i-FX2

Air source chillers with inverter screw compressors,

From 380 to 1859 kW

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

CONFIDENTIAL

AIR COOLED CHILLERS

R134a R513A 1234ze

i-FX2

Air cooled chillers with inverter driven screw compressors and R134a, R513A or R1234ze refrigerant

380 – 1859 kW

INVERTER
EC AXIAL
COOLING
EEV
T SHELL&T.
R HFC R134a
R HFO1234ze
R HFC R513A

i-FX2-G01
i-FX2-G04
i-FX2-G05

Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

Family overview

Technical insight
Controls
Performance
Heat recovery solutions
Operating limits
Hydronic modules
Further options
Selling points

AIR COOLED CHILLERS

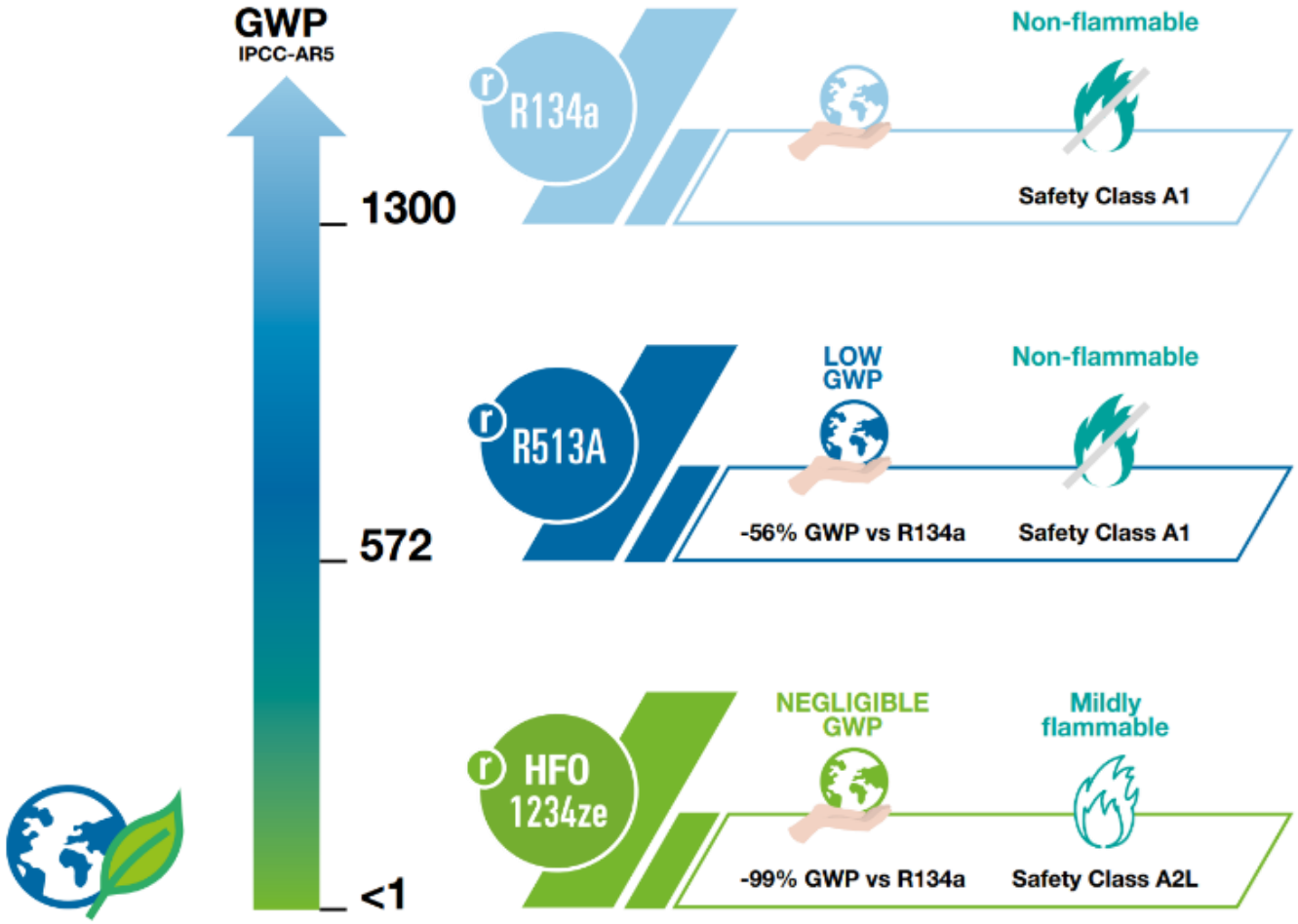
i-FX2

Air cooled chillers for outdoor installation

New ranges main features:

- **Variable speed screw compressors**
- **Specific optimization for R134a, R513A or R1234ze** refrigerants
- **Dry expansion, proprietary S&T evaporator**
- **R.E.D. Cooler patented technology**
- **4 noise levels**

Optimized design for every refrigerant, thanks to dedicated product families:



i-FX2-G01

i-FX2-G05

i-FX2-G04

2 EFFICIENCY VERSIONS

- **K:** key efficiency models, providing **the best balance between footprint and efficiency**. Being more compact that previous generation, K models are **ideal for plant refurbishments**. The efficiency could be further improved thank to the use of **optional EC fans**.
- **E:** high efficiency models. The use of enlarged heat surfaces, standard EC fans and proper management of the compressors guarantees to reach **efficiency levels among the best players in the market**, still maintaining a **competitive footprint**

2 ACOUSTIC VERSIONS

- **STD:** standard design, without compressor enclosure. To mitigate the noise, **optional compressor enclosures** (-2 dBA) **or Noise Reducer kit** (-5 dBA) are available
- **SL: Super low noise versions.** Special soundproofing of the compressor section and the pumps (if present), reduced fan speed and oversized condensing section for **the lowest sound power, without any compromise in terms of performance.**

3 HEAT RECOVERY VERSIONS:

- **STD: standard unit,** for the production of chilled water. All the condensing thermal load is rejected into the air.
- **-D versions**: the units are provided with additional heat exchangers, placed right after the compressors. These heat exchangers are designed to recover the desuperheating heat. A smart activation of the pumps of the desuperheater circuit is available with option 3371.
- **-R versions: total heat recovery** version. Thanks to a dedicated heat exchanger, placed in parallel with the condensing coils, the entire condensing thermal load can be recovered. **Cu/Al coils are standard for all –R versions.**

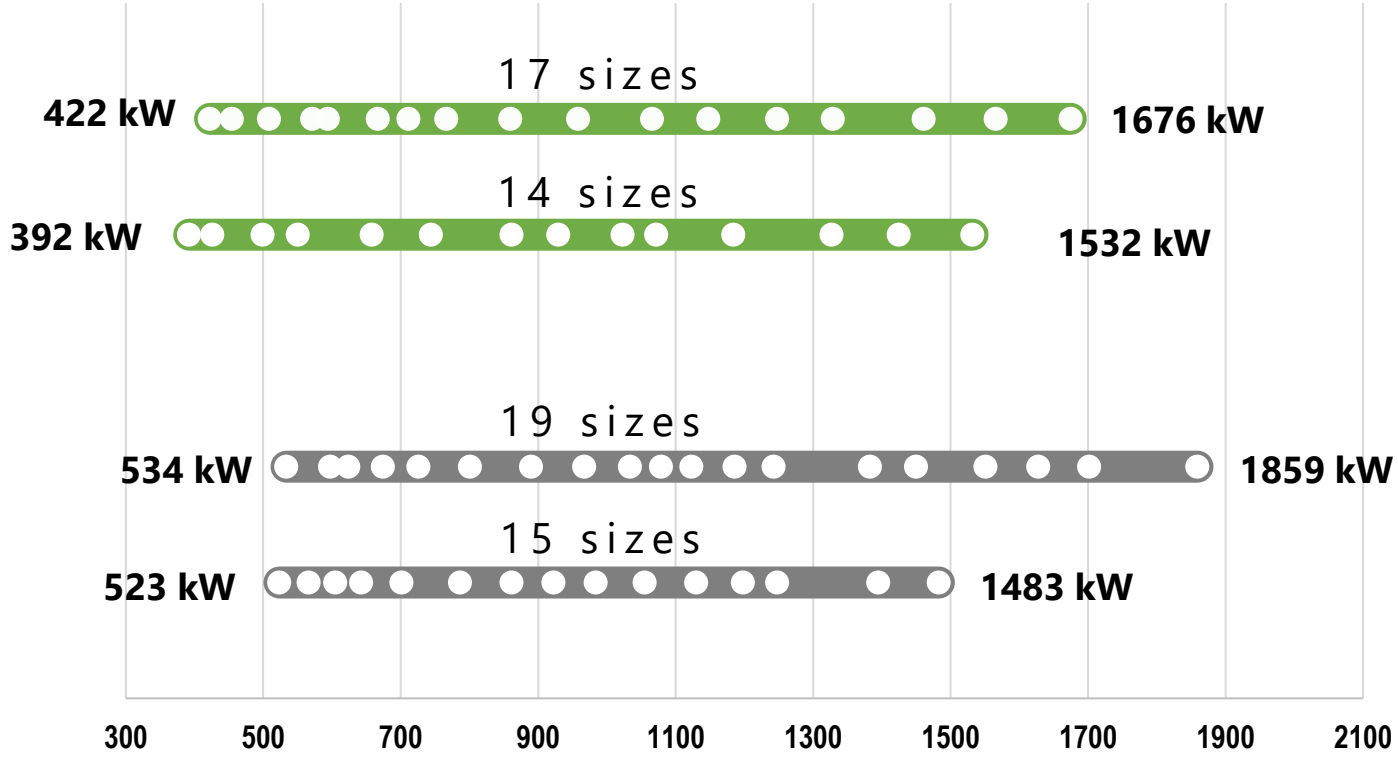
i-FX2 – Family overview: RANGE AND SIZES

i-FX2-G04-K
Key efficiency version

i-FX2-G04-E
High efficiency version

i-FX2-G01_G05-K
Key efficiency version

i-FX2-G01_G05-E
High efficiency version



COOLING CAPACITY at 12/7 °C, 35° ext. air

Nomenclature

1	2 3 4	5	6	7	8	9	10 11
i	- FX2		-G04-		E		1533

Code	Descriptions	Extension	Descriptions
1	Inverter Driven Tech	-	NOT
		i	Inverter
2	Compressor Type	N	Scroll
		F	Screw
		T	Centrifugal Oil Free
3	Brand	X	Climaveneta
		R	RC
4	Product Generation	-	
		2	New Product Generation
5	Unit Type	-	Air source chiller
		FC	Free Cooling chiller
6	Refrigerant	G01	R134a
		G02	R410A
		G03	R407C
		G04	HFO1234ze
		G05	R513A
		G06	R454B
		G07	R32

Code	Descriptions	Extension	Descriptions
7	Application segment	-	Comfort
		Y	Process
		Z	IT Cooling
8	Function	-	STD
		NG	No Glycol configuration
9	Version	-	Unique single version
		K	Key efficiency
		A	High efficiency
		E	Enhanced efficiency
		SL-K	Key efficiency + Super Low Noise
		…	*other*
10	Size	4 digit code	first 3 digits: cooling capacity * 0,1 [kW]
			last digit: compressors number
11	Evaporator type	-	one evaporator type (plate or S&T)
		T	Shell&Tube
		P	Plate

INVERTER
EC AXIAL
COOLING
EEV
T SHELL&T.
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i-FX2-G01
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Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

i-FX2 – Technical insight

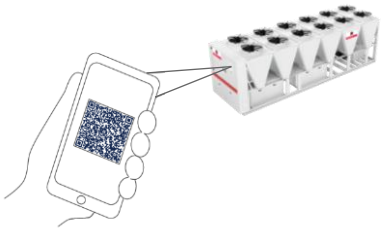
Inspectable coils section
With removable panels

AC fans (std for K versions)
EC fans (std for E versions, opt for K)

V-shape microchannel coils with RED COOLER

PATENTED
R.E.D. Cooler
Reduced Exergy Depletion
PATENTED

Proprietary W3000+ Control Software



KIPLink (STD)

2 or 3 Variable speed screw compressors with independent refrigerant circuits
Compressor enclosure available as option

Fully accessible electrical panel

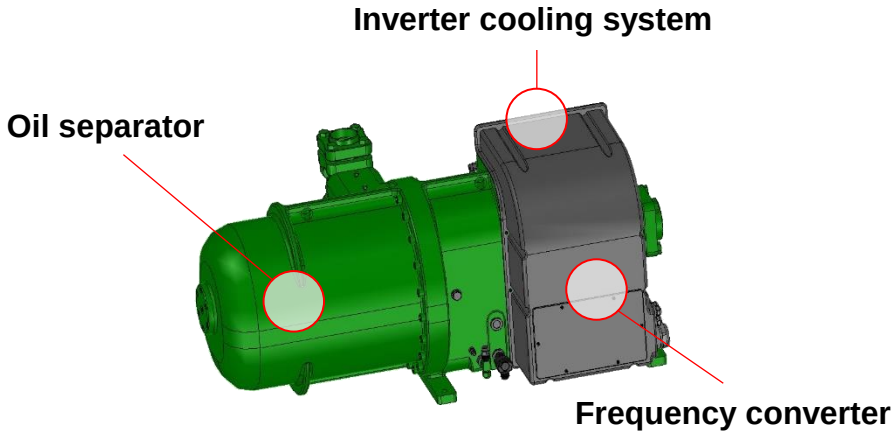
Proprietary Dry Expansion Shell&Tube Evaporator

Variable speed screw compressors

Variable speed, dual rotor screw compressors, **optimized for air source chillers.**

Independent refrigerant circuits: 1 VSD compressor / 1 circuit.

Compressor enclosure available as optional



Variable Speed Drive

Integrated and **compact** frequency converter, **refrigerant cooled**, for outstanding seasonal efficiency

Automatic internal volume ratio adaption

by **integrated Vi slider** to ensure the best efficiency in any working condition

Extreme reliability and durability

Envelope control function, 3-stage warning and alarm system, safe-torque-off function.

Carbon steel bearings granted for a **lifetime of over 150.000 hours**.

High efficiency high speed motor

For **unprecedented full and part load efficiencies** and extremely **wide and accurate capacity regulation**

❖ **Permanent magnet electric motor standard for sizes:**

i-FX2-G01/G05 K / SL-K:	0532 – 1032
i-FX2-G01/G05 E / SL-E:	0522 – 0982
i-FX2-G04 K / SL-K:	0422 – 0772
i-FX2-G04 E / SL-E:	0392 – 0742

The use of the synchronous electric motor enhances the efficiencies, in particular at partial loads.

VSD benefits

Higher energy efficiency

Inverter driven compressors ensure superior energy efficiency at part load conditions, enhancing the efficiency of the plant through the entire year.

Reduced sound power levels

LOWER SPEED, LOWER NOISE: The unit working in partial load conditions is far more silent than a fixed speed compressor unit.

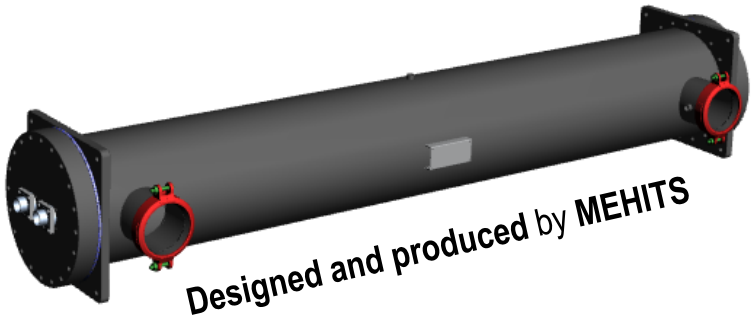
No in-rush currents

No electrical and mechanical stress: the unit never exceeds the nominal current.
No additional equipment needed such as star/delta commuters or soft starters.

Flexible selection

Thanks to the specific feature of the selecrtion software, i-FX2 selection can be matched to the exact capacity needed by the plant.

Evaporator



Single pass, dry expansion Shell&Tube evaporator

Enhanced heat transfer
Thanks to perfect counter-current flow and grooved copper pipes

Low pressure drops on water-side
for maximized efficiencies

Protected against ice formation
Water flow is controlled by a differential pressure switch. Electrical heater always present as standard.

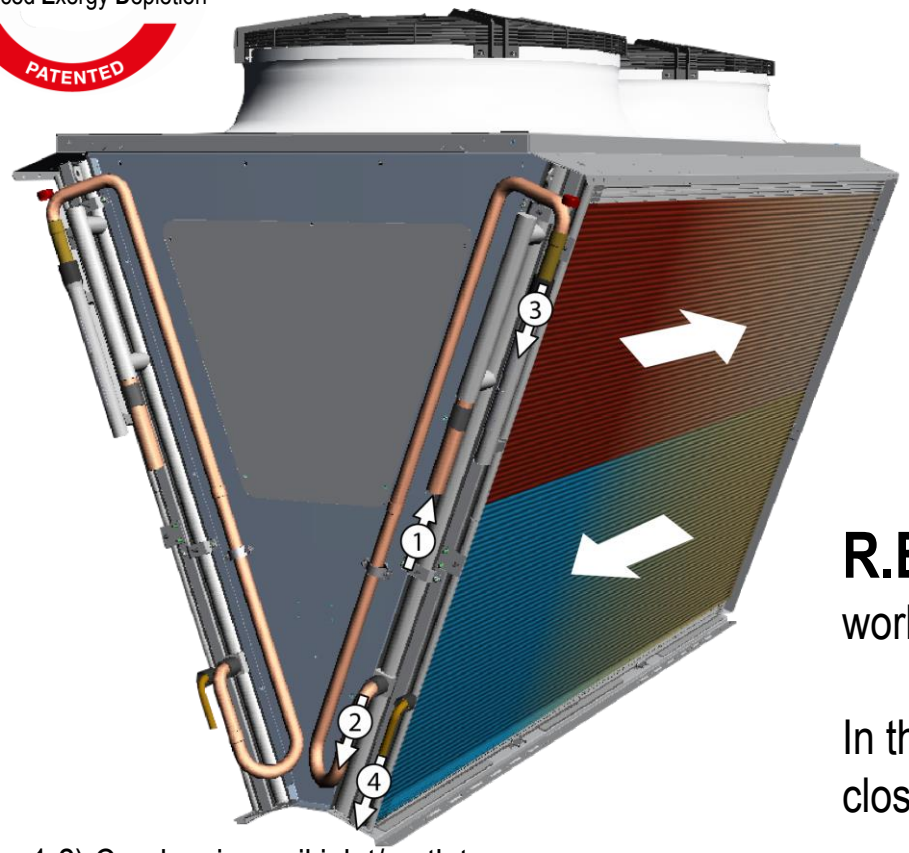
- Insulated with a **foamed polyethylene mat of 9 mm thickness** (19mm available as opt.)
- **TYPE H hydraulic connections:** Grooved coupling with weld end counter-pipe user side (supplied separately)

- **Optional HIGH DELTA T evaporator** (opt. 2842): a specific evaporator, designed to manage higher deltaT selections, is available. Depending on the size and the leaving water set point, selections with deltaT up and over 15K are possible.

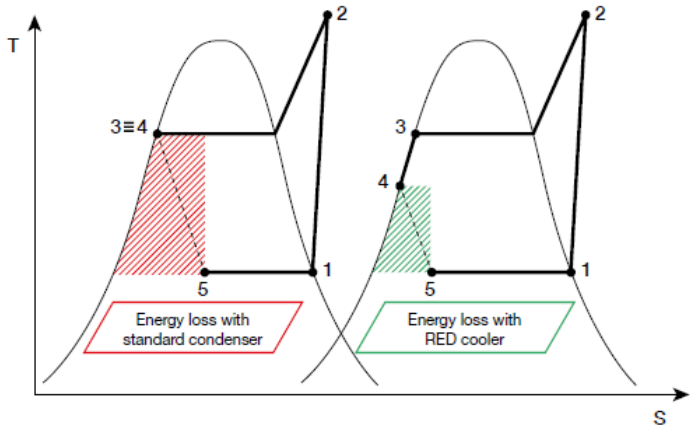
Coils & Coatings

PATENTED
R.E.D. Cooler
Reduced Exergy Depletion
PATENTED

R.E.D. Cooler is the technological solution that improves the efficiency of the unit and reduces the exergy loss of the expansion phase.



1-2) Condensing coil inlet/ outlet
3-4) Sub cooler coil inlet/ outlet

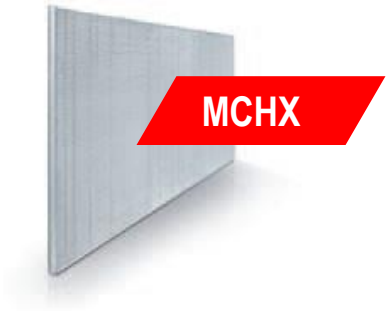


R.E.D. Cooler increases the cooling capacity of the chiller, the amount of work required by the compressor being equal.

In the subcooler, the refrigerant liquid is cooled down to a temperature very close to the external air, **exploiting the sub-cooling energy to the fullest**.

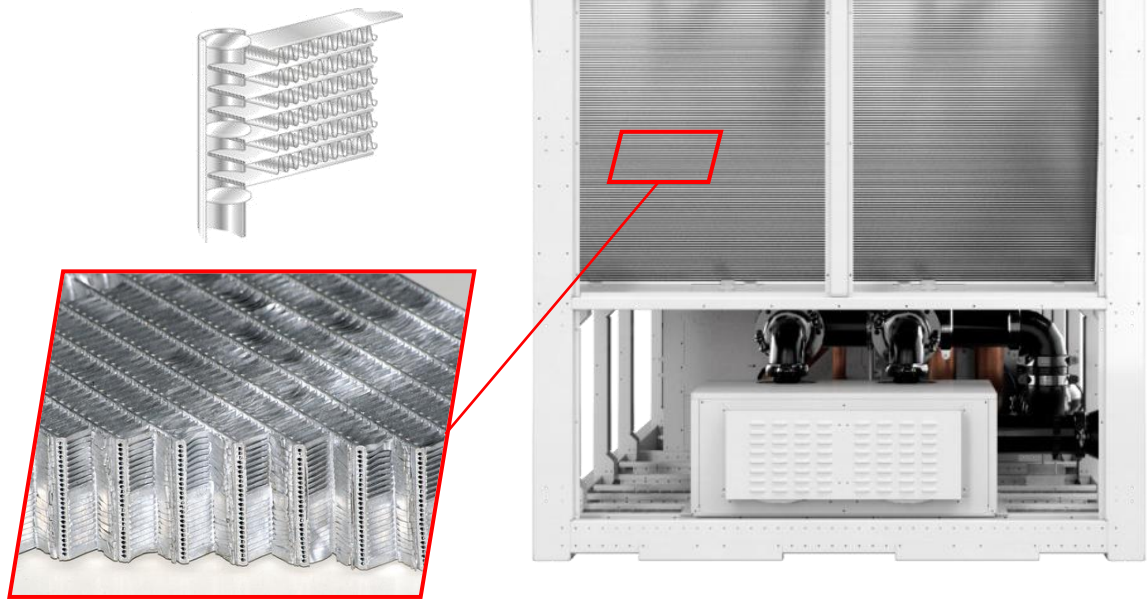
Coils & Coatings

MICROCHANNEL COILS: std
for all models, except –R versions



All-Aluminium coils, with primary header, fins and tubes joined by furnace brazed microchannels

- **Long Life Alloy** for higher corrosion resistance and longer life expectancy
- **-30% refrigerant charge reduction** vs. traditional solutions
- **Lower weight** vs. traditional solutions



Coating options:

- E-coating (Opt. 876)

Coils&Coatings: focus on E-COATING for mchx coils

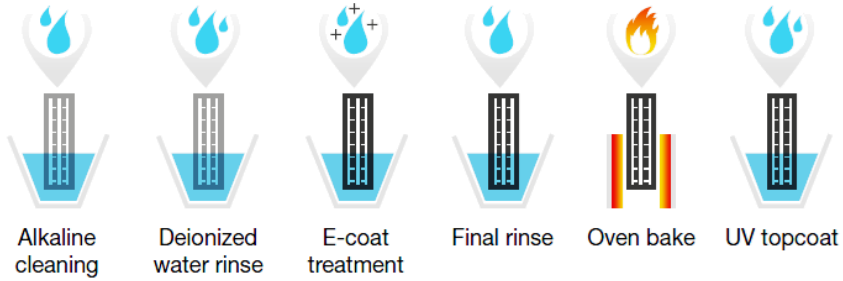
MCHX with e-coating (opt. 876)

E-COATED MCHX coils for harsh environments (Opt. 876)

The e-coating treatment creates a protective layer of epoxy polymer on the surface of the coils:

- **Over 3120 h** resistance as per **ASTM G85-02 A3** (SWAAT)
- **Over 6000 h** resistance as per **ASTM B117**
- **Over 1000 h** of surface protection against UV rays as per **ASTM G155-05a**

E-coating process

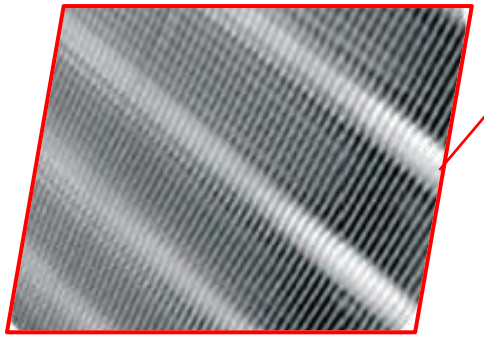


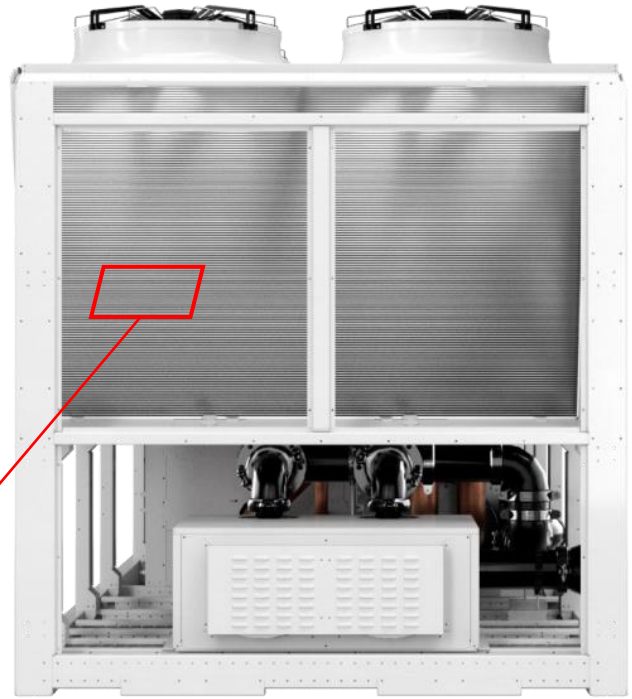
Coils & Coatings

TUBE & FINS COILS Options
(standard for –R versions)

Cu/Al coil (Opt. 879)

- **NEW PATENTED Tube&fin RED COOLER**
- **No performance losses** compared to Microchannel solution
- Excellent heat conduction:
  copper pipes brazed to the coil headers and joined (by mechanical expansion) to the aluminum fins
- Available several surface treatments against corrosion (options)

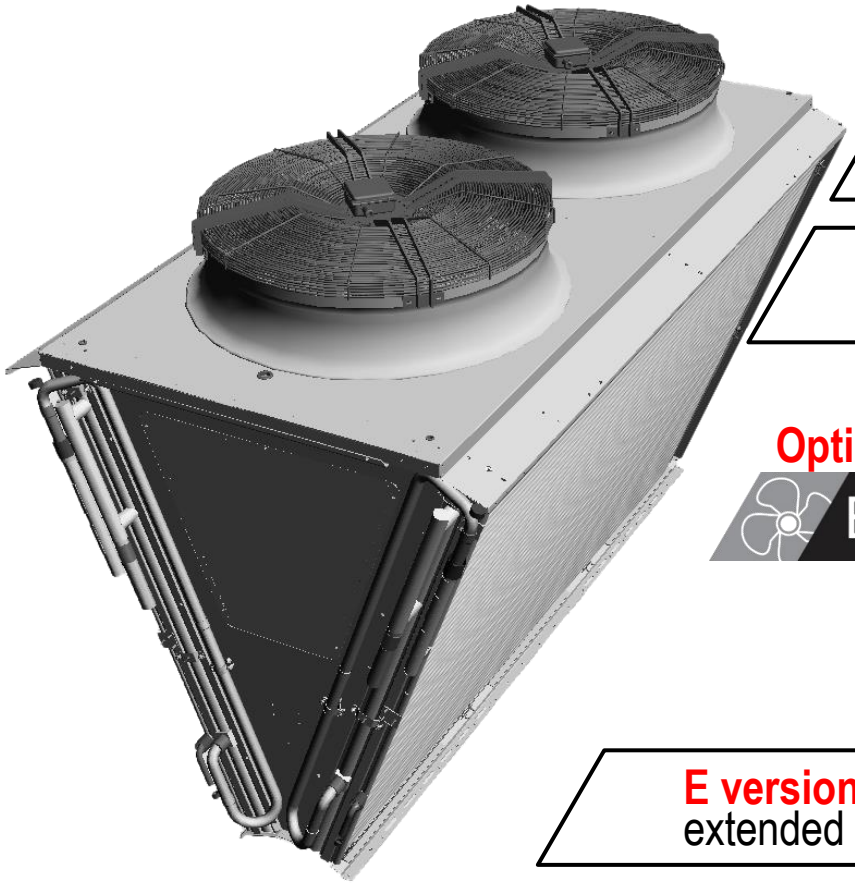




Coating options:

- Cu/Al - Pre-painted fins (Opt. 894)
- Cu/Al – Fin Guard Silver SB (Opt. 895)

Fans



High performing, 800mm-diameter **axial fans**

External bell mouth
for the highest efficiency and best-in-class sound power levels

K versions: Variable Speed control with auto-transformer and single-fractioning as standard (DVVF), for large operating limits

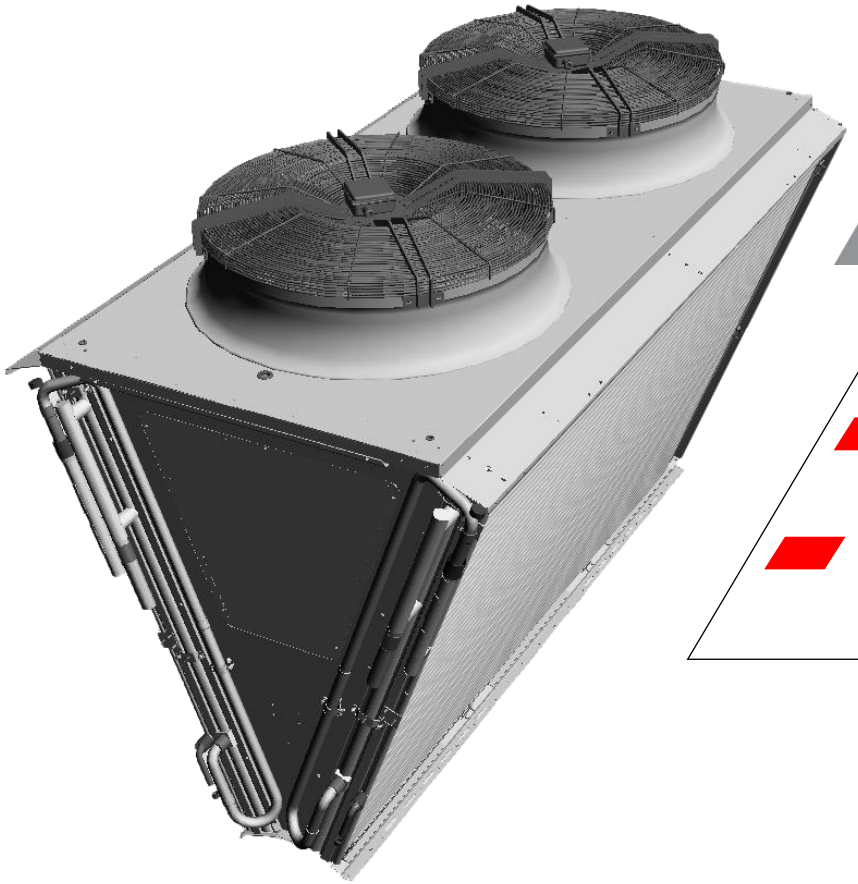
Optional EC fans for K versions:

EC AXIAL (Opt. 808)

Extended operating limits	Partial load efficiency
UP TO -20° C	+3,5%

E versions: EC fans as standard for maximum efficiencies and extended operating map

Fans



Optional oversized EC fans for all versions:

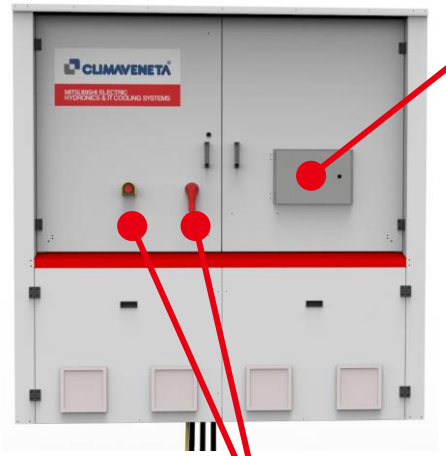
EC AXIAL with high ESP **(Opt. 818)**

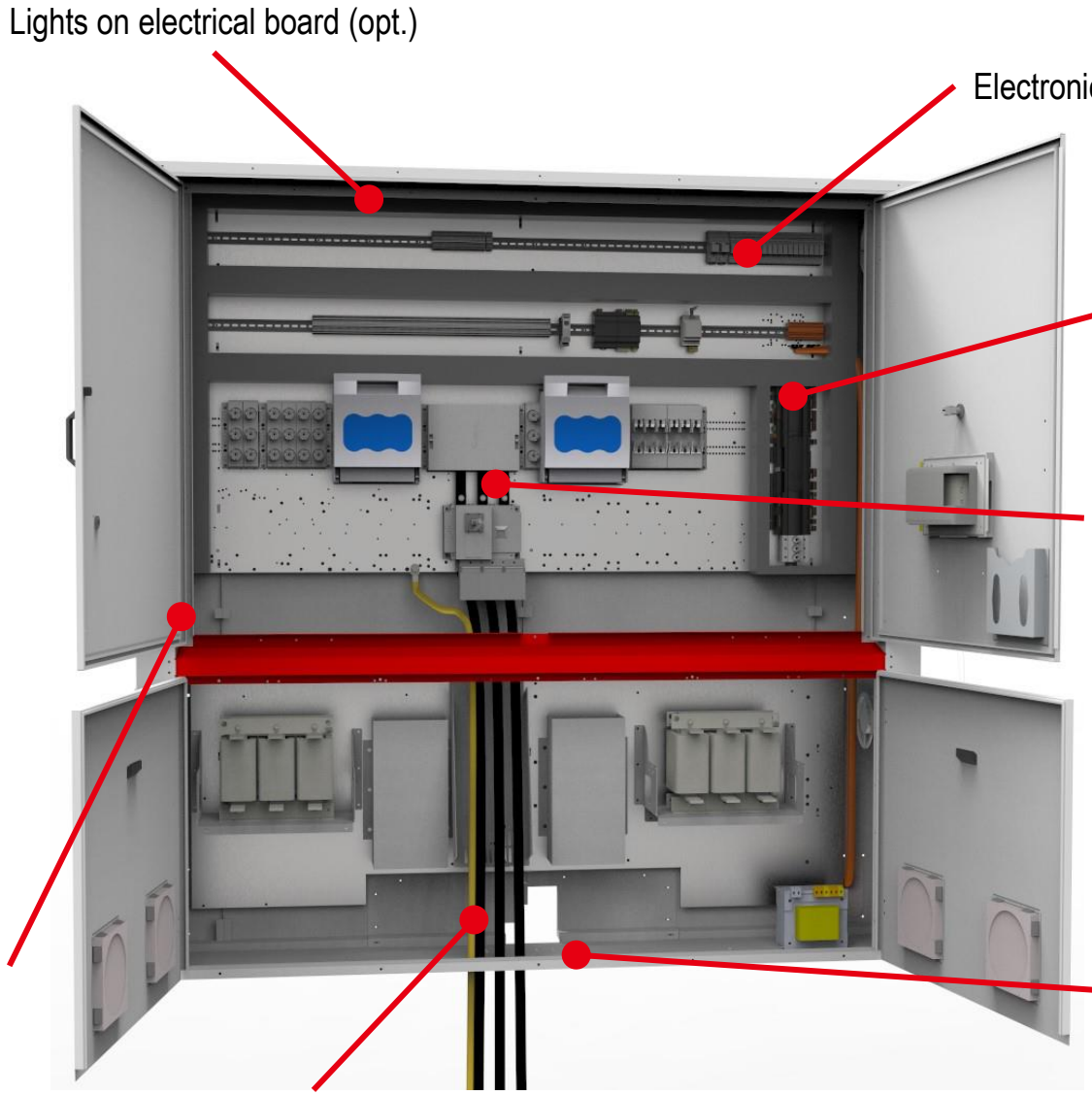
Ideal for installations featuring a short ducting of the fan discharge

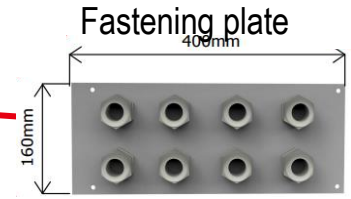
- **Up to 150 Pa** of available static pressure
- **No compromise on cooling capacity or efficiency** up to 100 Pa

Electrical panel

Full-height electrical panel, with straight cable entry, designed to ensure enough space for any option selection and easiness of service.
Distinctive RED bar on the front.







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Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

Control software

W3000+, fully in-house developed

Proprietary settings for faster adaptive responses to different dynamics, in all operating conditions.

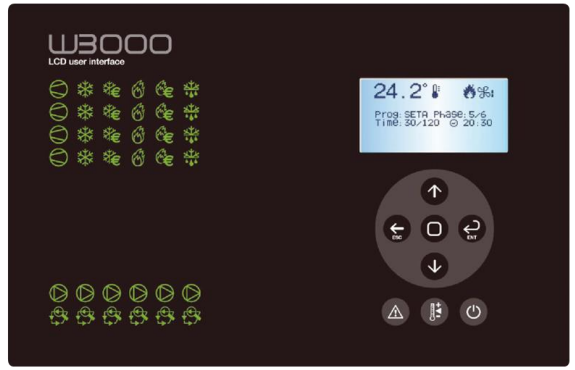
- **Thermoregulation**
  Proportional step on inlet probe or Quick Mind on outlet probe.
- **Monitoring**
  Complete visualization of the operation status. User-friendly navigation.
- **Diagnostics**
  Complete alarm management, with “black-box” and alarm history.
- **Security**
  3 levels of password: user, service, manufacturer.
- **Connectivity**
  BMS: Modbus, BACnet MS/TP, BACnet-over-IP, Konnex, Modbus over IP, SNMP.

User interface

KIPlink: the Keyboard is In your Pocket (STD)

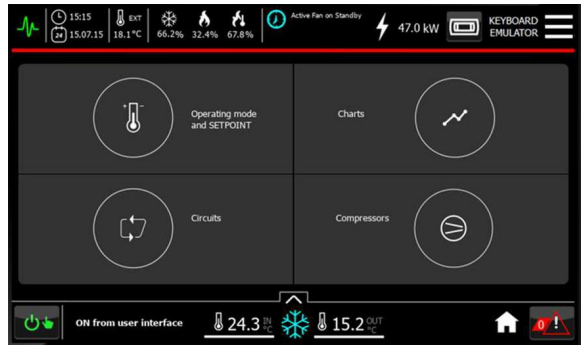
Based on the Wi-Fi technology, KIPlink allows to operate on the unit directly from mobile device (smartphone, tablet, notebook).

Large keyboard (OPT.)



Standard interface. It features a complete LCD display and ergonomic keys for viewing data and navigating the multilevel menu.

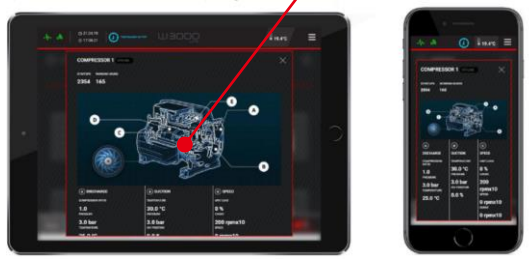
Touch keyboard (OPT.)



7" multilanguage touch display with new hardware and innovative functions

User interface

Easier on site operations



Real time graphs and trends

Data logger functions

KIPlink (STD)

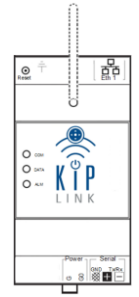
Equipment:

LED switch*

- Power LED
- Unit status LED
- On/off switch

QR code

- Scan to have access



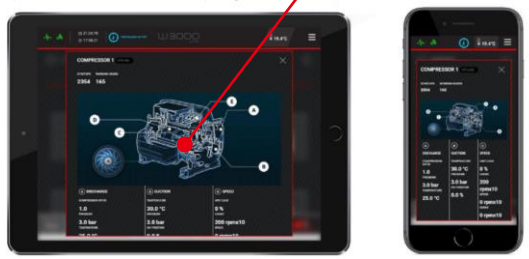
KIPlink hardware

- In the electrical board
- Wi-Fi antenna

* Provided when the unit is equipped with the KIPlink and without optional keyboard.

User interface

Easier on site operations



Real time graphs and trends

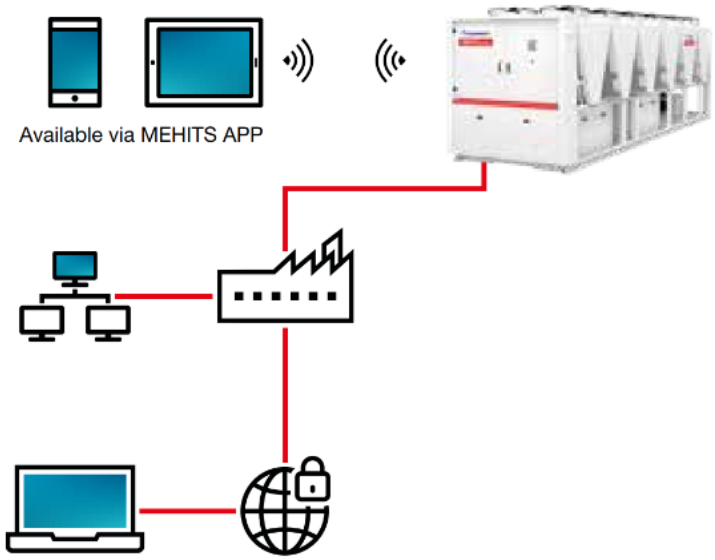
Data logger functions

KIPlink (STD)

1 **Wi-Fi** Proximity Smart Keyboard

2 **LAN via TCP/IP** Local Monitoring

3 **REMOTE via VPN** Same as local monitoring



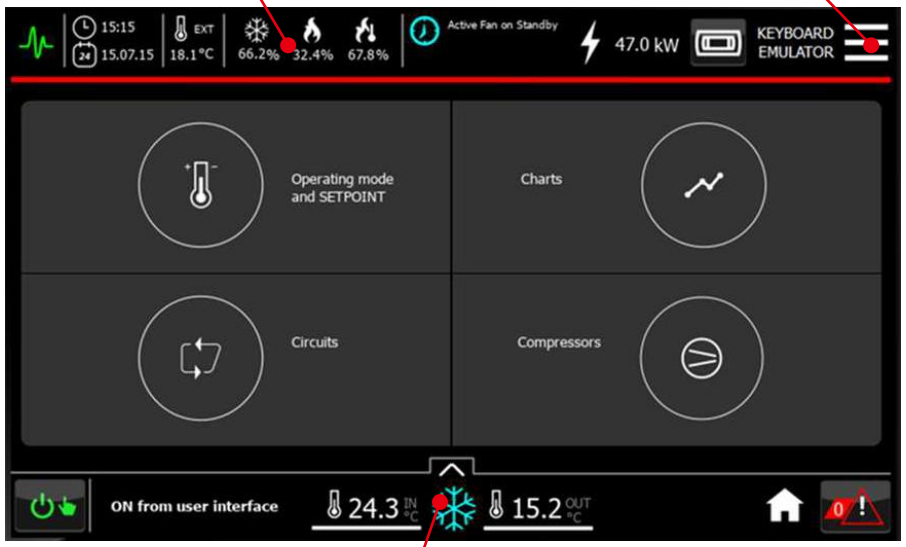
CUSTOMER VPN Secure accessibility to LAN

Customer in charge of cyber security

User interface

Quick menu access

Intuitive icons



Real time display

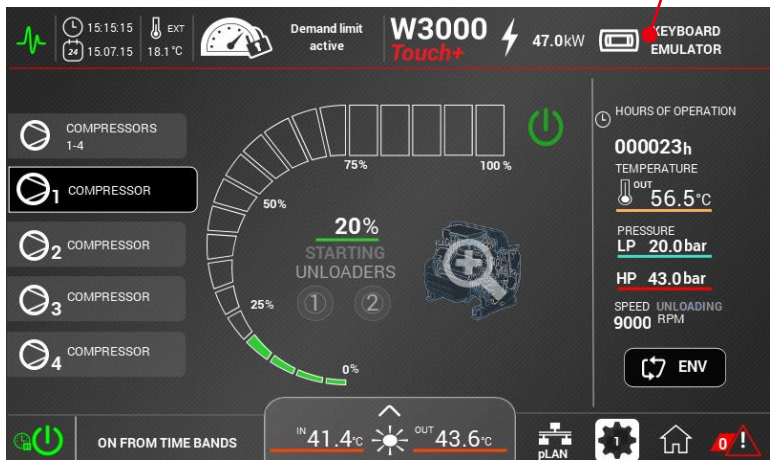
7” touch keyboard (opt)

New version with enhanced features:

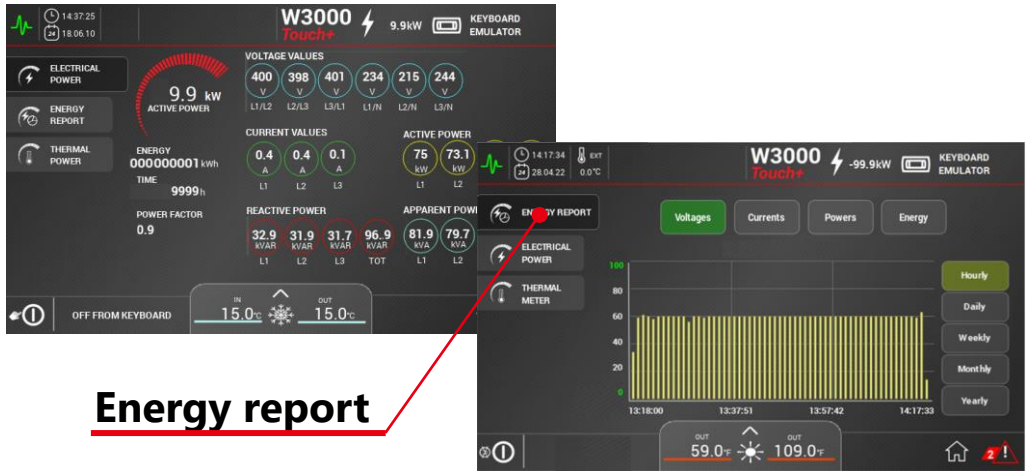
- Improved pages refresh rate
- Brighter display for better visualization
- Multilanguage
- MEHITS family feeling
- New user settings available and new graphs function for energy absorption

User interface

Keyboard emulator



Energy report

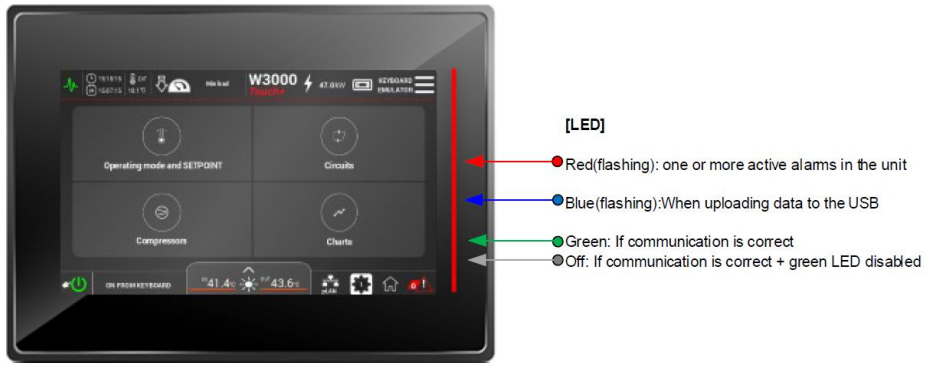


7” touch keyboard (opt)

- Optimized software and hardware with faster processor, for a better page refresh ratio and fluidity in data visualization
- Updated graphics and skins (as seen in ClimaPRO+ and KIPlink) for a more family feeling user experience
- New **emulator function** that allows to display the parameters directly by showing the internal masks of the controller keyboard
- New **energy report** function available with the energy meter paired with W3000+ control; showing electric consumption history with histograms

User interface

7” touch keyboard (opt)

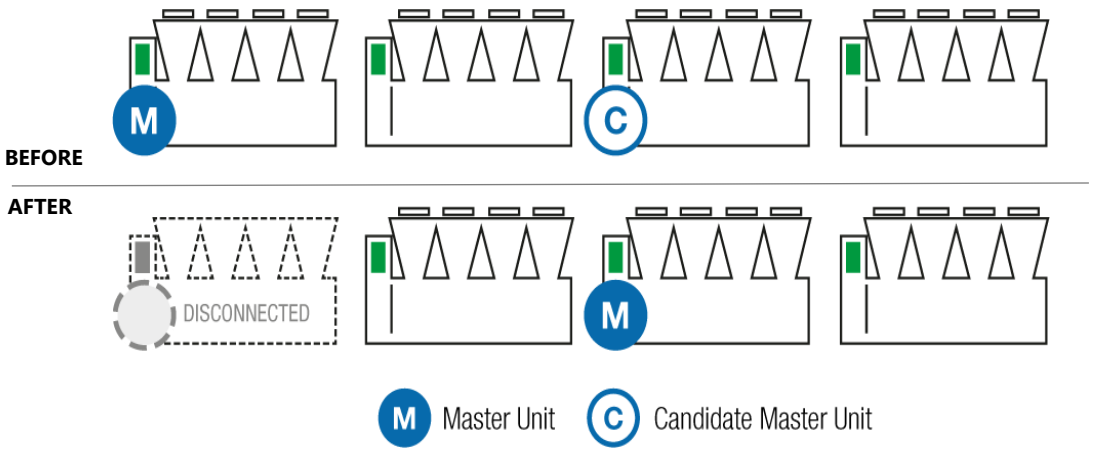


- New multifunction led bar that identifies the alarm status of the unit and communication with the controller
- New access screens featuring «Slide to unlock» and «Enter password» pages
- .csv files of log values now available for download also for User and Service profile

Multi-unit system control: MULTI MANAGER

MULTI MANAGER

MULTI MANAGER (opt) consists of **embedded LAN logics** for an easy connection between group of chillers.
The entire cooling equipment works as one, with **dynamic master**.



- **Dynamic master with succession priority**
  One master unit is elected to coordinate the equipment group and, in case it becomes disconnected, the candidate unit takes full control.
- **Resource priority management**
  It is possible to set the usage priority of each unit, making the most of the available cooling resources.

- **Up to 8 chillers** connected on the same group
- **Load Distribution and Saturation** logics for the smart distribution of cooling loads among the units

- No simultaneous start-ups of different unit's compressors, to prevent dangerous current peaks, but a selectable units' start-up sequence
- **Stand by unit management** with automatic or forced unit rotation

System controller and optimizer: ClimaPRO+

ClimaPRO+

The core of ClimaPRO+ is a performance feedback loop; a continuous cycling control algorithm, which instantaneously detects any change to the plant, and rectifies its actions accordingly.

ClimaPRO+ is **ideal for**:

- **Easy management** of entire plant through a single-access-point
- **Optimization** of the entire cooling plant
- **Pumps management**
- Detailed **energy report** of the entire cooling system
- **Real time monitoring and predictive maintenance**
- Redundancy management **up to Tier IV certification**

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i-FX2-G04
i-FX2-G05

Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

i-FX2 – Performance

The implementation of patented technologies (RED Cooler), the updated compressor models and specific redesign allow **i-FX2** to **exceed by far the efficiency levels of the previous range, improving the performance under all aspects:**

R134a R513A

New K
vs
current K

- EER **+6%** Average 3,08
- SEER **+5%** Average 5,09
- **Footprint -9%**
- Similar noise level

New E
vs
current A

- EER **+5%** Average 3,31
- SEER **+5%** Average 5,58
- **Similar footprint**
- Similar noise level

MITSUBISHI ELECTRIC
Changes for the Better

r1234ze

The implementation of patented technologies (RED Cooler), the updated compressor models and specific redesign allow **i-FX2** to **exceed by far the efficiency levels of the previous range, improving the performance under all aspects:**

New K
vs
current A

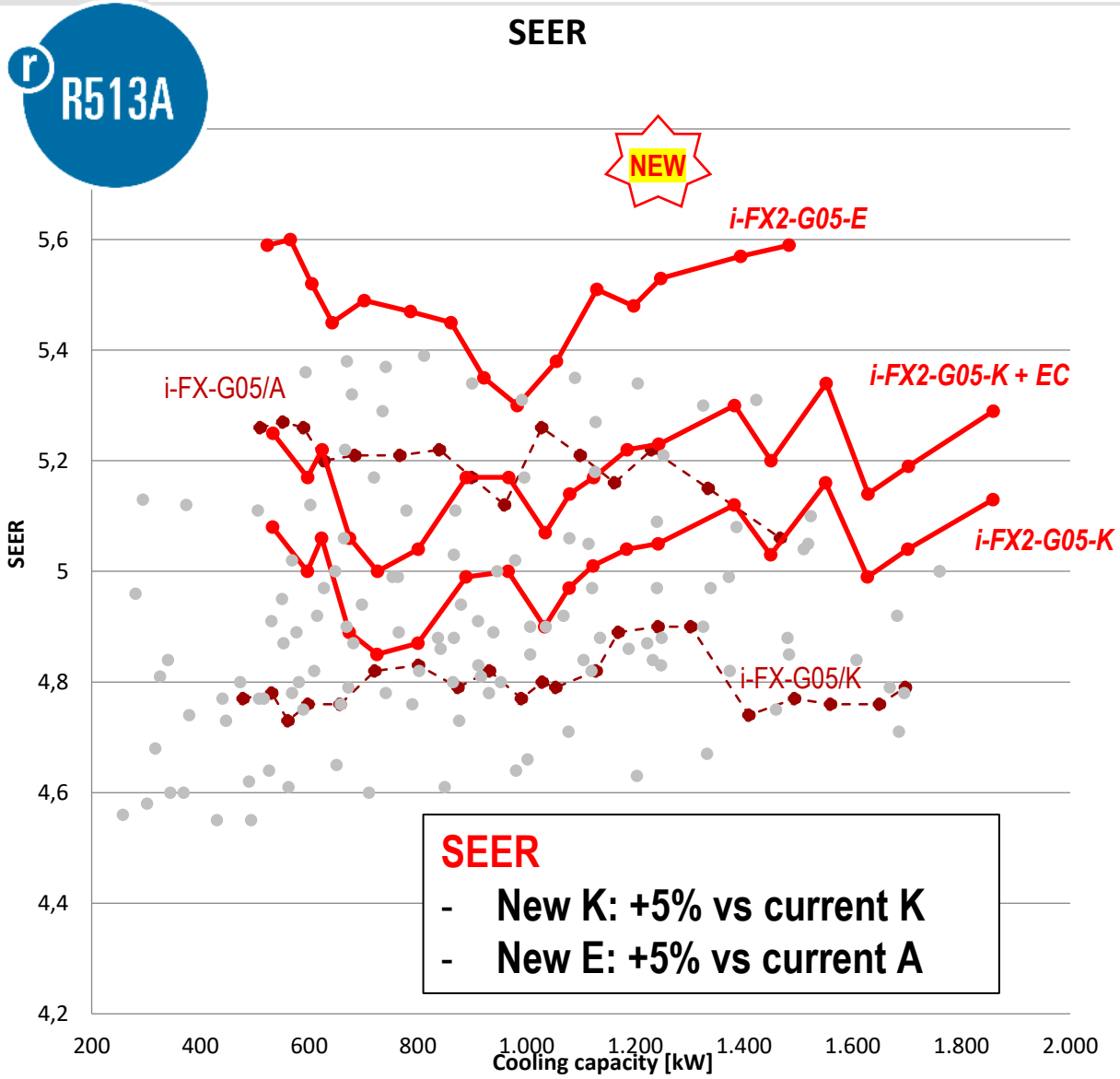
- **Similar EER**
  Average 3,12
- **Similar SEER**
  Average 5,08
- **Footprint -21%**
- Similar noise level

New E
vs
current A

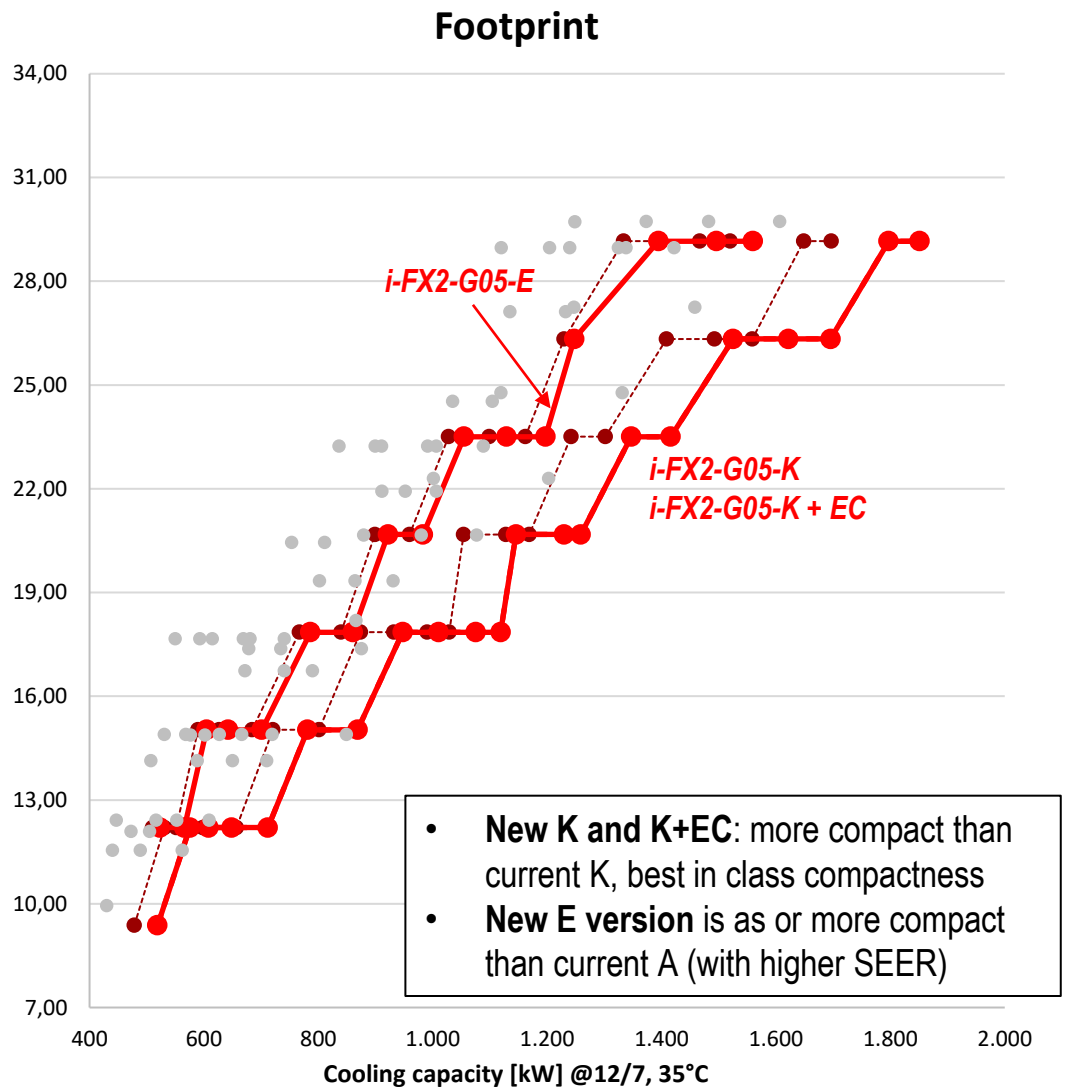
- **EER +7%**
  Average 3,29
- **SEER +8%**
  Average 5,53
- **Similar footprint**
- Similar noise level

i-FX2 – Performance

R513A



SEER
- **New K: +5% vs current K**
- **New E: +5% vs current A**

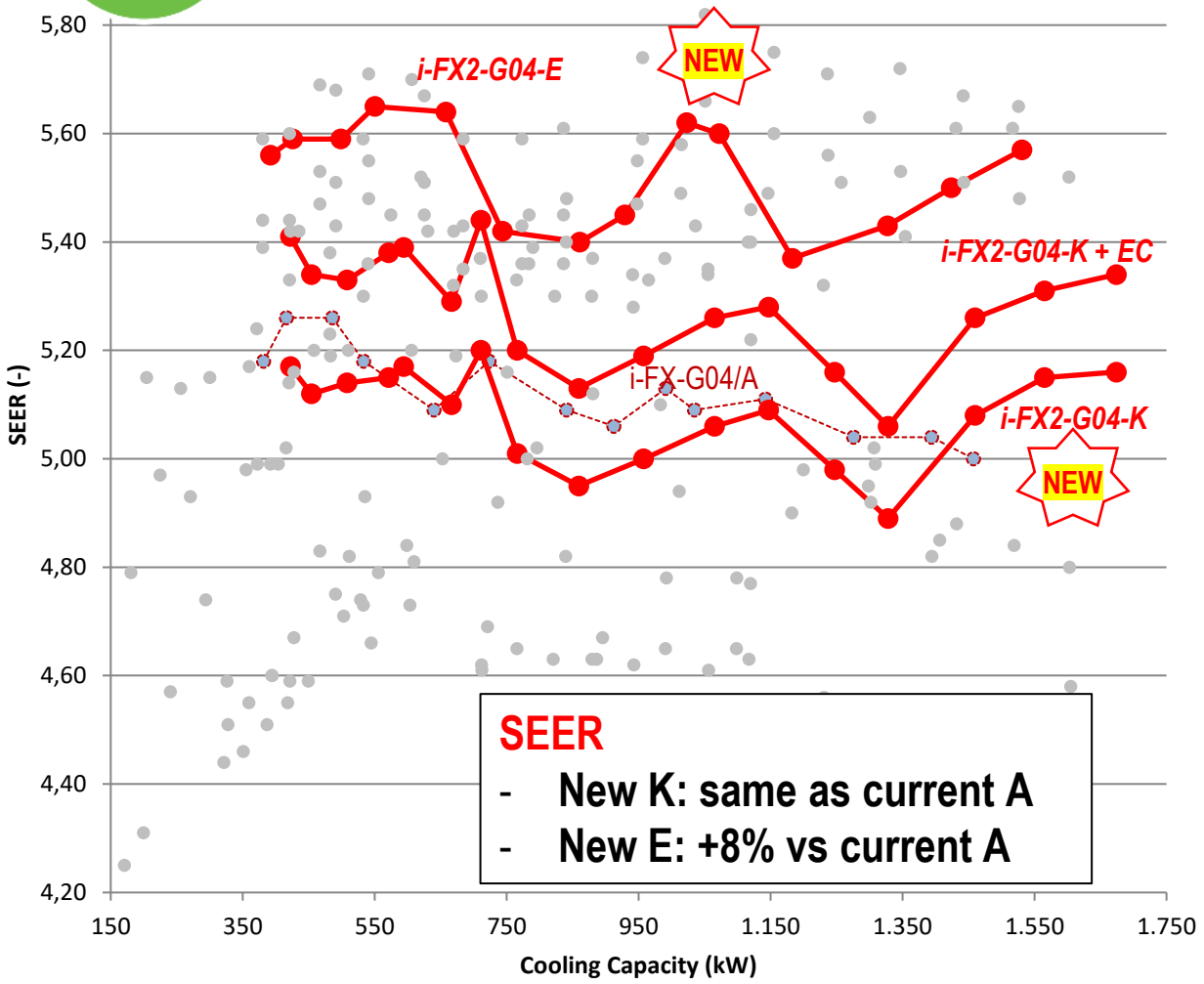


- **New K and K+EC**: more compact than current K, best in class compactness
- **New E version** is as or more compact than current A (with higher SEER)

i-FX2 – Performance

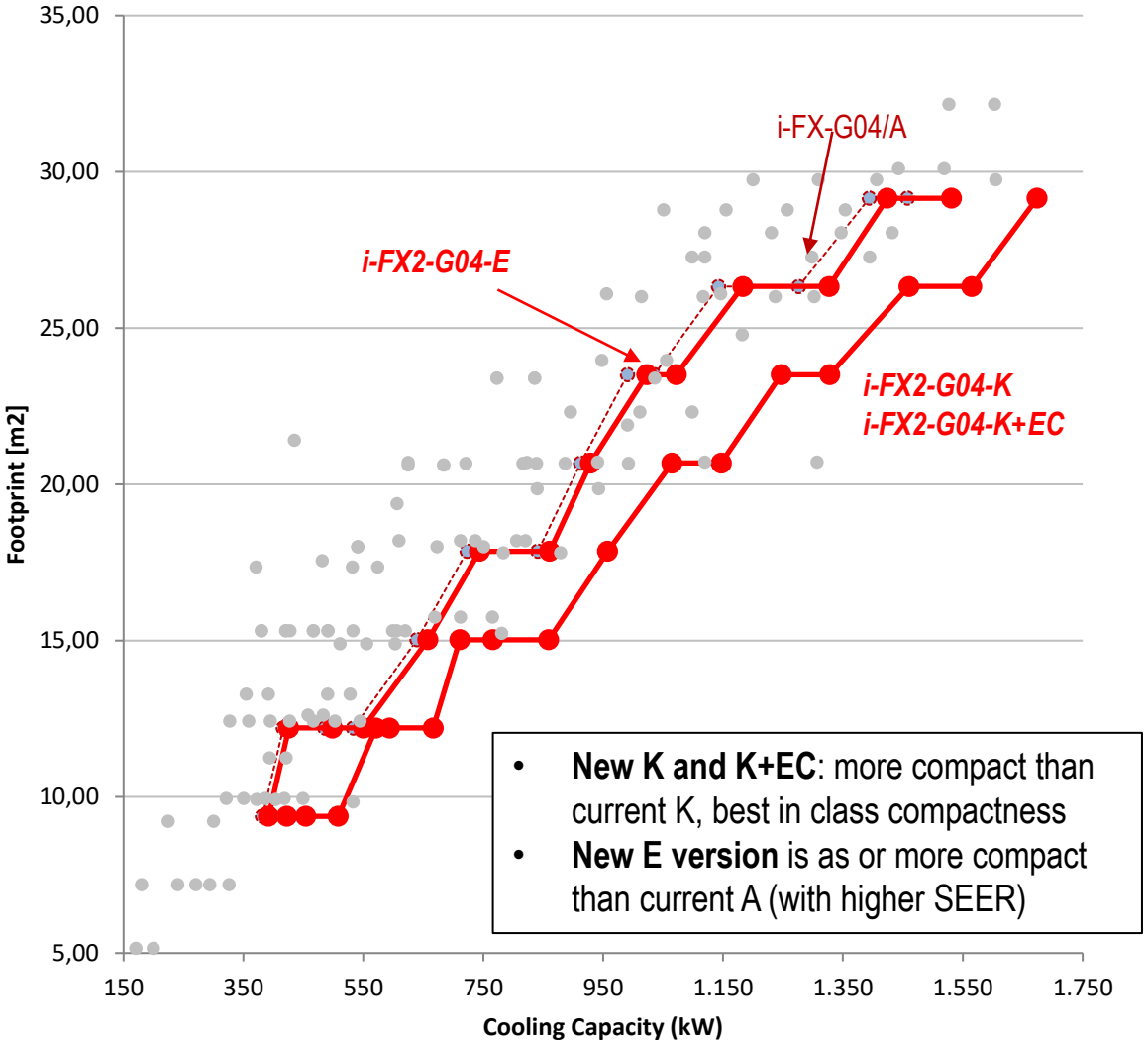
r1234ze

SEER



SEER
- **New K: same as current A**
- **New E: +8% vs current A**

FOOTPRINT



- **New K and K+EC**: more compact than current K, best in class compactness
- **New E version** is as or more compact than current A (with higher SEER)

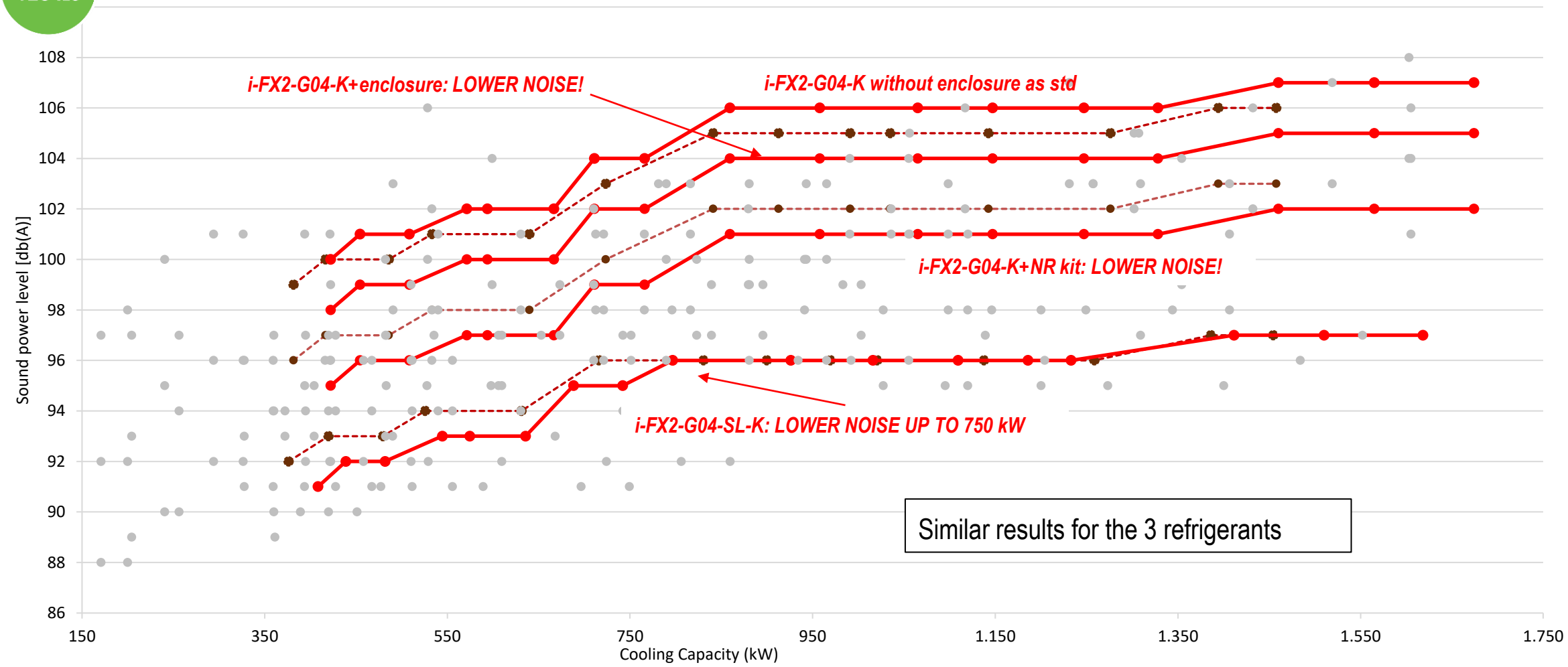
MITSUBISHI ELECTRIC
Changes for the Better

Sound power level

AIR COOLED CHILLERS

STANDARD CONFIGURATION		Compact design and reduced footprint, without compr. enclosure
COMPRESSOR ENCLOSURE	-2 dB(A)	Compressors are located in a metal sheet enclosure
NOISE REDUCER	-5 dB(A)	NR kit includes the soundproofing of the compressor enclosure and a dedicated fans' speed calibration
SL VERSION	-7 dB(A)	Special soundproofing of the compressor section and the pumps (if present), reduced fan speed and oversized condensing section

Sound power level



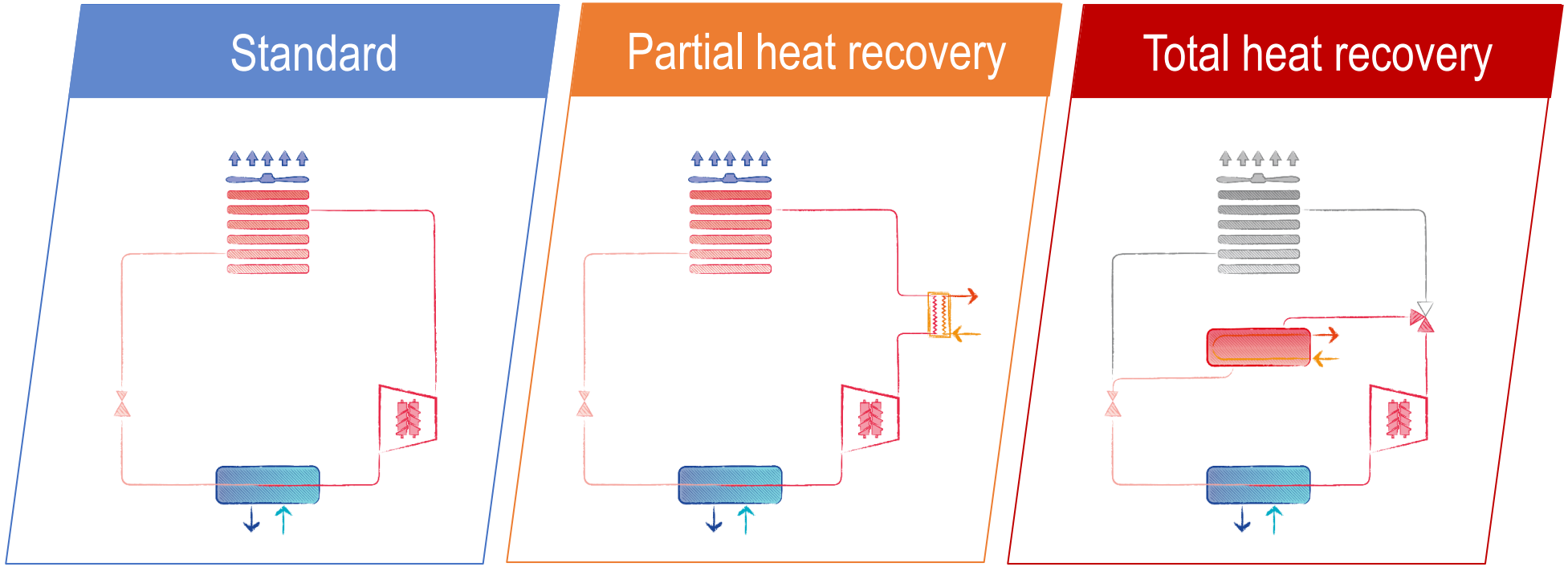
INVERTER
EC AXIAL
COOLING
EEV
T SHELL&T.
R HFC R134a
R HFO1234ze
R HFC R513A

i-FX2-G01
i-FX2-G04
i-FX2-G05

Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

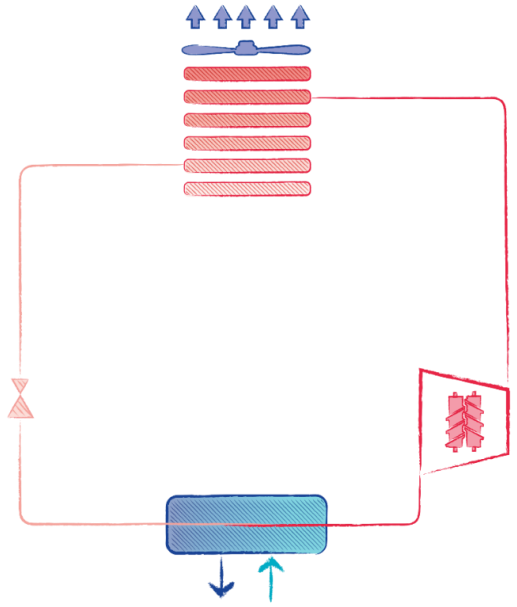
Heat recovery versions



Heat recovery configurations provide heating for free.
Suitable for **DHW** production, **integration of a boiler**, air treatment in **AHU**.

Heat recovery versions

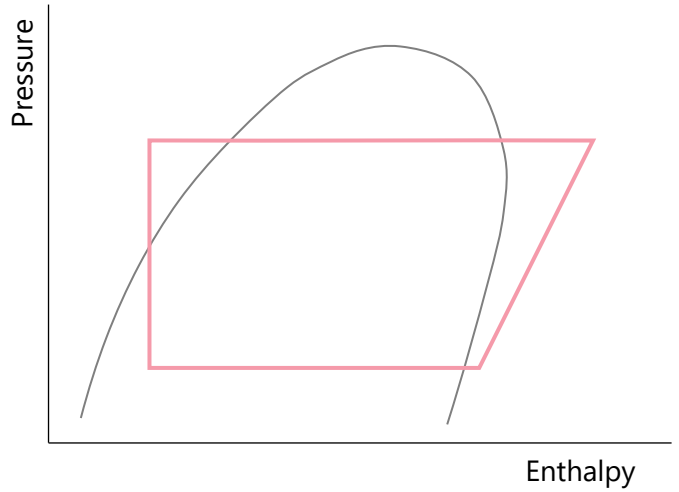
Standard



Standard refrigerant circuits.

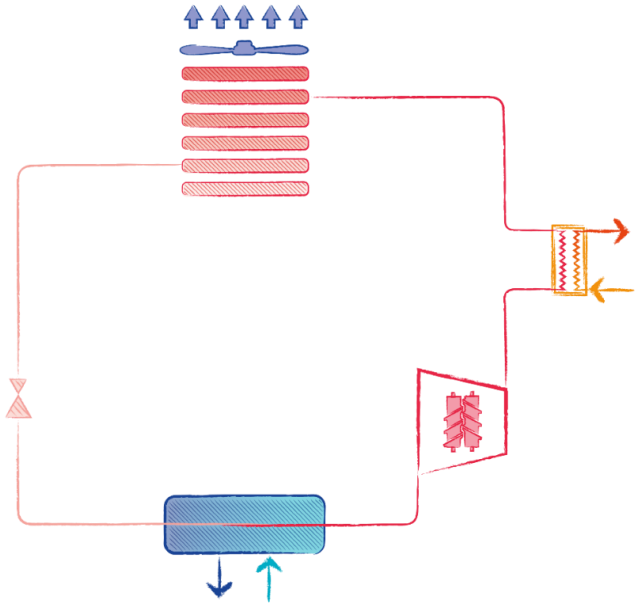
No heat recovery

All the condensation heat is dispersed in the air.



Heat recovery versions

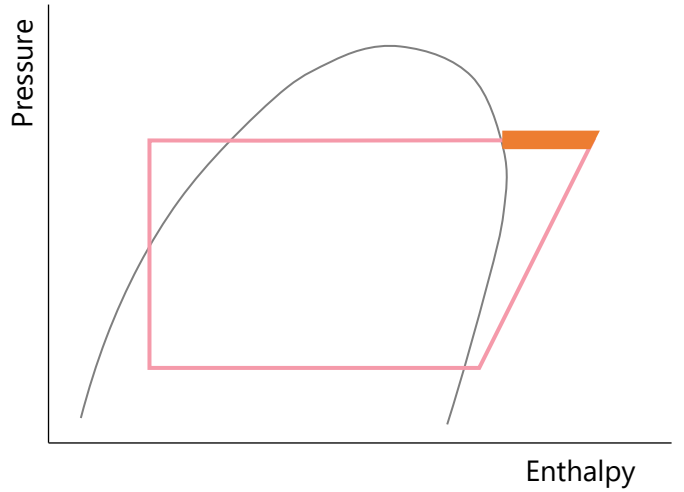
Partial heat recovery



Each refrigerant circuit is fitted with a **desuperheater** in series with the condenser coils.

Approximately **20%** of the chiller's capacity (*)

Up to **60° C** of leaving water temperature



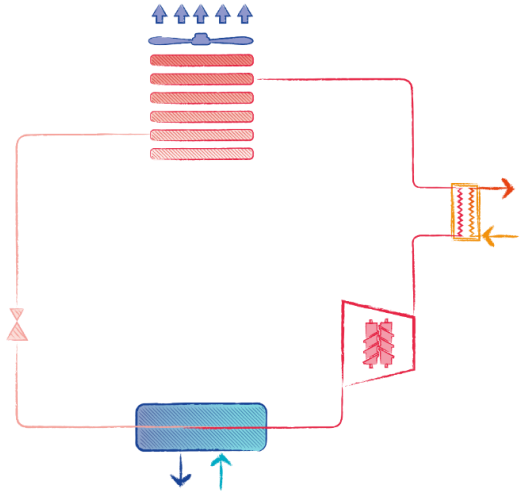
(*) The heat recovery and its amount depend on the unit's operating conditions, in particular the outdoor air temperature and the load percentage.

Heat recovery versions

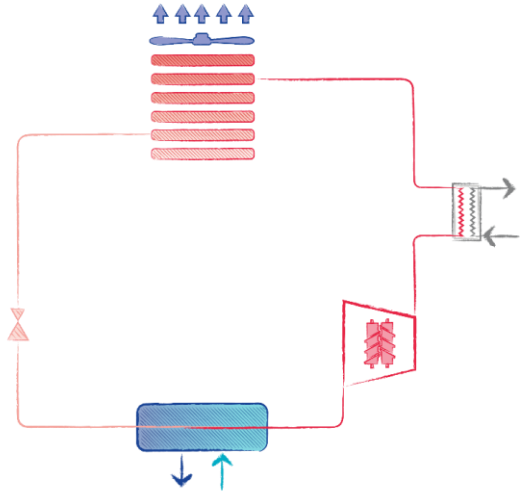
The desuperheater can recover the heat only when the temperature of the hot water circuit is lower than the **compressor discharge temperature**.

It is advised to **interrupt the water flow** to the desuperheater when the conditions for an actual heat recovery are not met.

Heat recovery: ON

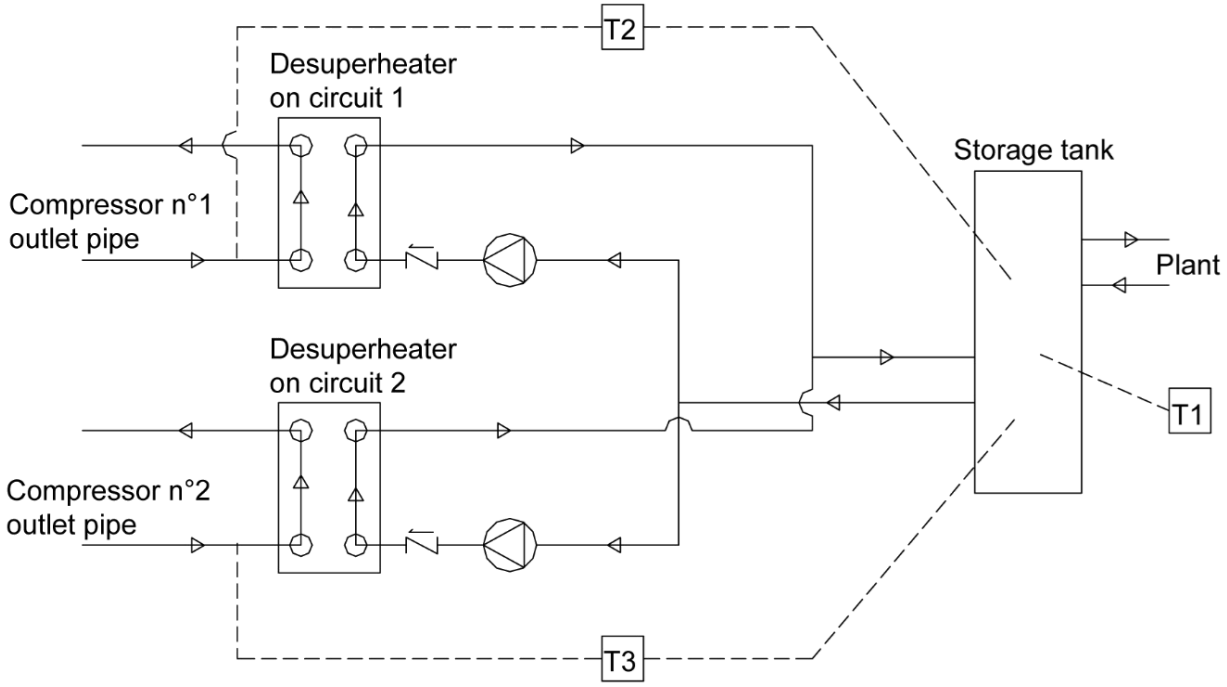


Heat recovery: OFF water flow stopped



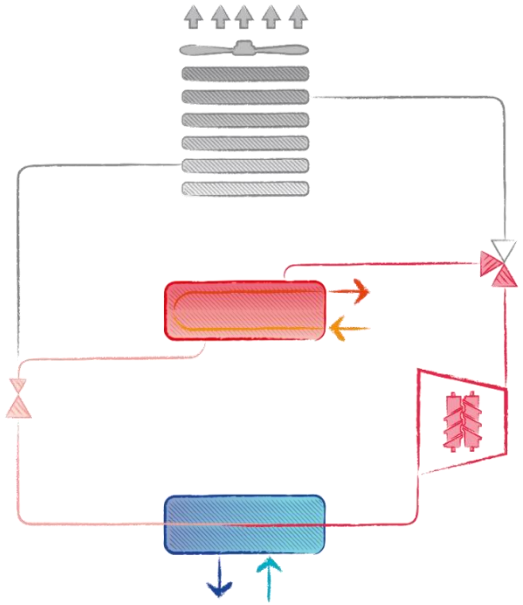
Heat recovery versions

Option 3371 D - RELAY 1 PUMP (ON/OFF) **interrupts the water flow** to the desuperheater when the conditions for an actual heat recovery are not met.



Heat recovery versions

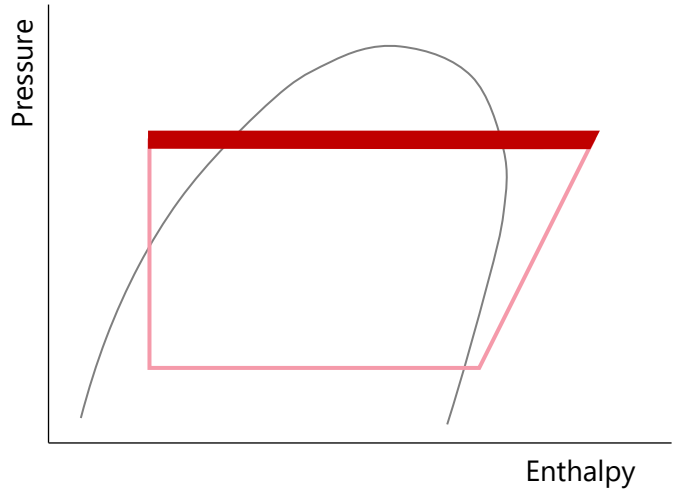
Total heat recovery



Each refrigerant circuit is fitted with a **total heat recovery exchanger**, in parallel with the condenser coils.

Always
100%
of the chiller's capacity

Up to
68° C for i-FX2-G04 + HT kit
of leaving water temperature (*)



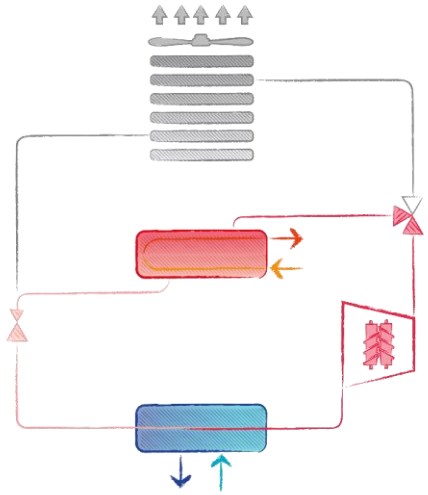
(*) For i-FX2-G01, G04 and G05

Heat recovery versions

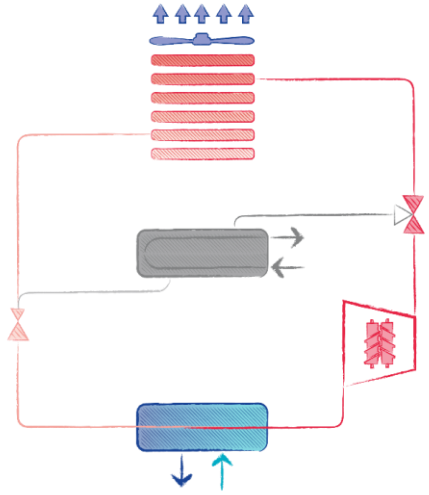
The heat recovery mode is managed according to the **hot water temperature set-point**.

With the optional hydronic modules 4802 and 4803, the unit is provided with 1 or 2 relays to control the activation of 1 or 2 external pumps. The function “sniffer” is available.

Heat recovery: ON



Heat recovery: OFF



INVERTER
EC AXIAL
COOLING
EEV
T SHELL&T.
R HFC R134a
R HFO1234ze
R HFC R513A

i-FX2-G01
i-FX2-G04
i-FX2-G05

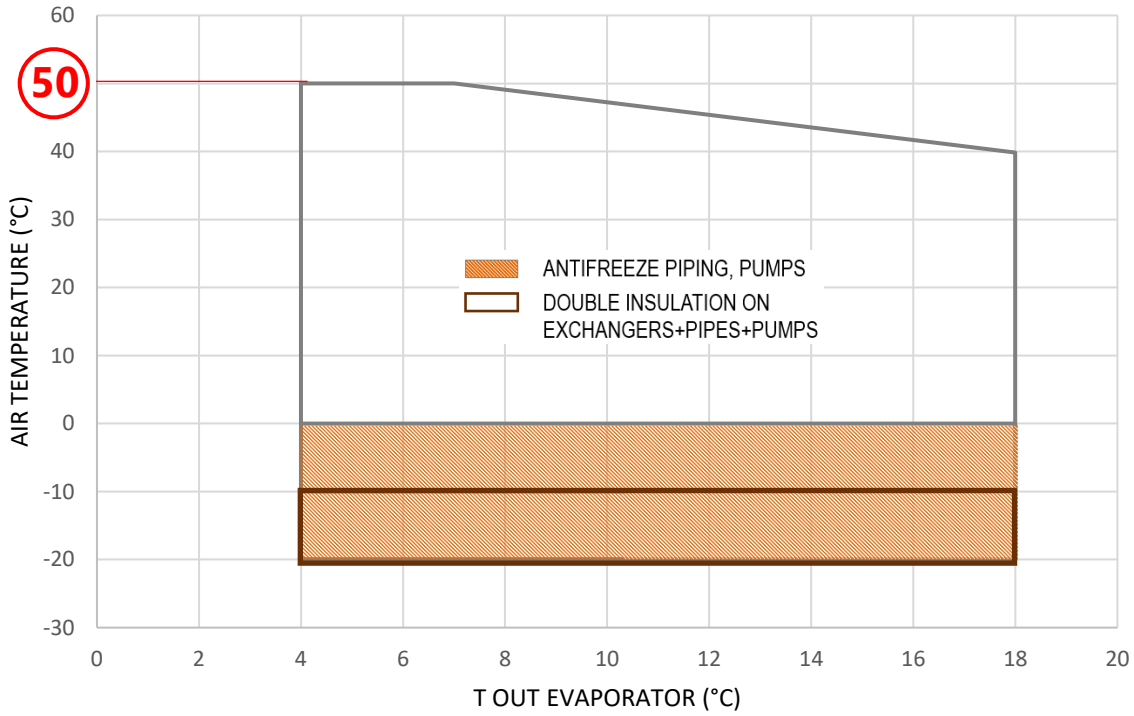
Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

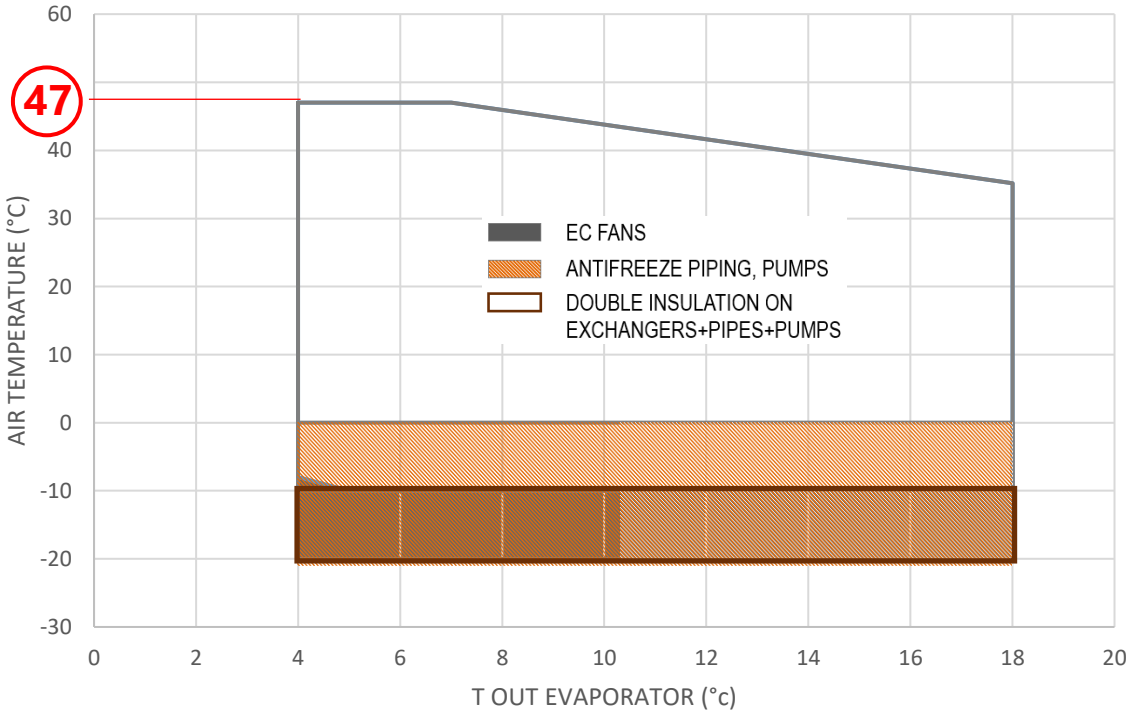
Operating limits – i-FX2-G01/G05

R134a R513A

i-FX2-G01[G05]-E



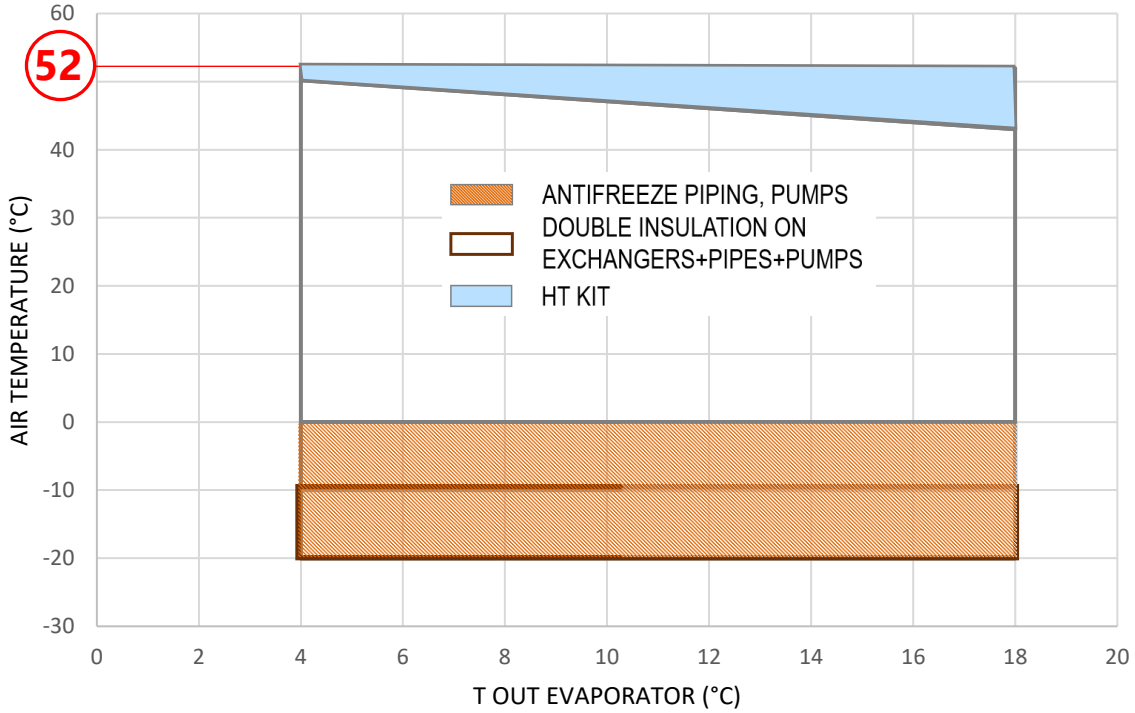
i-FX2-G01[G05]-K



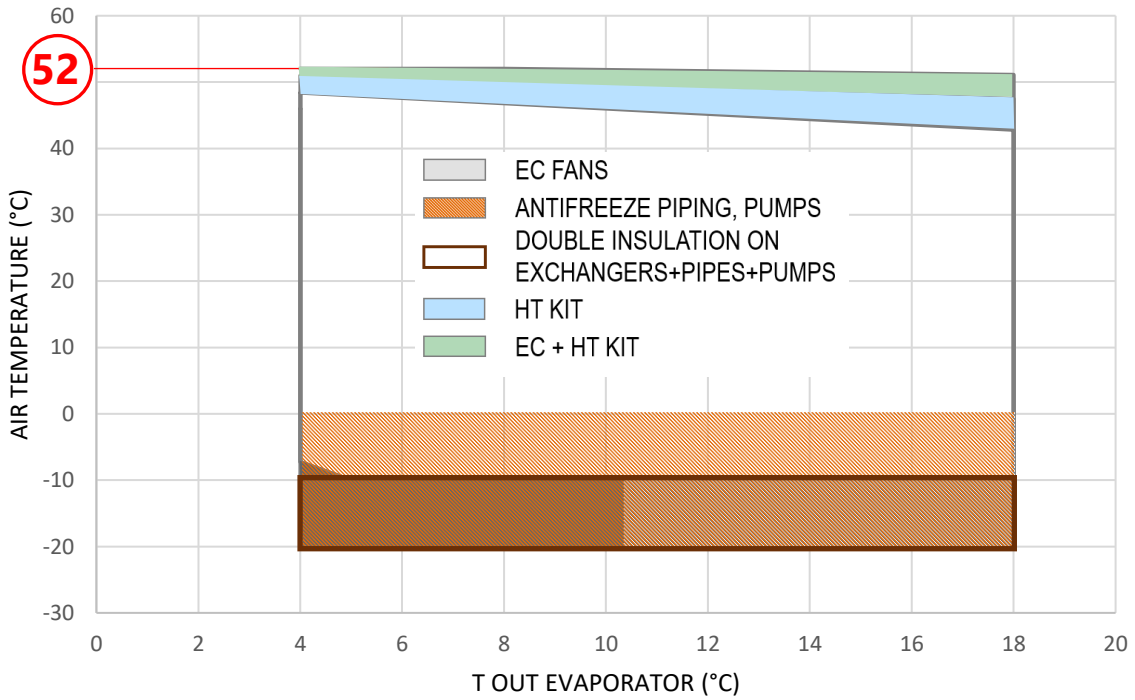
Operating limits – i-FX2-G04

r1234ze

i-FX2-G04-E



i-FX2-G04-K



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R HFC R134a
R HFO1234ze
R HFC R513A

i-FX2-G01
i-FX2-G04
i-FX2-G05

Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

Hydronic modules – optional

Hydronic modules

i-FX2 can be provided with **hydronic module** (opt.) including all the main hydraulic components, for the best **optimization of the installation space, time and costs**.

Standard configuration

- Terminals for external pump control (fixed speed or 0-10V signal for VFD pump)
- VPF.E flow control logic
  (For systems with only the primary circuit and terminals with bypass)

Pumps

- In-line or end-suction configuration
- 2-pole motor
- 2 pumps, fixed or variable speed
- Low or high head (approx. 100 or 200 kPa)

Pumps + Inverter

- Air cooled inverter to adjust the waterflow
- Reduced energy consumption
- VPF and VPF.D variable flow control logics
- Constant flow parameter-set logic

With hydraulic decoupler probe: Pumps activation is regulated in accordance with the water temperature measured by the storage probe (in the systems with the preliminary and secondary circuits separated by a hydraulic decoupler). The function reduces the pump operating hours and related energy consumption.

N.B.1: In some models, the pump group does not fit in the unit and is installed on a 1250 mm frame extension.

N.B.2: Built-in pumps for –R versions: please contact sales department (RFQ)

Hydronic modules – optional

Primary flow control

Depending on the hydronic module selected, different flow controls are available and managed by the unit's control:

Flow controls available for:

Fixed speed pumps

The unit is set-up to operate with a constant water flow in the evaporator.

Constant flow
Opt. 4861

Flow controls available for:

Variable speed pumps or modulating signal

The unit can operate with both constant or variable flow.

Constant flow

Constant flow (parameter set)

For a quick and easy commissioning.

Opt. 4862

Variable flow

VPF.E: constant ΔT

For systems with only the primary circuit and terminals with bypass

STANDARD

VPF: constant ΔP

For systems with only the primary circuit.

Opt. 4864 or 4865 for single unit
Opt. 4866 for multi-unit system

VPF.D: constant ΔT

For systems with primary and secondary circuits separated by a hydraulic decoupler.

Opt. 4867 for single unit
Opt. 4868 for multi-unit system

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Hydronic modules – optional

Pump group composition

- **Pumps***
  2 pumps, 2 poles, low or high head,
  fix speed or variable speed (with external, air cooled frequency converter)
- **Pump enclosure**
  Acoustically insulated for silenced units
- **Suction** and **discharge valves**
- **One-way valve** (in case of 2 pumps)
  Flap type for in-line pumps
- **Purge valve**
- **Drain plug**

* **In-line** or **end-suction** models were chosen based on dimensions and performances.

Excluded from the pump group supply, but **mandatory** for the correct unit and system operation:

- **Unit inlet water filter** **
  with a maximum mesh size of 1 mm
- **Unit outlet flow-switch** **

** Available as accessories, **supplied loose**.

In-line pumps

End-suction pumps

- Single-stage, **close-coupled** pumps **by Grundfos**.
- **SiC/SiC** (silicon carbide) **primary seal pairing**, extremely resistant against wear, abrasive particles and wear.
- **EPDM bellows seal** prevent the risk of deposits, such as rust, on the shaft.
- **Pull-out design**: during maintenance the power head can be pulled out without removing the pump housing from the pipework.

Hydronic modules – optional

Pump group composition

- **Pumps***
  2 pumps, 2 poles, low or high head,
  fix speed or variable speed (with external, air cooled frequency converter)
- **Pump enclosure**
  Acoustically insulated for silenced units
- **Suction** and **discharge valves**
- **One-way valve** (in case of 2 pumps)
  Flap type for in-line pumps
- **Purge valve**
- **Drain plug**

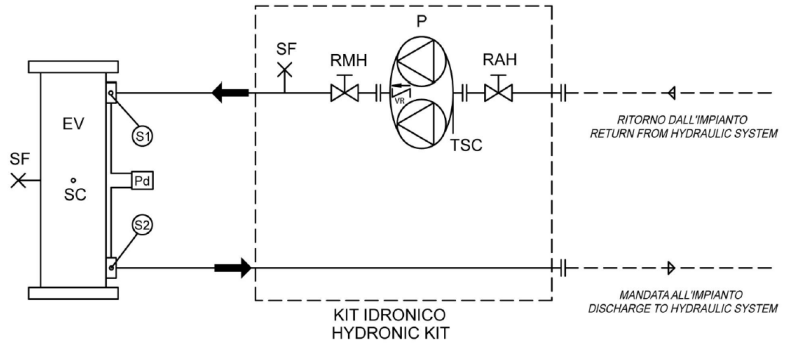
* **In-line** or **end-suction** models were chosen based on dimensions and performances.

Excluded from the pump group supply, but **mandatory** for the correct unit and system operation:

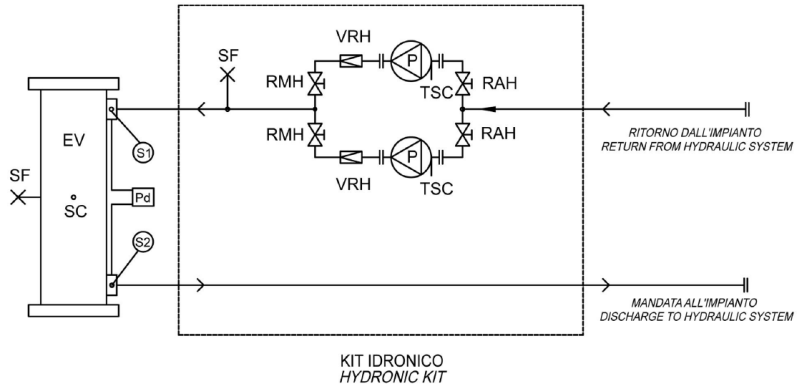
- **Unit inlet water filter** **
  with a maximum mesh size of 1 mm
- **Unit outlet flow-switch** **

** Available as accessories, **supplied loose**.

Hydraulic diagram for 2 **in-line** pumps



Hydraulic diagram for 2 **end-suction** pumps



Hydronic modules – optional

Pump group composition

- **Pumps***
  2 pumps, 2 poles, low or high head,
  fix speed or variable speed (with external, air cooled frequency converter)
- **Pump enclosure**
  Acoustically insulated for silenced units
- **Suction** and **discharge valves**
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  Flap type for in-line pumps
- **Purge valve**
- **Drain plug**

* **In-line** or **end-suction** models were chosen based on dimensions and performances.

Excluded from the pump group supply, but **mandatory** for the correct unit and system operation:

- **Unit inlet water filter** **
  with a maximum mesh size of 1 mm
- **Unit outlet flow-switch** **

** Available as accessories, **supplied loose**.

VARIABLE FREQUENCY DRIVE

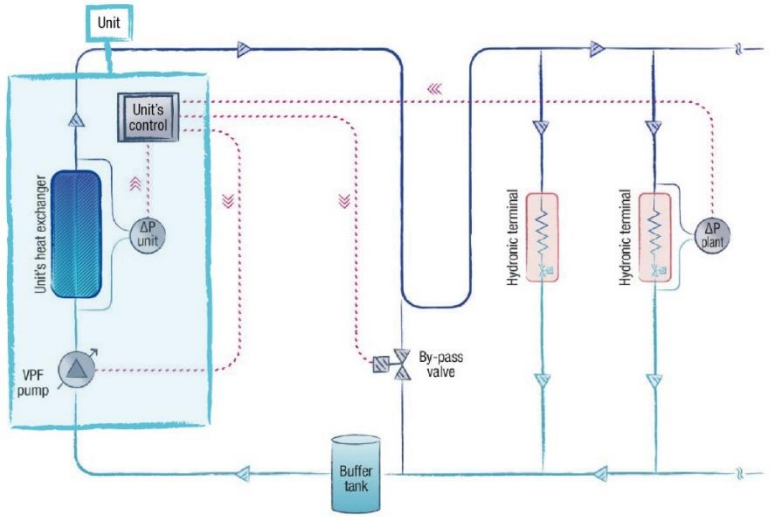
- Frequency converters, with IP55 protection rating for rough environment.
- One drive for each pump, air cooled and installed with a dedicated enclosure.
- The drive features built-in EMC filter (EN 61800-3, 1st Environment, Category C2) and DC link choke to significantly reduce electromagnetic noise and current harmonic distortion THDi.
- Optimum control of the excitation current maximizes motor efficiency for additional energy savings.

Variable Primary Flow – single-unit plants

The VPF control series (Variable Primary Flow) doesn't only **adjust the pump speeds** on the basis of the **plant's thermal load**, but also **dynamically optimizes the unit's thermoregulation** for variable flow operation, thus ensuring both the highest pump energy savings and chiller stable operation.

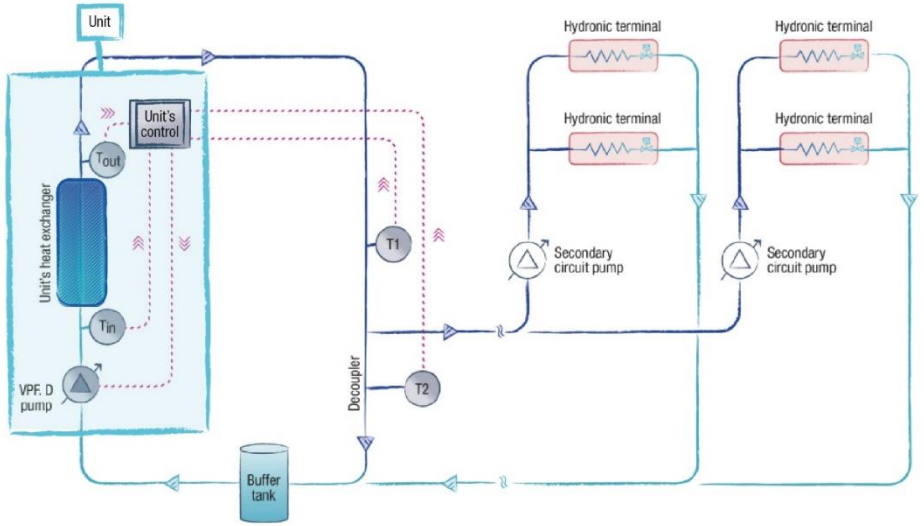
VPF: constant ΔP

Systems with only the primary circuit.



VPF.D: constant ΔT

Systems with primary and secondary circuits separated by a hydraulic decoupler.



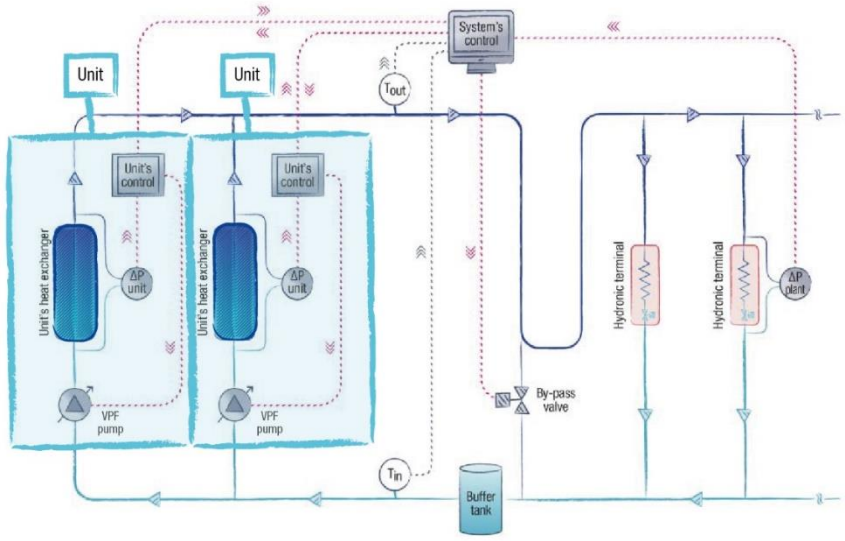
With the VPF system, the water flow can be reduced to 50% of the unit nominal water flow, with regards to the selection conditions, provided that the minimum water flow required by the unit's heat exchanger is respected.

Variable Primary Flow – multiple-unit plants with EXTERNAL GROUP CONTROL (Manager3000+ or ClimaPRO+)

The VPF control series (Variable Primary Flow) doesn't only **adjust the pump speeds** on the basis of the **plant's thermal load**, but also **dynamically optimizes the unit's thermoregulation** for variable flow operation, thus ensuring both the highest pump energy savings and chiller stable operation.

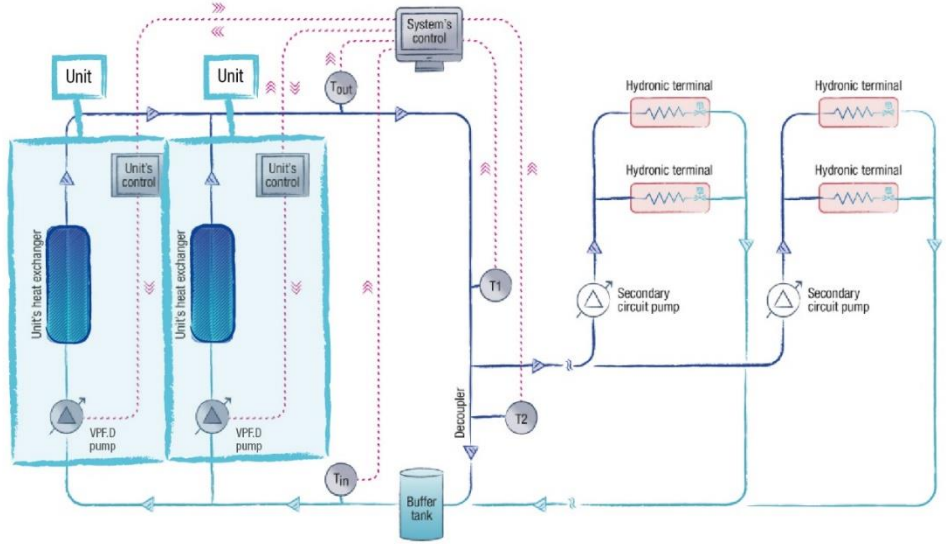
VPF: constant ΔP

Systems with only the primary circuit.



VPF.D: constant ΔT

Systems with primary and secondary circuits separated by a hydraulic decoupler.



With the VPF system, the water flow can be reduced to 50% of the unit nominal water flow, with regards to the selection conditions, provided that the minimum water flow required by the unit's heat exchanger is respected.

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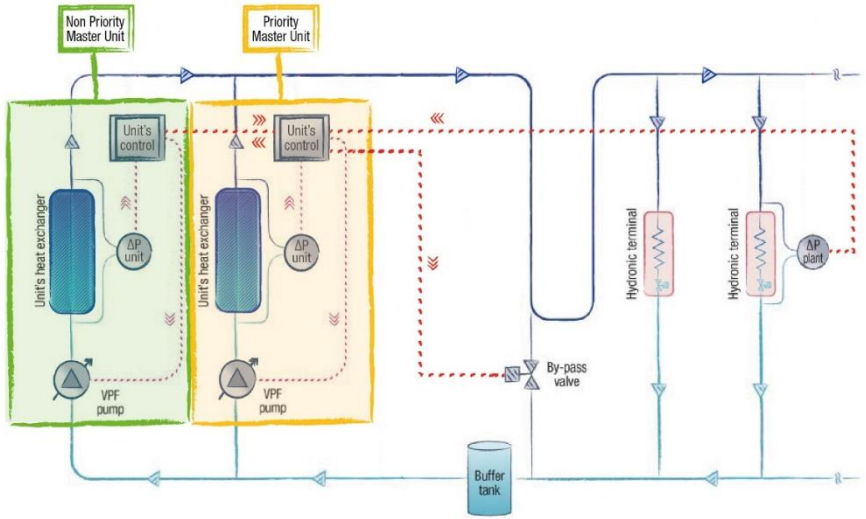
Variable Primary Flow – multiple-unit plants with MULTI MANAGER group control option

The VPF control series (Variable Primary Flow) doesn't only **adjust the pump speeds** on the basis of the **plant's thermal load**, but also **dynamically optimizes the unit's thermoregulation** for variable flow operation, thus ensuring both the highest pump energy savings and chiller stable operation.

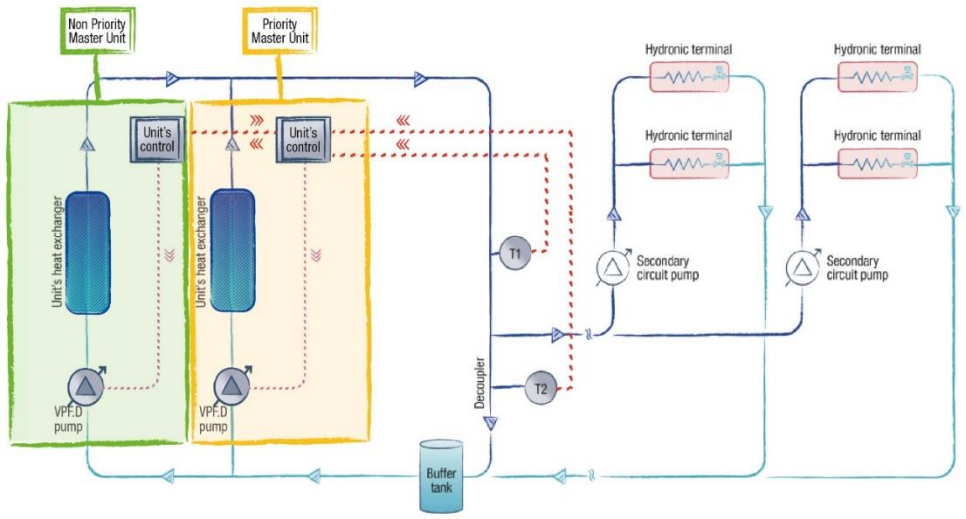
VPF: constant ΔP

Systems with only the primary circuit.



VPF.D: constant ΔT

Systems with primary and secondary circuits separated by a hydraulic decoupler.



With the VPF system, the water flow can be reduced to 50% of the unit nominal water flow, with regards to the selection conditions, provided that the minimum water flow required by the unit's heat exchanger is respected.

INVERTER
EC AXIAL
COOLING
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R HFC R134a
R HFO1234ze
R HFC R513A

i-FX2-G01
i-FX2-G04
i-FX2-G05

Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

Unit's main options – refrigerant leak detection

Several leak detection solutions are available to detect the gas leakage and raise an alarm

Internal refrigerant leak detector

Proprietary control logic that is able to detect a refrigerant leak, without needing external devices, by reading and interpreting of internal cycle parameters.

❖ Leak detector

In case of a gas leak detection, it raises an alarm.

❖ Leak detection with compressor off

In case of a gas leak detection, it raises an alarm and stops the units.

❖ Leak detection + pump-down

In case the device detects a leakage, the unit stops and stores the remaining refrigerant inside the evaporator.

❖ *Compressor enclosure is required*

Mission critical equipment

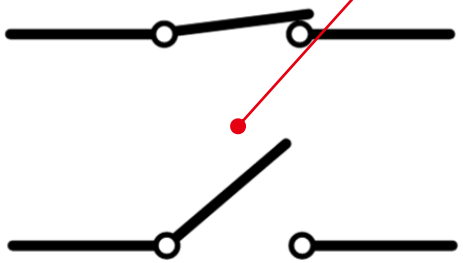
Additional expansion board

Double alarm management

Second contact fully configurable:

- The first contact can be set to report all alarms or only manually reset alarms
- The second contact can be set to report all manually reset alarms or only unit blocking alarms.

NO or NC configurable alarm

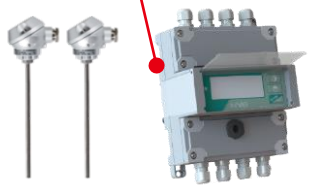


Both contacts are by default NO (Normally Open).
They can be set as NC (Normally Closed) during commissioning.

Unit's main options – advanced monitoring

Thermal energy meter (opt) & flow meter (opt)

Thermal energy meter (opt)



Flow meter (opt)

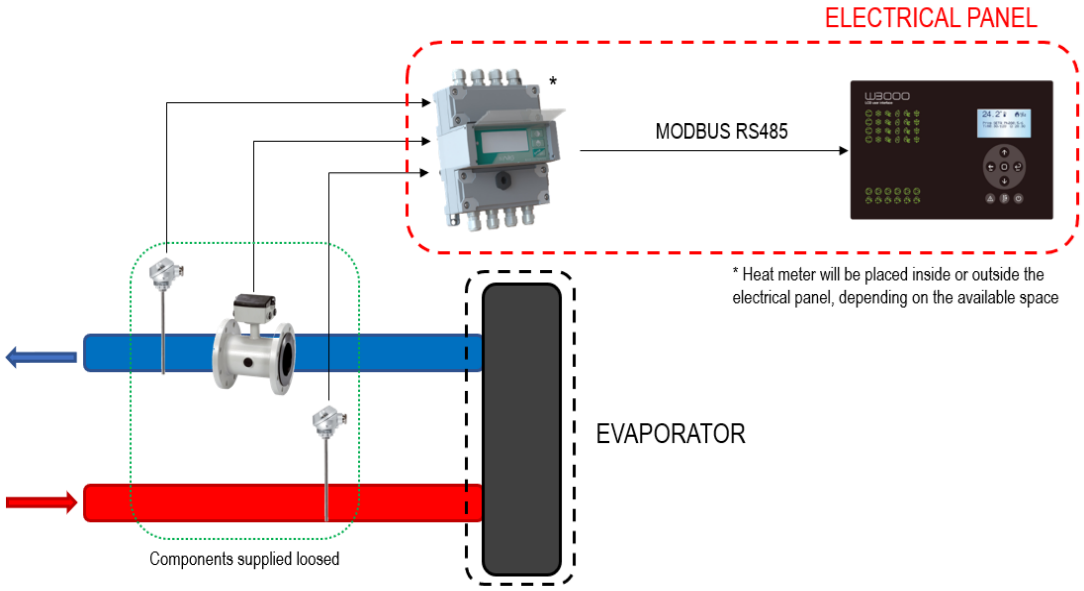
Network analyser (opt)

Energy monitoring is becoming more and more relevant in Data Centers and Process applications. The unit can be equipped with different kits depending on the needs:

- **Thermal energy meter** and **flow meter** allow to measure the cooling capacity produced
- **Network analyzer** evaluates the power absorbed by the unit

The measured data are available to the BMS/DCIM or on the controller.

Unit's main options – advanced monitoring



Thermal energy meter (opt) & flow meter (opt)

Combination of thermal energy meter option and flow meter, allows to measure the instantaneous cooling capacity produced by the unit.

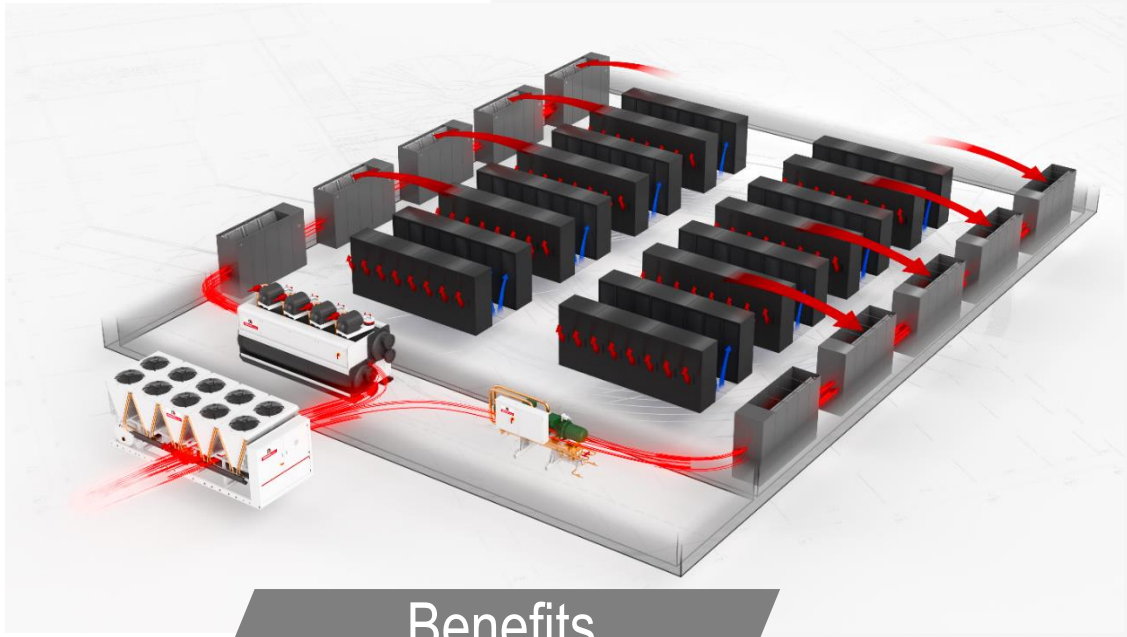
It consists of:

- **2 temperature probes** (supplied loose) which detect the leaving and entering water T
- **1 flow meter** (supplied loose) which measures the water flow of the unit
- **1 heat meter** mounted on the unit that collects the 3-input data coming from the previous devices and calculates the cooling capacity

The value is sent to the unit controller or to the BMS.

Unit's main options - Complex systems: ClimaPRO+

ClimaPRO+



The core of **ClimaPRO+** is a performance feedback loop; a continuous cycling control algorithm, which instantaneously detects any change to the plant, and rectifies its actions accordingly.

ClimaPRO+ is ideal for:

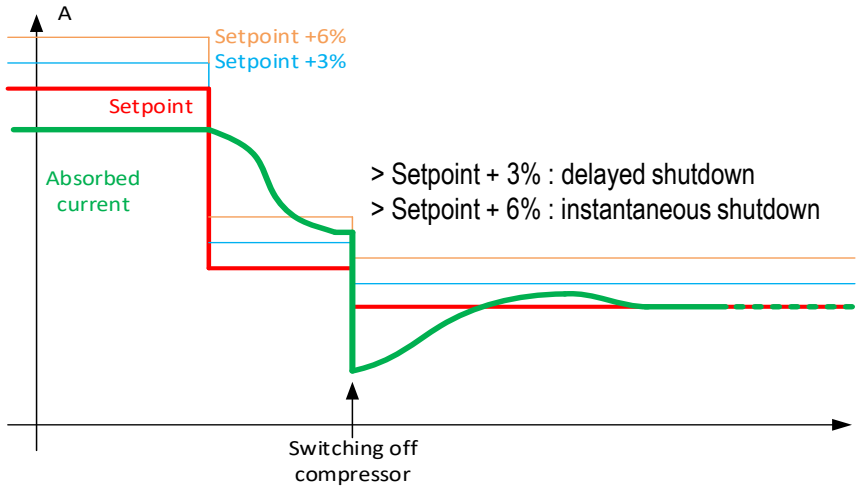
- Control and optimization
- Maintenance and diagnostic
- Management and monitoring
- Measurement and performance verification
- Reporting

Benefits

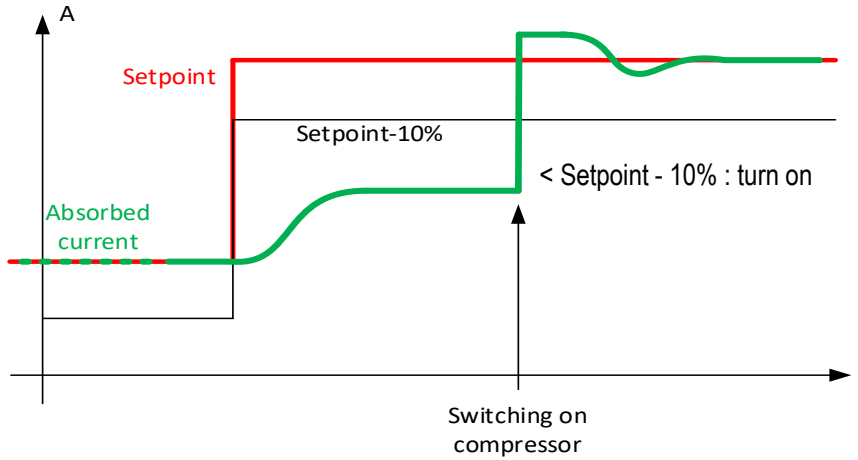
- **Intelligent staging and sequencing** according to the performance profile of each HVAC unit
- Efficient and effective **integration of non-homogeneous technologies**
- **Reliable management of redundancies** in mission-critical applications
- **Increase of system uptime**
- Smart **activation of the best operating condition** of each HVAC unit to reduce energy consumption

Unit's main options

Switching off compressor



Switching on compressor



Smart current limit (opt)

Developed to satisfy the need for keeping the **absorbed current (and power) below a predetermined value**.

This **function requires the energy meter** (opt. 5924 or 5925). Energy meter reads the voltage and the power absorbed. Current is consequently calculated

- If current absorbed is above 3% of current setpoint → Shutdown of one of the compressors is delayed by a time parameter set
- If current absorbed is above 6% of current setpoint → Shutdown of one of the compressors is instantaneous
- If the current absorbed is lower than 90% of current setpoint absorption, compressor is switched on

Unit's main options

OPERATING MAP

Antifreeze piping, pumps: Electrical heaters on pipes and pumps to protect the unit against ice formation on its hydraulic components.

Double insulation on exchanger (+pipes+pumps): Thermal insulation on heat exchangers, pumps and pipes to reduce heat losses and prevent from condensate problems.

DEMAND LIMIT SOLUTIONS

Demand Limit: Limits the unit's power absorption for safety reasons or in temporary situations (digital imput).

External capacity cap: Limits the unit's cooling capacity to a specific % value, by acting on active resources and their operating frequencies. The unit can exceed this limit in specific conditions.

AUXILIARY INPUTS

4-20 mA: Enables remote set-point adjustments (analog input).

Double set-point: Enables the remote switch between 2 set-points (digital input).

CONTROL FUNCTIONS

U.L.C. User Limit Control: Controls a mixing valve (not included) to ensure a safe start-up and operation of the unit even in critical conditions.

Remote probe: Controls the unit's and pump's activation on the base of the water temperature of the buffer tank or hydraulicdecoupler.

Night mode: The noise of the unit is reduced limiting maximum compressor frequency and fan speed.

ENERGY METER

Energy meter for BMS: Acquires the electrical data and the power absorbed by the unit and sends them to the BMS for energy metering (Modbus RS485).

Energy meter for W3000+: The electrical data acquired is available directely on the unit's control.

HYDRAULIC

Evaporator flow switch: Flow switch with AISI 316L stainless steel basket and IP65 protection suitable for installation in industrial plant pipes.

Electronic water flow switch: Flow switch with electronic detection of the flow in the pipes.

INVERTER
EC AXIAL
COOLING
EEV
T SHELL&T.
R HFC R134a
R HFO1234ze
R HFC R513A

i-FX2-G01
i-FX2-G04
i-FX2-G05

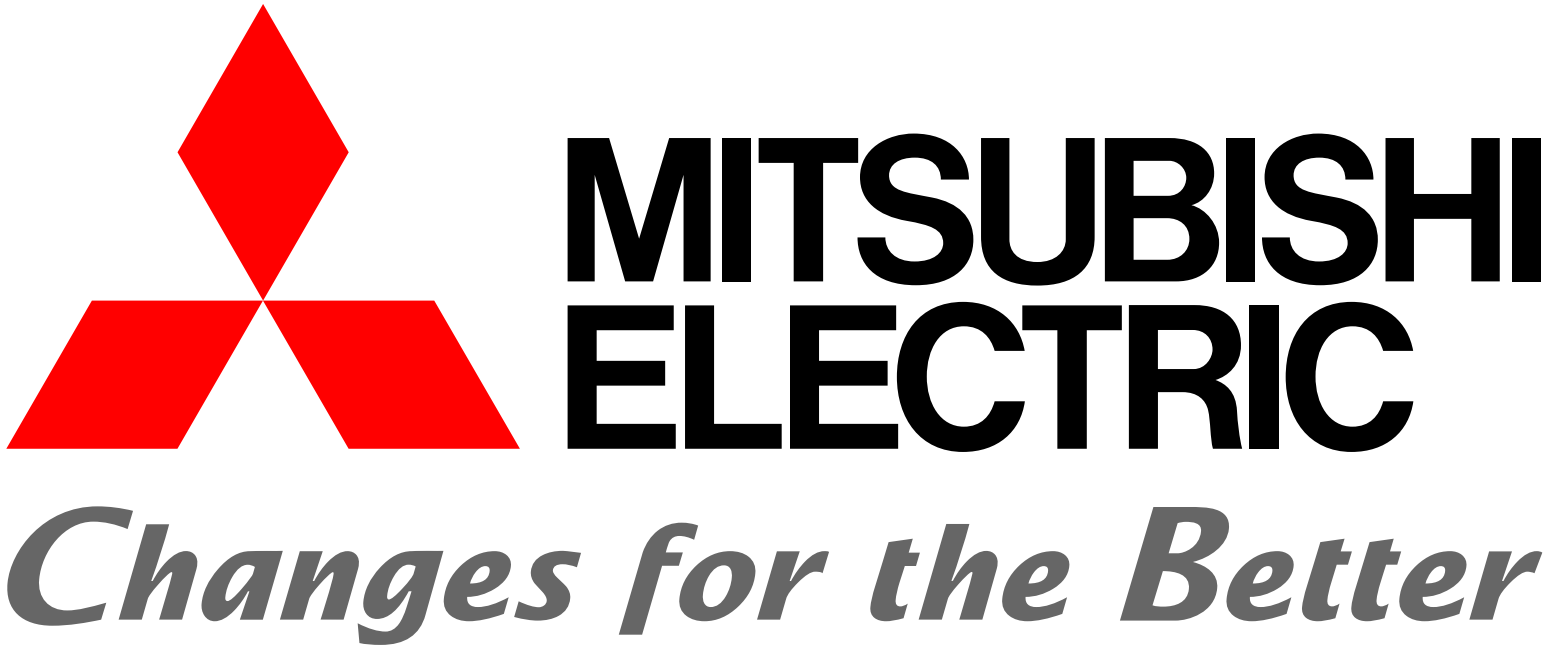
Air source chillers with variable speed screw compressors and R134a, R1234ze or R513A refrigerants

380 – 1859 kW

Unique selling points

SELLING POINTS

- **3 refrigerants**: standard R134a, mid-term R513A, environment-friendly R1234ze
- **3 efficiency levels**, K with AC fans, K with EC fans and E
- **4 sound configurations** to match the most sensitive environments
- Best in class **compactness** for K version
- **Full inverter technology:** stepless regulation
- Patented technology in-house developed: **Red Cooler**
- Optional **hydronic kit** with **variable and fixed-speed dual pumps** for a plug&play installation
- **Wide operating area**, working with external air temperature from -20 up to 52° C
- **High configurability:** Hydronic kits, Automatic Circuit Breakers on Loads, Noise Reducer, Cu/Al Coils, Oversized EC Fans, Energy Meter, Multifunction Card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