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

IT COOLING

CHILLERS

FR-W-Z

WATER SOURCE CHILLERS WITH SCREW COMPRESSORS, FROM 124kW TO 399kW

ErP COMPLIANT 2021

rcitcooling.com

FR-W-Z

HIGHEST EXPERIENCE FOR YOUR IT ENVIRONMENT

Water source chillers with screw compressors 124kW - 399kW

FR-W-Z features semi-hermetic screw compressors optimized to operate with low compression ratio and R134a refrigerant, dry expansion shell and tube evaporator fully developed by Mitsubishi Electric Hydronics & IT Cooling Systems, shell and tube condenser, electronic expansion valve, and in-house developed management software.

THE COOLING SOLUTION FOR IT APPLICATIONS

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

FR-W-Z chiller has been designed to efficiently serve indoor units and work with high temperature IT environments, delivering consistent cooling to the most challenging IT infrastructures.

Available with one or two independent circuits and safety features, the unit ensures perfect dependability and non-stoppable 24/7 operation.

IT COOLING APPLICATIONS

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

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 been rejected the environment.

- **Workplaces heating:** thermal heat is redirected to offices located close to the server room.
- **Domestic hot water production.**
- **Swimming pools or greenhouses 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**
D	**Partial heat recovery**	A desuperheater on the compressor discharge line recovers approximately 20% of the unit's capacity.	**60°C**
R	**Total heat recovery**	A devoted refrigerant water heat exchanger recovers all the condensation heat.	**48°C**

Unchallenged performance, proven dependability and quick-and-easy installation: FR-W-Z makes your data center work at peak efficiency.

TOTAL DEPENDABILITY

Engineered with selected components and careful design, the FR-W-Z units are available with one or two independent circuits to guarantee ultimate redundancy and proven dependability.
A compact structure and reduced maintenance costs crown FR-W-Z units as the perfect solution to provide a consistent cooling to the most challenging IT infrastructures.

EXTRA DURABILITY

Particular attention has been paid to the unit intensive use (24/7) and long-lasting operation.
Top-quality components and dedicated features such as Fast Restart or the Double power supply are key for an uninterruptible operation of the chiller under any unexpected circumstance.

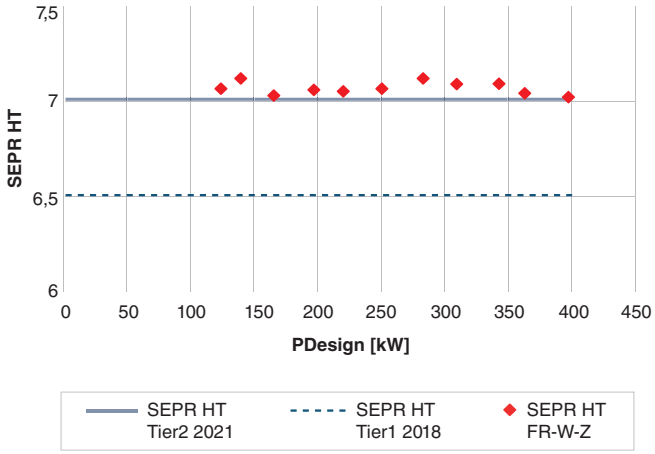
ErP 2021 COMPLIANT

A new energy performance ratio has been introduced to allow refrigeration end-users to easily compare chiller efficiency performance: the Seasonal Energy Performance Ratio (SEPR) for industrial process chillers.
All FR-W-Z units are compliant with the latest ErP 2021 efficiency targets.

EXTREME EFFICIENCY

FR-W-Z range has been designed with efficiency in mind.
For whatever cooling capacity needed, FR-W-Z chiller satisfies the SEPR HT (High Temperature) requirements, thus matching the most challenging TIER2 IT requirements.

EER*=4,87 **SEPR HT*= 7,06**
*Average values



EXTENDED OPERATING FIELD FOR A VAST ARRAY OF APPLICATIONS

Dedicated heat exchangers and wide operating limits: FR-W-Z fits a vast range of fields.

- **2-pass condenser (std):** compatible with water with small rise of temperature (typically tower water).
- **4-pass condenser (opt):** compatible with water with high delta temperature from open loop sources (typically groundwater or waterworks).
- **Cu/Ni 90/10 tubes condenser (opt) for seawater:** to provide protection against corrosion and guarantee a reliable operation and optimal condensation.

Thermal vector fluid temperature at the evaporator outlet between -8°C and 15°C

Thermal vector fluid at the condenser outlet between 20°C and 48°C (53°C with HWT kit).

Precise condensation control
FR-W-Z range provides several solutions for the control of the condenser water system. A 0-10V signal is provided as standard to regulate 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. A 2 or 3-way modulating valve can be offered as customized accessory following a technical verification. Hydraulic connections kits are available for both the evaporator and condenser.

TECHNOLOGICAL CHOICES

Dual circuit units

from 250kW cooling capacity for increased reliability and easier maintenance operations.

Compressors enclosure (opt.)

in peraluman panels with 30mm polyester acoustic insulation (-5 dB(A)).

Shell and tube condenser

2 passes optimized for ΔT=5°C or
4 passes optimized for ΔT >10°C

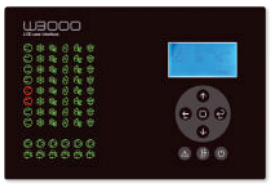
Frame in polyester-painted galvanized steel

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

W3000TE CONTROL and USER-FRIENDLY USER INTERFACE

Fully in-house software developed by Mitsubishi Electric Hydronics & IT Cooling Systems.

- 19 supported languages.
- Optional serial cards with the most common protocols are available: ModBus, Bacnet MS/TP RS485, Bacnet Over IP, Echelon Lonworks.
- “QUICK MIND” logic: a self-adapting algorithm that activates or deactivates the compressors only when a change in the system load moves the flow temperature out of the setpoint neutral zone.
- Diagnostics: “BLACK BOX” function for saving more than 100 machine variables for a rapid trouble-shooting.
- Demand limit option: it restricts the maximum number of resources that can be activated by the unit and limits the chiller capacity during period of peak energy usage. This function is available for double circuit units.



The Large keyboard with a wide LCD display and LED icons is fitted on all the FR-W-Z units ensuring a quick and easy setting of the unit.

The unit can also be configured with the touch interface with a 7” WVGA color display and a front USB port. The touch-screen’s technology is characterized by an easy-to-access data, and an effective graphical representation of the main figures.

Trusted reliability, simplified installation, maximized performance: FR-W-Z features top-quality technologies for the most rugged IT environments.

COMPACT SCREW COMPRESSORS, OPTIMIZED FOR LOW PRESSURE RATIO APPLICATIONS

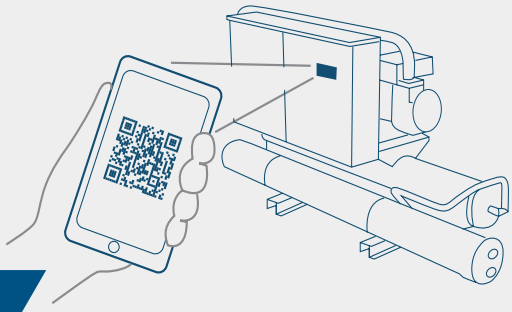
- 25% minimum capacity step (opt. for two circuit units).
- Long-life bearings (more than 150.000h at full load)
- Part winding start
- Three-stage oil separator

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



KIPlink USER INTERFACE

Innovative Wi-Fi interface for an easy and enhanced unit management.

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) just by scanning the QR code positioned on the side of the unit.

- Communication based on Wi-Fi technology (no internet connection needed)
- User-friendly components monitoring
- Real-time graphs and key trends

DEFINED FEATURES FOR MISSION CRITICAL APPLICATIONS

FR-W-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”

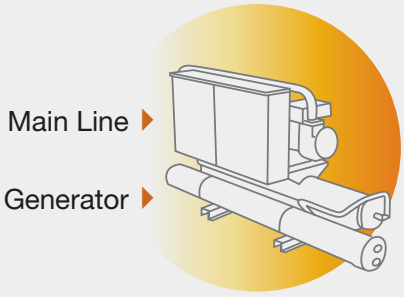
Full load resumption in a shorter time compared to standard unit restart

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



A secure source of electrical energy is fundamental to keep services running.
With the optional Automatic Transfer Switch (ATS), FR-W-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-Z 0551-1752

Chiller, water source for indoor installation, from 124kW to 399kW.

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

VPF VAR.PRIM.FLOW

R HFC R-134a

COOLING

T SHELL & TUBES

SCREW

FR-W-Z			0551	0651	0751	0851	0951	1102	1302	1402	1502	1602	1752
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
PERFORMANCE													
COOLING ONLY (GROSS VALUE)													
Cooling capacity	(1)	kW	124	140	166	198	222	252	285	32	345	366	401
Total power input	(1)	kW	24,5	27,3	34,1	38,9	44,2	49,0	54,6	61,5	68,4	73,0	83,2
EER	(1)	kW/KW	5,07	5,15	4,88	5,10	5,02	5,15	5,22	5,07	5,05	5,02	4,81
COOLING ONLY (EN14511 VALUE)													
Cooling capacity	(2)	kW	124	140	166	198	221	251	284	311	344	365	399
EER	(2)	kW/KW	4,90	4,97	4,69	4,90	4,82	4,96	5,03	4,88	4,88	4,85	4,66
ESEER	(2)	kW/kW	5,53	5,57	5,48	5,51	5,44	5,75	5,75	5,70	5,69	5,63	5,59
Cooling energy class			B	B	B	B	B	B	B	B	B	B	B
SEPR HT	(7)(8)		7,05	7,11	7,02	7,05	7,04	7,05	7,11	7,08	7,08	7,03	7,01
COOLING													
16°/10°C													
Cooling capacity	(9)	kW	138	156	184	220	245	280	316	345	382	405	443
Total power input	(9)	kW	25,5	28,4	35,7	40,6	46,2	51,2	57	64,3	71,3	75,9	86,3
EER	(9)	kW/KW	5,39	5,48	5,15	5,41	5,31	5,46	5,55	5,37	5,36	5,34	5,13
23°/15°C													
Cooling capacity	(10)	kW	161	183	215	258	288	328	373	405	448	475	518
Total power input	(10)	kW	25,9	29	36,1	40,9	46,7	51,9	58	65,3	72,5	76,9	87
EER	(10)	kW/KW	6,22	6,32	5,95	6,3	6,16	6,32	6,42	6,21	6,19	6,18	5,95
EXCHANGERS													
HEAT EXCHANGER USER SIDE IN REFRIGERATION													
Water flow	(1)	l/s	5,94	6,72	7,95	9,48	10,60	12,07	13,63	14,91	16,51	17,51	19,16
Pressure drop	(1)	kPa	19,8	19,7	27,6	33,0	41,2	41,0	38,5	46,1	32,0	36,0	43,0
HEAT EXCHANGER SOURCE SIDE IN REFRIGERATION													
Water flow	(1)	l/s	7,09	7,99	9,55	11,29	12,67	14,36	16,18	17,79	19,7	20,92	23,03
Pressure drop	(1)	kPa	21,8	25,6	30,6	26,6	26,2	22,4	26,3	28,9	32,5	28,5	24,5
REFRIGERANT CIRCUIT													
Compressors nr.		N°	1	1	1	1	1	2	2	2	2	2	2
No. Circuits		N°	1	1	1	1	1	2	2	2	2	2	2
Refrigerant charge		kg	22,0	32,0	30,0	56,0	54,0	44,0	64,0	62,0	60,0	86,0	110
NOISE LEVEL													
Sound Pressure	(3)	dB(A)	75	75	76	76	76	77	77	78	78	78	78
Sound power level in cooling	(4)(5)	dB(A)	92	92	93	93	93	95	95	96	96	96	96
SIZE AND WEIGHT													
Length	(6)	mm	2600	2600	2600	3000	3000	3000	3000	3000	3200	3200	3200
Width	(6)	mm	940	940	940	940	940	1100	1100	1100	1200	1200	1200
Height	(6)	mm	1500	1500	1500	1500	1500	1600	1600	1600	1700	1700	1700
Operating weight	(6)	kg	1090	1150	1320	1470	1470	1770	1880	2040	2320	2450	2590

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 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.
4 Sound power on the basis of measurements made in compliance with ISO 9614.
5 Sound power level in cooling, indoors.
6 Unit in standard configuration/execution, without optional accessories.
7 Seasonal energy efficiency of high temperature process cooling [REGULATION (EU) N. 2281/2016].
8 Seasonal Energy Efficiency of Process Cooling.
9 User side heat exchanger water temperature (in/out) 16°C/10°C; source side heat exchanger water temperature (in/out) 30°C/35°C.
10 User side heat exchanger water temperature (in/out) 23°C/15°C; source side heat exchanger water temperature (in/out) 30°C/35°C.

The units highlighted in this publication contain HFC R134a [GWP$_{100}$ 1430] 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 FOCS-W 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 FOCS-W water cooled chiller,
4x Close Control units

IBM
Warsaw - Poland

Data Center

Cooling capacity: 1800 kW
Installed machines:
3x FOCS-ME condenserless chiller,
13x AC Close control units,
2x FOCS-W water cooled chillers

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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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