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

COMFORT

CHILLERS

TECS-FC

AIR COOLED CHILLERS WITH FREE-COOLING TECHNOLOGY, FROM 302 TO 1649 KW

climaveneta.com

CLIMAVENETA®

“THE GREATER PART OF PROGRESS IS THE DESIRE TO PROGRESS”

Lucio Anneo Seneca
Latin Philosopher
(4 BC - 64 AC)

TOP LEVEL EFFICIENCY

Strict energy consumption and environmental impact regulations continually push towards ever more efficient units.
Achieving the greatest energy savings and ensuring long-term sustainability are challenges that modern cooling systems need to tackle.

24/7 RELIABILITY

Reliability is key, especially when it comes to IT-cooling and process cooling applications. The uninterrupted operations of data centers, telecommunications infrastructures and manufacturing machineries depend on a steady and precise cooling load coverage.

SOME PROJECTS DON'T ACCEPT COMPROMISES, THEY SIMPLY DEMAND THE BEST TECHNOLOGY.

TECS-FC

THE NEW FOREFRONT OF THE PROGRESS

The power of the ultimate technological solutions
and a massive use of renewable resources have been merged to create TECS-FC.

Widest use of free-cooling

Capitalise the energy of the environment to cut the operating costs.

Unbeatable performance

Magnetic levitation compressors, flooded evaporator and EC fans for the highest energy saving.

Highest manufacturing quality

Over ten years of experience with magnetic levitation compressors and extensive expertise in the free-cooling technology.

EER over 4,0 (1)
over 5,0 (2)

TFC* over 2,0 °C (3)
over 10,0 °C (4)
TEMPERATURE

(1) Water (in/out) 15°C/10°C; Air (in) 30°C; Et. glycol 30%.
(2) Water (in/out) 27°C/20°C; Air (in) 30°C; Et. glycol 30%.

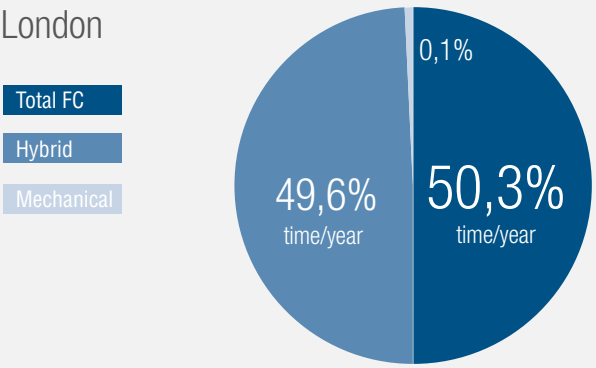
(3) Water (in/out) 15°C/10°C; Et. glycol 30%.
(4) Water (in/out) 27°C/20°C; Et. glycol 30%.

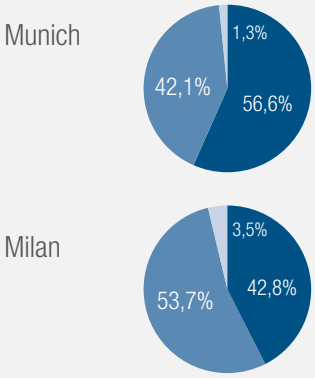
*TFC: Total Free-cooling

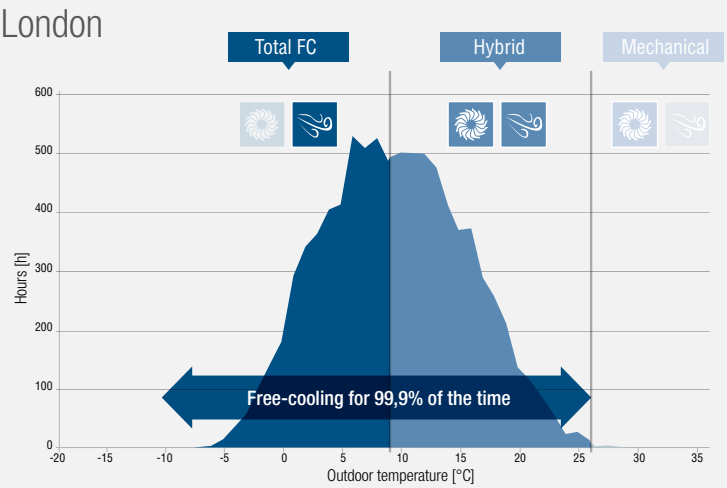
NATURAL EFFICIENCY TO COOL YOUR SYSTEM

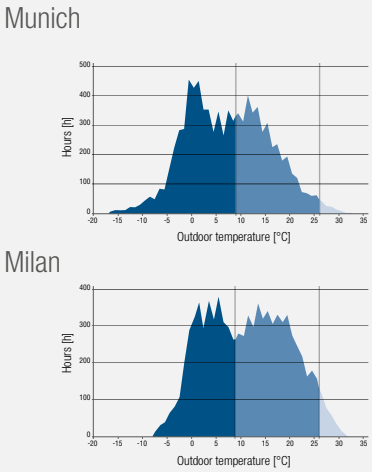
FREE-COOLING POTENTIAL: TEMPERATURE OCCURRENCE DISTRIBUTION

Wherever cooling demand is constant all year round, free-cooling provides significant energy saving opportunities.
In a cooling system located in London, working with favorable levels of water temperature (such as 27-20°C), the outdoor air alone can satisfy the cooling demand 50,3% of the time. 49,6% of the time, the outdoor air cooling capacity allows the chiller's compressors to run at part load, with a significant increase in efficiency.
For only 0,1% of the time, the unit works as an ordinary chiller.









How Climaveneta masters free-cooling

Climaveneta's free-cooling chillers work in three different modes: Total free-cooling, Hybrid cooling, Mechanical cooling, according to outdoor air conditions and operating water temperature. As the outdoor air temperature drops 1 degree below the returning water temperature, a valve system redirects the water to the special coils and the benefits of the free-cooling begin.

Total free-cooling

- The outdoor air temperature is low enough to satisfy the entire cooling demand.
- Total cooling capacity is provided by the outdoor air in the free-cooling coils while the compressors are off.

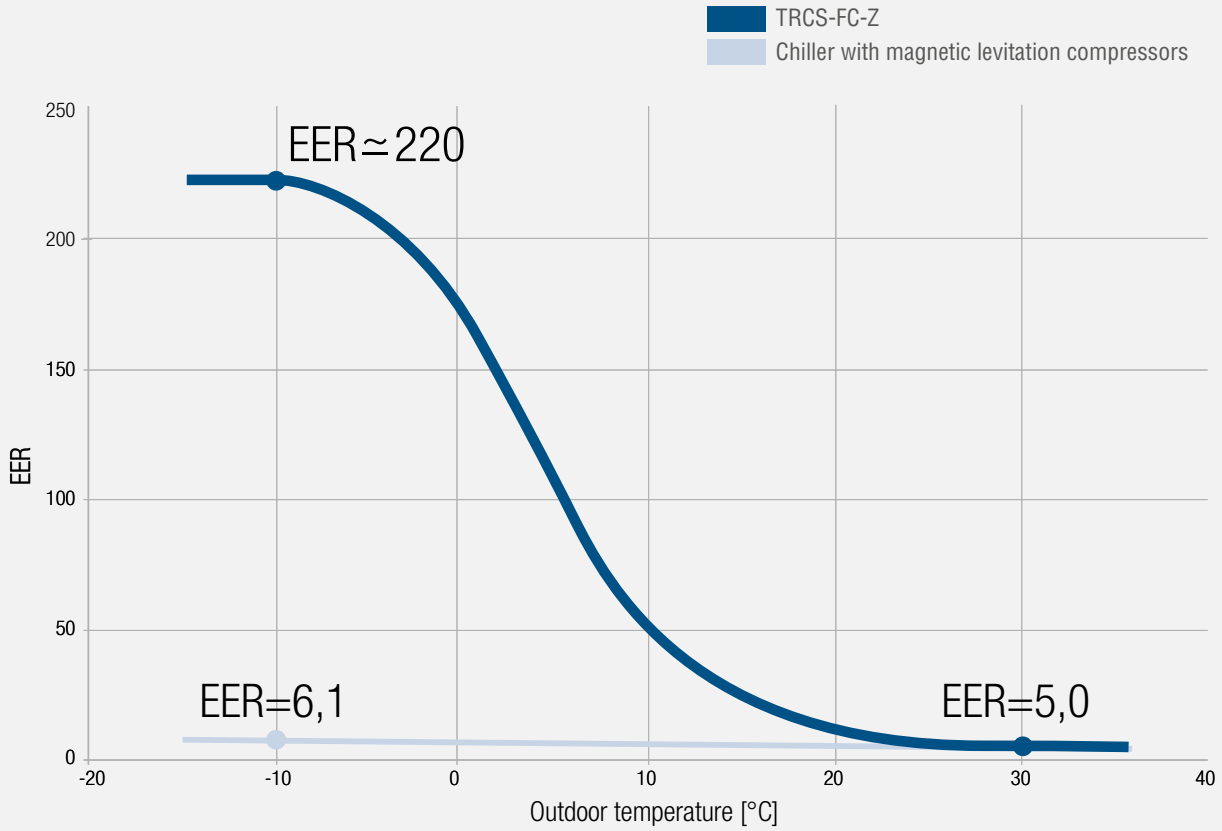
Maximum Energy Saving

FREE-COOLING TECHNOLOGY

THE ULTIMATE SOLUTION TO HARNESS THE FULL POTENTIAL OF RENEWABLE SOURCES

EFFICIENCY COMPARISON: TRADITIONAL CHILLER VS FREE-COOLING CHILLER

To understand how free-cooling can cut the energy bill of your cooling system, it is sufficient to compare the efficiency of a TECS-FC unit with the efficiency of a comparable technology chiller without free-cooling.
When the outdoor air temperature is too high to provide free-cooling, the EER (Energy Efficiency Ratio) of the energetica) delle due unità sono allineati ma, non appena two units are aligned.
But as the air temperature decreases, the gap between the units' efficiency becomes clear and even huge.
In total free-cooling mode, the compressors are off and very little energy is needed to provide the whole cooling capacity.



Note: Plant (side) cooling exchanger water (in/out) 27°C/20°C; Ethylene glycol 30%.

Hybrid cooling

- The outdoor air temperature is lower than the returning water temperature but not cold enough to achieve total free-cooling.
- Part of the cooling capacity is provided by the outdoor air while the rest is provided by the compressors.

Optimised Source Management

Mechanical cooling

- The outdoor air temperature is equal to or higher than the returning water temperature.
- Total cooling capacity is provided by the compressors, in the evaporator.

Conventional Chiller Operation

TECHNOLOGICAL CHOICES

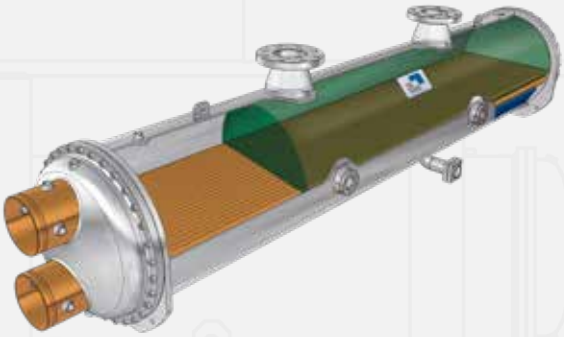
Extreme efficiency and absolute reliability: the secret formula is cutting-edge technologies and deep know-how.

CENTRIFUGAL COMPRESSOR WITH MAGNETIC LEVITATION

THE EXPERTISE MAKES THE DIFFERENCE

These top level technology compressors bring enormous benefits in terms of efficiency, adjustments, vibrations and weight. Magnetic levitation eliminates the need for lubricant, its delicate management and heat exchange penalisation. Partial load efficiency, which is crucial during the hybrid operation, is therefore strongly increased.

A profound knowledge is necessary to harness such a concentration of technology and here is where Climaveneta brand really makes the difference thanks to its 10-year experience in magnetic levitation compressors units and thousands of projects all over the world.



FLOODED EVAPORATOR

THE EXCELLENCE IN HEAT EXCHANGE

Designed and built internally, the geometry of the flooded evaporator grants optimum temperature distribution along the shell, hence highly efficient heat exchange and low refrigerant pressure drops.

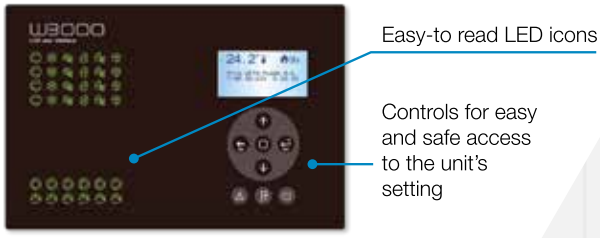
Allowing the over-heating surface to be eliminated, the flooded evaporation delivers unbeatable heat exchange efficiency, but it also requires maximum care in keeping the exact liquid refrigerant level.
This could become tricky in case of wide variations of the evaporator cooling load, which in these units happens again and again due to free-cooling contribution. Climaveneta units ensure a fully reliable way out thanks to specific design solutions and proprietary electronic expansion valve control algorithms.

ADVANCED CONTROL

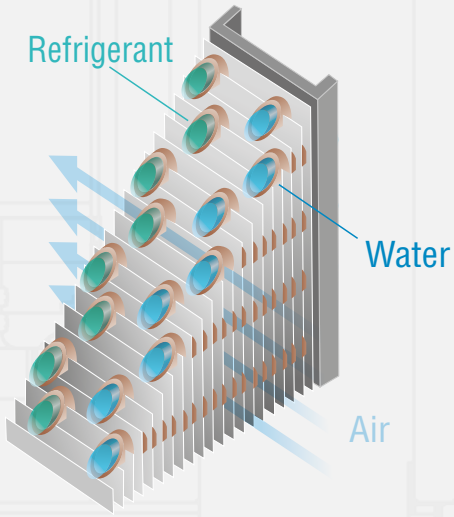
The controller features proprietary settings that ensure fast adaptive responses to different dynamics, in all operating modes.

The interface is intuitive and user-friendly thanks to the adoption of LED icons for a full and immediate status display of the various circuits.

Standard interface



CLIMAVENETA BRAND MANUFACTURING QUALITY IN EVERY DETAIL



SPECIAL COILS

KEEP THE EFFICIENCY UP OVER TIME

Free-cooling efficacy is strictly related to the effectiveness of the air/water direct heat exchange. Nevertheless, an efficient air/refrigerant coil is necessary for proper condensation.

A special coil, made of both refrigerant and water tubes, achieves both goals. This particular configuration, instead of two separate finned coils, also prevents fin spacing misalignment and dust and dirt accumulation. Hence low pressure drops and high heat exchange efficiency will last.

EC FANS

HOLD THE REINS ON AIR FLOW RATE

Managing both free-cooling and condensation with rough air flow regulation would mean a significant energy loss due to unfavourable condensation pressure or not capitalising on free-cooling.

EC fans are efficient and silent and have the capability to adjust their rotational speed continuously. Their accurate and quick air flow regulation allows Climaveneta's control functions to perform at their best, granting the best possible unit operation in any condition.

THE BRAIN BEHIND THE SUCCESS

As an option, a 7" touch screen color display interface is available with a USB port, for quick and easy application updates and downloading of all registered variables in graphic form.

Optional touch screen interface

TECS-FC

0211 - 1204

High efficiency air cooled chiller with free-cooling
(302-1649 kW)

VERSIONS

K Compact units
CA High efficiency units

CONFIGURATIONS

\- Standard
NG No Glycol

VPF · FREE C. · CENTRIF. · FLOODED · VSPEED · COOLING · HFC R134a · EC AXIAL

TECS-FC /K			0211	0351	0452	0552	0652	0712	0903	0953	1003	1164	1204
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	302	483	594	689	943	980	1185	1253	1421	1578	1649
Total power input	(1)	kW	87,1	141	179	181	285	275	320	373	425	455	461
EER	(1)	kW/kW	3,47	3,43	3,33	3,81	3,31	3,56	3,70	3,36	3,35	3,47	3,58
COOLING ONLY (EN14511 VALUE)													
Cooling capacity	(1)(2)	kW	300	479	590	684	936	973	1177	1246	1411	1567	1637
EER	(1)(2)	kW/kW	3,36	3,31	3,23	3,67	3,21	3,44	3,59	3,28	3,25	3,36	3,46
FREE-COOLING TOTALE (GROSS VALUE)													
Cooling capacity	(3)	kW	302	483	594	689	943	980	1185	1253	1421	1578	1649
EER	(3)	kW/kW	59,25	50,28	49,52	67,55	56,15	51,05	49,38	52,21	53,83	50,58	52,85
Total free-cooling temperature	(3)	°C	-1,9	-2,5	-1,9	-1,4	-2,7	-1,4	-1,2	-2,7	-2,5	-1,6	-1,8
ENERGY EFFICIENCY													
SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)													
Ambient refrigeration													
Prated,c	(8)	kW	261	414	507	608	800	851	1045	1069	1212	1361	1435
SEER	(8)(9)		4,91	4,62	4,66	5,23	4,73	4,77	4,62	4,46	4,53	4,38	4,41
Performance ηs	(8)(10)	%	193	182	184	206	186	188	182	175	178	172	173
EXCHANGERS													
HEAT EXCHANGER USER SIDE IN REFRIGERATION													
Water flow	(1)	l/s	16,01	25,57	31,48	36,50	49,98	51,93	62,78	66,38	75,30	83,61	87,35
Pressure drop	(1)	kPa	86,0	98,6	89,3	104	104	107	91,8	80,2	103	106	115
REFRIGERANT CIRCUIT													
Compressors nr.		N°	1	1	2	2	2	2	3	3	3	4	4
No. Circuits		N°	1	1	1	1	1	1	2	2	2	2	2
Refrigerant charge		kg	120	140	260	260	320	320	430	520	520	540	540
NOISE LEVEL													
Sound Pressure	(4)	dB(A)	56	61	62	58	63	63	64	64	65	65	65
Sound power level in cooling	(5)(6)	dB(A)	88	93	94	91	96	96	97	97	98	98	98
SIZE AND WEIGHT													
A	(7)	mm	4000	4000	4900	6400	7000	7900	10600	11200	11200	13000	13600
B	(7)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(7)	mm	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500
Operating weight	(7)	kg	3430	3850	5080	5820	6340	6900	9750	10260	10530	12290	12350

Notes:
1 Plant (side) cooling exchanger water (in/out) 15°C/10°C; Source (side) heat exchanger air (in) 30°C; Ethylene glycol 30%.
2 Values in compliance with EN14511-3:2013.
3 Plant (side) cooling exchanger water (in/out) 15°C/10°C; Ethylene glycol 30%.
4 Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.
5 Sound power on the basis of measurements made in compliance with ISO 9614.
6 Sound power level in cooling, outdoors.
7 Unit in standard configuration/execution, without optional accessories.
8 Seasonal energy efficiency of the cooling environment in AVERAGE climatic conditions [REGULATION (EU) N. 2016/2281]
9 Seasonal space heating energy index
10 Seasonal energy efficiency of the space cooling
The units highlighted in this publication contain HFC R134a [GWP_{100}1430] fluorinated greenhouse gases.

Certified data in EUROVENT

TECS-FC /CA			0211	0251	0351	0452	0552	0712	0803	0903	1003
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
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	310	354	496	616	714	990	1068	1209	1446
Total power input	(1)	kW	85,4	89,8	134	173	177	268	267	308	412
EER	(1)	kW/kW	3,63	3,94	3,69	3,56	4,03	3,69	4,00	3,92	3,51
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	307	351	492	611	708	983	1062	1201	1436
EER	(1)(2)	kW/kW	3,50	3,79	3,56	3,44	3,87	3,56	3,90	3,80	3,40
FREE-COOLING TOTALE (GROSS VALUE)											
Cooling capacity	(3)	kW	310	354	496	616	714	990	1068	1209	1446
EER	(3)	kW/kW	60,71	52,04	58,36	60,37	52,51	58,25	52,35	54,71	65,43
Total free-cooling temperature	(3)	°C	-0,1	-0,2	-1,0	-0,5	0,4	-0,9	0,2	0,0	-1,6
ENERGY EFFICIENCY											
SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)											
Ambient refrigeration											
Prated,c	(8)	kW	271	319	434	535	650	867	972	1086	1244
SEER	(8)(9)		5,04	4,95	5,05	5,18	5,26	5,16	5,21	5,06	4,94
Performance ηs	(8)(10)	%	199	195	199	204	207	204	205	199	195
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN REFRIGERATION											
Water flow	(1)	l/s	16,40	18,75	26,28	32,63	37,83	52,47	56,60	64,05	76,60
Pressure drop	(1)	kPa	90,3	96,3	104	95,9	111	109	74,6	95,6	107
REFRIGERANT CIRCUIT											
Compressors nr.		N°	1	1	1	2	2	2	3	3	3
No. Circuits		N°	1	1	1	1	1	1	2	2	2
Refrigerant charge		kg	120	120	140	260	280	320	430	430	520
NOISE LEVEL											
Sound Pressure	(4)	dB(A)	56	57	58	58	59	60	61	61	61
Sound power level in cooling	(5)(6)	dB(A)	88	89	90	91	92	93	94	94	94
SIZE AND WEIGHT											
A	(7)	mm	4000	4000	4900	6400	7900	10000	12100	13000	13000
B	(7)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(7)	mm	2500	2500	2500	2500	2500	2500	2500	2500	2500
Operating weight	(7)	kg	3660	3790	4380	5720	6770	8870	10530	11370	11730

Notes:
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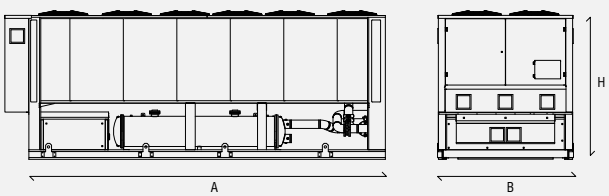
The units highlighted in this publication contain HFC R134a [GWP_{100}1430] fluorinated greenhouse gases.

Certified data in EUROVENT

ACCESSORIES

- Leak detector with automatic refrigerant migration
- Energy meter with BMS interface
- Electromagnetic compatibility (EMC) - EN6100-6-3 for residential environments

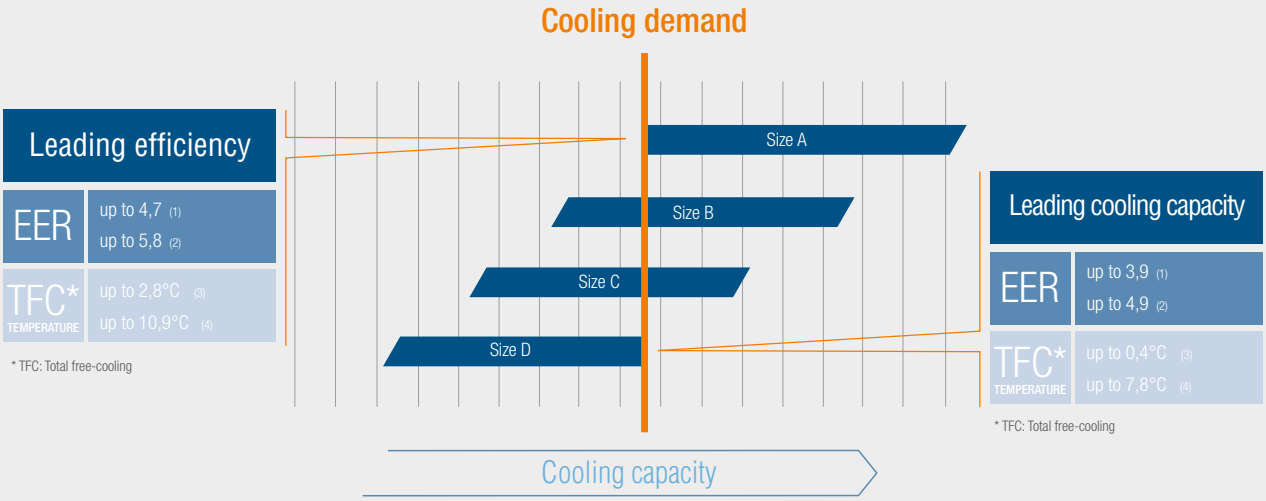


POWERFUL FLEXIBILITY

A MIGHTY CORE TAILORED TO A PROJECT'S NEEDS

Every job has its own specific needs. Because of the skillful use of component technical features, TECS-FC range perfectly tailors the actual specifications and priorities of any project.

A definite cooling demand can in fact be provided giving priority to reducing the initial investment cost (leading cooling capacity), or putting a premium on annual energy savings and payback time (leading efficiency).



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THDI AND POWER FACTOR

THDi

The accurate design of electrical and electronic components and the use of specific solutions, such as compressor line reactors (std) and power factor correction capacitors (opt), reduce the THDi (Total Harmonic Distortion of current) and increase unit's Power Factor. To fit even the most demanding requirements, modular active harmonic filters can be added to cut the THDi down to values below 5%.

HFO REFRIGERANT

HFO 1234ze

GREENEFFICIENCY

In line with the most severe environmental regulations, TECS-FC is also available with the new green HFO 1234ze refrigerant. A solution that complies with the highest efficiency targets required by modern projects, whilst offering an eco-friendly alternative to HFCs.

ClimaPRO

clima PRO

PERFORMANCE RELIABILITY OPTIMISATION

According to the units' actual efficiency curves, ClimaPRO continuously optimises plant working conditions by promptly adjusting equipment staging and sequencing, managing operating set-points and controlling water flows throughout the entire system. ClimaPRO can be natively interfaced with any BMS or it can successfully perform all functions on its own.

“EXPERIENCE IS BY FAR THE BEST PROOF”

Sir Francis Bacon
British philosopher
(1561-1626)

RINASCENTE STORE

2015 - 2018 - ROME (ITALY)

Application:
Retail

Plant type:
Hydronic System

Cooling capacity:
2200 kW

Heating capacity:
800 kW

Installed machines:
1x TECS-FC / K 1204,
1x ERACS2-Q / SL-CA 3222

PROJECT

Mitsubishi Electric Hydronics & IT Cooling Systems, through its brand Climaveneta, has supplied the air conditioning units for the new new La Rinascente department store located in Tritone Street, Rome.

CHALLENGE

To grant the best internal comfort to the customers throughout the year, offering a unique and irreplaceable shopping experience, the M&E designer planned efficient and reliable technical plants for the store.

SOLUTION

The HVAC system is based on Climaveneta units:
1 TECS-FC / K 1204 chiller and 1 multi-purpose heat pump ERACS2-Q / SL-CA 3222 for a total cooling capacity of almost 2,200 kW.

TECS-FC_ENG_02-2018

CLIMAVENETA®

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.

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

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