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TRF CF

HiRef

Innovators above
the standards

DATA CENTER



Chilled water perimeter mounted units

TRF CF

for Data Centers with underfloor fans

Range: 77.6–373.9 kW



TRF CF is the range of chilled-water air conditioners for computer rooms **with very high power density**. As for the TRF CS range, the fans are mounted in separate housing, but in addition units are **equipped with two chilled water batteries**. With these solutions the **cooling capacity is maximized**, at the same depth of 960 mm. In-depth fluid dynamic analysis has resulted in the meticulous design of every last constructive detail **to minimise air pressure drops and fan power consumption**, the only power load in the machine.

Main advantages

FREE FAN solution

The FREE FAN solution with the fans mounted in separate housing frees up space inside the unit and thus increases the surface area of the coil. This results in both an increase in air flow and cooling capacity and a reduction in air pressure drops. The FREE FAN solution increases the refrigerating power of the entire range.

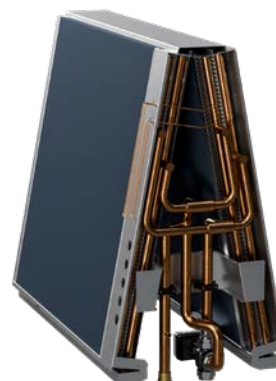


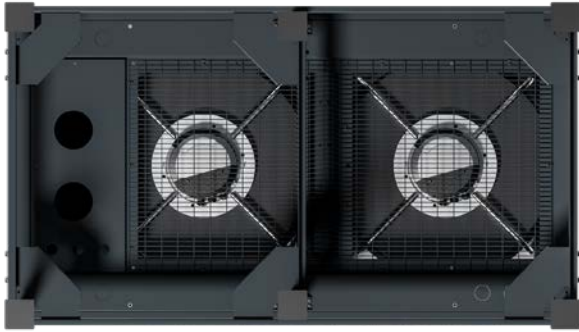
Ventilation EC 2.0

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant ΔP and ΔT . Their accurate adjustment allows an efficient use of power for ventilation and a consequent reduction of the system's PUE. Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation even in the event of microprocessor malfunctions.

Accurate regulation with multiple types of valves

All units in the TRF CS range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system or with servo motor with spring return. Pressure-independent valves can also be fitted on request. All these types of valves ensure the utmost adjustment accuracy while maintaining the system's hydronic balance.





Ventilation adjustment

The most suitable on-board ventilation system can be chosen based on the air distribution logic in the server room, guaranteeing a constant flow of air (airflow control) or a constant available overlap (Δp control); the latter is particularly useful when using a floating floor.

Finned pack coil with hydrophilic coating

All models in the TRF CF range feature heat exchange coils with hydrophilic coating. This special coating – together with adequate adjustment of air through-flow speeds – helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit.



Double circuit

Chilled water units are also available with a double circuit. In this version the supply is via two different hydraulic circuits that can offer the utmost operational continuity if one of the two circuits malfunctions. Each circuit is equipped with a regulating valve



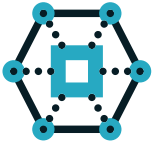
Easier scheduled maintenance

The unit has been painstakingly designed to ensure frontal access to components. This makes routine maintenance easier in full compliance with safety standards.

Double coil

The double coil solution is designed to optimize the internal spaces of the unit, significantly increasing the heat exchange surface and potential refrigerating power.

Technological components



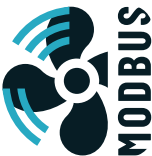
Multi-protocol communication interface

HiRef units can be integrated with the customer's external supervision Building Management System (BMS), using the most popular communication protocols, including Modbus RTU, Modbus/IP, BacNet, LonWorks, SNMP.



EC Radial Fans

Radial or centrifugal fans are characterised by backward blades. Air is taken in the axial direction, parallel to the rotation axis and delivered radially, perpendicular to the rotation axis. This type of fan does not require an external screw, has a high head and is suitable for use in indoor units where the air is often ducted and recirculated. They are driven by electronically commutated (EC) brushless permanent-magnet (BLDC) synchronous motors. The use of these motors reduces unit consumption, noise and footprint, improves the efficiency and life cycle of the system through accurate control of speed and acceleration, resulting in less heat dissipation. In addition, inrush currents and sparks are eliminated.



Modbus controlled fans

The Modbus protocol, unlike the 0-10V signal, allows to not only control the speed of the fans, but also to capture, monitor and manage considerably more data and alarm information.



Pressure independent valve (PICV)

The pressure independent valve (PICV) controls the automatic flow balance. Traditional valves are affected by the pressure in the system, causing variable flow rate circulation in the unit. When the system pressure changes, for example due to the shutdown or start-up of other units, the compensation system of this independent valve helps to keep the water flow constant and to always guarantee unit operation in the agreed project conditions.



Fast restart

The fast restart function (on request) allows the unit to restart quickly after a mains power outage. This optional feature is available with dual power to minimise restart times.



On-board Humidifier

Humidifiers are essential components for maintaining the right level of humidity in the server room and ensuring the proper functioning of the room equipment. Humidifiers with immersed electrodes can be installed in HiRef units, managed by proprietary software which, equipped with a special probe, keeps humidity levels at pre-established values.



Variable geometry coil (Flexy)

Chilled water units can be selected based on the room working conditions. HiRef has designed three configurations of the heat exchange coils, each suitable for operation in commonly found operating conditions:

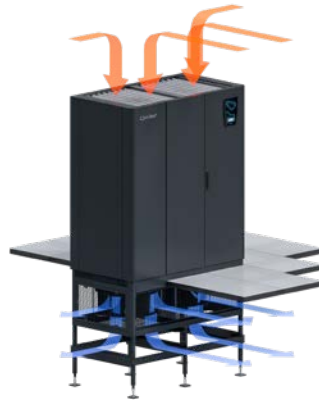
- **A:** Solution for systems with low ΔT ($\approx 5^{\circ}\text{C}$) and high water flow rates
- **B:** Solution for systems with moderate ΔT ($\approx 8^{\circ}\text{C}$) and average water flow rates
- **C:** Solution for systems with high ΔT ($\approx 12^{\circ}\text{C}$) and low water flow rates



Double circuit

The chilled water units are also available in a double circuit version, fed from two different independent hydraulic circuits, able to offer maximum redundancy in case one of them should go out of service. Each circuit is equipped with its own regulating valve.

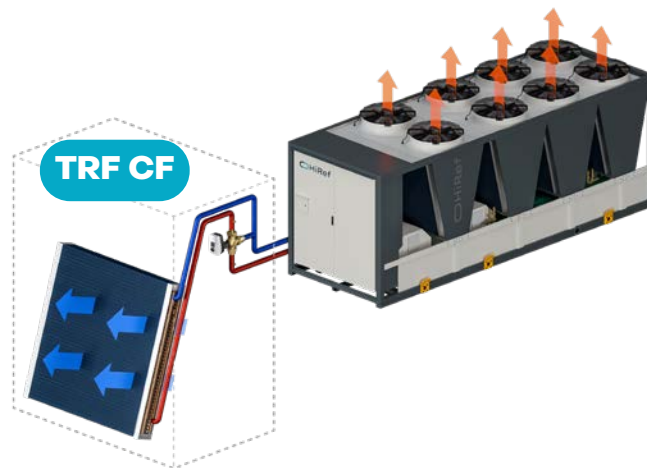
Air flow configurations



Types of system



CHILLED WATER



Additional benefits

- Temperature control through heating and post-heating systems with electric heating elements
- Humidity control through dehumidification and humidification
- Humidifier installed on board the machine
- Fan speed modulation based on thermal load (constant ΔT)
- Hydraulic connections from the bottom of the unit
- Broad choice of accessories, including plenums for ducting, plenums for direct Free-Cooling
- Air filter class G3 supplied as standard Air Filters G4, M5, F7
- Double power supply with automatic switch
- Double panelling only on the front doors or on the whole machine
- Instant reading of water flow rate, water inlet and outlet temperatures, or cooling capacity

Technical table

TRF CF		045	055	065	075	150	180	200	210	
VERSION A - AIR TEMPERATURE 24°C - RELATIVE HUMIDITY 50% / WATER TEMPERATURE IN 7°C OUT 12°C										
COOLING CAPACITY	kW	92.8	111.2	154.5	191.2	234.5	-	-	-	
SHR	-	0.77	0.73	0.78	0.74	0.78	-	-	-	
EER	-	33.56	38.75	26.02	30.55	24.78	-	-	-	
VERSION A - AIR TEMPERATURE 30°C - RELATIVE HUMIDITY 35% / WATER TEMPERATURE IN 10°C OUT 15°C										
COOLING CAPACITY	kW	91.1	102.4	154	176.7	233.7	-	-	-	
SHR	-	1	0.93	1	0.94	1	-	-	-	
EER	-	32.94	35.68	25.93	28.23	24.7	-	-	-	
VERSION A - AIR TEMPERATURE 35°C - RELATIVE HUMIDITY 30% / WATER TEMPERATURE IN 15°C OUT 20°C										
COOLING CAPACITY	kW	91.2	100.5	154.4	173.6	234.2	-	-	-	
SHR	-	1	1	1	1	1	-	-	-	
EER	-	32.99	35.03	25.99	27.75	24.75	-	-	-	
VERSION B - AIR TEMPERATURE 30°C - RELATIVE HUMIDITY 35% / WATER TEMPERATURE IN 10°C OUT 18°C										
COOLING CAPACITY	kW	85.9	97.9	141.8	164.6	219.8	254.3	283.7	329.2	
SHR	-	1	0.95	1	0.98	1	0.97	1	0.98	
EER	-	31.06	34.14	23.88	26.31	23.23	25.54	22.07	24.28	
VERSION B - AIR TEMPERATURE 35°C - RELATIVE HUMIDITY 30% / WATER TEMPERATURE IN 15°C OUT 23°C										
COOLING CAPACITY	kW	85.7	96.6	141.7	163.9	219.5	253.2	283.4	327.9	
SHR	-	1	1	1	1	1	1	1	1	
EER	-	30.99	33.68	23.85	26.2	23.2	25.43	22.05	24.18	
VERSION C - AIR TEMPERATURE 30°C - RELATIVE HUMIDITY 35% / WATER TEMPERATURE IN 10°C OUT 22°C										
COOLING CAPACITY	kW	77.6	90.6	127.2	153.2	193	232.5	254.4	300.4	
SHR	-	1	1	1	1	1	1	1	1	
EER	-	28.06	31.59	21.41	24.49	20.4	23.35	19.79	22.16	
VERSION C - AIR TEMPERATURE 35°C - RELATIVE HUMIDITY 30% / WATER TEMPERATURE IN 15°C OUT 27°C										
COOLING CAPACITY	kW	78	89.9	128	153.6	194.2	233	256	301.2	
SHR	-	1	1	1	1	1	1	1	1	
EER	-	28.19	31.35	21.55	24.54	20.53	23.41	19.92	22.22	
AIR FLOW	m³/h	16500			29000		44000		58000	
FANS ABSORBED POWER	kW	2.8	2.9	5.9	6.3	9.5	10	12.9	13.6	
POWER SUPPLY	-	400/3+N/50								
POWER SUPPLY at 2 meters free field	dB	70			71		73		74	75
DIMENSIONS [LxHxD]	mm	1270x2000x960			1760x2000x960		2510x2000x960		3160x2000x960	

Also available with 60 Hz power supply. | Minimum height with fanmodule 2550 mm.

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