]: ⁵	ZET temperature	°C	10.8	9.2	11.6	10.2	10.9	8.5	8.7		
	Cooling capacity	kW	697	764	813	886	997	1159	1308	1443	1597
Mechanical cooling performance	Total power input (Premium fans)	kW	155	181	185	207	229	272	306	336	376
High ΔT version: ¹	Unit EER (Premium fans)	-	4.51	4.23	4.39	4.28	4.35	4.26	4.27	4.29	4.25
	Fluid flow	m3/h	67	73	78	85	96	111	126	138	153
Total freecooling High ΔT version [100% load]: 2	ZET temperature	°C	8.5	7.3	9.1	8	8.5	6.5	6.8	7.2	7.1
Wet mode cooling performances High ΔT version: ⁴	Unit EER (Premium fans)		5.35	4.97	5.14	5.04	5.06	4.99	5	4.99	4.93
Wet mode total freecooling High ΔT version [100% load]: ⁵	ZET temperature	°C	11.5	10	12.2	10.9	11.5	9.1	9.4	9.9	9.8
	N. of fans		10	10	12	12	14	14	16	18	20
	Sound Pressure Level - SPL (Premium fans) 7	dB(A)	78.8	79.1	79.3	79.5	79.8	79.6	79.9	80.1	80.4
Sound levels	Sound Power Level - PWL (Premium fans) 8	dB(A)	100.3	100.6	101.3	101.5	102.2	102.0	102.6	103.2	103.8
	Sound Pressure Level - SPL (Low noise version) 9	dB(A)	73.4	74.6	74.2	75.2	75.4	74.6	75.2	75.5	76.0
	Sound Power Level - PWL (Low noise version) 9	dB(A)	94.9	96.1	96.2	97.2	97.7	97.0	97.9	98.6	99.5
	Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Dimensions	Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865



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



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