

**mitsubishi electric**  
**HYDRONICS & IT COOLING SYSTEMS S.p.A.**

PROCESS

CHILLERS

# TECS-FC-Y

# TECS-FC-G05-Y

**AIR COOLED CHILLERS WITH  
OIL-FREE COMPRESSORS AND  
FREE-COOLING TECHNOLOGY,  
FROM 302 TO 1649 kW**

**r**  
**R513A**



# TECS-FC-Y

# TECS-FC-G05-Y



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

**Lucio Anneo Seneca**

Latin Philosopher  
(4 BC - 64 AC)

## High efficiency air cooled chiller with oil-free compressors and free-cooling, 302-1693 kW

Resulting from the recognised prestige of Climaveneta brand products utilizing magnetic levitation technology, TECS-FC-Y air cooled chillers match the advantages of oil-free technology with a free-cooling system.

Thanks to the innovative green refrigerant, R513A, TECS-FC-G05-Y represents an innovative eco-friendly solution for process cooling activities working 24/7.

## PROCESS APPLICATIONS

- ✓ Food industry
- ✓ Chemical and Pharmaceutical
- ✓ Printing industry
- ✓ Plastics
- ✓ Winery

## 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.

TECS-FC-Y range of chillers adopts an advanced free-cooling system that has been conceived to reduce the compressor work and maximize the use of the outdoor air.

## 2 REFRIGERANT OPTIONS

Climaveneta oil-free compressor chillers are now available with two refrigerants, both dedicated to comfort applications:

- **TECS-FC-Y:** High efficiency air cooled chiller with free-cooling and R134a high performing refrigerant.

- **TECS-FC-G05-Y:** High efficiency air cooled chiller with free-cooling and R513A high performing and low GWP refrigerant.

## VERSIONS

**K**

Key efficiency, compact version

**CA**

High energy efficiency version

## CONFIGURATIONS

**-**

Standard free-cooling

**NG**

Function for free-cooling without glycol

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

# TECS-FC-Y

## THE FOREFRONT OF PROGRESS

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

### WIDEST USE OF FREE-COOLING



Capitalizing on the energy of the environment to cut operating costs.

Thanks to special heat exchangers featuring a large surface area and advanced logics for free-cooling management, the liquid is cooled by outdoor air, thus lowering the load of the compressors to zero. This already occurs at positive outdoor temperatures.

### HIGHEST MANUFACTURING QUALITY



Climaveneta has over ten years of experience with magnetic levitation compressors and extensive expertise in free-cooling technology.

The Climaveneta brand oil-free chiller range takes advantage of this profound experience in order to achieve the highest quality standards in every single detail.

### UNBEATABLE PERFORMANCE



Top-level seasonal efficiencies thanks to technological solutions that are at the forefront of innovation: magnetic levitation compressors, flooded evaporator, and EC fans for the highest energy savings.

### NOW EVEN WITH R513A REFRIGERANT



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

EER: over 4,0 (1)

EER: over 5,0 (2)

(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%.

TFC\*: over 2,0 °C (3)

TFC\*: over 10,0 °C (4)

(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

# FREE-COOLING TECHNOLOGY

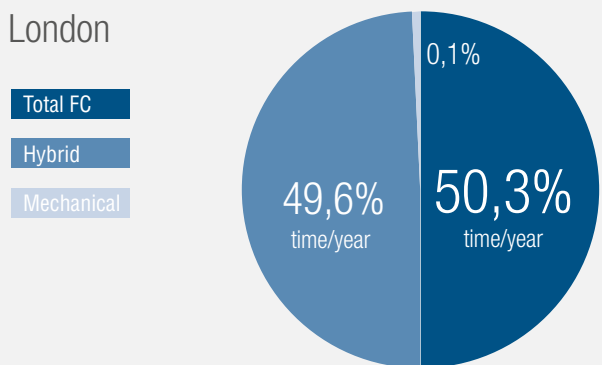


## Free-cooling potential: temperature occurrence distribution

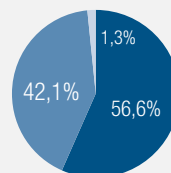
Wherever cooling demand is constant all year round, free-cooling provides significant energy saving opportunities. In a cooling system located in London, working with favorable levels of water temperature (such as 27-20°C), the outdoor air alone can satisfy the cooling demand

50,3% of the time. 49,6% of the time, the outdoor air cooling capacity allows the chiller's compressors to run at part loads, with a significant increase in efficiency. For only 0,1% of the time, the unit works as an ordinary chiller.

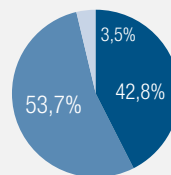
### London



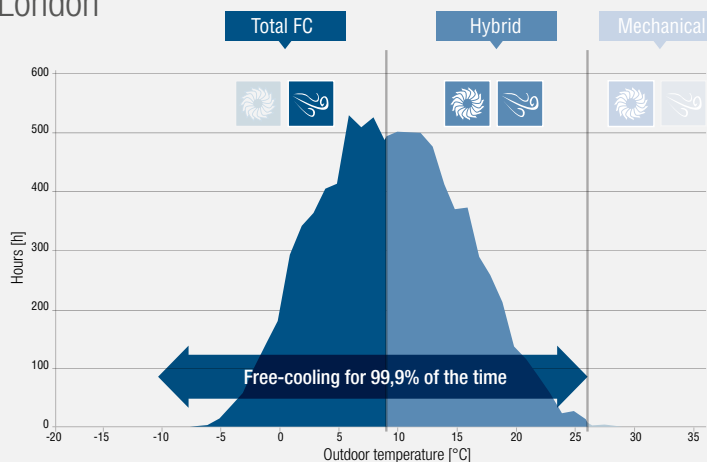
### Munich



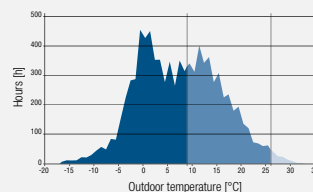
### Milan



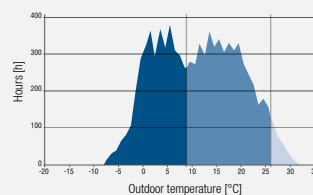
### London



### Munich



### Milan



## 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.

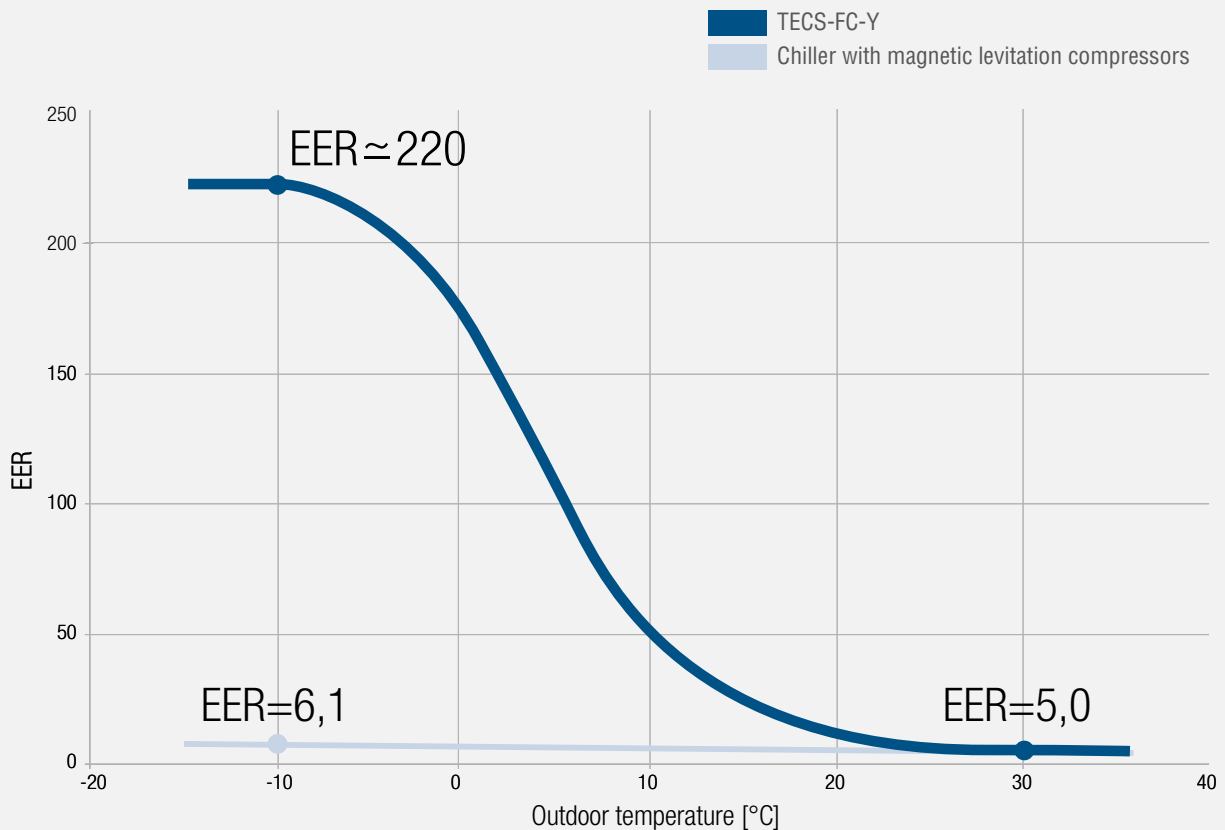
## Maximum Energy Savings

# THE ULTIMATE SOLUTION TO HARNESS THE FULL POTENTIAL OF RENEWABLE SOURCES

## Efficiency comparison: traditional chillers vs free-cooling chillers

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-Y 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 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

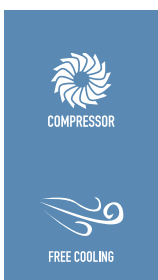
- ▶ The outdoor air temperature is lower than the returning water temperature but not cold enough to achieve total free-cooling.
- ▶ Part of the cooling capacity is provided by the outdoor air while the rest is provided by the compressors.

#### 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

## 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.

## 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.



## 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

- ✓ Easy-to read LED icons
- ✓ Controls for easy and safe access to the unit's settings



**Climaveneta brand manufacturing quality in every detail.  
Extreme efficiency and absolute reliability: the secret formula is  
cutting-edge technologies and deep know-how.**



## Flooded evaporator

### Excellence in the 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.

## 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 the 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.

## THE BRAIN BEHIND THE SUCCESS

As an option, a 7" color touch screen 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

- ✓ 7" color display
- ✓ USB Port

# TECS-FC-Y

## FOR HEAVY-DUTY APPLICATIONS

**The highest standards of reliability and reduced running costs, without any compromise.**

In many manufacturing and chemical industrial processes, downtime costs are a crucial aspect. In all these applications, an interruption in the cooling supply may seriously compromise the technical equipment operation, causing unexpected shutdowns. Climaveneta's approach to cooling dependability goes

beyond the unit's accurate and sturdy design. It also involves several devices and functions that maximize unit's uptime in case of emergency circumstances such as power supply outage.

### FAST RESTART

**Sometimes few seconds can determine the shutdown of the entire facility.**

After a power failure, the cooling must be ensured as soon as possible. Fast Restart is the special function that ensures:



#### Immediate cooling start-up

Compressor start-up within 26" after power is restored.

#### Accelerated cooling ramp-up

1000 kW are delivered within 6' 30" after a voltage dip.

### SMART PUMP MANAGEMENT

Free-cooling units lead to high energy savings but, because of their very nature, they always involve a water flow management issue: when the free-cooling is activated, the pressure drops suddenly increase due to the additional path throughout the free-cooling coils. This causes a significant change in the pump working conditions.

With the 2PS (2 Pump Speeds) function (opt), the unit adjusts the pump speed according to the free-cooling chiller operating mode, keeping the water flow steady without any energy waste nor hydraulic plant complications.

#### Variable primary flow management To leverage load variation



#### 2 Pump Speed adjustment Perfect for free-cooling units



The awareness of the most demanding application requirements and the commitment to improve their energy efficiency has led to the development of devoted solutions.

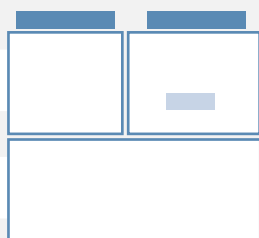
## DOUBLE POWER SUPPLY

### Redundancy increases uptime.

With the aim of enhancing cooling dependability, TECS-FC-Y also extends this concept to the electrical supply.

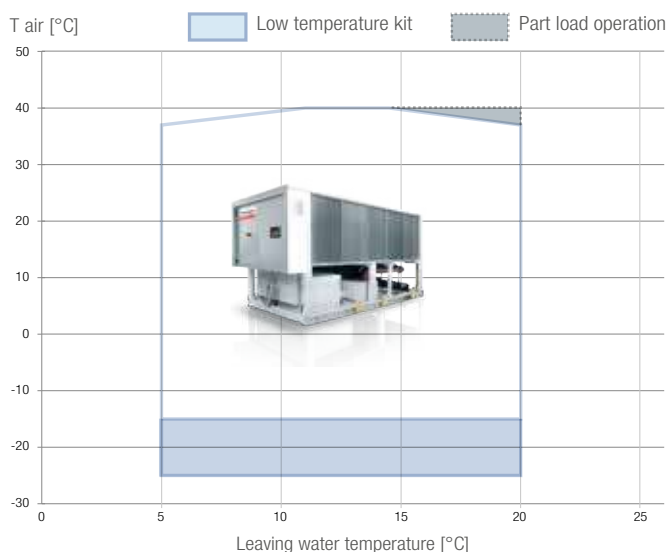
Main Line ▶

Generator ▶



With the double power supply configuration, the unit is equipped with an ATS (Automatic Transfer Switch) and can be connected to two separate power lines (usually the mains and the auxiliary generator line). In case of a main line power outage, the ATS automatically switches over to the other line, granting uninterrupted power supply to the unit.

## WIDE OPERATING RANGE



Modern infrastructures are designed to work with cooling water temperatures which are higher than traditional levels, significantly enhancing the overall efficiency of the cooling system.

TECS-FC-Y has been developed to operate properly with leaving water temperature up to 20°C, ensuring outstanding energy savings and fully capitalizing on free-cooling.

# TECS-FC-G05-Y



## TECS-FC-G05-Y 0211 - 1204

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

Fully committed to supporting the creation of a greener tomorrow, Mitsubishi Electric Hydronics & IT Cooling Systems designed TECS-FC-G05-Y, a complete large capacity chiller range with reduced environmental impact, optimized for R513A refrigerant.

Combining brilliant annual efficiency with the use of a low GWP refrigerant, TECS-FC-G05-Y 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.



### LOW GWP

-56% GWP vs R134a



### Non-flammable

Safety Class A1

## 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 |

\*IPCC AR4

\*\*ASHRAE 34 - ISO 817

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 TECS-FC-G05-Y, 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).



| TECS-FC-G05-Y/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 |
| <b>PERFORMANCE</b>                                        |              |          |          |          |          |          |          |          |          |          |          |          |
| <b>COOLING ONLY (GROSS VALUE)</b>                         |              |          |          |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (1) kW       | 299,2    | 479,3    | 590,0    | 682,1    | 932,1    | 969,4    | 1173     | 1238     | 1409     | 1558     | 1627     |
| Total power input                                         | (1) kW       | 87,50    | 140,4    | 177,9    | 180,1    | 284,6    | 275,0    | 319,5    | 372,8    | 425,0    | 456,2    | 459,3    |
| EER                                                       | (1) kW/kW    | 3,419    | 3,414    | 3,316    | 3,787    | 3,275    | 3,525    | 3,671    | 3,321    | 3,315    | 3,415    | 3,542    |
| <b>COOLING ONLY (EN14511 VALUE)</b>                       |              |          |          |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (1)(2) kW    | 297,1    | 475,7    | 586,0    | 677,0    | 925,4    | 962,2    | 1166     | 1231     | 1399     | 1547     | 1615     |
| EER                                                       | (1)(2) kW/kW | 3,310    | 3,300    | 3,220    | 3,650    | 3,180    | 3,410    | 3,570    | 3,240    | 3,220    | 3,310    | 3,430    |
| <b>TOTAL FREE-COOLING (GROSS VALUE)</b>                   |              |          |          |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (3) kW       | 299,2    | 479,3    | 590,0    | 682,1    | 932,1    | 969,4    | 1173     | 1238     | 1409     | 1558     | 1627     |
| EER                                                       | (3) kW/kW    | 58,67    | 49,93    | 49,17    | 66,87    | 55,48    | 50,49    | 48,88    | 51,58    | 53,37    | 49,94    | 52,15    |
| Total free-cooling temperature                            | (3) °C       | -1,8     | -2,4     | -1,8     | -1,3     | -2,5     | -1,3     | -1,1     | -2,5     | -2,4     | -1,5     | -1,6     |
| <b>ENERGY EFFICIENCY</b>                                  |              |          |          |          |          |          |          |          |          |          |          |          |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)</b> |              |          |          |          |          |          |          |          |          |          |          |          |
| <b>Ambient refrigeration</b>                              |              |          |          |          |          |          |          |          |          |          |          |          |
| Prated,c                                                  | (8) kW       | 258,2    | 411,3    | 503,6    | 601,6    | 790,5    | 841,6    | 1035     | 1056     | 1201     | 1343     | 1416     |
| SEPR                                                      | (8)(10)      | 6,59     | 6,53     | 6,38     | 6,62     | 6,39     | 6,54     | 6,41     | 6,23     | 6,27     | 6,23     | 6,27     |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2015/1095)</b> |              |          |          |          |          |          |          |          |          |          |          |          |
| <b>Process refrigeration at medium temperature</b>        |              |          |          |          |          |          |          |          |          |          |          |          |
| Prated,c                                                  | (9) kW       | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| SEPR                                                      | (9)(10)      | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| <b>EXCHANGERS</b>                                         |              |          |          |          |          |          |          |          |          |          |          |          |
| <b>HEAT EXCHANGER USER SIDE IN REFRIGERATION</b>          |              |          |          |          |          |          |          |          |          |          |          |          |
| Water flow                                                | (1) l/s      | 15,85    | 25,39    | 31,26    | 36,14    | 49,38    | 51,36    | 62,16    | 65,59    | 74,62    | 82,52    | 86,21    |
| Pressure drop                                             | (1) kPa      | 84,3     | 97,2     | 88,0     | 102      | 101      | 105      | 90,0     | 78,3     | 101      | 103      | 112      |
| <b>REFRIGERANT CIRCUIT</b>                                |              |          |          |          |          |          |          |          |          |          |          |          |
| 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      |
| <b>NOISE LEVEL</b>                                        |              |          |          |          |          |          |          |          |          |          |          |          |
| 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       |
| <b>SIZE AND WEIGHT</b>                                    |              |          |          |          |          |          |          |          |          |          |          |          |
| 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    |

| TECS-FC-G05-Y/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 |
| <b>PERFORMANCE</b>                                        |              |          |          |          |          |          |          |          |          |          |
| <b>COOLING ONLY (GROSS VALUE)</b>                         |              |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (1) kW       | 306,5    | 351,4    | 492,6    | 609,7    | 705,6    | 979,4    | 1058     | 1195     | 1433     |
| Total power input                                         | (1) kW       | 85,80    | 89,50    | 133,8    | 172,4    | 176,9    | 268,1    | 266,3    | 308,1    | 412,7    |
| EER                                                       | (1) kW/kW    | 3,572    | 3,926    | 3,682    | 3,537    | 3,989    | 3,653    | 3,973    | 3,879    | 3,472    |
| <b>COOLING ONLY (EN14511 VALUE)</b>                       |              |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (1)(2) kW    | 304,2    | 348,7    | 488,7    | 605,3    | 700,0    | 972,0    | 1052     | 1187     | 1423     |
| EER                                                       | (1)(2) kW/kW | 3,450    | 3,780    | 3,550    | 3,420    | 3,840    | 3,530    | 3,870    | 3,760    | 3,370    |
| <b>TOTAL FREE-COOLING (GROSS VALUE)</b>                   |              |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (3) kW       | 306,5    | 351,4    | 492,6    | 609,7    | 705,6    | 979,4    | 1058     | 1195     | 1433     |
| EER                                                       | (3) kW/kW    | 60,10    | 51,68    | 57,95    | 59,77    | 51,88    | 57,61    | 51,86    | 54,07    | 64,84    |
| Total free-cooling temperature                            | (3) °C       | 0,0      | -0,1     | -0,9     | -0,4     | 0,5      | -0,8     | 0,3      | 0,1      | -1,5     |
| <b>ENERGY EFFICIENCY</b>                                  |              |          |          |          |          |          |          |          |          |          |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)</b> |              |          |          |          |          |          |          |          |          |          |
| <b>Ambient refrigeration</b>                              |              |          |          |          |          |          |          |          |          |          |
| Prated,c                                                  | (8) kW       | 268,1    | 317,1    | 431,0    | 529,3    | 642,5    | 857,3    | 962,2    | 1073     | 1233     |
| SEER                                                      | (8)(10)      | 6,90     | 6,87     | 7,11     | 6,78     | 6,83     | 6,89     | 6,84     | 6,82     | 6,60     |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2015/1095)</b> |              |          |          |          |          |          |          |          |          |          |
| <b>Process refrigeration at medium temperature</b>        |              |          |          |          |          |          |          |          |          |          |
| Prated,c                                                  | (9) kW       | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| SEPR                                                      | (9)(10)      | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| <b>EXCHANGERS</b>                                         |              |          |          |          |          |          |          |          |          |          |
| <b>HEAT EXCHANGER USER SIDE IN REFRIGERATION</b>          |              |          |          |          |          |          |          |          |          |          |
| Water flow                                                | (1) l/s      | 16,24    | 18,62    | 26,10    | 32,30    | 37,38    | 51,89    | 56,04    | 63,28    | 75,91    |
| Pressure drop                                             | (1) kPa      | 88,5     | 94,9     | 103      | 94,0     | 109      | 107      | 73,1     | 93,3     | 105      |
| <b>REFRIGERANT CIRCUIT</b>                                |              |          |          |          |          |          |          |          |          |          |
| 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      |
| <b>NOISE LEVEL</b>                                        |              |          |          |          |          |          |          |          |          |          |
| 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       |
| <b>SIZE AND WEIGHT</b>                                    |              |          |          |          |          |          |          |          |          |          |
| 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    |



## TECS-FC-Y 0211 - 1204

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

| TECS-FC-Y /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 |       |
| <b>PERFORMANCE</b>                                        |         |          |          |          |          |          |          |          |          |          |          |          |       |
| <b>COOLING ONLY (GROSS VALUE)</b>                         |         |          |          |          |          |          |          |          |          |          |          |          |       |
| Cooling capacity                                          | (1)     | kW       | 302,2    | 482,7    | 594,2    | 689,0    | 943,4    | 980,2    | 1185     | 1253     | 1421     | 1578     | 1649  |
| Total power input                                         | (1)     | kW       | 87,10    | 140,9    | 178,6    | 181,0    | 285,2    | 275,2    | 320,1    | 373,2    | 424,6    | 455,0    | 460,6 |
| EER                                                       | (1)     | kW/kW    | 3,470    | 3,426    | 3,327    | 3,807    | 3,308    | 3,562    | 3,702    | 3,357    | 3,347    | 3,468    | 3,580 |
| <b>COOLING ONLY (EN14511 VALUE)</b>                       |         |          |          |          |          |          |          |          |          |          |          |          |       |
| Cooling capacity                                          | (1)(2)  | kW       | 300,0    | 479,0    | 590,1    | 683,7    | 936,5    | 972,8    | 1177     | 1246     | 1411     | 1567     | 1637  |
| EER                                                       | (1)(2)  | kW/kW    | 3,360    | 3,310    | 3,230    | 3,670    | 3,210    | 3,440    | 3,590    | 3,280    | 3,250    | 3,360    | 3,460 |
| <b>TOTAL FREE-COOLING (GROSS VALUE)</b>                   |         |          |          |          |          |          |          |          |          |          |          |          |       |
| Cooling capacity                                          | (3)     | kW       | 302,2    | 482,7    | 594,2    | 689,0    | 943,4    | 980,2    | 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  |
| <b>ENERGY EFFICIENCY</b>                                  |         |          |          |          |          |          |          |          |          |          |          |          |       |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)</b> |         |          |          |          |          |          |          |          |          |          |          |          |       |
| <b>Process refrigeration at high temperature</b>          |         |          |          |          |          |          |          |          |          |          |          |          |       |
| Prated,c                                                  | (8)     | kW       | 260,8    | 414,1    | 507,2    | 607,7    | 800      | 850,9    | 1045     | 1069     | 1212     | 1361     | 1435  |
| SEPR                                                      | (8)(10) |          | 6,66     | 6,54     | 6,39     | 6,64     | 6,43     | 6,58     | 6,45     | 6,28     | 6,32     | 6,30     | 6,31  |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2015/1095)</b> |         |          |          |          |          |          |          |          |          |          |          |          |       |
| <b>Process refrigeration at medium temperature</b>        |         |          |          |          |          |          |          |          |          |          |          |          |       |
| Prated                                                    | (9)     | kW       | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -     |
| SEPR                                                      | (9)(10) |          | -        | -        | -        | -        | -        | -        | -        | -        | -        | -        | -     |
| <b>EXCHANGERS</b>                                         |         |          |          |          |          |          |          |          |          |          |          |          |       |
| <b>HEAT EXCHANGER USER SIDE IN REFRIGERATION</b>          |         |          |          |          |          |          |          |          |          |          |          |          |       |
| 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   |
| <b>REFRIGERANT CIRCUIT</b>                                |         |          |          |          |          |          |          |          |          |          |          |          |       |
| 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   |
| <b>NOISE LEVEL</b>                                        |         |          |          |          |          |          |          |          |          |          |          |          |       |
| 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    |
| <b>SIZE AND WEIGHT</b>                                    |         |          |          |          |          |          |          |          |          |          |          |          |       |
| 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 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 high temperature process cooling [REGULATION (EU) N. 2016/2281]

9 Seasonal Energy Efficiency of Process Cooling at Medium Temperature [REGULATION (EU) N. 2015/1095]

10 Seasonal energy efficiency ratio

**TECS-FC-G05-Y on page 11: The units highlighted in this publication contain R513A [GWP<sub>100</sub> 631] fluorinated greenhouse gases.**

**TECS-FC-Y on pages 12 and 13: The units highlighted in this publication contain HFC R134a [GWP<sub>100</sub>1430] fluorinated greenhouse gases.**



| TECS-FC-Y /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 |
| <b>PERFORMANCE</b>                                        |         |         |          |          |          |          |          |          |          |          |          |
| <b>COOLING ONLY (GROSS VALUE)</b>                         |         |         |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (1)     | kW      | 309,6    | 353,9    | 496,1    | 615,8    | 714,1    | 990,3    | 1068     | 1209     | 1446     |
| Total power input                                         | (1)     | kW      | 85,40    | 89,80    | 134,3    | 173,2    | 177,2    | 268,3    | 266,8    | 308,4    | 412,3    |
| EER                                                       | (1)     | kW/kW   | 3,625    | 3,941    | 3,694    | 3,555    | 4,030    | 3,691    | 4,003    | 3,920    | 3,507    |
| <b>COOLING ONLY (EN14511 VALUE)</b>                       |         |         |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (1)(2)  | kW      | 307,3    | 351,1    | 492,1    | 611,3    | 708,3    | 982,7    | 1062     | 1201     | 1436     |
| EER                                                       | (1)(2)  | kW/kW   | 3,500    | 3,790    | 3,560    | 3,440    | 3,870    | 3,560    | 3,900    | 3,800    | 3,400    |
| <b>TOTAL FREE-COOLING (GROSS VALUE)</b>                   |         |         |          |          |          |          |          |          |          |          |          |
| Cooling capacity                                          | (3)     | kW      | 309,6    | 353,9    | 496,1    | 615,8    | 714,1    | 990,3    | 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     |
| <b>ENERGY EFFICIENCY</b>                                  |         |         |          |          |          |          |          |          |          |          |          |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)</b> |         |         |          |          |          |          |          |          |          |          |          |
| <b>Process refrigeration at high temperature</b>          |         |         |          |          |          |          |          |          |          |          |          |
| Prated,c                                                  | (8)     | kW      | 270,8    | 319,4    | 434,1    | 534,6    | 650,2    | 866,7    | 971,8    | 1086     | 1244     |
| SEPR                                                      | (8)(10) |         | 6,97     | 6,90     | 7,13     | 6,80     | 6,88     | 6,94     | 6,88     | 6,88     | 6,65     |
| <b>SEASONAL EFFICIENCY IN COOLING (Reg. EU 2015/1095)</b> |         |         |          |          |          |          |          |          |          |          |          |
| <b>Process refrigeration at medium temperature</b>        |         |         |          |          |          |          |          |          |          |          |          |
| Prated,c                                                  | (9)     | kW      | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| SEPR                                                      | (9)(10) |         | -        | -        | -        | -        | -        | -        | -        | -        | -        |
| <b>EXCHANGERS</b>                                         |         |         |          |          |          |          |          |          |          |          |          |
| <b>HEAT EXCHANGER USER SIDE IN REFRIGERATION</b>          |         |         |          |          |          |          |          |          |          |          |          |
| 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      |
| <b>REFRIGERANT CIRCUIT</b>                                |         |         |          |          |          |          |          |          |          |          |          |
| 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      |
| <b>NOISE LEVEL</b>                                        |         |         |          |          |          |          |          |          |          |          |          |
| 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       |
| <b>SIZE AND WEIGHT</b>                                    |         |         |          |          |          |          |          |          |          |          |          |
| 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:**

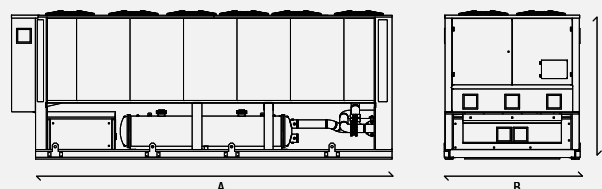
- Plant (side) cooling exchanger water (in/out) 15°C/10°C; Source (side) heat exchanger air (in) 30°C; Ethylene glycol 30%.
- Values in compliance with EN14511-3:2013.
- Plant (side) cooling exchanger water (in/out) 15°C/10°C; Ethylene glycol 30%.
- Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.
- Sound power on the basis of measurements made in compliance with ISO 9614.
- Sound power level in cooling, outdoors.
- Unit in standard configuration/execution, without optional accessories.
- Seasonal energy efficiency of the cooling environment in AVERAGE climatic conditions [REGULATION (EU) N. 2016/2281]
- Seasonal space heating energy index
- Seasonal energy efficiency of the space cooling

**TECS-FC-G05-Y on page 11: The units highlighted in this publication contain R513A [GWP<sub>100</sub> 631] fluorinated greenhouse gases.**

**TECS-FC-Y on pages 12 and 13: The units highlighted in this publication contain HFC R134a [GWP<sub>100</sub> 1430] fluorinated greenhouse gases.**

**ACCESSORIES**

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

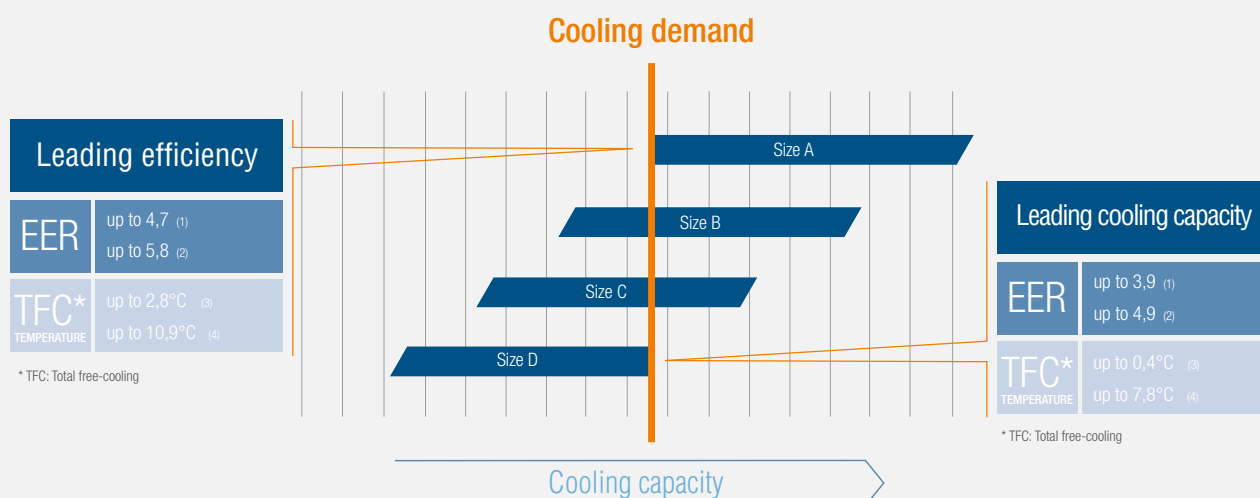


# POWERFUL FLEXIBILITY

## 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, the TECS-FC-Y 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).



(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%.

### THDI AND POWER FACTOR



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



In line with the most severe environmental regulations, TECS-FC-Y 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 • OPTIMIZATION



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)

## Unilever Research & Development Centre

2016 Wirral - Great Britain

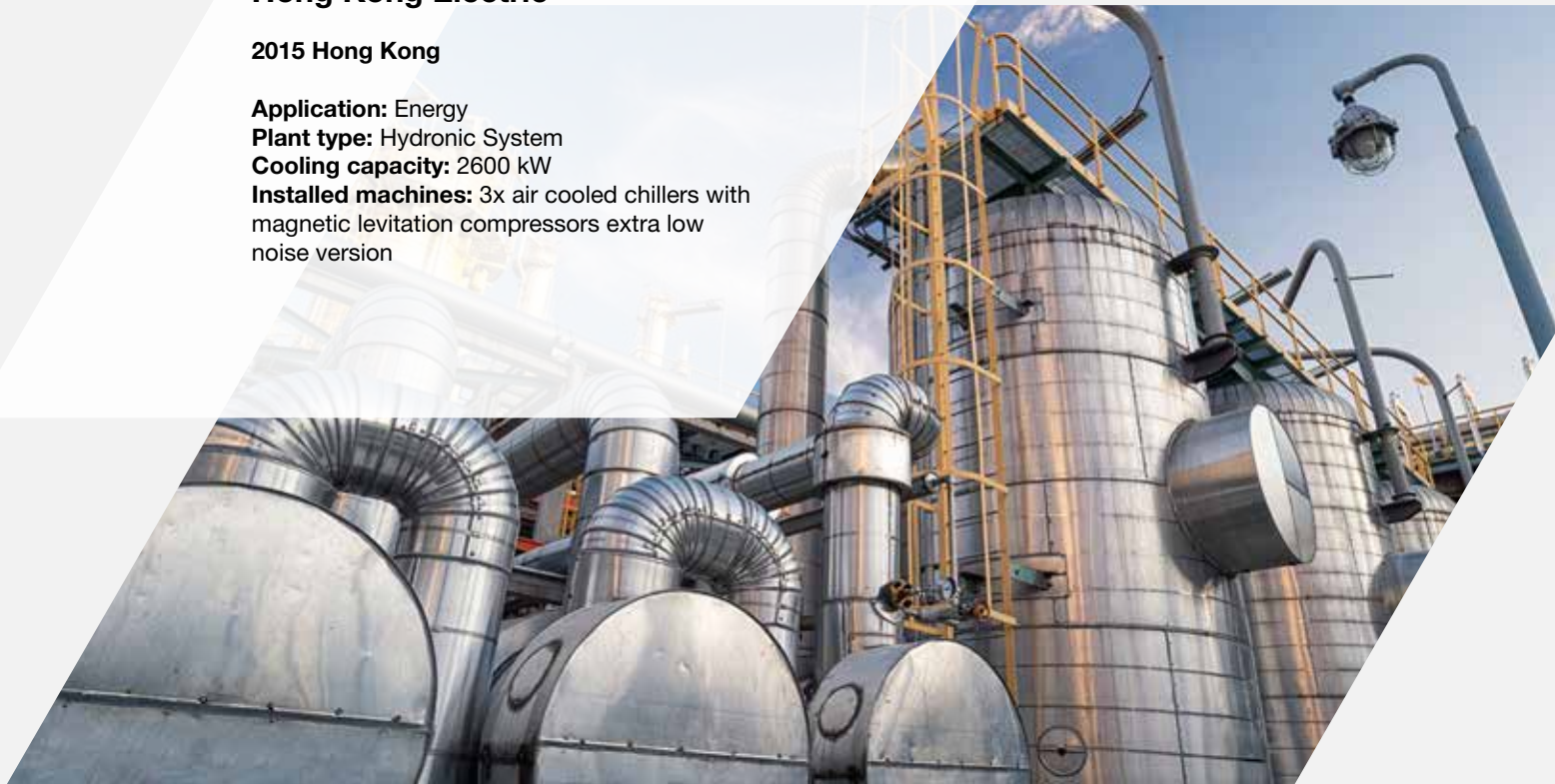
**Application:** Industrial Process  
**Plant type:** Hydronic System  
**Cooling capacity:** 1484 kW  
**Installed machines:** 1x TECS2/D/SL-CA/S 0712,  
1x TECS2/SL-CA/S 0712



## Hong Kong Electric

2015 Hong Kong

**Application:** Energy  
**Plant type:** Hydronic System  
**Cooling capacity:** 2600 kW  
**Installed machines:** 3x air cooled chillers with  
magnetic levitation compressors extra low  
noise version





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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