

IT COOLING

CHILLERS

FR-W-GO4-Z

**WATER SOURCE CHILLERS
WITH SCREW COMPRESSORS,
FROM 93 kW TO 372 kW**

r HFO
1234ze



FR-W-G04-Z

THE COMPACT CHILLER FOR THE HIGHEST GREEN EFFICIENCY



Water source chillers with screw compressors
93 kW - 372 kW

When business operations rely on uninterrupted server functions, round-the-clock cooling activity becomes crucial. Without a reliable air conditioning system, temperatures would quickly rise to levels that would corrupt mission-critical hardware.

FR-W-G04-Z is brilliantly engineered to be at the forefront of green innovation, delivering consistent cooling to the most challenging IT infrastructures.

Available with one or two independent circuits and safety features, the unit ensures great reliability and continuous 24/7 operation.

IT COOLING APPLICATIONS

- ✓ Data centers and server rooms
- ✓ Technological hubs
- ✓ Telecommunication installations
- ✓ Laboratories and technical rooms

EXTREME EFFICIENCY



FR-W-G04-Z range has been engineered to provide utmost efficiency at both full loads and partial loads, for whatever cooling capacity needed.

ErP 2021 COMPLIANT

FR-W-G04-Z satisfies the SEPR HT (high temperature) for IT cooling chillers, thus matching the most challenging ErP 2021 efficiency targets.

Single circuit unit

EER* = 4,72

SEPR HT* = 7,05

Dual circuit unit

EER* = 4,80

SEPR HT* = 7,09

*Average values

SMART HEAT RECOVERY: TURNING HEAT INTO PRECIOUS ENERGY



Most of the energy absorbed by the electrical components of a data center turns into heat. This precious thermal energy can be sustainably redirected to the nearby commercial or residential facility instead of being rejected in the environment.

- ✓ **Workplace heating:** thermal heat is redirected to offices located close to the server room.
- ✓ **Swimming pools or greenhouse heating.**
- ✓ **District heating:** Thermal heat is used to warm nearby houses through district heating networks.

HEAT RECOVERY CONFIGURATIONS

-	Standard unit	Unit for the production of chilled water.	Baseline
R	Total heat recovery	A devoted refrigerant water heat exchanger recovers all the condensation heat.	48°C

ALL-ROUND SUSTAINABILITY



FR-W-G04-Z is the result of Mitsubishi Electric Hydronics & IT Cooling Systems' extensive approach to sustainability.

Achieving outstanding performance and ensuring long-term sustainability are challenges that modern HVAC systems need to tackle.

Increasing concerns about the global warming impact of chillers and heat pumps is driving new regulatory policies

to push towards even more efficient units with the lowest carbon footprint.

Today, an all-round approach is the only way to effectively reduce the Total Equivalent Warming Impact (TEWI).

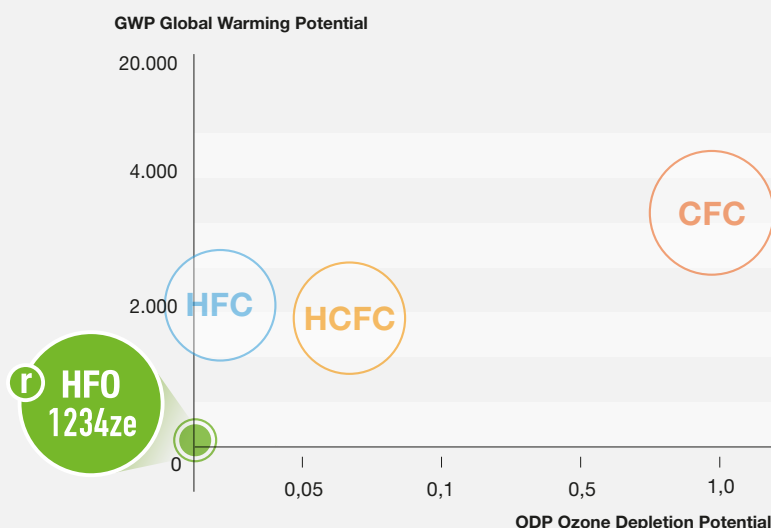
Fully committed to support the creation of a greener tomorrow, Mitsubishi Electric Hydronics & IT Cooling Systems designed FR-W-G04-Z, a complete chiller range optimized for HFO refrigerant R1234ze, with nearly zero environmental impact.

Combining brilliant annual efficiency with the use of a low GWP refrigerant, FR-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.



The path to a greener world

Starting from the 70s, several international agreements have been made to drive the industry towards eco-friendly refrigerants. The last crucial step was taken in 2016, when the Kigali Amendment to the Montreal Protocol was passed, paving the way for the global phasedown of HFCs.



TOTAL RELIABILITY

The FR-W-G04-Z units are designed for continuous operation in IT infrastructures that cannot afford cooling interruptions. The units are available with one or two independent circuits to guarantee ultimate redundancy and proven dependability. Dedicated features such as Fast Restart and Double power supply ensure uninterruptible operation under any unexpected circumstance.



COMPACT DESIGN FOR THE HIGHEST FLEXIBILITY

The compact and self-supporting structure resulting from the rationalized design and assembly of the chiller components leads to more flexibility during the installation phase, both in case of new plants and already-existing ones.



EXTRA DURABILITY AND REDUCED MAINTENANCE COSTS

Attention has been paid to the intensive use of the unit (24/7, 365 days a year) and long-lasting operation. The latest technology for the compressors and top-quality heat exchangers provide outstanding long-term reliability aimed at lower maintenance costs.

TECHNOLOGICAL CHOICES

Dual circuit units

From size 1102 for increased reliability and easier maintenance operations

Acoustical enclosure (opt.):

- ▶ Compressors enclosure in peraluman panels with 30mm polyester acoustic insulation (-5dB(A))
- ▶ Integral enclosure standard and plus (FR-W-G04-Z size 2002 only) in peraluman panels enclosure with an additional acoustic insulation in polyester fiber 30 mm (std) and 50 mm (plus) thick: -14 dB(A) and -18 dB(A), respectively.

Frame in polyester-painted galvanized steel

- ▶ Very easy maintenance thanks to the rationalized positioning of components
- ▶ Easy transport, lifting and handling
- ▶ Compact footprint (width < 950mm for single circuit units)

Shell-and-tube condenser

- ▶ **2 (std) or 4 (opt.) pass condenser:** to provide the best flexibility for various types of cooling water sources
- ▶ **Cu/Ni 90/10 tubes condenser (opt.) for seawater:** to provide protection against corrosion and guarantee reliable operation and optimal condensation



EXTENDED OPERATING FIELD FOR A VAST ARRAY OF APPLICATIONS

Dedicated heat exchangers and wide operating limits make FR-W-G04-Z suitable for a vast range of applications.

- ✓ **2-pass condenser (std):** optimized for water $\Delta T=5^{\circ}\text{C}$ (typically cooling tower).
- ✓ **4-pass condenser (opt):** optimized for water $\Delta T>10^{\circ}\text{C}$ (typically open loop sources: groundwater or waterworks).

Hydraulic connection kits are available for the condenser.

Thermal vector fluid temperature at the evaporator outlet between -2°C and 18°C .

Thermal vector fluid at the condenser outlet between 22°C and 48°C (53°C with the HWT Kit).

PRECISE CONDENSATION CONTROL

FR-W-G04-Z range provides several solutions for the control of the condenser water system. A 0-10V signal is provided as standard to control an external modulating valve or the dry-cooler EC fans.

Options include a pressostatic valve for regulating the water flow as a function of the condensing pressure, or the 0-10V signal with relay for external inverter driven pump speed control.

In addition, 2-way modulating valves can be offered as an accessory to control the condenser water flow.

Advanced technologies smartly combined with the green 1234ze HFO refrigerant: the perfect match for offering the highest efficiency levels.



Compact screw compressors, optimized for low pressure ratio applications

- ▶ 25% minimum capacity step (opt. for two circuit units).
- ▶ Long-life bearings (more than 150.000h at full load)
- ▶ Part winding start
- ▶ Three-stage oil separator

HFO refrigerant

4th generation refrigerant HFO 1234ze, with negligible greenhouse effect and zero impact on the ozone layer.

HFO 1234ze GWP_{100 year} < 1

(R134a GWP_{100 year} = 1300)

GWP values according to IPCC rev. 5th

Rapid molecule disintegration in the atmosphere

HFO 1234ze = 2 weeks

(R134a = 14 years)

Approved by international standards

ASHRAE 34, ISO 817:

A2L classification (non toxic, mildly flammable)

Compatible with common construction materials

No special components

No extra cost

In-line with environmental regulation objectives

No future retrofit required

Electronic expansion valve

Managed by proprietary dedicated logics, to guarantee an excellent flow control and a highly precise temperature control.

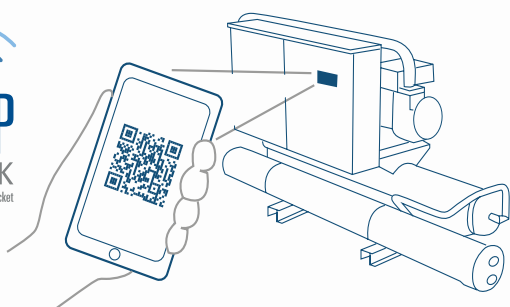
Dry expansion shell-and-tube evaporator fully developed by Mitsubishi Electric Hydronics & IT Cooling Systems

- ▶ Internally grooved copper tubes for enhanced heat exchange
- ▶ Low pressure drops
- ▶ Fully protected against ice formation

W3000TE CONTROL AND USER-FRIENDLY INTERFACE

The logic behind FR-W-G04-Z is the W3000TE control software. Characterized by advanced functions and algorithms, the proprietary software ensures faster adaptive responses to different dynamics, in all operating modes:

- ✓ Efficient and reliable operation in all conditions
- ✓ Connectivity with the most commonly used BMS protocols (Opt.)
- ✓ Demand limit option (available for double circuit units).



As an option, the direct control over the unit comes through the innovative **KIPLink interface**. Based on Wi-Fi technology, KIPLink gets rid of the standard keyboard and **allows one to operate on the unit directly from a mobile device** (smartphone, tablet, notebook).

Easier on-site operation

Real-time graphs and trends

Data logger function

DEDICATED FEATURES FOR MISSION CRITICAL APPLICATIONS

FR-W-G04-Z can be configured with accessories that ensure the system reliability and maximize the equipment uptime in case of emergency circumstances.

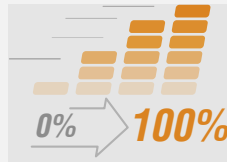
FAST RESTART

With IT playing a vital role in a business's success, organizations must choose appliances with quicker restart times to improve the IT cooling systems' dependability.

FAST RESTART is the control function that provides a quick resumption of the cooling resources after a power failure in order to re-establish, in the quickest time possible, the correct chilled water temperature.



Ensure immediate cooling start-up within 25"



Full load resumption in a shorter time compared to standard unit restart

Ramp-up time for 100% cooling capacity

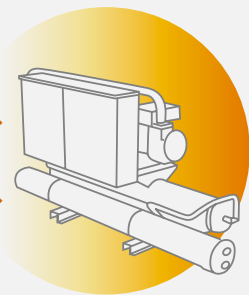
N. compressors	Standard unit	Unit with fast restart
1	520"	120" ⁽²⁾
2	710"	130" ⁽²⁾

⁽²⁾ if condensing control valve is present, add 30". Values refer to a unit working at standard conditions.

DOUBLE POWER SUPPLY

Main Line ▶

Generator ▶



A secure source of electrical energy is fundamental to keep services running.

With the optional Automatic Transfer Switch (ATS), FR-W-G04-Z can be connected to two separated power lines to enhance the system dependability. When the primary source fails, the ATS automatically switches over to the backup line, granting an uninterrupted power supply to the unit.

ENERGY METER



You can't manage what you don't measure.

PUE (Power Usage Effectiveness) is the ratio that determines how energy efficient data centers are comparing the power currently used for the IT equipment with the power used by the infrastructure which keeps that IT equipment working, including the cooling system.

Energy meter option allows to acquire the electrical data and the power absorbed by the unit and send them to the supervisor for energy metering.



FR-W-G04-Z 0551-2002

Chiller, water source for indoor installation, from 93 kW to 372 kW.



R HFO1234ze

COOLING

T SHELL & TUBES

SCREW

FR-W-G04-Z		0551	0651	0751	0851	0951	1102	1302	1402	1502	1702	1902	2002
Power supply	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE													
COOLING ONLY (GROSS VALUE)													
Cooling capacity	(1) kW	93,17	103,0	125,9	143,6	166,0	188,3	212,0	232,0	259,7	291,8	331,8	373,4
Total power input	(1) kW	18,52	20,89	26,21	29,65	33,88	37,05	41,78	47,06	52,41	59,28	67,77	75,44
EER	(1) kW/kW	5,038	4,928	4,805	4,851	4,897	5,089	5,072	4,926	4,956	4,921	4,894	4,952
ESEER	(1) kW/kW												
COOLING ONLY (EN14511 VALUE)													
Cooling capacity	(1)(2) kW	92,90	102,6	125,5	143,1	165,5	187,7	211,3	231,2	258,9	290,8	330,7	371,9
EER	(1)(2) kW/kW	4,840	4,730	4,650	4,660	4,720	4,910	4,900	4,760	4,790	4,750	4,720	4,770
Cooling energy class		B	B	B	B	B	B	B	B	B	B	B	B
SEPR	(3)(4)	7,05	7,04	7,03	7,02	7,08	7,05	7,13	7,06	7,15	7,10	7,06	7,07
COOLING ONLY (GROSS VALUE)													
16°C/10°C													
Cooling capacity	(5) kW	103,7	114,8	140,0	159,7	184,8	209,9	236,7	258,3	289,6	324,9	369,4	414,8
Total power input	(5) kW	18,60	20,97	26,29	29,72	33,96	37,21	41,94	47,25	52,57	59,43	67,93	75,69
EER	(5) kW/kW	5,575	5,467	5,323	5,377	5,435	5,642	5,649	5,461	5,506	5,470	5,440	5,480
23°C/15°C													
Cooling capacity	(6) kW	122,3	135,4	164,7	187,8	217,7	247,6	280,0	304,6	342,0	382,9	435,2	487,0
Total power input	(6) kW	18,63	20,97	26,23	29,64	33,86	37,28	41,96	47,28	52,47	59,27	67,72	75,58
EER	(6) kW/kW	6,575	6,448	6,286	6,345	6,422	6,638	6,667	6,440	6,514	6,457	6,428	6,442
EXCHANGERS													
HEAT EXCHANGER USER SIDE IN REFRIGERATION													
Water flow	(1) l/s	4,455	4,927	6,020	6,866	7,936	9,007	10,14	11,09	12,42	13,96	15,87	17,86
Pressure drop	(1)(2) kPa	23,3	28,5	20,3	27,6	27,7	30,7	30,5	36,5	31,6	39,9	38,8	49,2
HEAT EXCHANGER SOURCE SIDE IN REFRIGERATION													
Water flow	(1) l/s	5,320	5,902	7,242	8,249	9,517	10,74	12,09	13,29	14,87	16,72	19,03	21,38
Pressure drop	(1)(2) kPa	19,8	19,2	23,0	27,2	29,7	20,2	20,1	21,7	24,1	27,9	29,6	29,0
REFRIGERANT CIRCUIT													
Compressors nr.	N°	1	1	1	1	1	2	2	2	2	2	2	2
No. Circuits	N°	1	1	1	1	1	2	2	2	2	2	2	2
Refrigerant charge	kg	22,0	21,0	24,0	35,0	35,0	44,0	46,0	44,0	48,0	55,0	55,0	69,0
NOISE LEVEL													
Sound Pressure	(7) dB(A)	75	75	76	76	76	78	78	78	78	78	78	79
Sound power level in cooling	(8)(9) dB(A)	92	92	93	93	93	95	95	96	96	96	96	98
SIZE AND WEIGHT													
Length	(10) mm	2400	2400	2700	2700	2700	3000	3000	3100	3100	3100	3100	3640
Depth	(10) mm	945	945	945	945	945	1100	1100	1100	1100	1100	1100	1240
Height	(10) mm	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	2050
Operating weight	(10) kg	930	940	1210	1290	1310	1690	1700	1860	2030	2170	2190	3270

Notes:

- 1 Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger water (in/out) 30°C/35°C.
 - 2 Values in compliance with EN14511-3:2013.
 - 3 Seasonal energy efficiency ratio
 - 4 Seasonal energy efficiency of high temperature process cooling [REGULATION (EU) N. 2016/2281]
 - 5 User side heat exchanger water temperature (in/out) 16°C/10°C; source side heat exchanger water temperature (in/out) 30°C/35°C.
 - 6 User side heat exchanger water temperature (in/out) 23°C/15°C; source side heat exchanger water temperature (in/out) 30°C/35°C.
 - 7 Average sound pressure level at 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.
 - 8 Sound power on the basis of measurements made in compliance with ISO 9614.
 - 9 Sound power level in cooling, indoors.
 - 10 Unit in standard configuration/execution, without optional accessories.
- The units highlighted in this publication contain HFC HFO-1234ze [GWP₁₀₀ 7] fluorinated greenhouse gases.**

Certified data in EUROVENT

“BY FAR THE BEST PROOF IS EXPERIENCE”

Sir Francis Bacon
British philosopher
(1561-1626)

COLOZÜRI
Zurich - Switzerland



Data Center

Cooling capacity:
340 kW
Installed machines:
1x screw compressor water cooled chiller

CNES
Centre National d'Etudes Spatiales
Saint Denis - France



Data Center

Cooling capacity: 432 kW
Installed machines:
12x Rack cooler units,
1x screw compressor water cooled chiller,
4x Close Control units

IBM
Warsaw - Poland



Data Center

Cooling capacity: 1800 kW
Installed machines:
3x condenserless chiller,
13x Close control units,
2x screw compressor water cooled chillers





for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.



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