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

COMFORT

AIR SOURCE HEAT PUMPS WITH FULL INVERTER COMPRESSORS

i-FX-N G01 G05

AIR SOURCE REVERSIBLE HEAT PUMP WITH FULL INVERTER COMPRESSORS, FROM 444 TO 1154 kW

TOTAL INVERTER TECHNOLOGY

R513A

R134a

melcohit.com

CLIMAVENETA®

i-FX-N G01 G05

TOP-LEVEL EFFICIENCY IN ANY LOAD CONDITION

ErP 2021 COMPLIANT

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

Air source reversible heat pump with full inverter compressors. From 444 to 1154 kW

i-FX-N is the new high performing heat pump featuring inverter driven screw compressors and EC fans.

Dedicated to comfort applications – from small retail projects to large commercial schemes, the new generation of air source heat pump has been perfectly designed for reducing operating costs while keeping an extremely compact design.

OVER 1 MW OF COOLING AND HEATING CAPACITY

OVER 1 MW

i-FX-N delivers large cooling and heating capacities over 1 MW in order to fit the most stringent sustainable standards of the most huge buildings.

TOP-LEVEL PERFORMANCE IN HEATING AND COOLING

i-FX-N brings brilliant full load and part load efficiencies,
thus helping individuals and businesses reduce the energy bill of their HVAC system.

		EER	SEER	COP	SCOP
				HEATING	
				COOLING	
A	Standard version	2,94	4,91	3,39	4,10
A + kit NR	Standard version + kit NR	2,85	4,89	3,39	4,10
SL-A	Super low noise version	2,81	4,89	3,41	4,10

EER conditions: evap. 12/7°C, air 35°C – NET values [EN14511 – EN14825]
COP conditions: cond. 40/45°C, air 7(6)°C – NET values [EN14511 – EN14825]
SCOP - Regulation (EU) N.813/2013: average values for sizes with Pdesign,h < 400 kW
SEER - Regulation (EU) N.2281/2016: average values for sizes not included in Reg. (EU) N. 813/2013

TWO REFRIGERANT VERSIONS

R513A R134a

i-FX-N is available with both the R134a and the low GWP R513A refrigerants for matching the most stringent sustainable standards.

FULL INVERTER TECHNOLOGY

TOTAL INVERTER TECHNOLOGY

Full inverter technology applied on:
- Screw compressors
- Variable speed fans
- Integrated variable speed hydronic modules (opt.)

EXTENDED WORKING RANGE

HOT WATER	UP TO 60°C
AIR TEMPERATURES IN COOLING MODE	UP TO 50°C
AIR TEMPERATURES IN HEATING MODE	UP TO -12°C

An extended working range which ensures unit operation all year long and in any working condition.

i-FX-N G05 All-round sustainability

Fully committed to support the creation of a greener tomorrow, Mitsubishi Electric Hydronics & IT Cooling Systems presents i-FX-N-G05, a complete heat pump range with reduced environmental impact, optimized for R513A refrigerant.

Combining brilliant annual efficiency with the use of a low GWP refrigerant, i-FX-N-G05 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.

R513A

LOW GWP
-56% GWP vs R134a

Non-flammable
Safety Class A1

New generation refrigerant with reduced greenhouse effect. Non-flammable

Favorable physical properties
Same cooling capacity delivered as R134a
Same operating pressures as R134a

In line with standard building codes
No special equipment
No need for flammable risk assesment
No extra costs

Compliant with eco regulation objectives
No future retrofit required
Reduced price volatility

R513A

REFRIGERANT BENCHMARK

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 i-FX-N-G05, 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).

SCROLL

Refrigerant	GWP*	Flammability**
R410A	2088	NON flammable
R32	675	MILDLY flammable
R454B	467	MILDLY flammable
R452B	698	MILDLY flammable

SCREW

Refrigerant	GWP*	Flammability**
R134a	1430	NON flammable
R513A	**631**	**NON flammable**
1234ze	7	MILDLY flammable
1234yf	4	MILDLY flammable

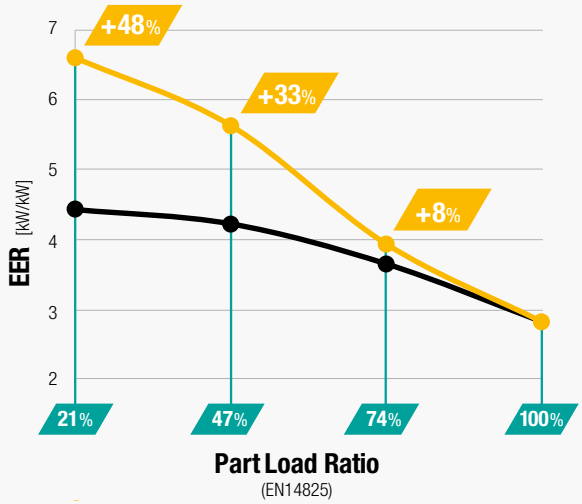
*IPCC AR4 **ASHRAE 34 - ISO 817

TO LEARN MORE ABOUT GREEEN REFRIGERANTS
https://www.melcohit.com/EN/Environment/green_refrigerant/

FULL INVERTER TECHNOLOGY

TOTAL INVERTER TECHNOLOGY

HIGHER ENERGY EFFICIENCY

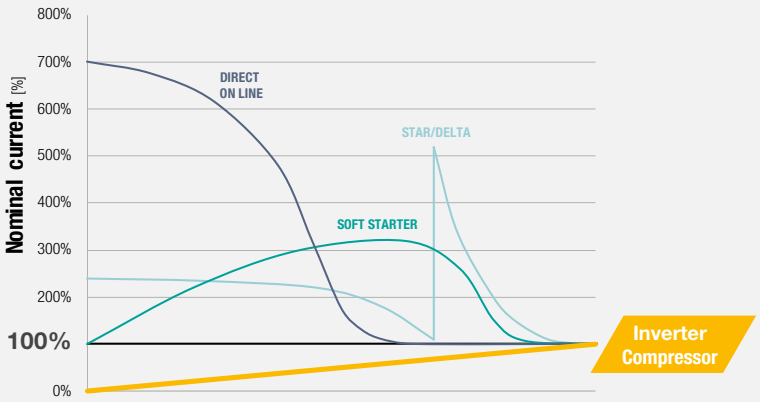


In comfort applications units are usually working partialized.
In this condition the inverter and variable Vi technology makes the real difference in terms of efficiency, even compared to the latest generation high efficiency fixed speed units.

i-FX-N
Fixed speed heat pump

ABSENCE OF IN-RUSH CURRENTS

The inverter technology involves a start-up phase with very low in-rush current. The frequency converters chosen by Mitsubishi Electric are characterized by values of Displacement Power Factor of between 0,97 and 0,99.



No electrical and mechanical stress

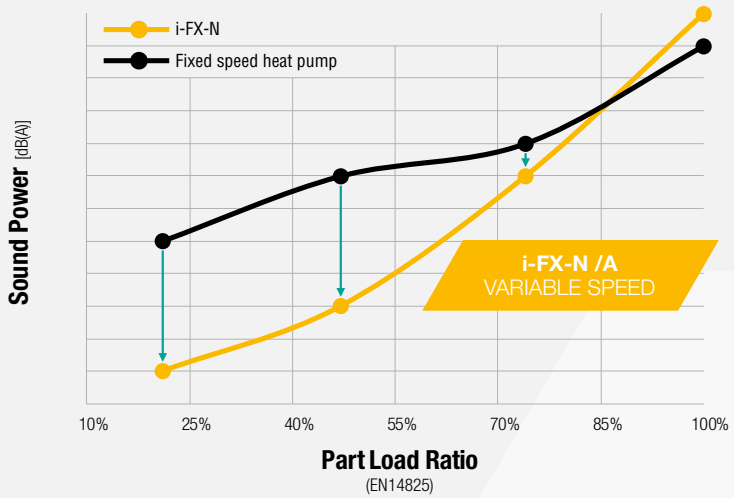
The unit never exceeds the nominal current, not even when starting up.

No additional equipment needed

Such as star/delta commuters or soft starters

The new i-FX-N reversible heat pumps apply variable speed technology in all of its main components, achieving top-level performances in any load condition.

REDUCED SOUND POWER LEVELS



LOWER SPEED, LOWER NOISE

The unit working in partial loads is far more silent than a fixed speed compressor unit.

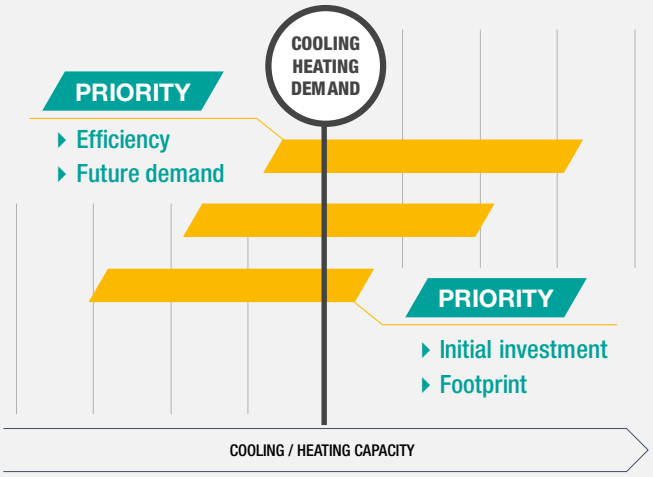
i-FX-N ensures extremely low noise operations compared to fixed speed units.

Ideal for sound sensitive environments

- Museums and Theatres
- Hospitals
- Institutions
- Hotels

FLEXIBLE SELECTION

The smart design of the units combined with the ELCAWorld selection software allows you to always choose the right unit for every project, prioritizing efficiency, additional future plant demands or reducing the initial investment and the footprint.



Choose YOUR target

- EFFICIENCY
- INITIAL INVESTMENT
- FOOTPRINT
- FUTURE PLANT DEMANDS

TECHNOLOGICAL CHOICES

W3000+ CONTROL

Fully in-house developed management software.

- Proprietary settings for faster adaptive responses to different dynamics
- Enhanced diagnostics thanks to the black box function
- Connectivity with the most commonly used BMS protocols and M-Net Mitsubishi Electric proprietary protocol (Opt.)

KIPlink USER INTERFACE

Based on Wi-Fi technology, KIPlink is an option that allows one to operate the unit directly from a mobile device (smartphone, tablet, or notebook) by simply scanning the QR code positioned on the unit.

TECHNICAL DATA i-FX-N G01 **TECHNICAL DATA i-FX-N G05**

Variable speed fans

High performing EC fans as standard, for higher efficiency and continuous speed modulation.
External bell mouth for the highest efficiency.

Smart Defrost

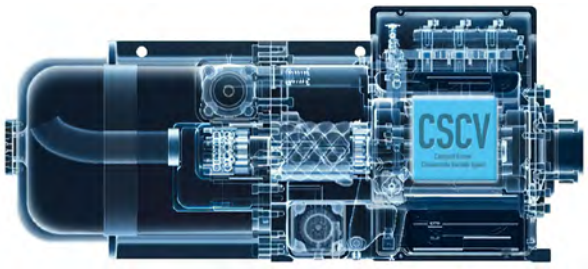
Smart proprietary auto adaptive algorithms to manage the defrosting cycles in the smartest way.

+10%
NET HEATING CAPACITY
compared to units with traditional defrost cycles

- Reduction in defrosting time
- Minimum impact on leaving water temperature
- Reduction of energy required for defrosting
- Increase of COP

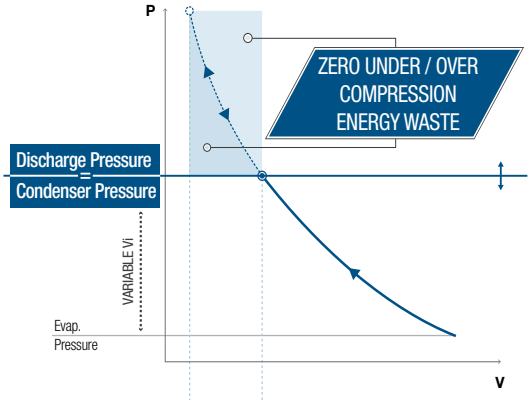
CSCV Compressors

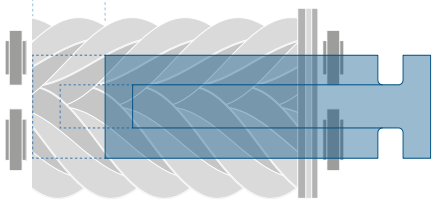
Inverter, Variable Vi dual rotor screw compressors, designed according to Mitsubishi Electric Hydronics & IT Cooling Systems specifications and for its' exclusive use.



- **Variable Speed Drive**
- **Automatic internal volume ratio adaption**
  thanks to a Vi slider which adapts the internal geometry to the current operating condition
- **Extra durability**
  Carbon steel bearings granted for a lifetime of over 150.000 hours
- **Super efficient high speed motor**

SMART VARIABLE Vi LOGIC





Shell-and-tube plant-side heat exchanger

Dry expansion shell-and-tube heat exchanger fully developed inhouse.

- Internally grooved copper tubes for enhanced heat exchange
- Low pressure drops
- Fully protected against ice formation

TUBE & FINS

Cu/Al
Regular (std for i-FX-N)

Cu/Cu
Tube & fin coil

Cu/Al
Pre-painted fins

- Fins treated with protective polyester resin paint.
- 1000 h of salt spray protection as per ASTM B117.
- Excellent resistance to UV rays.

Cu/Al
Fin Guard Silver SB

- Polyurethane paint with metallic emulsion.
- 3000 h of salt spray protection as per ASTM B117.
- Excellent resistance to UV rays.

i-FX-N G01 G05 Energy Analysis

PROJECT

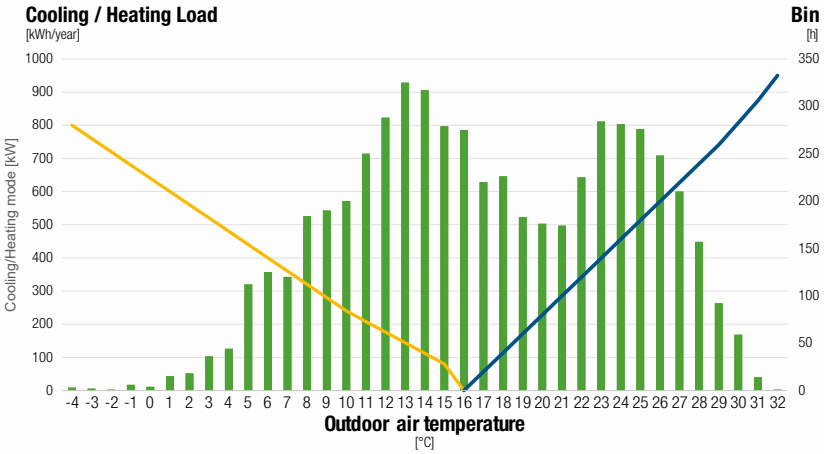
Mixed-use building, Rome (Italy)

This project has provided data to evaluate the advantages in seasonal efficiency of the new i-FX-N inverter screw heat pump compared to traditional solutions with fixed speed compressors.

HEATING LOAD

TEMPERATURE PROFILE

COOLING LOAD



The building is located in Rome, Italy. The cooling load is 950 kW at 32°C of external air temperature, while the heating load is 800 kW at -4°C.

However, as visible from the graph, for most of the hours the unit is working at partial load: the perfect conditions to make the most of i-FX-N units.

Energy analysis parameters:

Cold water set point: 7°C
Hot water set point: 45°C
Natural gas cost: 0,99 €/kg
Electric energy cost: 0,16 €/kWh

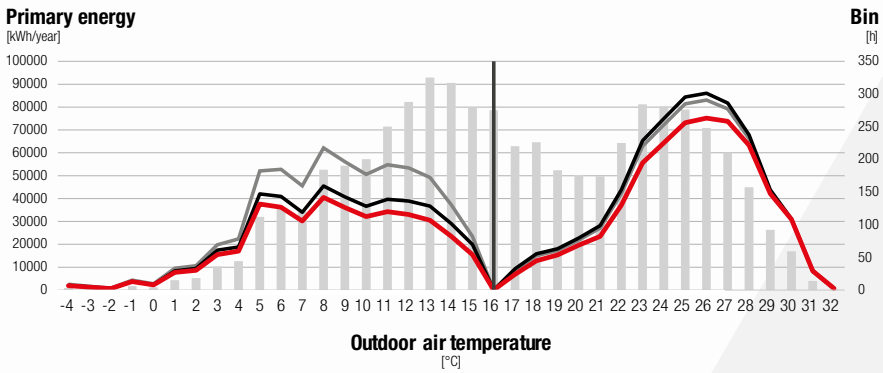
Electricity generation coeff.: 0,4
Interest rate: 6%
Inflation rate: 3%

A COMPARISON BETWEEN DIFFERENT TECHNOLOGIES

The energy analysis will compare three different technologies, with the aim of finding out the most convenient solution for the project. i-FX-N heat pump with full inverter compressors will be compared with a high efficiency chiller with inverter compressors and a fixed speed compressors heat pump.

	Cooling capacity (12/7°C, 35°C)	EER	SEER	Heating capacity (40/45°C, 7°C)	COP	SCOP	Length
i-FX-N /A	1033 kW	3,01	4,90	995 kW	3,48	4,19	11800 mm
High efficiency heat pump with fixed speed compressors	1038 kW	3,05	4,29	1050 kW	3,47	3,83	11800 mm
High efficiency chiller with fixed speed compressors + Boiler	1028 kW	3,18	4,31	GAS BOILER	800 kW		10400 mm

RESULTS



The energy analysis displays how i-FX-N heat pump is always more convenient if compared with the other two solutions.

The primary energy consumption is from 12 to 13 % lower than i-FX-N compared to a fixed speed heat pump.

The results is even better (up to 33% less energy consumption) if comparing the i-FX-N solution with a Chiller + Boiler solution.

i-FX-N /A

	Winter consumption	Summer Consumption	Payback Period
vs Fixed speed compressors chiller + Gas Boiler	-33 %	-9 %	2.4 years
vs Fixed speed compressors heat pump	-13 %	-12 %	3 years

WITNESS TESTING EXPERIENCE

TEST YOUR HEAT PUMP BEFORE INSTALLATION AND MAKE SURE ITS' PERFORMANCE IS TOTALLY RELIABLE

PERFORMANCE WITNESS TEST

Performance Witness testing is available as additional service in order to test the unit under specific conditions.

Carried out within modern and sophisticated facilities, this service gives the customer the possibility to choose among different witness test options in order to:

- Verify unit operation under severe conditions
- Check performance, both at full and partial loads
- Test the unit with low outdoor air temperature operation
- Detect sound emissions
- Time the fast restart

TO LEARN MORE ABOUT THIS FACILITY
https://www.youtube.com/watch?v=Cy2FXAfhvj8&t

“BY FAR THE BEST PROOF IS EXPERIENCE”

Sir Francis Bacon
British Philosopher (1561 - 1626)

NAVE DE VERO

2014 Marghera - Italy

Application:
Shopping Centre

Cooling capacity:
3842 kW

Installed units:
1x FOCS2-W/CA-E 4802,
1x FOCS-N/SL-CA 4822, 1x NECS/Q/SL 0152,
2x FOCS2-W/D/CA-E 4802,
2x FOCS-N/D/SL-CA 4822

Plant type:
Hydronic System

Certifications:
BREEAM - Outstanding

PROJECT

Nave De Vero, the shopping center of Marghera, has 55,000 square meters of commercial area, including a 4,000 sqm hypermarket, 120 shops, a food court, offices, and 2,400 parking spaces.

CHALLENGE

Steel, glass, wood, and stone were used to create the outline of a large three-story ‘ship’. The shopping center was first commercial center in Italy to obtain Breeam certification: the most demanding international environmental assessment protocol, which establishes the highest quality green building standard.

SOLUTION

Many system choices were made to guarantee the environmental sustainability of the center. The hypermarket and the shopping center have separate and independent facilities. The first consists of a central heating plant with condensation boilers and air handling units, the second has a heating and cooling plant composed of high efficiency FOCS-N/SL-CA 4822 chillers and 3 tower-circuit water-cooled FOCS2-W/CA chillers.

TO LEARN MORE ABOUT THIS PROJECT
https://www.melcohit.com/EN/Projects/2462/Nave-De-Vero.html

MORE THAN 1000 PROJECTS ALL OVER THE WORLD

2015-2016 Grosseto - Italy

Maremà Shopping Centre

Application: Shopping Centre
Plant type: Hydronic System - Air to Air System
Cooling Capacity: 2185 kW
Heating Capacity: 1271 kW
Installed machines:
1x FOCS-N/CA/S 2722,
1x FOCS-N/CA/S 2622,
1x FOCS-N/CA/S 3622,
10x WSM/HR-P/S

TO LEARN MORE ABOUT THIS PROJECT
https://www.melcohit.com/EN/Projects/4975/Marema-Shopping-Centre.html

Climaveneta's heat pump units, with their unbeatable advantages in terms of efficiency, quality, and precision are already the preferred choice of the major brands in the most prestigious projects all over the world.

2016-2018 Viña del Mar - Chile

Gustavo Fricke Hospital

Application: Healthcare / Hospitals
Plant type: Hydronic System
Cooling Capacity: 6381 kW
Cooling Capacity: 5711 kW
Installed machines:
1x ERACS2-Q/SL-CA 2722,
2x FOCS-N/B 2622,
4x FOCS-N/B 3222,
2x FOCS-N/B 2222,
1x MANAGER 3000

TO LEARN MORE ABOUT THIS PROJECT
https://www.melcohit.com/EN/Projects/3770/Gustavo-Fricke-Hospital.html

CLIMAVENETA®

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