

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

IT COOLING

CHILLERS

WATER COOLED CHILLER RANGE

**SCREW INVERTER
COMPRESSORS WITH
R513A REFRIGERANT**

r R513A



TOP-RELIABLE CHILLER RANGE FOR YOUR IT COOLING FACILITY



The awareness of the complexity of data center industry, together with its commitment to be in line with current sustainable standards, have led IT infrastructures to find alternative cooling solutions able to ensure complete dependability in a greener way, whilst ensuring minimized running costs.

Fully committed to support the creation of a greener tomorrow, Mitsubishi Electric presents a complete range of water cooled screw compressor chillers optimised for the use of the R513A, the innovative low GWP refrigerant that ensure top-level chiller performance and a completely reliable usage.

IT COOLING APPLICATIONS

- ✓ Data centers and server rooms
- ✓ Technological hubs
- ✓ Telecommunications
- ✓ Laboratories and technical rooms

2 EVAPORATING TECHNOLOGIES

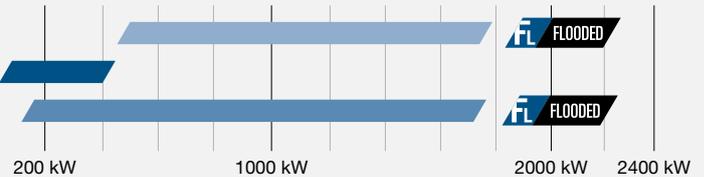
T SHELL&T.

Two types of heat exchangers to achieve premium levels of efficiency at both full and partial loads.

FL FLOODED

A COMPLETE RANGE FROM 124 kW TO 2 MW

i-FR-W(1+i)-G05-Z
FR-W-G05-Z
FRCS3-W-G05-Z



HEAT RECOVERY SYSTEM AVAILABLE



For recovering heat when both hot and cold water are required.

THE BEST COMPRESSOR COMBINATION

(1+i)

Two compressor technologies that can offer best efficiency according to the real thermal loads.

INNOVATIVE 1+i INVERTER TECHNOLOGY

1 Fixed speed compr.

i Variable Speed Compr.



MANY INSTALLATION OPPORTUNITIES

i-FR-W(1+i)-G05-Z	531-1778 kW	<ul style="list-style-type: none"> ✓ Inverter driven compressor ✓ Unbeatable efficiency both at full and partial loads ✓ Compact design 	Ideal for medium-large applications
FR-W-G05-Z	124-399 kW	<ul style="list-style-type: none"> ✓ High efficiency ✓ Heat recovery system available 	Ideal for small-medium size applications
FRCS3-W-G05-Z	188-1688 kW	<ul style="list-style-type: none"> ✓ Extremely low footprint ✓ Very high efficiency 	Ideal for medium applications

ALL-ROUND SUSTAINABILITY



The new screw compressor chiller range with R513A refrigerant is the result of Mitsubishi Electric Hydronics & IT Cooling Systems' extensive approach to sustainability.

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).

Combining brilliant annual efficiency with the use of a low GWP refrigerant, the range of chillers with R513A tackles both the indirect (due to primary energy consumption) and the direct global warming, thus resulting in the perfect choice for any new, forward-looking cooling system.



-56% GWP
vs R134a



Non-flammable
Safety Class A1

New generation refrigerant with reduced greenhouse effect. Non-flammable.

Reduced GWP

R513A GWP_{100 year} = 572
(R134a GWP_{100 year} = 1300)
GWP values according to IPCC AR5

Non-toxic, non-flammable

ASHRAE 34, ISO 817: A1 class

Favorable physical properties

Same cooling capacity delivered as R134a
Same operating pressures as R134a

In line with standard building codes

No special equipment
No need for flammable risk assessment
No extra costs

Compliant with eco regulation objectives

No future retrofit required
Reduced price volatility

REFRIGERANT BENCHMARK

SCROLL			SCREW		
Refrigerant	GWP*	Flammability**	Refrigerant	GWP*	Flammability**
R410A	2088	NON flammable	R134a	1430	NON flammable
R32	675	MILDLY flammable	R513A	631	NON flammable
R454B	466	MILDLY flammable	R1234ze	7	MILDLY flammable
R452B	698	MILDLY flammable	R1234yf	4	MILDLY flammable

New regulations like the EU F-gas and the Kigali Amendment to the Montreal Protocol, are driving the industry towards new eco-friendly refrigerants, with reduced greenhouse effect.

Unfortunately, the majority of low GWP refrigerants raises another critical issue: flammability.

The new refrigerant R513A, chosen for the water cooled chiller range, is a brilliant exception: it offers a -56% GWP reduction compared to R134a's while ensuring complete non-toxicity and non-flammability (Class A1 of ASHRAE 34, ISO 817).

*IPCC AR4 **ASHRAE 34 - ISO 817

i-FR-W(1+i)-G05-Z

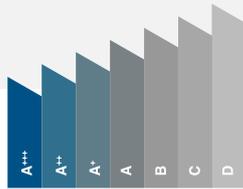
HIGH EFFICIENCY WATER COOLED CHILLER WITH INVERTER TECHNOLOGY AND FLOODED EVAPORATOR. 531-1607 kW

i-FR-W(1-i)-G05-Z is the Climaveneta brand water cooled chiller with 1+i innovative logics that combines fixed speed and variable speed screw compressors, thus ensuring continuous modulation of loads and a perfect leaving water stability. All the units come with an exclusive flooded evaporator and a shell and tube condenser, specifically conceived and developed in-house.

Their exclusive design ensures a perfect heat exchange coefficient and provides EER results not only above class A but also among the highest values available on the market of water chillers with screw compressors.



PREMIUM ENERGY EFFICIENCY



i-FR-W(1-i)-G05-Z has been designed to operate at very high levels of efficiency at both full and partial loads.

With EER in Class A and unbeatable ESEER values, the water cooled chiller meets always the requested cooling capacity, thus ensuring reduced energy consumption and 20% less CO₂ emissions compared to other Class A chillers.

LARGE ENERGY SAVINGS



Brilliantly engineered technological choices combined with great efforts during the design phase of the product have demonstrated that high efficiency can go hand by hand with significant cost savings up to 21% compared to traditional chillers featuring the same technology.

EER* = 5,10

SEPR HT* = 7,74

*Average values

QUICK RETURN ON THE INVESTMENT



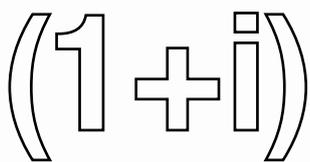
Accessibility is key in social development. This means that technology and innovation must be available and affordable.

The unparalleled efficiency of i-FR-W(1+i)-G05-Z allows for a quick return on the investment. The inverter driven technologies of screw compressor chillers has never been so accessible.

ALWAYS MATCHING THE REQUIRED LOAD



Thanks to the inverter technology, i-FR-W(1+i)-G05-Z always produce the perfect cooling load, thus reducing energy consumption and improving the facility's profitability.



A new concept of efficiency:

Fixed speed compressor (1)
+ Variable speed compressor (i)

UNBEATABLE EFFICIENCY, IN EVERY LOAD CONDITION

The advantages of 1+i logic

Always the best combination of compressors

Continuous modulation from 15% to 100%

Perfect leaving water temperature stability

EER in Class A efficiency

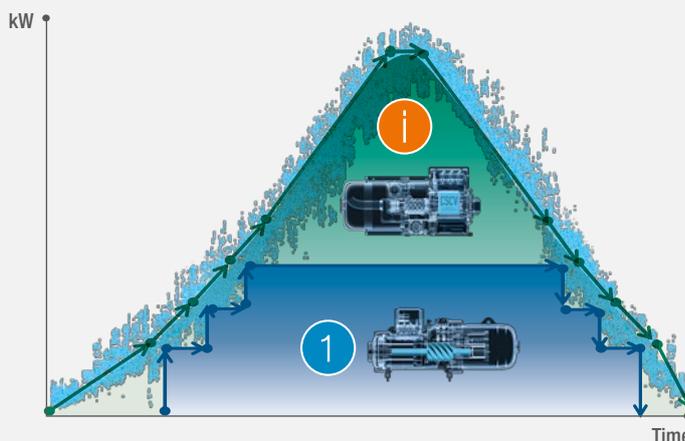
SEPR HT up to 7,9

Mitsubishi Electric has developed a new concept of efficiency: the combination of a fixed speed screw compressor (1) with a variable speed inverter driven screw compressor (+ i). This solution, combined with unique and advanced control logic, improves the best features and benefits of each compressor.

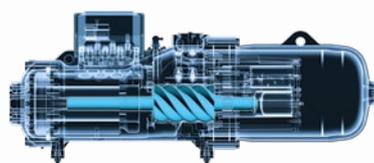
The result is a unit that focuses on efficiency in all load conditions, overcoming the limitations traditionally imposed by the full inverter system on full loads and the fixed speed screw compressors on partial loads.

PREMIUM EFFICIENCY THANKS TO THE COMBINATION (1+i) COMPRESSORS

- Cooling load of the variable speed compressor
- Cooling load of the fixed speed compressor
- Total requested cooling load

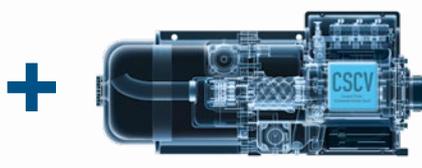


1 Fixed Speed Compressor



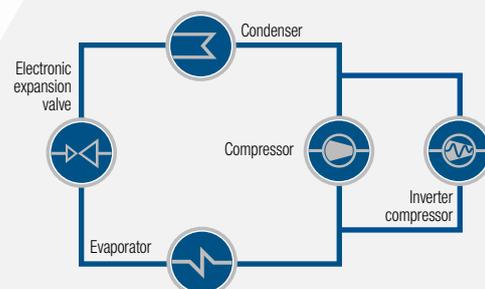
The new generation of fixed speed compressors is the result of our commitment to avoid the efficiency loss in part-load operation: the new compressor features a better lubrication system and an innovative internal geometry that allows a jump in performance at partial loads.

i Variable Speed Compressor



The new inverter driven compressor is compact, with an oil separator, frequency inverter and cooling system integrated all within a single casing. The Vi control allows automatic adaptation to the different operating conditions thus ensuring that different refrigeration load levels are always at the highest values of energy efficiency.

Two compressors in one single refrigerant circuit



The two compressors are combined on the same refrigerant circuit, ensuring higher efficiency values at partial loads in comparison with units featuring independent circuits.



i-FR-W(1+i)-G05-Z

High efficiency water cooled chiller,
for indoor installation.
531-1607 kW

i-FR-W(1+i)-G05-Z			1402	1752	1902	2152	2602
Power supply		V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE							
COOLING ONLY (GROSS VALUE)							
Cooling capacity	(1)	kW	532,3	665,0	721,0	819,3	998,7
Total power input	(1)	kW	102,0	124,6	135,4	154,6	189,4
EER	(1)	kW/kW	5,219	5,337	5,325	5,299	5,273
ESEER	(1)	kW/kW	8,360	8,410	8,310	8,450	8,440
COOLING ONLY (EN14511 VALUE)							
Cooling capacity	(1)(2)	kW	486,7	608,1	659,4	750,0	914,3
EER	(1)(2)	kW/kW	5,160	5,270	5,260	5,260	5,260
Cooling energy class			A	A	A	A	A
SEPR	(3)(4)		7,70	7,83	7,64	7,69	7,59
COOLING ONLY (GROSS VALUE)							
16°C/10°C							
Cooling capacity	(5)	kW	594,2	741,5	803,1	913,1	1114
Total power input	(5)	kW	103,0	125,8	137,0	156,4	192,1
EER	(5)	kW/kW	5,769	5,894	5,862	5,838	5,799
23°C/15°C							
Cooling capacity	(6)	kW	702,0	874,9	946,1	1076	1314
Total power input	(6)	kW	104,5	127,5	139,8	159,4	196,6
EER	(6)	kW/kW	6,718	6,862	6,768	6,750	6,684
EXCHANGERS							
HEAT EXCHANGER USER SIDE IN REFRIGERATION							
Water flow	(1)	l/s	25,45	31,80	34,48	39,18	47,76
Pressure drop	(1)(2)	kPa	36,3	41,3	40,2	39,4	44,0
HEAT EXCHANGER SOURCE SIDE IN REFRIGERATION							
Water flow	(1)	l/s	30,22	37,63	40,81	46,41	56,61
Pressure drop	(1)(2)	kPa	45,3	42,9	50,5	50,2	46,9
REFRIGERANT CIRCUIT							
Compressors nr.		N°	2	2	2	2	2
No. Circuits		N°	1	1	1	1	1
NOISE LEVEL							
Sound Pressure	(7)	dB(A)	82	82	81	83	83
Sound power level in cooling	(8)(9)	dB(A)	100	100	100	102	102
SIZE AND WEIGHT							
Length	(10)	mm	2950	3310	3310	3310	4475
Width	(10)	mm	1320	1425	1445	1480	1410
Height	(10)	mm	1805	1935	2000	2150	2250
Operating weight	(10)	kg	3350	4280	4410	4830	6630

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 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.

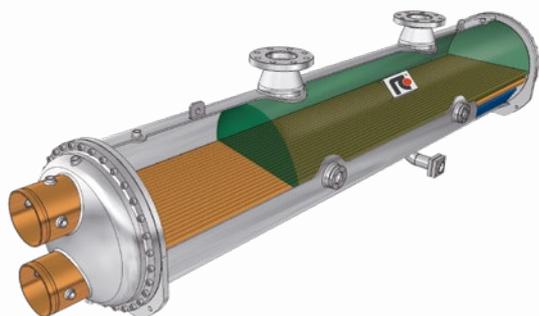
9 Sound power level in cooling, indoors.

10 Unit in standard configuration/execution, without optional accessories.

The units highlighted in this publication contain HFC R134a [GWP₁₀₀ 1430] fluorinated greenhouse gases.

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Innovative design of Heat Exchangers



The flooded evaporator and the shell and tube condenser, both fully designed and built internally, present an exclusive design aimed to maximise the cooling power and optimise the operation of the compressors.

The shell and tube condenser is designed in order to guarantee reduced pressure drops on the water side and to decrease the pumping costs as much as possible.

In the evaporator the complete flooding of the tubes is guaranteed also during partial load conditions by an electronic expansion valve, managed by proprietary control logics.



i-FR-W(1+i)-G05-Z			3002	3402	3852	4252
Power supply		V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50
PERFORMANCE						
COOLING ONLY (GROSS VALUE)						
Cooling capacity	(1)	kW	1143	1296	1472	1607
Total power input	(1)	kW	216,0	243,1	275,6	303,9
EER	(1)	kW/kW	5,292	5,331	5,341	5,288
ESEER	(1)	kW/kW	8,380	8,400	8,430	8,280
COOLING ONLY (EN14511 VALUE)						
Cooling capacity	(1)(2)	kW	1046	1186	1348	1482
EER	(1)(2)	kW/kW	5,310	5,360	5,400	5,300
Cooling energy class			A	A	A	A
SEPR	(3)(4)		7,73	7,82	7,89	7,77
COOLING ONLY (GROSS VALUE)						
16°C/10°C						
Cooling capacity	(5)	kW	1275	1445	1642	1792
Total power input	(5)	kW	219,2	247,3	280,3	309,1
EER	(5)	kW/kW	5,817	5,843	5,858	5,797
23°C/15°C						
Cooling capacity	(6)	kW	1505	1705	1937	2112
Total power input	(6)	kW	224,5	253,7	287,7	316,9
EER	(6)	kW/kW	6,704	6,721	6,733	6,665
EXCHANGERS						
HEAT EXCHANGER USER SIDE IN REFRIGERATION						
Water flow	(1)	l/s	54,66	61,97	70,41	76,87
Pressure drop	(1)(2)	kPa	44,5	37,8	36,6	43,7
HEAT EXCHANGER SOURCE SIDE IN REFRIGERATION						
Water flow	(1)	l/s	64,76	73,34	83,30	91,08
Pressure drop	(1)(2)	kPa	36,4	40,4	36,0	43,0
REFRIGERANT CIRCUIT						
Compressors nr.		N°	2	2	2	2
No. Circuits		N°	1	1	1	1
NOISE LEVEL						
Sound Pressure	(7)	dB(A)	83	82	82	84
Sound power level in cooling	(8)(9)	dB(A)	102	102	102	104
SIZE AND WEIGHT						
Length	(10)	mm	4475	4570	4650	4650
Width	(10)	mm	1405	1435	1495	1495
Height	(10)	mm	2250	2380	2500	2500
Operating weight	(10)	kg	7470	8220	8800	8930

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 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 R134a [GWP₁₀₀ 1430] fluorinated greenhouse gases.**

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Perfect lubricant recovery

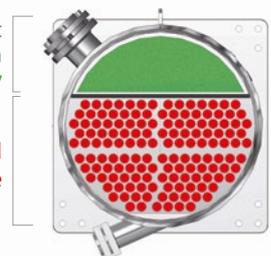
On the evaporator the presence of refrigerant fluid in the shell side and water in the tube side allows:

- ✓ Minimisation of pressure drops
- ✓ Perfect unified temperature as well as complete refrigerant evaporation
- ✓ No surface for the over-heating
- ✓ Easy cleaning operations

Unique design of the heat exchangers that provides the perfect separation and complete recovery of the lubricant in order to guarantee proper lubrication of the compressors and the relevant cleaning of the shell and tube exchanging surfaces.

Lubricant separation and recovery

Thermal exchange



FR-W-G05-Z

COMPACT WATER COOLED CHILLER WITH SCREW COMPRESSORS. 124-399 kW



FR-W-G05-Z is the ideal solution for applications from small to medium size.

This range is available also with the heat recovery version, delivering exceptional efficiency values not only in producing cooling, but also in heating mode.

Thanks to its precise and accurate thermoregulation, FR-W-G05-Z can easily adapt to different thermal load conditions and countless installation requirements.



EXTREME EFFICIENCY

The FR-W-G05-Z range has been designed to provide utmost efficiency at both full loads in the summer, and partial loads in the spring and fall when the building cooling requirements decrease.

ErP 2021 COMPLIANT

Engineered with selected components and careful design, all FR-W-G05-Z units are compliant with the latest ErP 2021 efficiency targets for comfort applications.

Single circuit unit

EER*=4,67

SEPR HT*=7,00

Dual circuit unit

EER*=4,69

SEPR HT*=7,00

*Average values

HEAT RECOVERY SYSTEM



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 the environment. aWorkplace heating: thermal heat is redirected to offices located close to the server room.

- ✓ **Domestic hot water production.**
- ✓ **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
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



R R513A

COOLING

T SHELL & TUBES

SCREW

FR-W-G05-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	124,3	140,5	166,3	198,2	221,7	252,4	285,1	311,9	345,2	366,2	400,6
Total power input	(1)	kW	25,50	28,41	35,57	40,52	46,10	51,04	56,86	64,04	71,26	76,05	86,66
EER	(1)	kW/kW	4,875	4,947	4,671	4,894	4,809	4,949	5,011	4,873	4,842	4,812	4,621
ESEER	(1)	kW/kW	5,970	5,950	5,960	5,940	5,930	6,320	6,240	6,220	6,120	6,110	6,090
COOLING ONLY (EN14511 VALUE)													
Cooling capacity	(1)(2)	kW	123,9	140,1	165,8	197,5	220,8	251,4	284,1	310,7	344,2	365,1	399,2
EER	(1)(2)	kW/kW	4,710	4,780	4,510	4,710	4,630	4,770	4,830	4,690	4,680	4,660	4,480
Cooling energy class			B	B	C	B	C	B	B	B	B	B	C
SEPR	(3)(4)		7,00	7,04	7,00	7,02	7,00	7,01	7,03	7,02	7,02	7,00	7,00
COOLING ONLY (GROSS VALUE)													
16°C/10°C													
Cooling capacity	(5)	kW	137,9	156,2	184,2	220,2	246,0	280,4	317,3	346,4	383,3	406,3	443,9
Total power input	(5)	kW	25,75	28,68	35,87	40,81	46,45	51,57	57,43	64,68	71,91	76,69	87,34
EER	(5)	kW/kW	5,345	5,443	5,131	5,397	5,302	5,434	5,528	5,354	5,331	5,297	5,085
23°C/15°C													
Cooling capacity	(6)	kW	161,5	183,5	215,1	258,4	288,1	328,8	373,3	406,1	449,2	475,7	518,8
Total power input	(6)	kW	26,07	29,04	36,19	41,03	46,77	52,24	58,20	65,48	72,66	77,33	87,96
EER	(6)	kW/kW	6,188	6,328	5,942	6,302	6,156	6,299	6,414	6,200	6,179	6,154	5,895
EXCHANGERS													
HEAT EXCHANGER USER SIDE IN REFRIGERATION													
Water flow	(1)	l/s	5,944	6,719	7,954	9,479	10,60	12,07	13,63	14,91	16,51	17,51	19,16
Pressure drop	(1)(2)	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	7,133	8,045	9,611	11,37	12,75	14,45	16,29	17,90	19,83	21,06	23,19
Pressure drop	(1)(2)	kPa	22,1	25,9	31,0	27,0	26,5	22,7	26,6	29,3	33,0	28,9	24,8
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
NOISE LEVEL													
Sound Pressure	(7)	dB(A)	75	75	76	76	76	78	77	78	78	78	78
Sound power level in cooling	(8)(9)	dB(A)	92	92	93	93	93	95	95	96	96	96	96
SIZE AND WEIGHT													
Length	(10)	mm	2400	2600	2700	3000	3000	3000	3100	3100	3200	3200	3200
Width	(10)	mm	920	920	950	960	960	1100	1100	1100	1100	1200	1200
Height	(10)	mm	1500	1500	1500	1500	1500	1500	1500	1500	1600	1600	1600
Operating weight	(10)	kg	1050	1110	1280	1450	1460	1710	1820	1990	2280	2430	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.
 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 Parameter calculated according to [REGULATION (EU) N. 2016/2281]
 8 Seasonal energy efficiency ratio
 9 Seasonal space cooling energy efficiency
The units highlighted in this publication contain HFC R513A (XP10) [GWP₁₀₀ 631] fluorinated greenhouse gases.

Certified data in EUROVENT



TOTAL RELIABILITY

FR-W-G05-Z range meets the needs of an industry that cannot afford any cooling interruption. 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 uninterrupted operation under any unexpected circumstance.



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.



COMPACT DESIGN FOR THE HIGHEST FLEXIBILITY

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



EXTENDED OPERATING FIELD

Dedicated heat exchangers and wide operation limits for a vast range of applications:
 - Operation down to -8°C
 - Suitable for applications with dry cooler and cooling tower.

FRCS3-W-G05-Z

WATER COOLED CHILLER WITH SCREW COMPRESSORS AND FLOODED EVAPORATOR. 188-1688 kW

FRCS3-W-G05-Z is the high efficiency screw compressor chiller featuring shell-and-tube condenser, flooded evaporator and electronic expansion valve.

Thanks to its vertical and compact design, the chiller can be easily installed in narrow spaces and can fit into most building layouts. High performances and premium efficiency are achieved thanks to the accurate sizing of all components and the precision in the control logics.



HIGH EFFICIENCY AT FULL LOADS



The combination of the flooded evaporator and the fixed speed compressor ensure maximum efficiency at full loads. In uninterrupted IT environments where cooling activity is required 24/7, high efficiency levels lead to significant yearly cost savings.

COMPACT DESIGN



The compact and essential design leads to more flexibility during the design phase, both in the case of new plants and preexisting ones, to a higher ease of handling and on site positioning in plants with reduced space.

EASY ADAPTABILITY

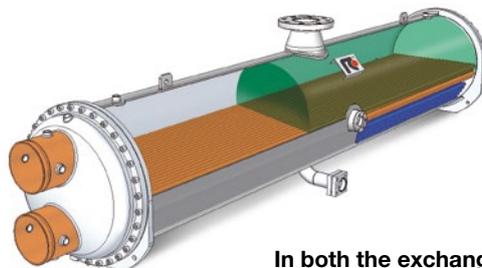


Maximum adaptability to the needs of the plant thanks to the continuous modulation of the cooling capacity and the precision in the control logics.

INNOVATIVE DESIGN OF THE HEAT EXCHANGERS

The flooded evaporator and the shell and tube condenser, both fully designed and built internally, present an exclusive design aimed to maximising the cooling power and optimising the operation of the compressors.

In the evaporator the complete flooding of the tubes is guaranteed also during partial load conditions by an electronic expansion valve, managed by proprietary control logics. The shell and tube condenser is designed in order to guarantee reduced pressure drops on the water side and to decrease the pumping costs as much as possible.



In both the exchangers the presence of refrigerant fluid in the shell side and water in the tube side allows:

Minimization of pressure drops

Perfect unified temperature as well as complete refrigerant evaporation

Elimination of a surface dedicated to super-heating

Facilitation of cleaning operation



FRGS3-W-G05-Z		0551	0701	0851	0951	1101	1301	1401	1651	1901	2101	2501
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	188,2	250,0	306,0	337,6	383,5	459,9	524,0	591,8	681,6	741,3	837,0
Total power input	(1) kW	36,40	47,78	58,45	63,77	72,73	85,99	96,90	108,2	127,0	138,7	155,6
EER	(1) kW/kW	5,170	5,230	5,231	5,292	5,275	5,348	5,408	5,470	5,367	5,345	5,379
ESEER	(1) kW/kW	6,910	7,150	6,560	6,830	6,800	6,730	7,250	6,960	7,020	6,920	6,800
COOLING ONLY (EN14511 VALUE)												
Cooling capacity	(1)(2) kW	187,4	248,9	304,7	336,1	381,9	458,2	522,3	589,5	679,4	738,9	834,3
EER	(1)(2) kW/kW	4,890	4,950	4,960	5,010	5,000	5,090	5,190	5,200	5,120	5,130	5,160
Cooling energy class		B	B	B	B	B	A	A	A	A	A	A
SEPR	(3)(4)	7,74	7,82	7,46	7,50	7,48	7,50	7,52	7,51	7,51	7,70	7,65
COOLING ONLY (GROSS VALUE)												
16°C/10°C												
Cooling capacity	(5) kW	209,7	278,5	340,5	375,4	426,5	512,8	584,3	659,5	759,4	826,5	933,2
Total power input	(5) kW	36,80	48,26	59,02	64,49	73,57	87,13	98,25	110,0	129,2	140,9	158,0
EER	(5) kW/kW	5,698	5,766	5,771	5,820	5,795	5,887	5,944	5,995	5,878	5,866	5,906
23°C/15°C												
Cooling capacity	(6) kW	247,0	328,1	400,3	441,0	501,0	604,9	689,3	777,5	894,8	974,7	1101
Total power input	(6) kW	37,32	48,85	59,64	65,46	74,75	88,70	100,2	112,4	132,1	143,8	161,1
EER	(6) kW/kW	6,622	6,710	6,716	6,733	6,698	6,820	6,879	6,917	6,774	6,778	6,834
EXCHANGERS												
HEAT EXCHANGER USER SIDE IN REFRIGERATION												
Water flow	(1) l/s	9,001	11,95	14,63	16,15	18,34	21,99	25,06	28,30	32,59	35,45	40,03
Pressure drop	(1)(2) kPa	42,0	48,7	49,1	52,4	52,8	47,5	39,9	50,9	42,0	42,7	42,8
HEAT EXCHANGER SOURCE SIDE IN REFRIGERATION												
Water flow	(1) l/s	10,70	14,19	17,36	19,13	21,74	26,02	29,60	33,37	38,54	41,94	47,31
Pressure drop	(1)(2) kPa	57,4	57,9	56,7	59,3	58,1	55,2	44,8	55,8	60,4	45,8	48,1
REFRIGERANT CIRCUIT												
Compressors nr.	N°	1	1	1	1	1	1	1	1	1	1	1
No. Circuits	N°	1	1	1	1	1	1	1	1	1	1	1
NOISE LEVEL												
Sound Pressure	(7) dB(A)	77	77	80	80	80	80	80	80	80	82	82
Sound power level in cooling	(8)(9) dB(A)	95	95	98	98	98	98	98	98	98	100	100
SIZE AND WEIGHT												
Length	(10) mm	2400	2600	2700	3000	3000	3000	3100	3100	3200	3200	3200
Width	(10) mm	920	920	950	960	960	1100	1100	1100	1100	1200	1200
Height	(10) mm	1870	1870	1870	1870	1870	1960	1970	1960	2050	2100	2200
Operating weight	(10) kg	1740	1790	2170	2200	2260	2940	3020	3150	3270	3570	3960

FRGS3-W-G05-Z		2602	3002	3152	3502	3652	4002	4102	4502	4602	4752	
Alimentazione elettrica	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	
PRESTAZIONI												
REFRIGERAZIONE (GROSS VALUE)												
Potenza frigorifera	(1) kW	915,9	1062	1140	1218	1303	1382	1450	1522	1614	1693	
Potenza assorbita totale	(1) kW	171,0	194,8	204,3	222,9	234,1	251,9	263,1	279,3	295,9	304,3	
EER	(1) kW/kW	5,356	5,452	5,580	5,464	5,566	5,486	5,511	5,449	5,455	5,564	
ESEER	(1) kW/kW	7,060	7,330	7,530	7,150	7,400	7,130	7,200	7,190	7,230	7,500	
REFRIGERAZIONE (EN14511 VALUE)												
Potenza frigorifera	(1)(2) kW	913,2	1058	1137	1214	1299	1377	1445	1517	1609	1688	
EER	(1)(2) kW/kW	5,160	5,200	5,400	5,220	5,380	5,250	5,290	5,210	5,240	5,320	
Classe EUROVENT		A	A	A	A	A	A	A	A	A	A	
SEPR	(3)(4)	7,62	7,50	7,71	7,50	7,68	7,50	7,59	8,00	8,00	8,00	
REFRIGERAZIONE (GROSS VALUE)												
16°C/10°C												
Potenza frigorifera	(5) kW	1021	1184	1272	1357	1454	1541	1617	1697	1801	1888	
Potenza assorbita totale	(5) kW	173,2	197,4	207,1	226,5	237,6	255,8	267,2	283,7	300,5	308,4	
EER	(5) kW/kW	5,895	5,998	6,142	5,991	6,120	6,024	6,052	5,982	5,993	6,122	
23°C/15°C												
Potenza frigorifera	(6) kW	1205	1397	1502	1600	1715	1817	1907	2001	2125	2229	
Potenza assorbita totale	(6) kW	176,3	201,2	210,9	231,3	242,3	261,1	272,5	289,3	306,1	313,2	
EER	(6) kW/kW	6,835	6,943	7,122	6,917	7,078	6,959	6,998	6,917	6,942	7,117	
SCAMBIATORI												
SCAMBIATORE UTENZA IN REFRIGERAZIONE												
Portata	(1) l/s	43,80	50,79	54,53	58,23	62,33	66,11	69,33	72,76	77,20	80,94	
Perdita di carico	(1)(2) kPa	40,0	51,5	37,4	51,4	39,8	50,4	46,7	51,5	42,5	46,7	
SCAMBIATORE SORGENTE IN REFRIGERAZIONE												
Portata	(1) l/s	51,80	59,91	64,10	68,67	73,30	77,91	81,66	85,84	91,05	95,19	
Perdita di carico	(1)(2) kPa	44,5	54,4	32,0	56,8	34,1	53,5	50,1	55,4	53,7	58,7	
CIRCUITO FRIGORIFERO												
N. compressori	N°	2	2	2	2	2	2	2	2	2	2	
N. circuiti	N°	2	2	2	2	2	2	2	2	2	2	
LIVELLI SONORI												
Pressione sonora	(7) dB(A)	81	81	81	81	81	81	82	82	82	82	
Potenza sonora in refrigerazione	(8)(9) dB(A)	100	100	100	100	100	100	101	102	102	102	
DIMENSIONI E PESI												
Length	(10) mm	4430	4430	4440	4470	4470	4470	4565	4650	5270	5270	
Width	(10) mm	1270	1270	1270	1270	1320	1270	1320	1320	1320	1320	
Height	(10) mm	2210	2210	2280	2250	2330	2280	2380	2380	2380	2380	
Peso in funzionamento	(10) kg	6200	6430	7080	7160	7560	7280	7850	7940	8420	8950	

Notes:

- Plant (side) cooling exchanger water (in/out) 12°C/7°C; Source (side) heat exchanger water (in/out) 30°C/35°C.
- Values in compliance with EN14511
- Seasonal energy efficiency ratio
- Seasonal energy efficiency of high temperature process cooling [REGULATION (EU) N. 2016/2281]
- User side heat exchanger water temperature (in/out) 16°C/10°C; source side heat exchanger water temperature (in/out) 30°C/35°C.
- User side heat exchanger water temperature (in/out) 23°C/15°C; source side heat exchanger water temperature (in/out) 30°C/35°C.

- 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.
 - Sound power on the basis of measurements made in compliance with ISO 9614.
 - Sound power level in cooling, indoors.
 - Unit in standard configuration/execution, without optional accessories.
- The units highlighted in this publication contain R513A [GWP₁₀₀ 631] fluorinated greenhouse gases.**

Certified data in EUROVENT



A SELECTION OF RC INSTALLATIONS

BNP PARIBAS

2014 - 2015
BAILLY ROMAINVILLIERS (FRANCE)

Application:
Data Center

Plant type:
Hydronic System

Cooling capacity: 12208 kW

Installed machines:
2x FR FC NG 3902 SL-T,
10x FRCS2 3602 SL-K-S, 8x ACU 25 EC,
4x ACU 30 EC, 8x ACU 70 EC,
8x ACU 171 EC





PROJECT

Val d'Europe was built in conjunction with The Walt Disney Company, who wished to create a town near the Resort. In this modern and fast-moving context BNP Paribas decided to establish their new data center.

CHALLENGE

The new project consists of two buildings of 1630 and 9990 m², located on a 74,965 m² piece of land aimed at combining the landscaping requirements with the company's environmental responsibility policy, that is, to reduce their own ecological footprint as much as possible. The new buildings contain offices and 4 data centers that will host and enable IR + Networks + telecom operations of most of the bank's IT production.

SOLUTION

At BNPP Val d'Europe RC supplied a complete system able to combine the reliability and continuous cooling in the data center with sustainability and the perfect level of comfort in the offices. The system is composed of 12 high efficiency chillers and 28 close control units for a total of 12,200 kW and is worth more than one million euros. Going in depth 2 FX FC NG 3902 SL-T chillers in a super low noise version with a 100% positive free-cooling temperature are able to grant an energy cost very close to zero and reach an EER equal to 36. Furthermore, 10 FOCS2 3602 SL-K-S air source chillers in a compact and super low-noise version have been installed inside the data centers 28 Accurate close control units have been installed for the precise temperature and humidity control.

MORE THAN 1000 PROJECTS ALL OVER THE WORLD

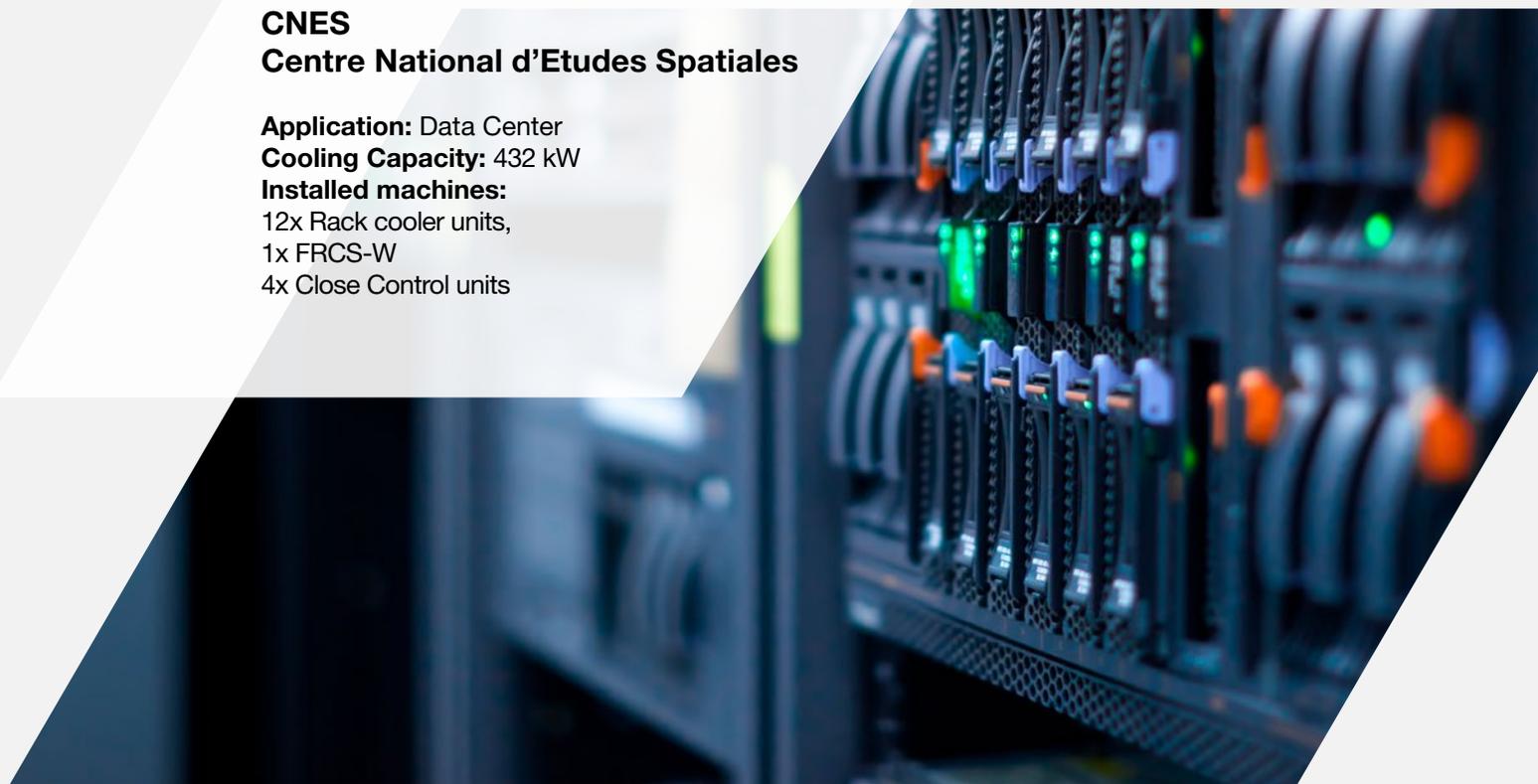
2010 Zurich – Switzerland
COLOZÛRI

Application: Data Center
Cooling Capacity: 340 kW
Installed machines: 1x FRCS-W



2012 Saint Denis – France
CNES
Centre National d'Etudes Spatiales

Application: Data Center
Cooling Capacity: 432 kW
Installed machines:
12x Rack cooler units,
1x FRCS-W
4x Close Control units



Climaveneta's chiller 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.

**2016 - 2007 Warsaw – Poland
IBM**

Application: Data Center
Cooling Capacity: 1800 kW
Installed machines:
3x FRCS-ME condenserless chiller,
13x AC Close control units,
2x FRCS-W water cooled chillers



**2010 Milan – Italy
VODAFONE MSC
MILANO 3**

Application: Data Center
Plant type: Hydronic System
Cooling Capacity: 1700 kW
Installed machines: 2x high efficiency
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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