MITSUBISHI ELECTRIC
Changes for the Better

for a greener tomorrow eco Changes

COMFORT HEAT PUMPS

R454B

NX²-N G06

Air source reversible heat pumps
with multiple scroll compressors
and low-GWP refrigerant

316 - 800 kW

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

CLIMAVENETA®

COOLING
HEATING
SCROLL
R R454B

NX²-N G06

316 - 800 kW

Air source reversible heat pumps
with multiple scroll compressors

- Family overview
- Technical insight
- Controls
- Performance
- Operating limits
- Heat recovery
- Hydronic modules
- Coils & coating
- Further options
- Selling points

COOLING
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NX²-N G06

316 - 800 kW

Air source reversible heat pumps
with multiple scroll compressors

Family overview

NX2-N-G06 - Family overview

Key features

NX²-N G06 0344 – 0808

COOLING | SCROLL | EC AXIAL
HEATING | SHELL&T. | AXIAL

Air source reversible heat pumps with multiple scroll compressors and low-GWP refrigerant

- 12 sizes, **316 – 800 kW**
- Sizes with 4, 6 and 8 compressors
- Two efficiency versions (/K and /A)
- Super low noise version (/SL)
- Shell&tubes evaporator

The compressors and the refrigerant circuits are below the V-block coils. Compressor enclosures are provided upon selection of opt. 2312 Acoustical enclosure (for /K and /A versions)

R454B

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

NX2-N-G06 - Family overview

Nomenclature

1	2 3 4	5	6	7	8	9	10 11
N	X 2 -	N -	G 0 6 -		/ D /		0 4 0 4

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
		N	Air source heat pump
		Q	Air source 4 pipes units
6	Refrigerant	G01	R134a
		G02	R410A
		G03	R407C
		G04	HFO1234ze
		G05	R513A
		G06	R454B

Code	Descriptions	Extension	Descriptions
7	Application segment	-	Comfort
		Y	Process
		Z	IT Cooling
8	Function	-	Without heat recovery
		D	Partial heat recovery
9	Version	-	Unique single version
		K	Key efficiency
		A	High efficiency
		SL	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

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NX²-N G06

316 - 800 kW

Air source reversible heat pumps
with multiple scroll compressors

NX2-N-G06 - Technical insight

Main components

Variable-speed AC axial fans.

Continuous fans speed management on all units.

Patented solution to ensure circuit independence.

For higher seasonal efficiency, EC fans

- as option up to 550 kW
- as STD above 600 kW

Source side heat exchanger

V-shaped module with Cu/Al coils and several surface treatments available against corrosion (opt.). Internal frame to divide the condensing section (independent circuits).

Electrical panel

with power circuit components and **W3000+** control

Scroll compressor tandem

in multiple refrigerant circuits, with **electronic expansion valve** as standard

Evaporator:

Dry shell and tubes

evaporator/condenser, fully developed in-house

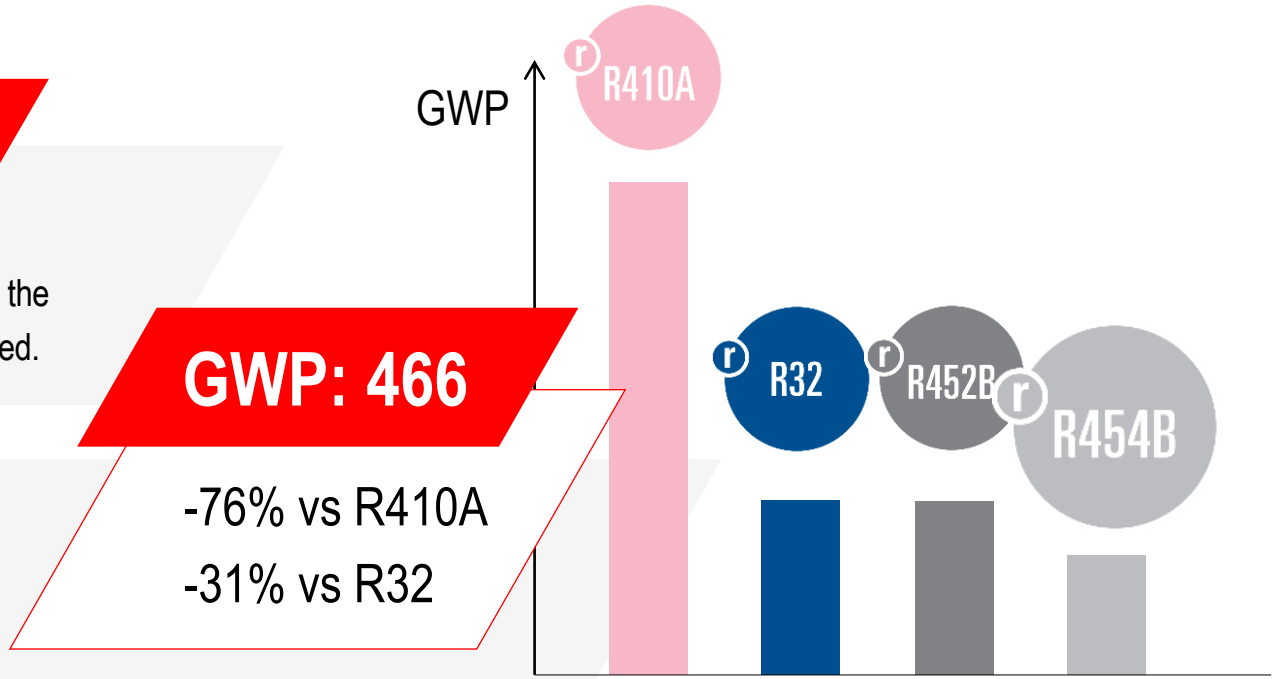
On-board factory-installed pumps (with VPF options) and **buffer tank** for the minimum installation time and cost (optional).

NX2-N-G06 - Technical insight

The refrigerant

R454B refrigerant

High density, **low GWP refrigerant**.
Its physical properties are **similar to R410A**, so the same type of equipment / component can be used.



GWP: 466

-76% vs R410A
-31% vs R32

Reliability

- Use of **well-known components**
- Refrigerant circuit **reliability** is kept

Performance & envelope

- Same **operating limits** of R410A
- Higher efficiency (full load +3,5%, seasonal +2%)
- Slightly lower capacity

- Composition: 69% R32 + 31% R1234yf
- Global Warming Potential: 466 (IPCC AR5)
- Safety classification:
  A2L mildly flammable (ISO 817)
  Fluid Group 1 (PED)

NX2-N-G06 - Technical insight

The compressors

Scroll compressor tandem

R454B

- New generation scroll compressors, developed for the use of high density refrigerants
- **Tandem configuration** to capitalize on the whole heat exchange surface at part loads and reach **higher seasonal efficiency**
- Further **safety** threshold with **thermostats** on each compressor discharge
- **Specific oil management solution**

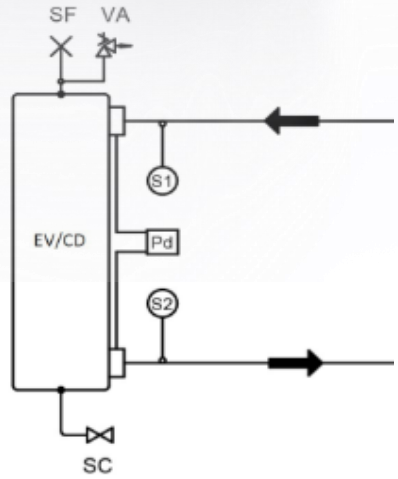
High seasonal efficiency

Complete reliability

Oil management proven effectiveness

NX2-N-G06 - Technical insight

The user side heat exchanger



Shell & Tubes heat exchanger

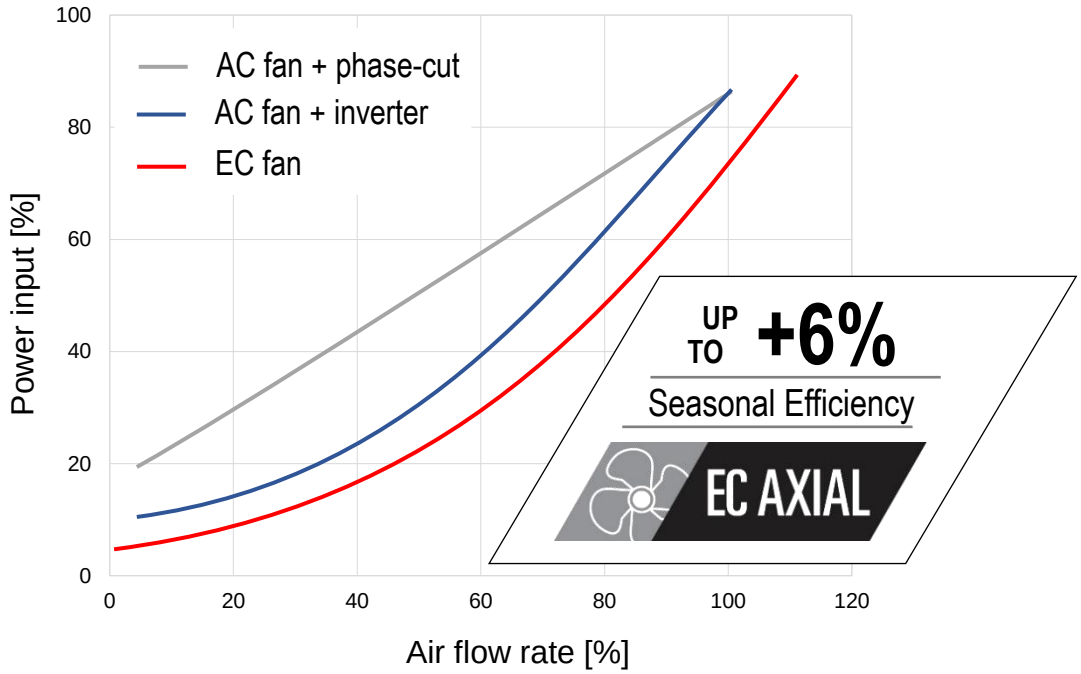
- **Available for the entire range, from 316 to 800 kW**
- **Dry shell and tubes evaporator**, fully developed by MEHITS
- Internally grooved copper tubes for enhanced heat exchanger
- Insulated with a **foamed polyethylene mat of 9 mm thickness**
- Water flow is controlled by a differential pressure switch to avoid the risk of ice generation

EV	Evaporator	**Pd**	Differential pressure switch
CD	Condenser	**S1**	Water inlet probe
SC	Drain valve	**S2**	Water outlet probe
SF	Purge valve	**VA**	Safety valve

NX2-N-G06 - Technical insight

The fans

Fan speed control



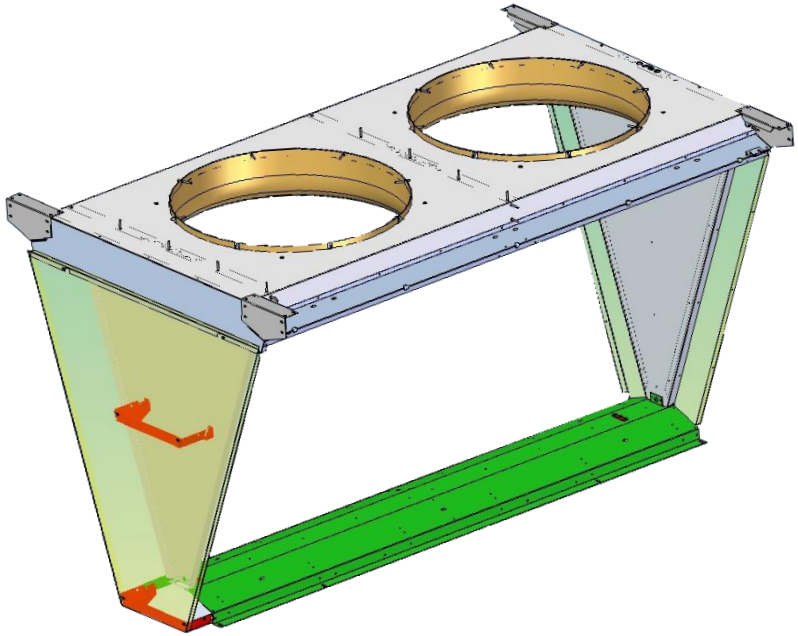
Axial fans

- High performing, 800mm-diameter **axial fans** or mixed solution with high performing 450 mm-diameter and 800mm-diameter **axial fans**
- **Variable Speed low-temperature Device (DVV)**, as standard, to control condensation/evaporation adjusting the rotational speed by phase-cut devices
- **EC fans** are available
  - as option up to 550 kW
  - STD above 600 kW

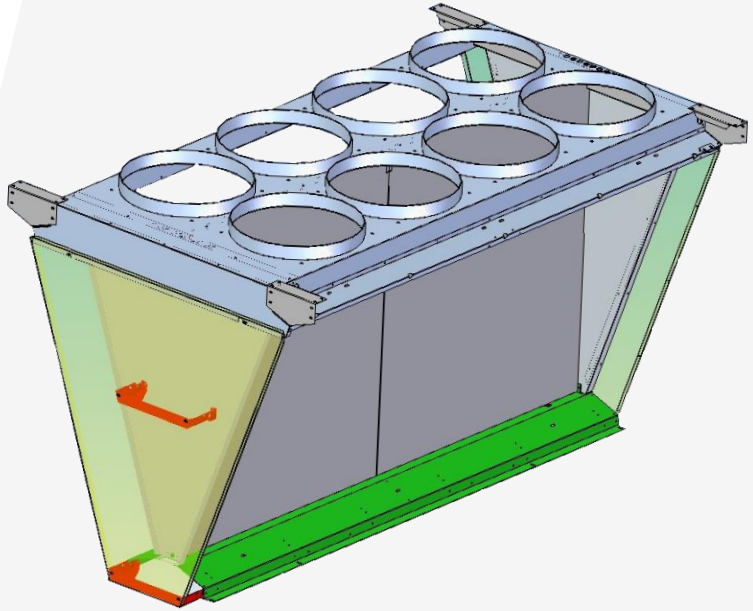
NX2-N-G06 - Technical insight

The fans

NX2-N-G06 units use a mixed solution of different size of fans to ensure independence between all the circuits:



Classical module configuration:
2 coils and **2 axial fans** (**800mm**-diameter)

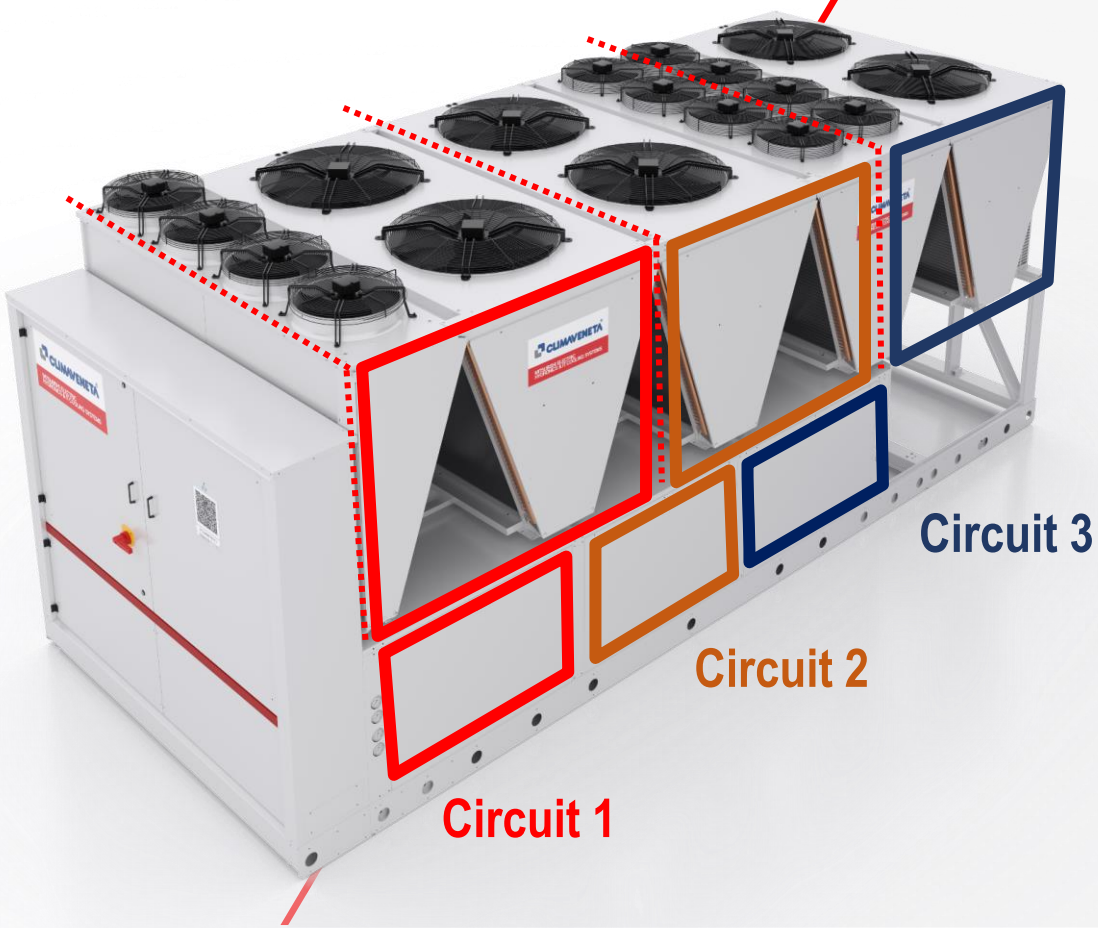


Alternative module configuration:
2 coils and **8 axial fans** (**450mm**-diameter)
with a division frame

NX2-N-G06 - Technical insight

The fans

Patented Solution – Structure of ventilation section



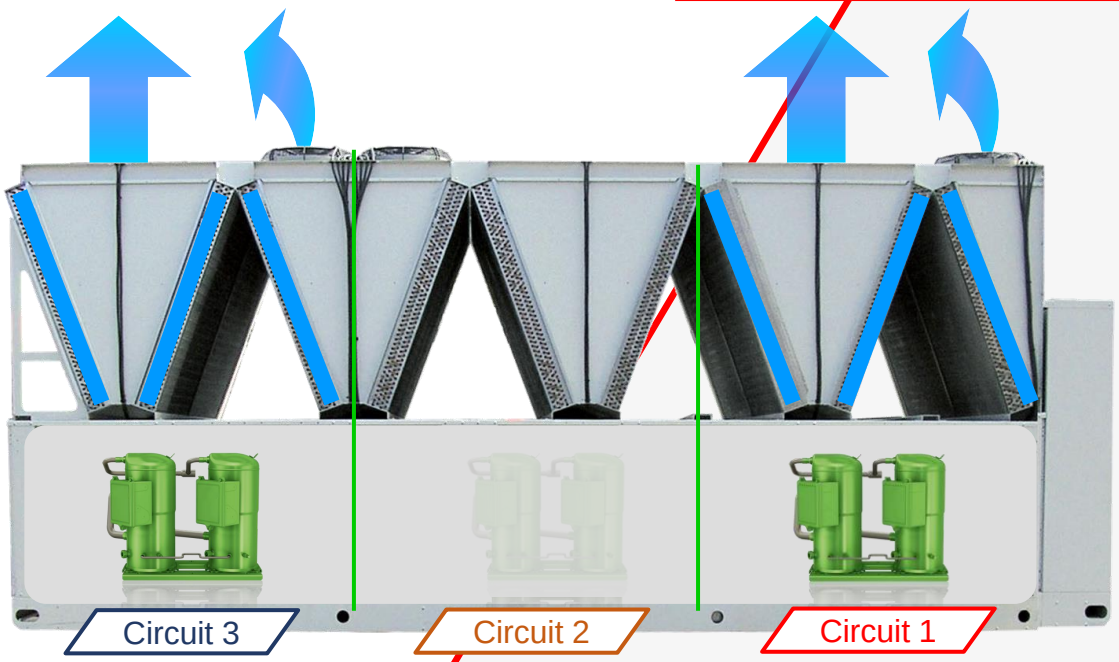
The use of a different shape of fans has allowed to adopt a 3-coil module, optimizing the capacity of compressors and achieving all the following benefits:

1) elimination of the reciprocal dependency on adjacent circuits
2) ability to manage independent defrost cycles at different time
3) higher efficiency in part load conditions thanks to a more accurate fans speed management
4) More compactness

NX2-N-G06 - Technical insight

The fans

Patented Solution – Structure of ventilation section



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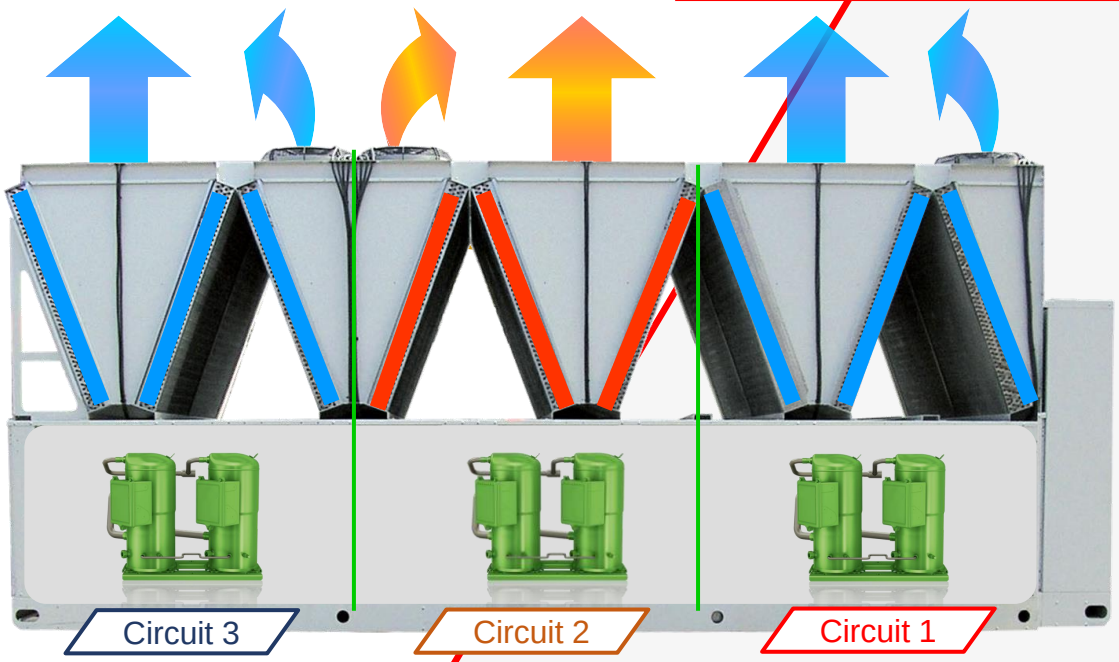
1) **elimination of the reciprocal dependency on adjacent circuits**
2) ability to manage independent defrost cycles at different time
3) higher efficiency in part load conditions thanks to a more accurate fans speed management

In the example figure above:
- circuit 2 is OFF
- circuits 3 (with a “share module”) can properly manage the air flow through the coil adjacent circuit 2
- the fans’ power consumption is optimized for managing the circuit 3 only

NX2-N-G06 - Technical insight

The fans

Patented Solution – Structure of ventilation section



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1) elimination of the reciprocal dependency on adjacent circuits

2) ability to manage independent defrost cycles at different time

3) higher efficiency in part load conditions thanks to a more accurate fans speed

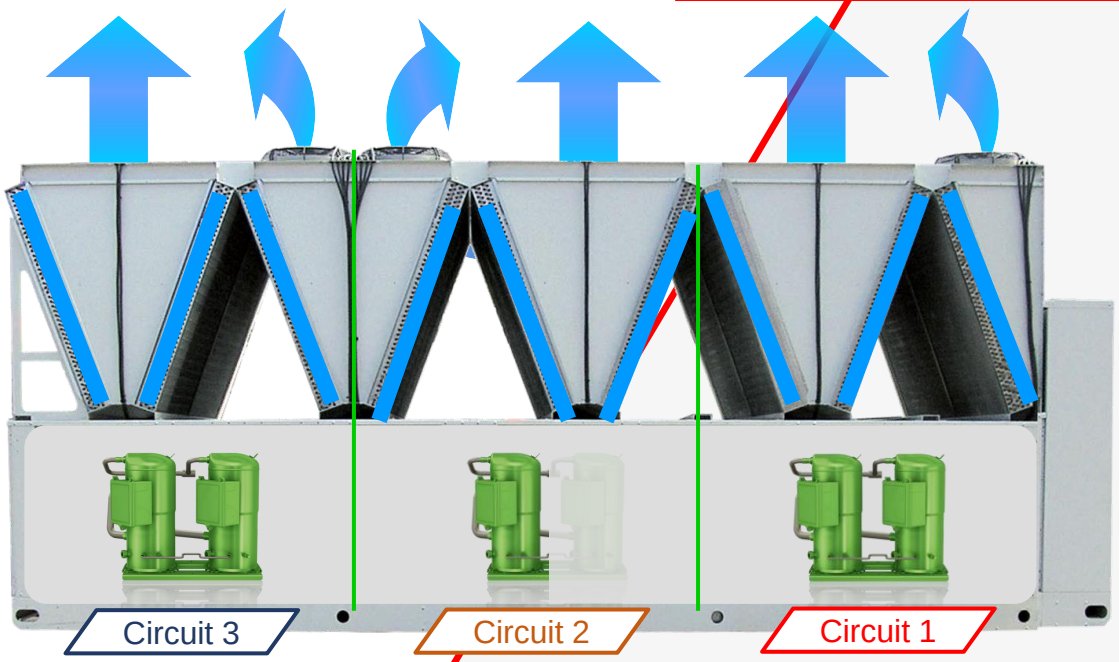
ctness

In the example figure above:
- circuit 2 is in defrost mode
- the ventilation on circuits 3 (with the “share module”) is still working, guaranteeing circuit 3 power and not affecting the defrost cycle of the adjacent circuit 2

NX2-N-G06 - Technical insight

The fans

Patented Solution – Structure of ventilation section



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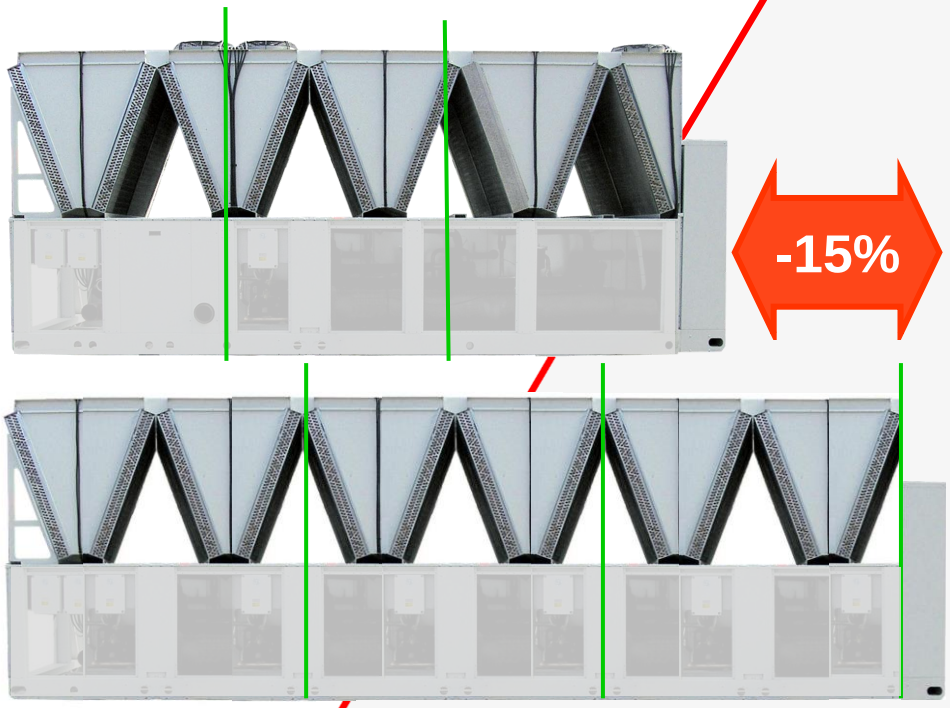
1) elimination of the reciprocal dependency on adjacent circuits
2) ability to manage independent defrost cycles at different time
3) **higher efficiency in part load conditions thanks to a more accurate fans speed management**
4) More compactness

In the example figure above:
- circuit 2 operates in part load with just one compressor working
- thanks to this patented solution, the ventilation on circuit 2 can be reduced compared to full load operation
- a unique ventilation system would had generated an oversized air flow through the coil in the “shared” module

NX2-N-G06 - Technical insight

The fans

Patented Solution – Structure of ventilation section



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1) elimination of the reciprocal dependency on adjacent circuits
2) ability to manage independent defrost cycles at different time
3) Higher efficiency in part load conditions thanks to a more accurate fans speed management

4) More compactness

The patented solution allows to include an odd number of coils for each circuit. Consequently, with the same load coverage, even half V-module can be used, reducing the footprint of the unit.

NX2-N-G06 - Technical insight

The electrical panel

Electrical wirings

- General door lock isolator
- Automatic circuit breakers (opt.)
- Terminals for cumulative alarm
- Remote on/off terminals

Set-point control

- **Pump control relay + 0-10V modulating signal** for external VSD pump control
- **4-20 mA** (analog input)
- **Set point compensation for outdoor temperature**

Other functions (opt.)

- **Demand limit**
- **Night mode**
- **Energy meter**
- **Remote probe for buffer tank / decoupler**
- **User limit control**
- **VPF and VPF.D variable flow control**

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NX²-N G06

316 - 800 kW

Air source reversible heat pumps
with multiple scroll compressors

NX2-N-G06 - Controls

The unit's control

W3000+ control software

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

Fully in-house developed

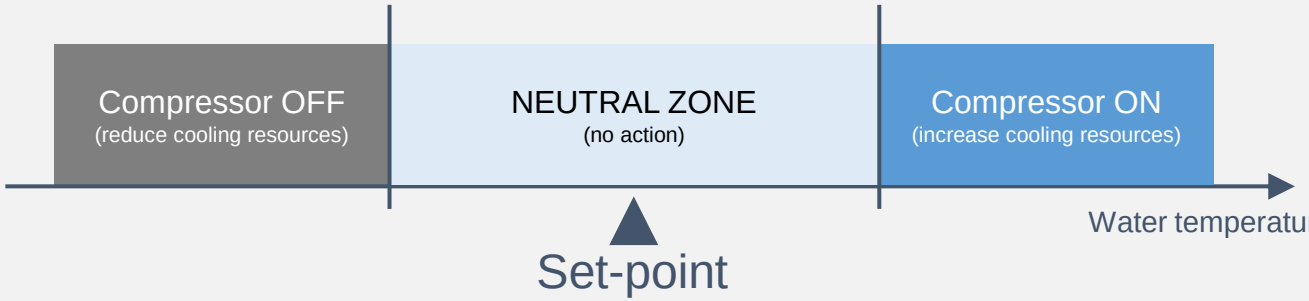
- **Thermoregulation**
  Based on the patented "Quick-Mind" outlet water temperature regulation logic.
- **Monitoring**
  Complete visualization of the operation status. User-friendly navigation.
- **Diagnostics**
  Complete alarm management, with "black-box" and alarm history.
- **Security**
  3 levels of password: user, service, manufacturer.
- **Connectivity**
  BMS: Modbus, LonWorks, BACnet MS/TP, BACnet-over-IP, Konnex, Modbus over IP, SNMP. Proprietary: Manager3000, ClimaPRO, M-net network.

NX2-N-G06 - Controls

Thermoregulation

Water temperature control

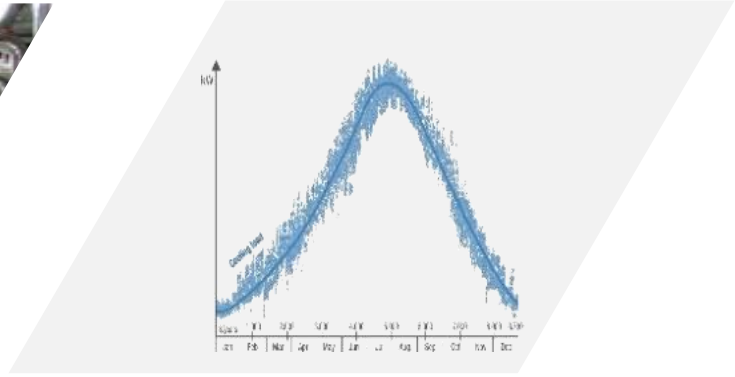
QUICK MIND



The width of the neutral zone is **dynamic** and automatically calculated on the basis of:

Maximum allowed number of start-ups per hour

Water content of the plant



Load requested by the plant

NX2-N-G06 - Controls

The user interface

Compact keyboard

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

KIPlink: the Keyboard is In your Pocket (opt.)

KIP LINK
Keyboard In your Pocket

Based on the **Wi-Fi technology**, KIPlink gets rid of the standard keyboard and allows one to operate on the unit directly from his **mobile device** (smartphone, tablet, notebook).

NX2-N-G06 - Controls

The user interface

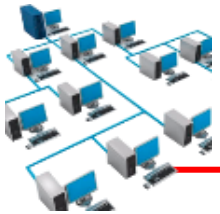
KIPlink: **LOCAL and REMOTE MONITORING FUNCTIONS**

Monitor and control the unit from a LAN device (PC, laptop, mobile phone) with a **simple web browser**

1 **PROXIMITY SMART KEYBOARD**
WI-FI

Available via MEHITS APP

3 **REMOTE FROM ANYWHERE**
Same as LOCAL via VPN



2 **LOCAL MONITORING**
LAN via TCP/IP

Ethernet

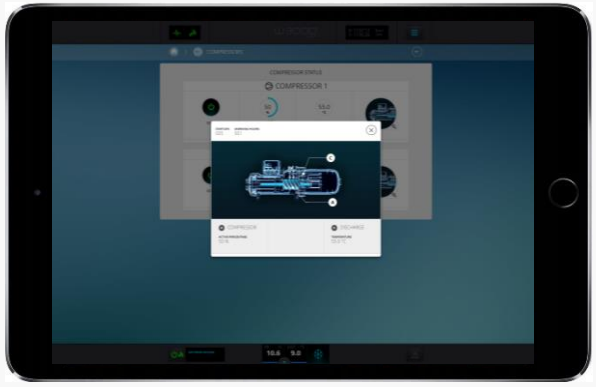
Customer VPN
Secure accessibility to LAN
(cyber security in charge of customer)

NX2-N-G06 - Controls

The user interface

KIP LINK
Keyboard In your Pocket

KIPlink: the Keyboard is In your Pocket (opt.)

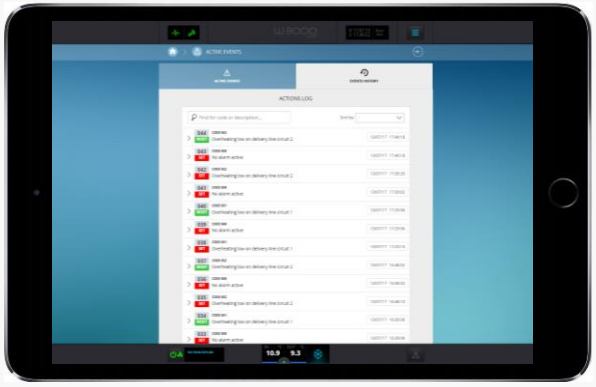


Easier on-site operation

- **Monitor** each component **while moving** around the unit for maintenance.
- View and change all parameters with **easy-to-understand screenshots** and dedicated tooltips.
- Get devoted “help” message for alarm reset and trouble shooting.

Real-time graphs and trends

- Monitor the **immediate labor status** of the compressors, heat exchangers, cooling circuits and pumps.
- View the real-time graphs of the key **operating variable trends**.



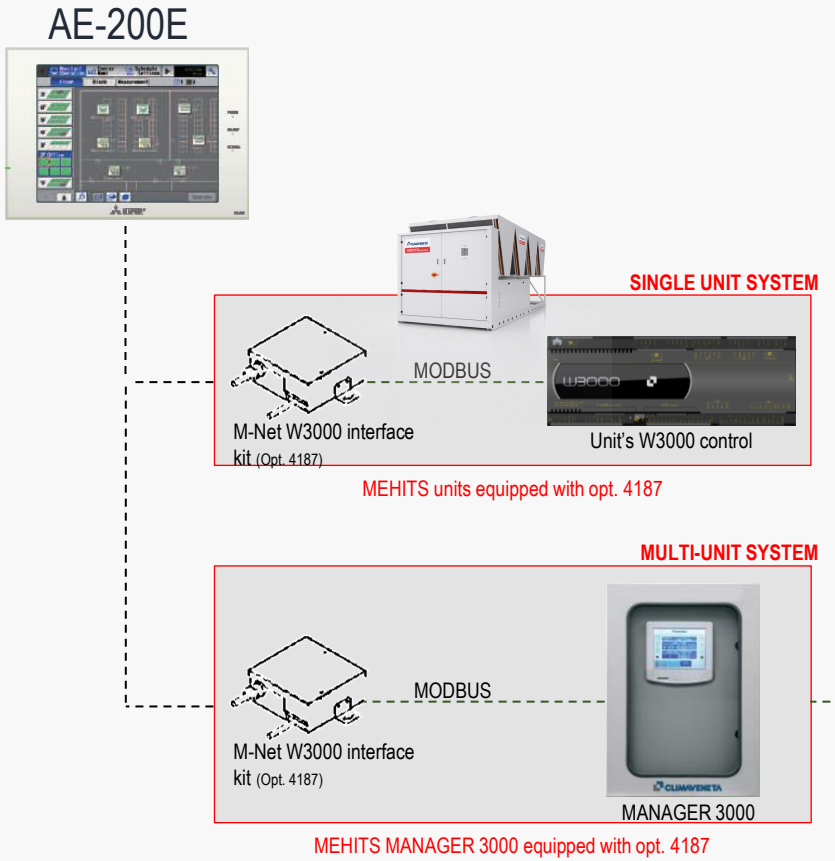
Data logger function

- View history of events and use the **filter for a simple search**.
- Enhance diagnostics with data and graphs of **10 minutes before and after** each alarm.
- **Download** all the data for detailed analysis.

NX2-N-G06 - Controls

Multi-unit system control

M-Net: connect to the Mitsubishi Electric network



- View the units and their working **status**
- **Alarm** display
- Control groups of units: **on/off**, **cooling/heating**, **set point**
- Set an **operating schedule** for each group of units
- **Web app**
- Compatible with Mitsubishi Electric:
  AE-200E, AE-50, EW-50 (Ver. 7.68 or later)

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316 - 800 kW

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NX2-N-G06 - Performance

Efficiency versions

COOLING | SCROLL | EC AXIAL
HEATING | T SHELL&T. | AXIAL

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NX²-N G06

316 – 800 kW

/K **Key efficiency,** compact units that grant the best cooling-heating capacity/footprint ratio

/A **High efficiency** units, with larger heat exchange surfaces for higher efficiency levels

/SL **Super low noise units**, with dedicated fans speed calibration, oversized condensing/ evaporating section and soundproofing of the most critical components for a lower sound power level

NX2-N-G06 - Performance

Efficiency versions

COOLING | SCROLL | EC AXIAL
HEATING | SHELL&T. | AXIAL

EUROVENT CERTIFIED PERFORMANCE
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NX2-N G06

316 – 800 kW

COOLING UP TO

EER	SEER
3,06	4,64

HEATING UP TO

COP	SCOP
3,32	4,04

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

NX2-N-G06 - Performance

Acoustic levels

3 sound configurations:

-	**Standard** Very low sound power levels already in the standard form, thanks to the dedicated compressors compartment	Baseline
Opt. 2312	**Acoustical enclosure** Additional compressor enclosures with sound-absorbing material, for even lower sound power levels	-2 dB(A)
/SL	**Super low noise version** Soundproofing insulation, compressor sound jackets, oversized condensing/evaporating section and calibrated fan speed for a better sound power level.	-8 dB(A)

COOLING
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NX²-N G06

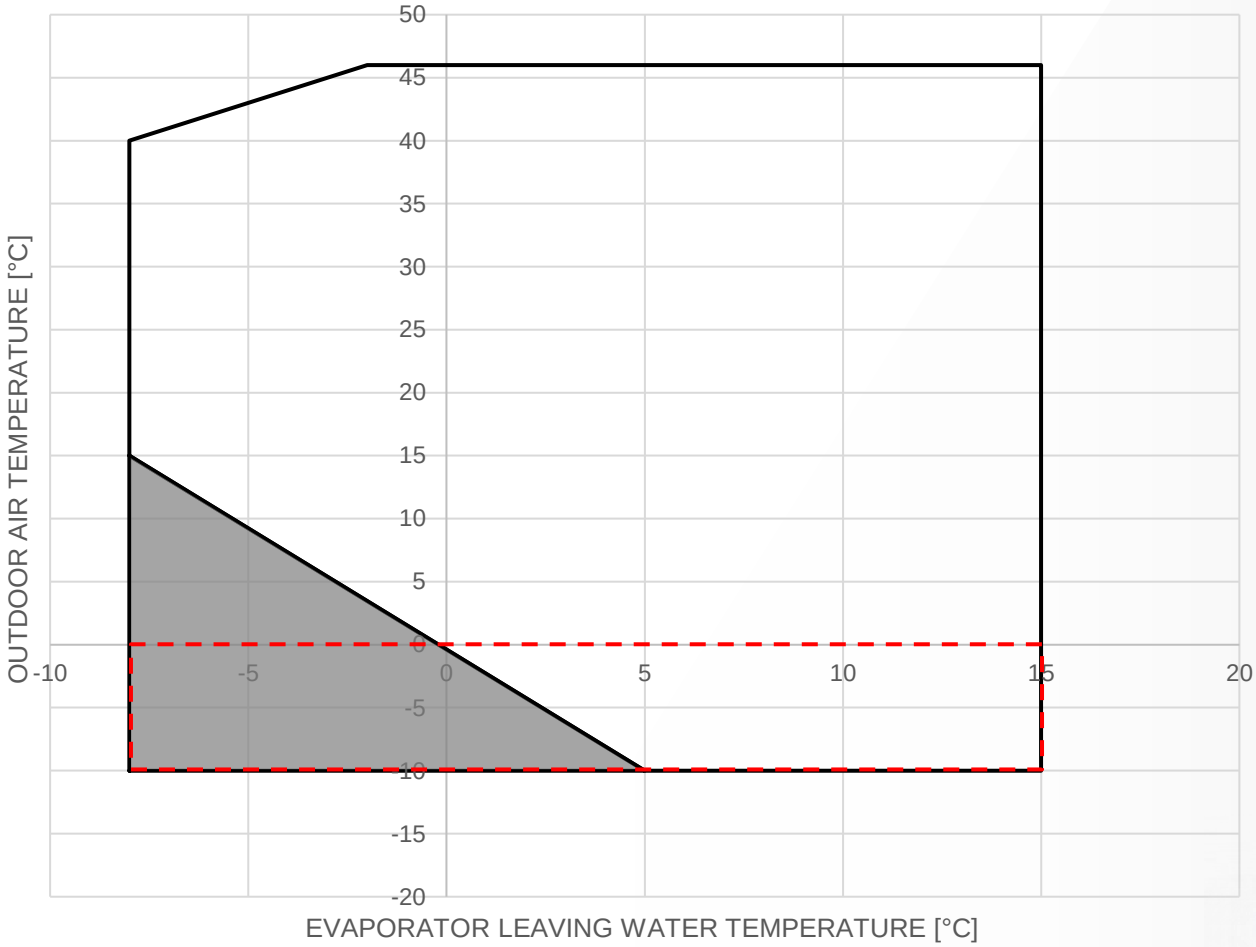
316 - 800 kW

Air source reversible heat pumps
with multiple scroll compressors

NX2-N-G06 - Operating limits

316 – 800 kW COOLING

Cooling



STD

EC fans (code 808)
- optional for versions /K and /SL
- optional from size 0344 to size 546, version /A
- STD from size 0606 to size 0808, version /A

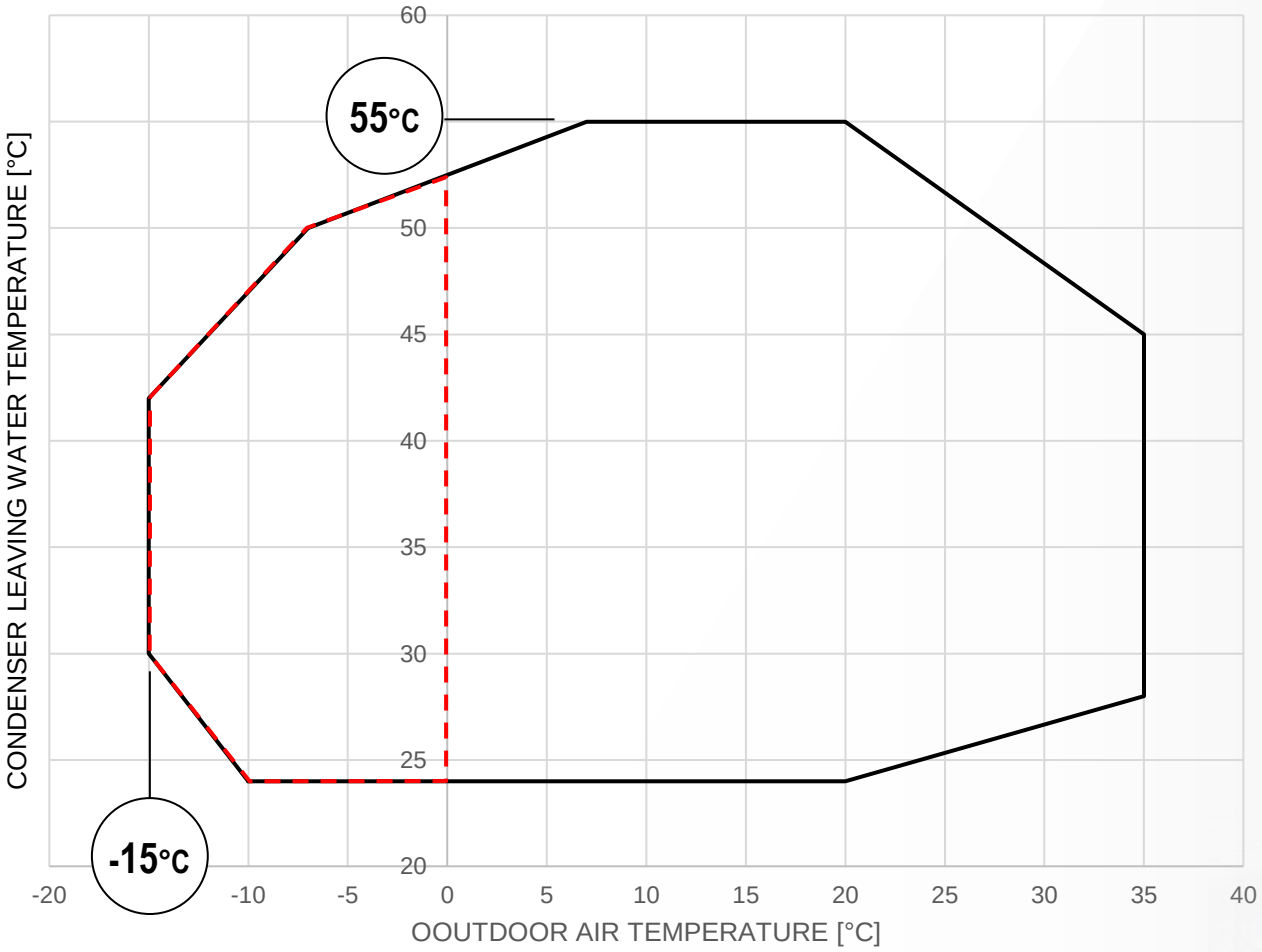
Antifreeze heaters on buffer tank (opt. 2421)

For the temperature limits of each size please refer to the selection software ElcaWorld

NX2-N-G06 - Operating limits

316 – 800 kW HEATING

Heating



STD

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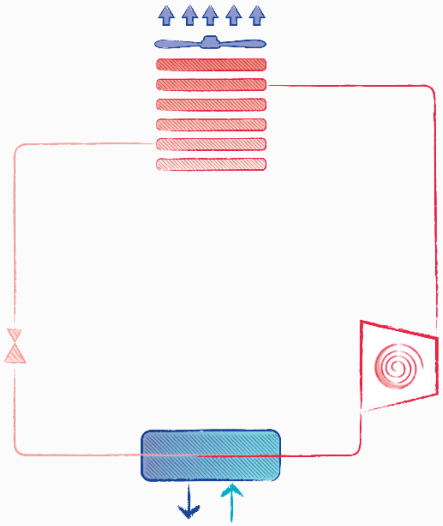
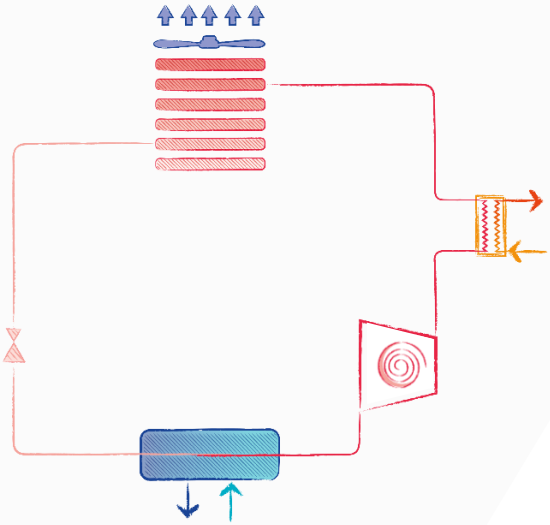
NX2-N-G06 - Heat recovery

Configuration overview

Standard



Partial heat recovery

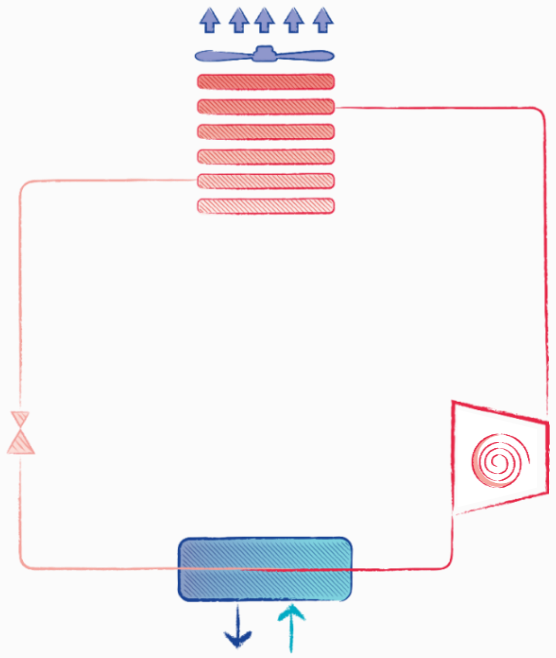


The heat recovery provides heating capacity for free.
Suitable for **DHW** production, **integration of a boiler**, air treatment in **AHU**.

NX2-N-G06 - Heat recovery

Standard configuration

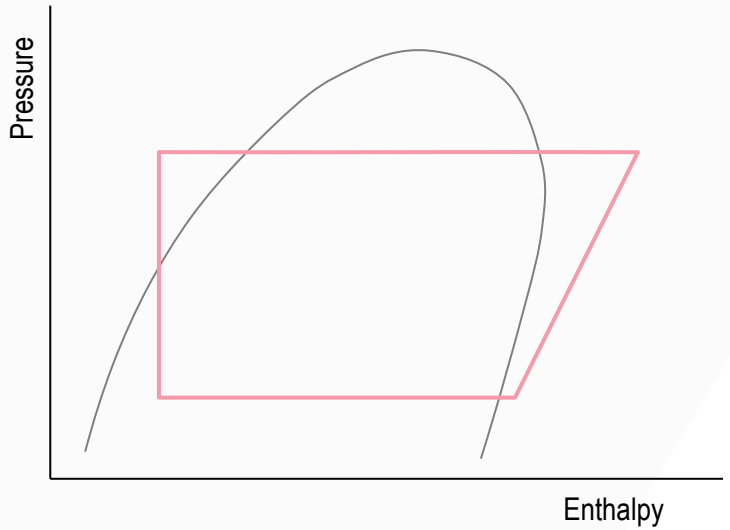
Standard



Standard refrigerant circuit.

No heat recovery

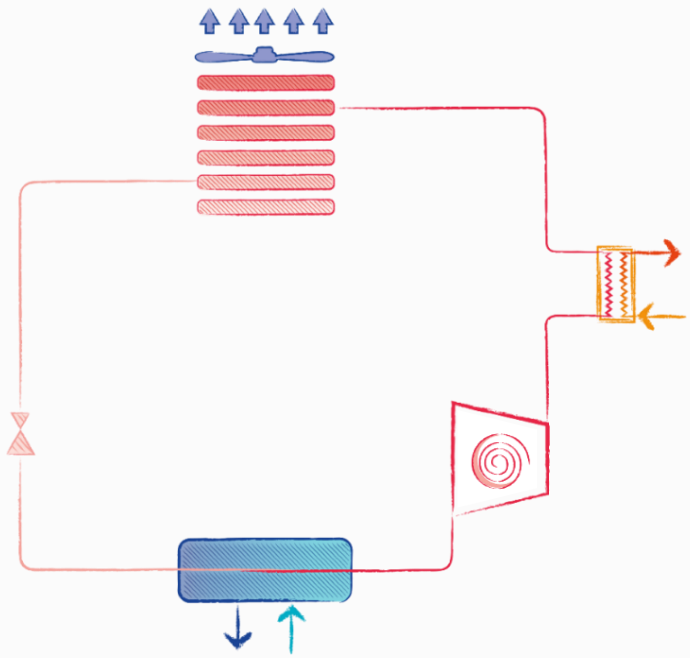
All the condensation heat is dispersed in the air.



NX2-N-G06 - Heat recovery

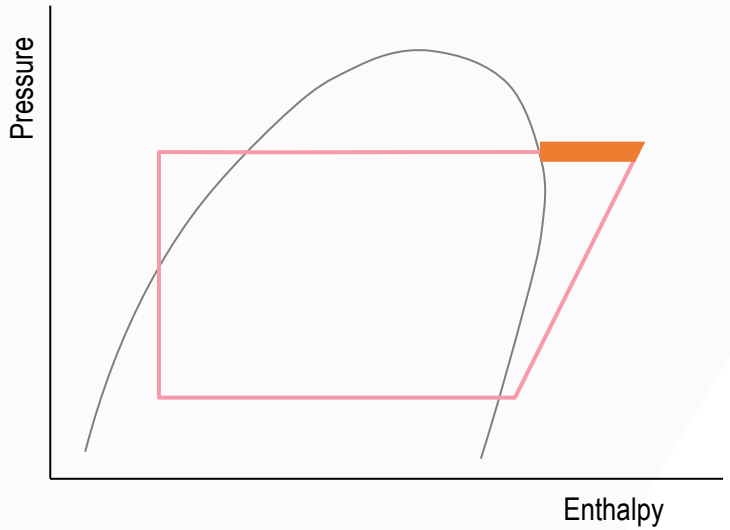
/D - Partial heat recovery configuration

Partial heat recovery



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

Up to **60°C** of outlet temperature



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

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

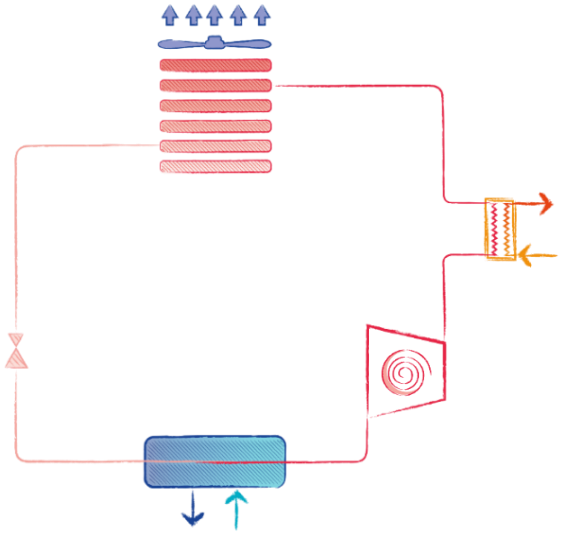
NX2-N-G06 - Heat recovery

/D - Partial heat recovery configuration

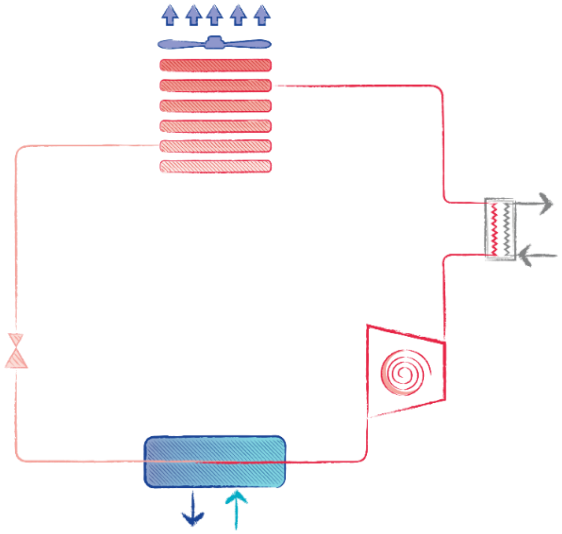
The desuperheater can recover the heat only when the temperature of the hot water circuit is lower than the **compressor discharge temperature**.

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



COOLING
HEATING
SCROLL
R R454B

NX²-N G06

316 - 800 kW

Air source reversible heat pumps
with multiple scroll compressors

NX2-N-G06 - Hydronic

Hydronic modules

Hydronic modules

The **fully integrated hydronic module** (opt.) includes the pumps, the buffer tank, and 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 configuration
- 2-pole motor
- Single or twin pumps
- Low or high head (approx. 100 or 200 kPa).

Pumps + Inverter

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

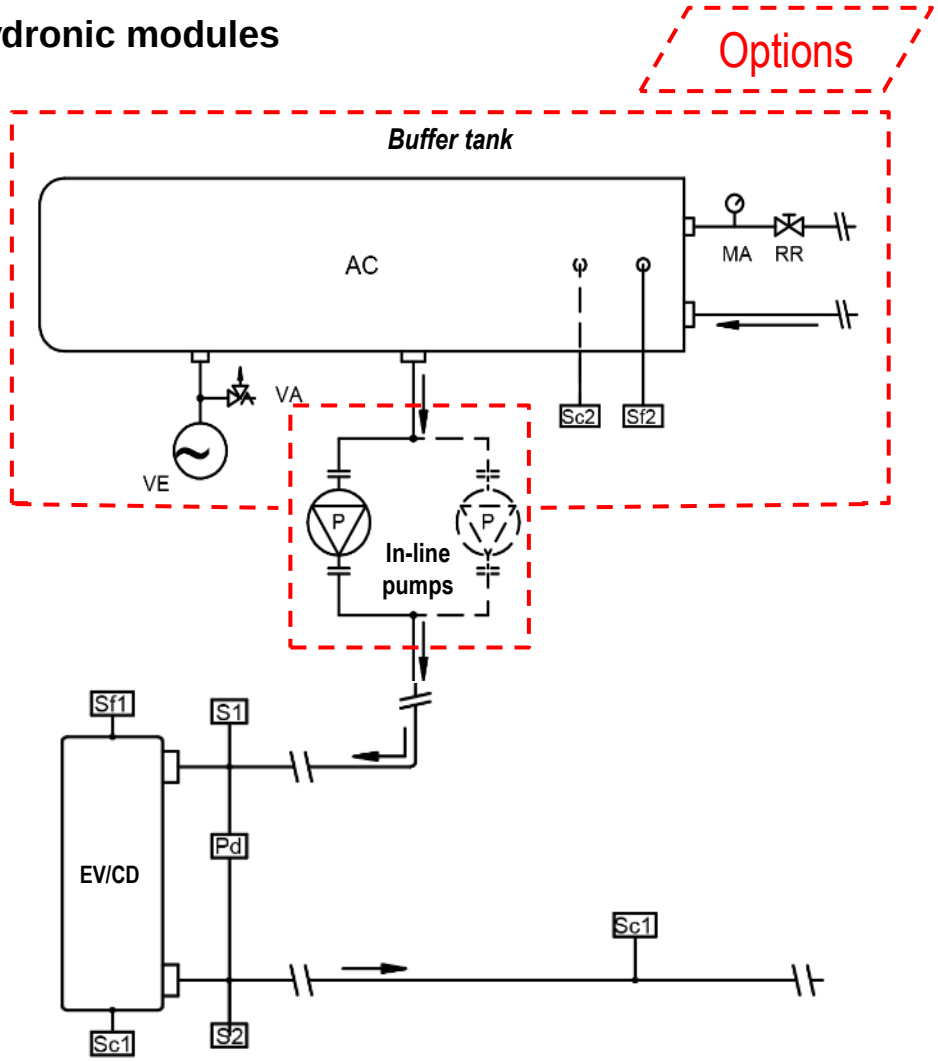
Pumps + Buffer tank

- Up to 1000 liters buffer tank
- 20 mm insulation lining
- Including: expansion vessel, safety valve, manometer.

Sniffer function: When there is no request for cooling production, the primary pumps (built-in or external) are switched off and activated periodically only to let the unit read the water temperature and sense the cooling request inception.

NX2-N-G06 - Hydronic

Hydronic modules



Hydraulic components

AC	Water tank
EV	Evaporator
CD	Condenser
P	Water Pump
Pd	Differential pressure switch
RR	Filling valve
S_	Temperature probe
SC	Water drain valve
SF	Air vent valve
VA	Pressure relief valve
VE	Expansion vessel

NX2-N-G06 - Hydronic

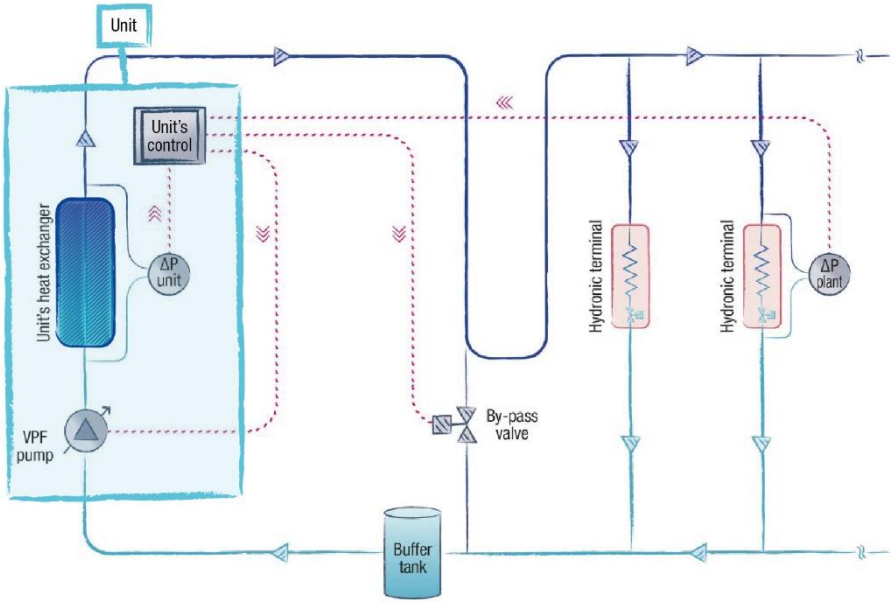
Variable Primary Flow – single-unit plants

VPF
Variable Primary Flow

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.

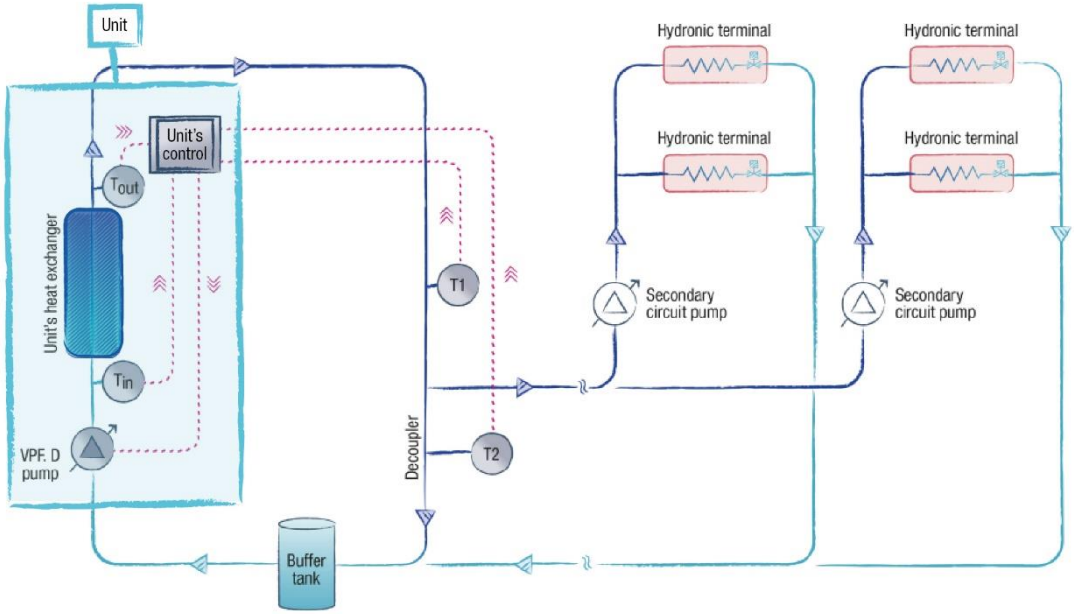
VPF: constant ΔP

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.

NX2-N-G06 - Hydronic

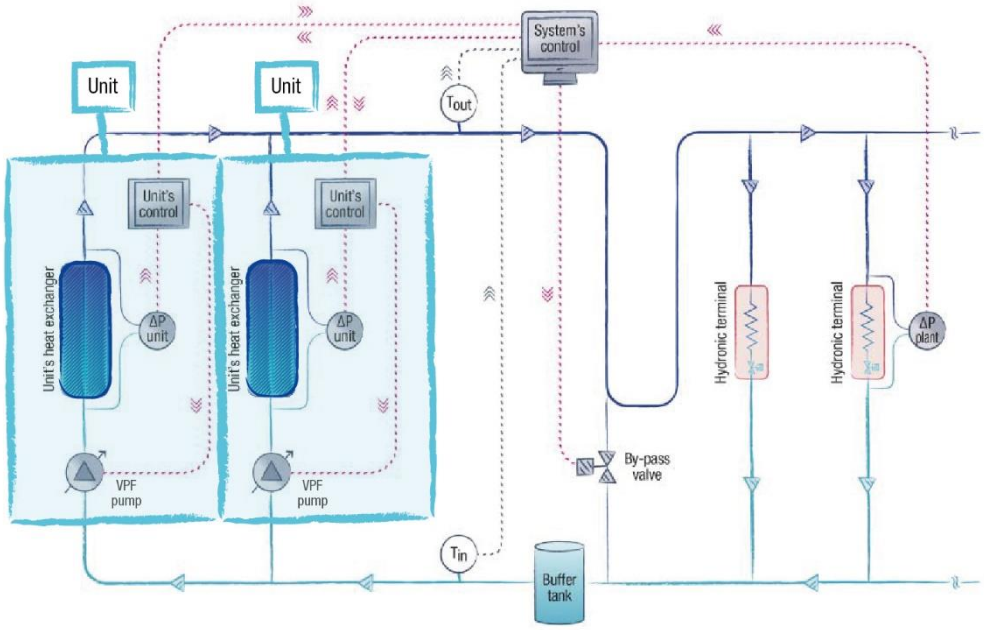
Variable Primary Flow – multiple-unit plants with EXTERNAL GROUP CONTROL (Manager3000+ or ClimaPRO+)

VPF Variable Primary Flow

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.

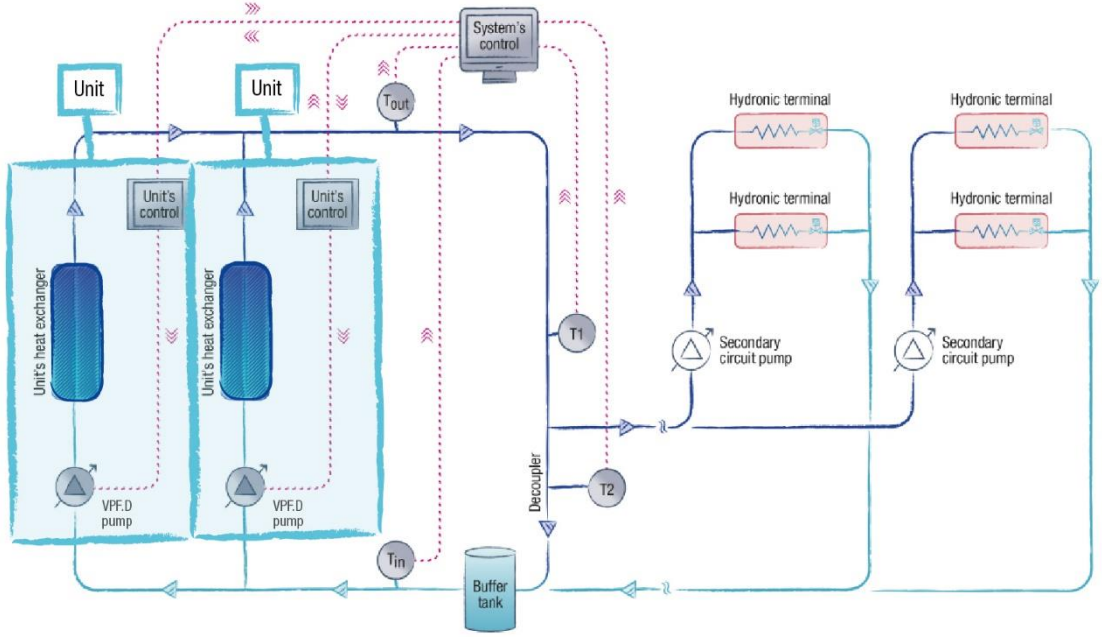
VPF: constant ΔP

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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316 - 800 kW

Air source reversible heat pumps
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NX2-N-G06 - Coils & coatings

The environments

Rural environment

Urban environment

Different environments need for different solutions

Marine environment

Industrial environment

NX2-N-G06 - Coils & coatings

Technologies and treatments

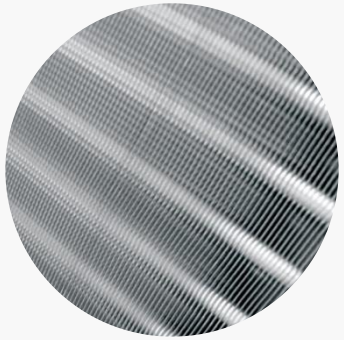
TUBE & FIN COILS

Cu/Al - Regular (STD)

Cu/Al - Pre-painted fins (Opt. 894)

Cu/Al - Spray coating (Opt. 895)

Cu/Cu - Tube & fin coil (RFQ)



NX2-N-G06 - Coils & coatings

Technologies and treatments

TUBE & FIN COILS

Cu/Al - Regular (STD)

Cu/Al - Pre-painted fins (Opt. 894)

Cu/Al - Spray coating (Opt. 895)

Cu/Cu - Tube & fin coil (RFQ)

Pre-painted fins	Polyester resin ✓ **1000 h** ASTM B117 ✓ **UV** rays	Opt. 894
Fin Guard Silver SB Thermoguard	Polyurethane resin ✓ **3000 h** ASTM B117 ✓ **UV** rays	Opt. 895
PoluAl XT Blygold	Polyurethane resin ✓ **4000 h** ASTM B117 ✓ **UV** rays	RFQ
Heresite P-413C Heresite Protective Coating, LLC	Phenolic resin ✓ **6000 h** ASTM B117 ~ **UV** rays	RFQ

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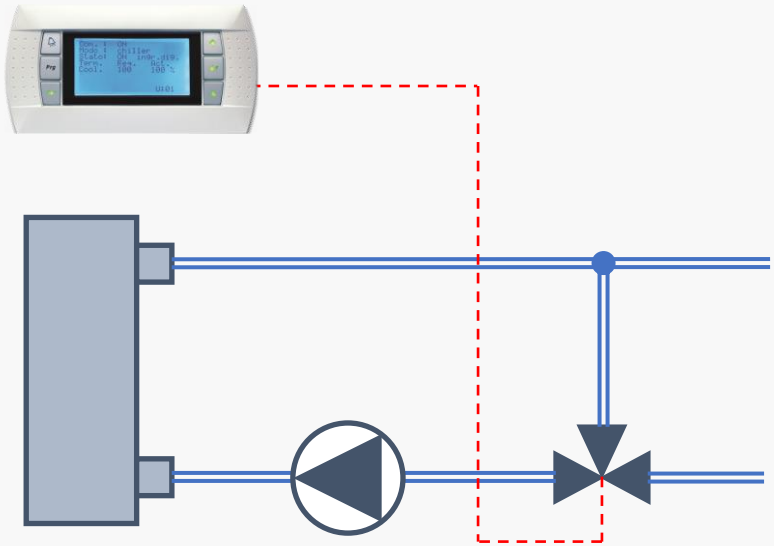
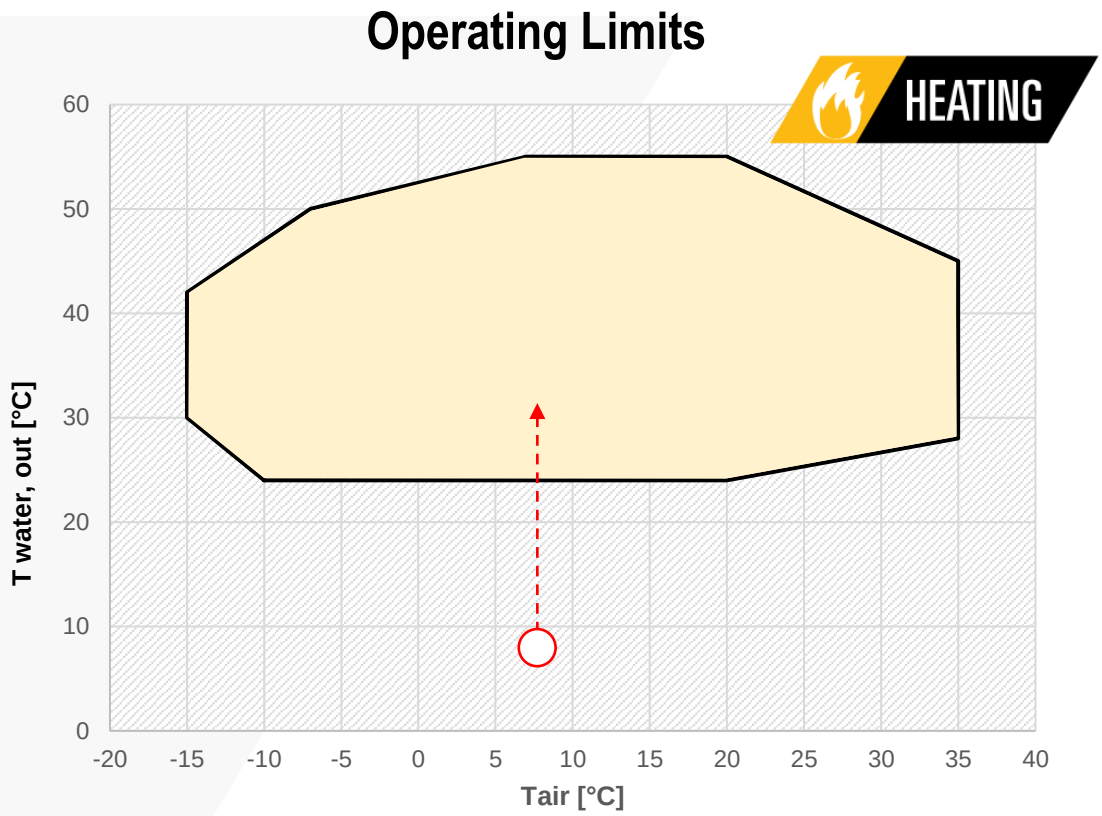
NX2-N-G06 - Further options

Reliability

User limit control

Controls a 3-way mixing valve to ensure unit's safe start-up and operation in case of critical water temperatures.





NX2-N-G06 - Further options

Electrical and mechanical accessories

Compressor power factor correction (Opt. 3301)
The capacitors on the compressor line increase the unit's power factor.

Soft-starter (Opt. 1511)
Lowers the motor windings' mechanical wear and avoids mains voltage fluctuations during start-up.

Energy meter for BMS (Opt. 5924)
Acquires the unit's power consumption data and sends them to the BMS for energy metering (Modbus RS485).

Spring anti-vibration mountings (supplied loose)
Reduce vibrations, keeping noise transmission to a minimum.

Water flow switch (supplied loose)
Stops and protects the unit in case the water flow is not sufficient.

Refrigerant leak detector (Opt. 3431)
Factory installed device, placed within the compressor enclosure. In case of a gas leak detection it raises an alarm.

Refrigerant leak detector + compr. off (Opt. 3433)
Factory installed device, placed within the compressor enclosure. In case of a gas leak detection it raises an alarm and stops the units.

Dual pressure relief valves (Opt. 1961)
The periodic safety valve maintenance can be done, without removing the refrigerant from the circuit.

Anti-intrusion grilles (Opt. 2021)
Perimeter metal grilles to protect against the intrusion of solid bodies into the unit structure.

NX2-N-G06 - Further options

Packaging options

Standard packing
- Plastic supports
- Lifting eye-plates

Container slides* (Opt. 9996)
- Metal slides
- Lifting eye-plates

Container packaging* (Opt. 9979)
- Metal slides
- Protective nylon layer
- Lifting eye-plates

Wooden box packing (Opt. 9972)
- Protective nylon layer
- Wooden crate
- Lifting eye-plates

Wooden cage packing (Opt. 9972)
- Protective nylon layer
- Wooden crate
- Lifting eye-plates

Marine packing (Opt. 9974)
- Lifting eye-plates
- Wooden crate
- Barrier bag (three layers of polyethylene, polyester and aluminum; vacuum packed with salt inside for hygroscopic function)

Supports and Nylon (Opt. 9999)
- Protective nylon layer
- Plastic supports
- Lifting eye-plates

* The selection of option *808 - EC fans* implies an increasing of the unit's height for the following sizes:
/K: 0344, 0364, 0404, 0446, 0506, 0526, 0546; /SL: 0344, 0446, 0506, 0526; /A: 0446
The final height including container slides is 2565 mm.

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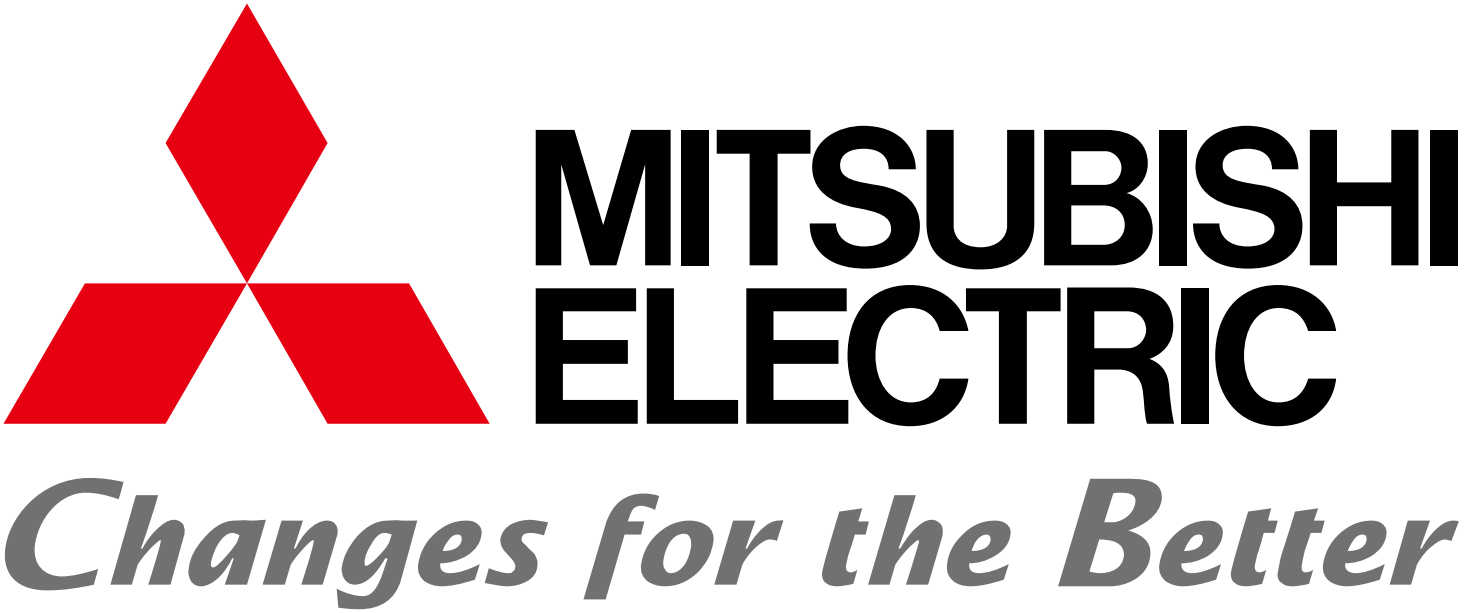
SELLING POINTS

- R454B refrigerant, with a GWP of 467, is the lowest-GWP alternative to R410A in this category of products
- 12 sizes, large capacity range (316 - 800 kW)
- Two efficiency versions and one super low noise version (-8 dBA)
- Large operating envelope: from -15°C to +35°C of outdoor air temperature, std water outlet temperature up to 55°C
- Redundancy: up to 4 refrigerant circuits, to minimize the downtime
- Patented ventilation section layout, with the use of different fan sizes
  - elimination of the reciprocal dependency on adjacent circuits
  - ability to manage independent defrost cycles at different time
  - higher efficiency in part load conditions thanks to a more accurate fans speed management
- Huge list of options available (VFD pumps, VPF systems, Kiplink control system, EC fans, acoustical enclosure (-2dBA) ..)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Changes for the Better