MITSUBISHI ELECTRIC
HYDRONICS & IT COOLING SYSTEMS S.p.A.

IT COOLING

CHILLERS

i-FR2-W-Z G04

WATER SOURCE CHILLERS WITH VSD SCREW COMPRESSORS AND NEARLY ZERO GWP REFRIGERANT, FROM 613 TO 1894 kW

r HFO 1234ze

INVERTER TECHNOLOGY

HYBRID FALLING FILM

melcohit.com

i-FR2-W-Z G04

THE GREENEST SOLUTION FOR YOUR DATA CENTER

Water-source chillers with VSD screw compressors. From 613 to 1894 kW

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

The i-FR2-W-G04-Z range is engineered to be at the forefront of green innovation in IT cooling applications, providing the best efficiency for the most advanced Data Centers. Thanks to the full-inverter technology and the HFO R1234ze refrigerant the unit perfectly suits modern and greener Data Center.

A COMPLETE NEW GENERATION OF CHILLERS

EFFICIENCY

	EER	SEPR HT
i-FR2-W-Z	7,75	9,40

EER: 28/20°C, air 30/36°C (EN14511 values)
SEPR HT: Regulation (EU) N. 2016/2281

WIDE OPERATING RANGE FOR IT COOLING APPLICATIONS

COOLING

EVAPORATOR (PLANT SIDE): +7 … +20 °C

EVAPORATOR DESIGNED FOR: high ΔT, up to 12 K

CONDENSER: up to 52 °C at full load

HIGH WATER TEMPERATURE KIT: up to 72°C at full load

ACOUSTIC OPTIONS

Standard	Low sound power levels already in the standard version.	**Baseline**
Compressors' acoustical enclosure	Unit with compressor acoustical enclosure	**-6 dB(A)**
Integral acoustical enclosure	Unit with an integral acoustical enclosure, for best-in-class sound power levels	**-16 dB(A)**

ALL-ROUND SUSTAINABILITY

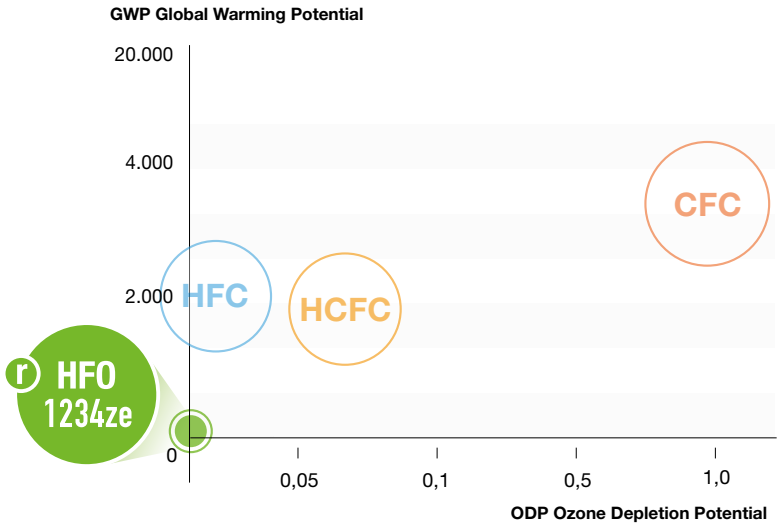
Fully committed to supporting the creation of a greener tomorrow, Mitsubishi Electric Hydronics & IT Cooling Systems designed i-FR2-W-G04-Z, a complete chiller range optimized for HFO refrigerant R1234ze, with nearly zero environmental impact.

Combining brilliant annual efficiency with the use of a low GWP refrigerant, i-FR2-W-G04-Z tackles both the indirect (due to the primary energy consumption) and the direct global warming impact, thus resulting the perfect choice for any new, forward-looking cooling system.

The environmental impact of the refrigerants is measured by two parameters:

- **ODP:** Ozone Depletion Potential
- **GWP:** Global Warming Potential

While in the past the focus was on reducing ODP values to 0, new regulations encourage Member States to work harder on GWP.



LEADING PROPRIETARY TECHNOLOGY

HYBRID FALLING FILM

Equipped with condensers and the new
Hybrid falling film evaporator by MEHITS

PATENT PENDING

FULL INVERTER TECHNOLOGY

INVERTER TECHNOLOGY

The new i-FR2-W-G04-Z showcases the latest variable speed technology:

- dual screw compressors with integrated refrigerant cooled inverter motor and variable Vi technology
- optimized for low condensing pressures
- especially suitable for water-cooled chillers

I-FR2-W-G04-Z ADJUSTS THE ROTATIONAL SPEED AND THE INTERNAL GEOMETRY TO:

- ✔ perfectly match the cooling load of the plant in any condition
- ✔ offer stepless and accurate capacity control
- ✔ ensure premium efficiency values, thus cutting operating costs

TECHNOLOGICAL CHOICES

Advanced technologies smartly combined with the green R1234ze HFO: the perfect match for offering the highest efficiency levels.

VSD SCREW COMPRESSORS

VSD screw compressors optimized for water source applications, with integrated frequency converter and Variable Vi technology

2 independent refrigerant circuits on all sizes to ensure:

- Total reliability
- Very low continuous minimum capacity ratio
- Easy maintenance

CSVW COMPRESSORS

Variable Speed Drive
Integrated and compact frequency converter, refrigerant cooled, for outstanding seasonal efficiency and wide capacity regulation.

Smart variable Vi logic
The integrated Vi slider adapts the internal geometry to the current operating condition, thus ensuring the best efficiency.

Extra durability achieved thanks to dedicated components:
- Envelope control function, 3-stage warning and alarm system, safe-torque-off function.
- Carbon steel bearings granted for a lifetime of over 150.000 hours.

High efficiency high speed motor
For unprecedented full and part load efficiencies and extremely wide and accurate capacity regulation.

TECHNICAL DATA
i-FR2-W-Z G04

HYBRID FALLING FILM EVAPORATOR

HYBRID FALLING FILM

PATENT PENDING

By combining brilliant efficiencies and reduced refrigerant charge, the new hybrid falling film evaporator used in i-FR2-W-G04-Z is at the forefront of green innovation. **Fully developed and manufactured by MEHITS, it is characterized by:**

- Top-level approach aligned with the best flooded technologies
- Very low pressure drops across all the range thanks to the optimized design
- Down to -50% refrigerant charge reduction compared to a traditional flooded evaporator
- Application flexibility thanks to its configurability
  E.g. Hydraulic connections on opposite sides and 16 bar water-side pressure options
- Complete reliability in any condition thanks to the proprietary oil separation and recovery solutions

DOWN TO **-50%** REFRIGERANT CHARGE REDUCTION

Compared to traditional flooded evaporators

Specifically designed for IT cooling applications

- Double independent refrigerant circuits in each size
- ITC specific operating map
- Evaporator suitable for high ΔT up to 12K
- Numbered wirings on electrical board
- Compressors suction and discharge valves
- Increased thermal insulation on both evaporator and condenser
- Temperature probes on condenser
- Internal leak detection control

SHELL&TUBE CONDENSER

The new shell&tube condensers, fully developed and manufactured by MEHITS, are designed for minimum pressure drops, both on the water and refrigerant sides.

The integrated oil separation and recovery system ensures complete reliability in any load condition.

- Application flexibility thanks to its configurability

  E.g. Hydraulic connections on opposite sides and 16 bar water-side service pressure options

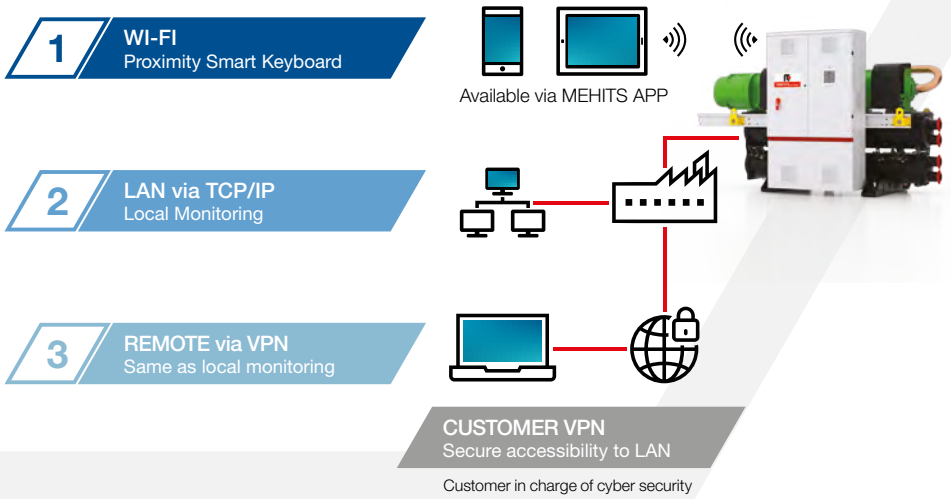
KIPlink: LOCAL AND REMOTE MONITORING FUNCTIONS

An exclusive product of Mitsubishi Electric Hydronics & IT Cooling Systems.

Monitor and control the unit from a LAN device (PC, laptop, mobile phone) with a simple web browser.

MAIN FEATURES

- **Easier on-site operation**
- **Real-time graphs and trends**
- **Data logger function**



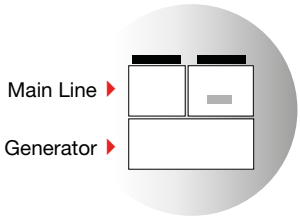
FAST RESTART

Ensures a **faster return to the necessary cooling** levels in the shortest time possible, while maintaining the **reliability** of the chiller.

Ensure immediate cooling start-up within 65”

The units in standard working conditions delivers 100% of cooling capacity within 310” after power is restored.

DOUBLE POWER SUPPLY



Redundancy increases uptime. i-FR2-W-G04-Z extends this concept also to the electrical supply: the unit, equipped with an ATS*, can be connected to two separate power lines to enhance the system dependability.
In case of a main line power outage, the ATS* automatically switches over to the backup line, granting uninterrupted power supply to the unit.
i-FR2-W-G04-Z is suitable for Uptime Institute’s TIER III and TIER IV** design topologies.

* ATS: Automatic Transfer Switch

** The Tier Classification System provides the data center industry with a consistent method to compare typically unique facilities based on expected site infrastructure performance, or uptime.

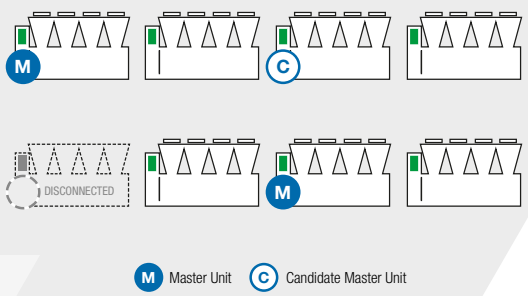
SMART LAN FUNCTIONS

i-FR2-W-G04-Z features embedded LAN logics for an easy connection between a group of chillers.

- **Up to 8 chillers connected to the same group.**
- **Load sharing and Sequencing.**
- **Selectable units’ start-up sequence.**
- **Stand by unit management with automatic unit rotation.**
- **Dynamic master with succession priority.**

  One master unit is elected to coordinate the group and if it becomes disconnected the candidate unit takes full control.
- **Resource priority management.**

MASTER SUCCESSION PRIORITY



FURTHER OPTIONS

Set-point adjustment

4-20 mA: Enables remote set-point adjustments (analog input).

Double set-point: Enables the remote switch between 2 set-points (digital input).

Control functions

External capacity cap: Limits the unit's cooling capacity to a specific % value, by acting on active resources and their operating frequencies. The unit can exceed this limit in specific conditions.

U.L.C. User Limit Control: Controls a mixing valve (not included) to ensure a safe start-up and operation of the unit even in critical conditions.

Remote probe: Controls the unit's and pump's activation on the base of the water temperature of the buffer tank or hydraulic decoupler.

Demand limit: Limits the unit's power absorption for safety reasons or in temporary situations (digital input).

Operating map

HWT kit: Enables condenser leaving water temperatures at full load operation up to 72°C. Perfect for heat recovery applications.

Connectivity

Serial card interface module to allow integration with BMS protocols:
Modbus / LonWorks / BACnet MS/TP / BACnet over IP / Konnex / Modbus TCP/IP/ SNMP

M-Net interface kit: Interface module to allow the integration of the unit with Mitsubishi Electric proprietary communication protocol M-Net.

Multi Manager options to allow easy connection between a group of chillers

Energy Meter

Energy meter for BMS: Acquires electrical data and the power absorbed by the unit and sends them the BMS for energy metering (Modbus RS485).

Energy meter for W3000+: The electrical data acquired is available directly on the unit's control.

Acoustical enclosures

Compressors acoustical enclosure: the compressors are enclosed in an acoustical enclosure.

Integral acoustical enclosure: a complete enclosure is provided, in order to achieve very low sound power levels.

Refrigerant leak detection

Internal refrigerant leak control: new proprietary algorithm that is able to check, by reading and interpretation of the internal parameters of the refrigerant circuits, if there is a refrigerant leak, without needing an external leak detector.

Leak detector + migration: Refrigerant leak detection and migration system. If the device detects a leak the unit stops and stores the remaining refrigerant inside the evaporator.

Hydraulic

Water flow switch: Designed to protect the unit when the water flow across the evaporator is not sufficient and falls outside of the operating parameters.

16 BAR Evaporator and/or Condenser: Exchangers with higher water-side pressure (std 10 bar) for high water column applications.

Evaporator and/or Condenser hydraulic connections on opposite sides

Structure

Rubber type anti-vibration mountings: Reduce vibrations, keeping noise transmission to a minimum.

Removable electrical panel: Electrical panel suitable for being removed, to decrease the width of the unit for easier access through existing doors/openings.

“BY FAR THE BEST PROOF IS EXPERIENCE”

Sir Francis Bacon
British Philosopher (1561 - 1626)

FORTUM DISTRICT HEATING

2017-2018 Kirkkonummi - Finland

Application:
Data Center

Cooling capacity:
27150 kW

Heating Capacity:
26486 kW

Plant type:
Hydronic System

Installed units:
2x FOCS2-W HFO/H/CA/S 5422, 8x ACU EXPANDED

PROJECT

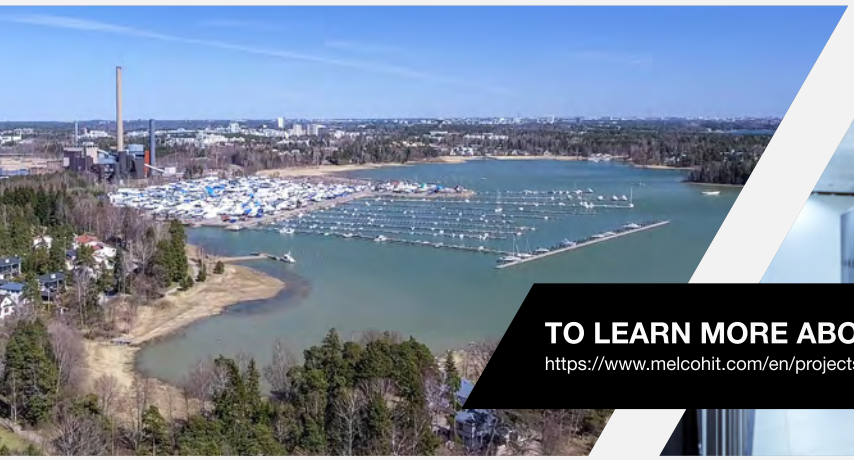
Fortum, a Finnish energy company, utilizes the waste heat from a data center to supply the heat into a district heat network in a very innovative and sustainable way. The facility currently generates between 10,000-15,000 megawatt-hours of heawaste annually.

CHALLENGE

The heat pumps are used as a primary cooling method for the data center. Fortum’s long-term goal is to serve all the district heating customers in Espoo, Kirkkonummi, and Kauniainen regions with carbon-neutral district heat by 2030. Using the heat waste of a data center is a good example of how it is actively possible to move towards low-carbon district heating. Furthermore, as demonstrated in several projects throughout Europe, heat pumps are an energy efficient and economical solution for district heating systems.

SOLUTION

To recover the heat waste of the Ericsson data center and serve the district heating in Kirkkonummi, 2 RC FOCS2-W HFO/H/CA/S 5422 heat pumps were supplied.
The FOCS2-W HFO RC heat pumps were selected for their efficiency and sustainability as they use HFO-1234ze refrigerant (1,3,3,3-Tetrafluoropropene), which has a minimal greenhouse effect.



TO LEARN MORE ABOUT THIS PROJECT

https://www.melcohit.com/en/projects/5001/fortum-district-heating

MORE THAN 1000 PROJECTS ALL OVER THE WORLD

CED POSTE VIALE EUROPA

2015 Rome - Italy

Application:
Data Center

Cooling capacity:
3450 kW

Plant type:
Hydronic System

Installed units:
4x i-FX-W (1+i)/CA 2152

RC's units, with their unbeatable advantages in terms of efficiency, quality, and precision are already the preferred choice of the major brands in the most prestigious projects all over the world.

TO LEARN MORE ABOUT THIS PROJECT
https://www.melcohit.com/en/projects/2649/ced-poste-viale-europa

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