

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32
ELCA_Engine ver.4.7.0.0



i-NX2-G07 0051 - 0112

50,1-110 kW
Chiller, air source for outdoor installation



R R32

SCROLL

P PLATES

(The photo of the unit is indicative and may vary depending on the model)

- ✓ **LOW GWP REFRIGERANT**
- ✓ **HIGH EFFICIENCY AT PARTIAL LOAD**
- ✓ **EXTREMELY SILENT OPERATION**
- ✓ **EXTREME COMPACTNESS**
- ✓ **WIDE OPERATING RANGE**
- ✓ **ALUMINIUM MICRO-CHANNEL HEAT EXCHANGERS**
- ✓ **PLUG&PLAY SOLUTION**

1	CERTIFICATIONS	pg.5
1.1	Product certifications	pg.5
1.2	Voluntary product certifications	pg.5
1.3	System certifications	pg.5
2	PRODUCT FEATURES	pg.7
2.1	Product features	pg.7
3	PRODUCT PRESENTATION	pg.8
3.1	Green certification relevant	pg.8
3.2	Unit description	pg.9
3.3	Key features	pg.9
3.4	Operating principle	pg.10
4	INCIPIIT	pg.13
5	UNIT DESCRIPTION	pg.14
5.1	Standard unit composition	pg.14
5.2	Unit standard composition – additional information	pg.19
5.3	Versions	pg.22
5.4	Configurations	pg.22
5.5	Electronic controller	pg.23
6	OPTIONS	pg.25
6.1	Options	pg.25
6.2	Options - additional information	pg.36
7	GENERAL TECHNICAL DATA	pg.42
8	TECHNICAL DATA SEASONAL EFFICIENCY IN COOLING (EN14825 VALUE)	pg.43
9	OPERATING LIMITS	pg.44
9.1	Operating limits - graphs	pg.44
10	HYDRAULIC DATA	pg.47
11	ELECTRIC DATA	pg.48
11.1	Electrical data	pg.48

11.2 Dimensions of the electrical connections to the main switch	pg.49
12 FULL LOAD SOUND LEVEL	pg.50
13 DIMENSIONAL DRAWINGS	pg.51
13.1 Dimensional drawings	pg.51
13.2 Legend of pipe connections	pg.57
14 HYDRONIC KIT	pg.59
14.1 Hydronic groups	pg.59
15 ATTACHMENTS	pg.78
15.1 Variable flow control	pg.78
15.2 Compressor rephasing and electromagnetic compatibility	pg.92

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The units highlighted in this publication contain R32 [GWP₁₀₀ 677] fluorinated greenhouse gases.

LEGEND

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32

Functions

Cooling

Refrigerant

R32

Compressors

Scroll compressor

Fan

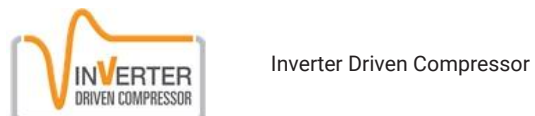
EC axial fan

Exchangers

Plates heat exchanger

Other features

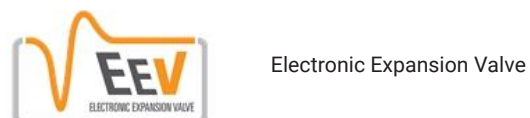
Eurovent



Inverter Driven Compressor



VPF



Electronic Expansion Valve

1.1 Product certifications



1.2 Voluntary product certifications



Check ongoing validity of certificate:
www.eurovent-certification.com
or
www.certiflash.com

1.3 System certifications



Occupational Health and Safety Management System complying with the requirements of BS OHSAS 18001:2007



Quality System complying with the requirements of UNI EN ISO9001:2008 regulation



Environmental Management System complying with the requirements of UNI EN ISO14001:2004 regulation

2.1 PRODUCT FEATURES

THE VERSATILE AND MULTI-FUNCTIONAL CHILLER FOR ALL APPLICATIONS

The chiller units are used in many applications, even completely different from each other, for the versatility and flexibility that distinguishes them.

MEHITS 'many years of experience combined with MELCO know-how, design specifications and technical support has led to the development of an ideal solution to the main challenges posed by comfort, industrial processes up to IT Cooling applications, without making any compromises.

COMFORT applications

- Top-level performance at partial load
- Extremely silent unit
- Extremely compact unit
- Extremely large operating map (down to -20°C and up to 50°C of outdoor air temperature)
- Plug&play solution, thanks to integrated pumps kit + buffer tank

PROCESS applications

- Large operating map at low temperature (down to -12°C of evap. leaving water temperature and down to -20°C of outdoor air temperature)
- Extremely high reliability components
- Fully accessible service points for an easier maintenance
- Availability of refrigerant leak detection options
- Several coil solutions including e-coated mchx, Cu/Al, pre-painted fins and fin guard silver

IT-COOLING applications

- High leaving water temperature up to 24°C
- Mission critical equipment
- LAN functions with up to 8 units
- HPC software optimize the entire chillers + CRAHs systems
- Wide option availability ideal for this kind of applications (demand limit, external capacity cap, thermal energy meter)

3.1 Green certification relevant

FOCUS ON GREEN CERTIFICATION RELEVANT

Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A., as a major player in the world HVAC market and a leading manufacturer of energy efficient, sustainable HVAC solutions, recognizes and supports the diffusion of green certification systems, as an effective way to deliver high performance buildings and improve the quality and the sustainability of the built environment.

Since the first certification system was introduced at the beginning of the 1990s, the demand for certified buildings has grown considerably, as well as the number of standards, rating and certification programs. Operating worldwide Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A., has extensive experience with many of them and is active member of Green Building Council Italy.

Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A., commitment to develop responsible and sustainable HVAC solutions, is reflected by a full range of premium efficiency products and systems, designed with special care to improve building energy performance ratings, according to major certification protocols, including LEED, BREAM, GREENSTAR, BCA, NABERS, DNGB, HQE and BEAM.

To find out more about how our products contribute to enhanced green certification rating and energy performance of a building, please refer to:
https://www.melcohit.com/EN/Environment/green_certifications/



3.2 Unit Description

Outdoor unit for the production of chilled water with variable speed Scroll compressors, optimized for R32 in a single-circuit configuration, micro-channel full-aluminum condenser coils, braze welded plate heat exchanger, axial-flow variable speed fans (inverter driven) with BLDC motor and electronic expansion valve as standard.

Flexible and reliable unit; it easily adapts to different thermal load conditions thanks to the precise temperature control together with the use of inverter technology. The high performance levels, both at full and partial loads, is achieved thanks to the unit's accurate design and to the use of a fixed speed motor together with a variable speed (inverter) motor. Thanks to the high-end proprietary technology and to the accurate design, the units shows very high efficiency values, especially at partial loads.

3.3 Key Features

LOW GWP REFRIGERANT

The pure refrigerant R32 is an extraordinary eco-sustainable alternative to traditional refrigerant R410A, offering a 66% reduction in terms of GWP, a higher efficiency and a lower refrigerant charge.

HIGH EFFICIENCY AT PARTIAL LOAD

Top-level partial load efficiency thanks to proprietary technological solutions at the forefront: VSD scroll compressors, variable speed fans with BLDC motor as standard and advanced control algorithms.

EXTREMELY SILENT OPERATION

The best compromise between silence and efficiency, as result of a systematic design oriented to minimize noise levels.

EXTREME COMPACTNESS

The precise design and the meticulous attention to the details of each single component make this range the best-in-class solution in terms of footprint per kW.

WIDE OPERATING RANGE

Unit operation with outdoor air temperature from -20°C up to 50°C. Production of evaporator leaving water temperature from -12°C to 24°C to suit every application.

ALUMINIUM MICRO-CHANNEL HEAT EXCHANGERS

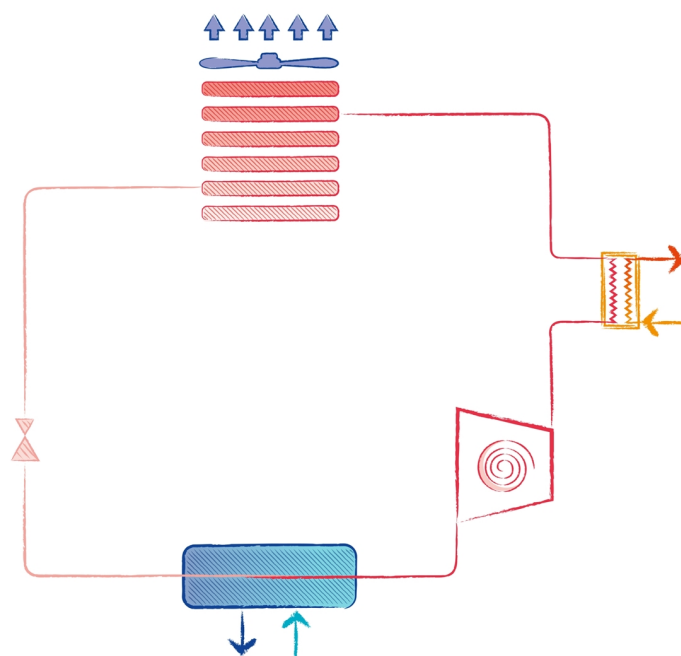
The full aluminium micro-channel condenser coils deliver high efficiency while ensuring a reduced refrigerant volume and a lower unit weight. The e-coating protection (optional) grants the highest level of corrosion resistance in any condition, even in the most aggressive environments.

/D, unit with partial heat recovery

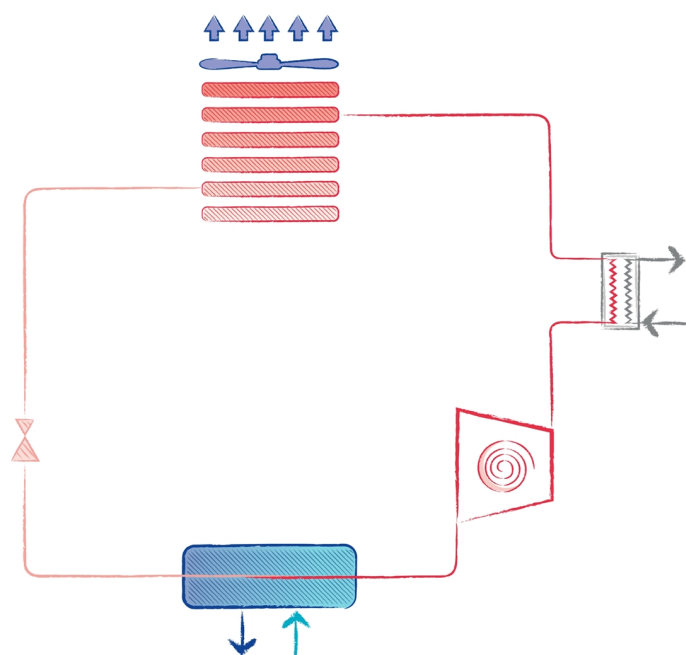
The refrigerant circuit is fitted with a desuperheater.

The superheating heat recovery is only possible when the temperature of the hot water circuit is lower than the compressor discharge temperature. The heat recovery and its amount depends on the unit's operating conditions, in particular the outdoor air temperature and the load percentage. 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)



i-NX2-G07 / D / 0112

Size

First 3 digits
Cooling capacity *0,1
Last digit
Number of compressors

Configurations

-
Basic function
D
Partial condensing heat recovery
function

Product

i-NX2-G07
Chiller, air source for outdoor
installation
Refrigerant gas R32

5.1 Standard unit composition

Chiller, air source for outdoor installation

Outdoor unit for the production of chilled water with variable speed Scroll compressors, optimized for R32 in a single-circuit configuration, micro-channel full-aluminum condenser coils, braze welded plate heat exchanger, axial-flow variable speed fans (inverter driven) with BLDC motor and electronic expansion valve as standard.

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The unit is supplied fully refrigerant charged and factory tested. On site installation only requires power and hydraulic connection.

Structure

Structure specifically designed for outdoor installation. Base and frame in hot-galvanised steel sheet of suitable thickness. All parts polyester-powder painted to assure total weather resistance. Color Munsell 5Y 8/1.

The compressors and most of the components of the cooling circuits are housed in a special box designed to guarantee noise emission reduction and easy inspection.

All the surfaces of the structure have a precise inclination, designed to guarantee complete drainage.

Refrigerant circuit

Main components of the refrigerant circuit:

- R32 refrigerant
- Electronic expansion valves
- refrigerant line sight glass with humidity indicator
- high and low pressure transducers
- crankcase heater on each ON/OFF compressor
- smart device to maintain the oil temperature of the inverter compressors
- metal mesh filters upstream of the expansion valves
- DBF device as standard
- liquid separators and oil recovery circuit

UNIT DESCRIPTION

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

R32 REFRIGERANT

The refrigerant used in these units is R32, a pure refrigerant, highly efficient and characterized by an ODP (Ozone Depletion Potential) index of 0 (zero) and a GWP (Global Warming Potential) value of 675.

Refrigerant gases are classified according to their degree of toxicity and flammability (ISO 817-2014).

The R32 is classified as A2L: the first digit defines toxicity (A: NON-TOXIC), while the last digits define the flammability level (2L: MILDLY FLAMMABLE - low burning velocity). It is classified by PED Directive into Group 1.

With regard to flammability, it is important to underline that the R32 is flammable only in high concentrations.

The triggering occurs only in the presence of a very high energy source, such as a flame with a minimum temperature of 648°C.

Moreover the flame propagation speed is very low, equal to 0.10 m/s.

It should be noted that if the power source is turned off, the flame is extinguished.

The Lower Flammability Limit (LFL Index) is 0.307 kg / m³.

ADVANTAGES OF THE R32

Comparing the characteristics of the R32 refrigerant with the R410A we obtain a series of advantages such as:

- It is more efficient
- At the same cooling capacity, the amount of refrigerant charge is reduced
- Reduces the electrical consumption of the machine
- As pure gas it is easy to load and recover
- Has a significantly reduced environmental impact

• All operations on the unit must be performed by trained and qualified personnel on flammable refrigerants handling, in accordance with the relevant local standards and codes of practice.

• The refrigerant is heavier than air and can stagnate, reaching a dangerous concentration. To avoid risks, maintain a safe environment by ensuring adequate ventilation.

• The units must be installed in such a way as to prevent any refrigerant leaks from flowing into the buildings or any place where it could cause damage to people, animals or properties. Pay particular attention to the presence and disposition of any external air intakes, doors, shutters, etc.

• Do not braze pipes and components containing refrigerant.

• Do not use flames to cut / open pipes.

• The hydraulic circuit must be designed in such a way as to prevent the release of refrigerant gas inside the buildings or in any case in places where it can cause damage to people, animals or properties.

Compressors

Mitsubishi hermetic fixed and variable speed scroll compressors, designed to ensure high performance in any load condition. The first three sizes 0051, 0061 and 0071 (first module) have a single inverter driven compressor in a single-circuit configuration. The sizes 0082, 0092, 0102, 0112 feature a hybrid tandem configuration (1+i) with variable speed and fixed speed compressors working in the same refrigerant circuit.

The logic adjusting the use of resources (1+i) has been specifically worked out so that, when the unit is started, the inverter compressor is always the first one to start, with consequent reduction of the starting currents, and it is also the last one to cut out.

The operation of the bi-compressor units is guaranteed even if a failure or disabling of the variable speed compressor inverter occur (the ON/OFF resource continues to operate) and, vice versa, if the ON/OFF compressor stop the variable speed resource continues to run.

In this way, the requested cooling capacity is continuously supplied and the perfect stability of outlet water temperature is ensured.

Added to this, depending on the required load condition, the logic privileges the most efficient combination between constant-speed compressor and variable-speed compressor (thanks to the continuous adjustment of the inverter compressor and to the step adjustment of the constant-speed compressor).

Compressor enclosure provided as standard with soundproofing insulation in polyester fiber mat (thickness of 30 mm).

Constant-speed compressor

Mitsubishi Electric hermetic scroll compressors complete with a crankcase heater, electronic overheating protection with centralised manual reset and a two-pole electric motor.

Variable speed compressor

The Mitsubishi Electric inverter scroll compressor uses a BLDC brushless Permanent Magnet Motor design to provide higher efficiency across a wider range of applications and with an oil sump heater.

Inverter logic ensures a soft start that reduces inrush current. The Mitsubishi Electric frequency converter is coupled with harmonic filters, making it compliant with industry standards.

The correct oil supply to each compressor is guaranteed.

Plant side heat exchanger

Braze welded AISI 316 plate heat exchanger. The heat exchanger is lined on the outside with 9 mm thick closed-cell neoprene lagging to prevent condensation, with a thermal conductivity of 0,33 W/mK at 0°C.

Source side heat exchanger

Microchannel coils ideally positioned on a Longitudinal V-shaped structure to optimize airflow and heat transfer. Made entirely in aluminum, the coils are not subjected to galvanic corrosion.

Fins and manifolds are made of aluminum AA3003, while the channels are made of a new aluminum alloy so defined Long Life Alloy (LLA). LLA alloy has a very fine grain microstructure that guarantees higher mechanical properties and a higher resistance to the inter-granular corrosion.

Fan section source side

The ventilation section combines high-end Mitsubishi Electric proprietary technologies. Mitsubishi Electric variable speed axial fans with BLDC motors and inverters (Mitsubishi Electric brand), diameter 700 mm, housed in aerodynamic bell-mouths complete with safety grille (Mitsubishi Electric layout), designed for maximum efficiency combined with the lowest noise level.

The bell-mouth, with pure aerodynamic and non-structural function, are mounted above the unit in order to ensure easy maintenance/replacement.

Electric motor with built-in overload protection.



UNIT DESCRIPTION

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

Electrical and control panels

The electrical power panel is separated from the electrical control panel: the opening of the second box is constrained by the removal of the voltage and the opening of the power box. Both panels are designed according to MELCO standard and built in compliance with the EN60204-1 standard and are complete respectively with the following components.

Electrical power panel:

- general door lock isolator
- Phases sequence control
- control circuit transformer
- numbered cables
- automatic circuit breakers for compressors and fans
- power supply 400V/3ph/50Hz+PE

.

Electrical control panel:

- Electronic control W3000+
- auxiliary 4-20mA analogue input
- Pump control relay + 0-10V modulating signal to control an external variable speed pump with the VPF.E control logic (plant-side constant ΔT for plants with primary circuit only and terminals with bypass)
- control circuit terminal board (design according to Poka Yoke standardization technique)
- Outdoor air temperature probe
- terminals for cumulative alarm block
- remote ON/OFF terminals
- PCB (Printed Control Board) for all signals connection

.

A rod is available to keep the electrical panel open, for an easier unit maintenance.

Extremely easy power cable connection thanks to the precise design of the structure with the front entrance or from the basement of the unit and a convenient direct connection to the electrical connectors



The electrical panel that contains the compressor frequency converters features a forced convection heat transfer. The boxes are equipped with special metal sheet labyrinth plates to prevent dust or snow suction.

The unit is equipped with extremely flexible anti-scratch, anti-UV and anti-oil electric cables that ensure the correct and easy opening of the hinged electrical boxes.

Certification and applicable directives

The unit complies with the following directives and relative amendments:

- CE - Declaration of conformity certificate for the European Union
- 2014/35/EC Low Voltage Directive
- 2014/30/EC EMC Directive
- ErP Directive 2009/125/EC
- Machinery Directive 2006/42/EC
- PED Directive 2014/68/EC
- WEEE (Waste Electrical and Electronic Equipment) Directive
- EAC - Product quality certificate for Russian Federation
- ISO 14001 - Company Environmental Management System certification
- ISO 9001 - Company Quality Management System certification

Tests

Tests performed throughout the production process, as indicated in ISO9001.

Performance or noise tests can be performed by highly qualified staff in the presence of customers.

Performance tests comprise the measurement of:

- electrical data
- water flow rates
- working temperatures
- power input
- power output
- pressure drops on the water-side exchanger both at full load (at the conditions of selection and at the most critical conditions for the condenser) and at part load conditions.

During performance testing it is also possible to simulate the main alarm states.

Noise tests are performed to check noise emissions according to ISO9614.

UNIT DESCRIPTION

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

5.2 Unit standard composition – Additional information

Poka-Yoke system design and fully accessible service points

Unit designed according to the powerful Poka Yoke standardization technique, a Japanese term that means “mistake-proofing” or “inadvertent error prevention” (yokeru - avoid, poka - error).

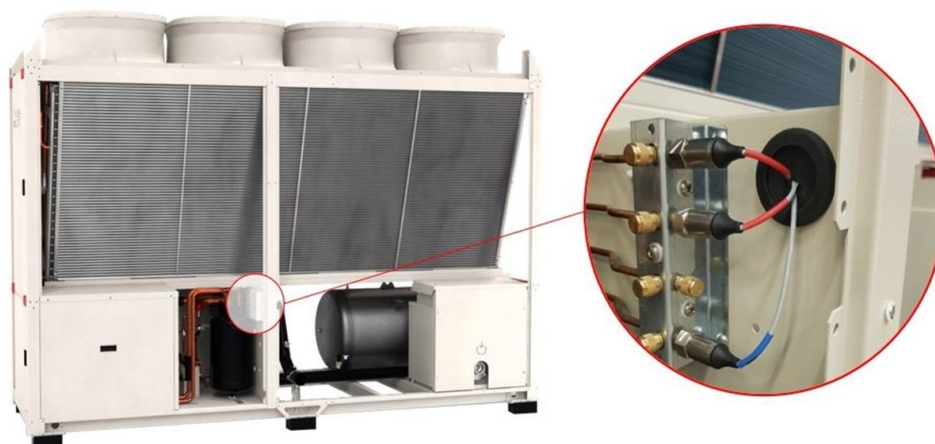
Indeed, during the design phase, numerous measures have been studied to minimize and avoid errors during the assembly phase of the unit and, in particular, to make the service points easily accessible to ensure an easier maintenance

- Unit fully accessible from 4 sides. Any maintenance intervention is also possible by accessing only the long sides of the machine
- Compact and easily accessible refrigeration circuit, thanks to the innovative hinged driver boxes that can be opened laterally
- Easy access for service to all circuit sockets, protected by a sheet metal cover, for easy pressure measurement and for unit charge/discharge activities on site
- Quick couplings for fans to reduce connection time
- Compressors mounted at the same level as the unit basement, for easier handling and removal of these components, even for a single operator

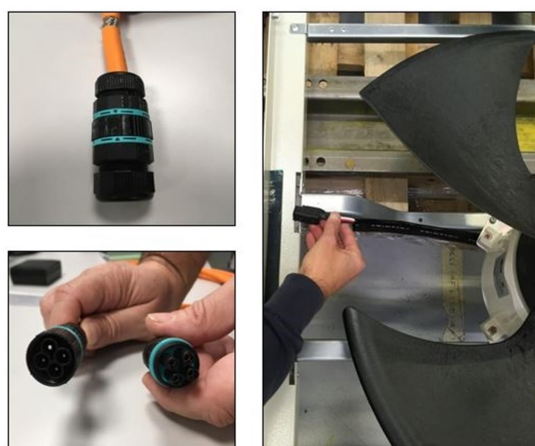
> Hinged driver boxes



- > Easy access to the service points



- > Quick electrical couplings for fans



UNIT DESCRIPTION

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

Noise reduction in part load conditions

Units are able to modulate in a stepless way the capacity, thanks to the variable speed drive scroll compressors and variable speed axial fans with BLDC motors and inverters. This means that when working at partial loads, the units will produce less noise compared to the nominal condition capacity.

In the following table there are the reductions in terms of dB(A) in part load conditions versus the nominal condition (point A) of the several versions. The part load conditions taken into consideration (point B, C, D) for the comparison are the conditions defined by EN14825 standard for the SEER parameter calculation (air source units, fan coil application, variable outlet).

<i>Air source units (rif. EN14825)</i>	Ref. Condition	Air temp.	Part load condition	Evap leaving water temp.	Δ [dB(A)]
	A	35°C	100%	7°C	
	B	30°C	74%	8,5%	2
	C	25°C	47%	10%	7
	D	20°C	21%	11,5%	12

Unit operation – Available static pressure

The unit can operate at nominal flow rates up to 90 Pa without penalizing the capacity. The following table shows the variations of the main parameters involved

Relative static pressure - nominal flow rate	30 Pa	60 Pa	90 Pa
Cooling capacity reduction	0%	0%	0%
Absorbed power increase	3%	7%	9%
Max operating outdoor air temp. reduction	0°C	0°C	0°C
Sound power increase	+2 dB(A)	+3 dB(A)	+3 dB(A)

5.3 Versions

- Standard Version

The standard version features high efficiency, excellent cooling capacity/footprint ratio and standard compressor acoustical enclosure for very low noise emissions (super low noise levels).

5.4 Configurations

- , standard unit

Standard unit for production of chilled water

/D, unit with partial heat recovery

Unit for the production of chilled water, equipped with an auxiliary heat exchanger (desuperheater) on the compressor discharge for superheat recovery. The recovered heat is approximately the 20% of the total cooling capacity and can be used for domestic hot water production or other secondary uses, such as the integration of an existing boiler.

5.5 Electronic controller

Electronic control W3000+

W3000+ features an easy-to-use interface and a complete LCD display that allows one to consult and intervene by means of a multi-language menu (19 languages are available). The diagnostics includes a complete alarm management, with the "black-box" and the alarm history display for enhanced analysis of the unit operation. The programmable timer manages a weekly schedule organized into time bands to optimize unit performance by minimizing power consumption during periods of inactivity. Up to 10 daily time bands can be associated with different operating set points. As option, KIPLink is available - Keyboard In Your Pocket. KIPLink is the innovative user interface based on WiFi technology that allows one to operate on the unit directly from the smartphone or tablet.

The regulation features the continuous modulation of capacity, based on sequential adjustment + DIP referring to the leaving water temperature.

Optional proprietary devices can perform the adjustment of resources in systems made of several units. Consumption metering and performance measurement are possible as well. The variable primary flow control is always available as per standard (VPF.E function).

Supervision can be easily developed via proprietary devices or the integration in third party systems by means of the most common protocols as ModBus, Echelon, Bacnet-over-IP, Bacnet MS/TP RS485, Konnex, ModBus TCP/IP, SNMP. Compatibility with the remote keyboard (up to 8 units).



UNIT DESCRIPTION**Data Book**

i-NX2-G07 0051 - 0112_202206_EN R32

KIPlink - Keyboard In your Pocket (optional)

KIPlink - Keyboard In Your Pocket - is the innovative user interface based on WiFi technology that allows one to operate on the unit directly from the smartphone or tablet. Using KIPlink, it is possible to turn the unit on and off, adjust the set-point, plot the main operating variables, monitor in detail the status of the refrigerant circuits, the compressors, the fans (if present) and the pumps (if present) and display and reset the possible alarms.



6 OPTIONS

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
380 NUMBERED WIRING			
381 NUMBERED WIRING ON EL. BOARD	Electrical board wires are identified by numbered labels. The reference numbers are indicated in the unit's wiring scheme.	Facilitate maintenance interventions to the electrical board connections.	ALL
383 NUMBERED WIRINGS+UK REQUESTS	Electrical board wires are identified by numbered labels. The reference numbers are indicated in the unit's wiring scheme.	Facilitate maintenance interventions to the electrical board connections.	ALL
2410 PHASE SEQUENCE RELAY			
2412 PHASE SEQU. RELAY + OVER/UNDER VOLT. MONIT.	Relay for checking mains phase-sequence and voltage	The monitoring relay protects loads against faults due to incorrect connection of mains, and it monitors whether it exceeds or falls below a specified voltage in a three-phase network.	ALL
4180 REMOTE CONNECTION ARRANGEMENT			
4181 SERIAL CARD MODBUS	Interface module for ModBUS protocols.	Allows integration with BMS operating with ModBUS protocol.	ALL
4182 SERIAL CARD FOR LONWORKS	Interface module for Echelon systems.	Allows integration with BMS operating with LonWorks protocols	ALL
4184 SERIAL CARD BACNET MS/TP RS485	Interface module for BACnet protocols.	Allows integration with BMS operating with BACnet protocol.	ALL
4185 SERIAL CARD FOR BACNET OVER IP	Interface module for BACnet OVER-IP protocols.	Allows to interconnect BACnet devices over Internet Protocol within wide-area networks.	ALL
4186 SERIAL CARD FOR KONNEX	Protocol for KNX system	Allows integration with BMS operating with KNX protocol	ALL
4187 M-Net W3000 INTERFACE KIT	Interface kit for M-Net protocol.	Interface module to allow the integration of the unit with Mitsubishi Electric proprietary communication protocol M-Net.	ALL
4188 SERIAL CARD MODBUS TCP/IP	Interface module for ModBus TCP/IP protocol	Allows integration with BMS operating with ModBus TCP/IP protocol.	ALL
4189 SERIAL CARD SNMP	Interface module for SNMP protocol	Allows integration with BMS operating with SNMP protocol.	ALL
6160 AUXILIARY INPUT			
6161 AUXILIARY SIGNAL 4-20mA	4-20 mA analog input	Allows to change the operating set-point according to the value of current applied to the analogue input.	ALL
6162 REMOTE SIGNAL DOUBLE SP	Allows to activate the Energy Saving set-point.	Allows to change the operating set-point according to a remote switch	ALL
6170 DEMAND LIMIT			
6172 SIGNAL EXTERNAL CAPACITY CAP	Limits the unit cooling capacity to a specific % value, by acting on active resources and their operating frequencies. The unit can exceed this limit in specific conditions (e.g. start-up phase, oil recovery procedures).		ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
1470 MULTIFUNCTION CARD			
1431 NIGHT MODE	The option includes a related controller expansion board and dedicated terminal block.	Night mode is a system setting to limit maximum noise level of the unit. Noise level is reduced limiting maximum compressor frequency and fan speed.	ALL
1472 4951 + 1431 + 4961	The option includes a related controller expansion board and dedicated terminal block (it is necessary to install a 3 way valve).	Enables the functions corresponding to the indicated accessory codes.	ALL
1477 4962 + 4951 + 1431	The option includes a related controller expansion board and dedicated terminal block (it is necessary to install a 3 way valve).	Enables the functions corresponding to the indicated accessory codes.	ALL
4951 WITH HYDRAULIC DECOUPLER PROBE	Water temperature probe on hydraulic decoupler.	The pump activation can be set by parameter according to the water temperature on buffer tank measuring by the sensor (in the systems with the primary and secondary circuits separated by a hydraulic decoupler), thus bringing significant pump consumption reduction during unit's stand-by.	ALL
4961 U.L.C.F. - WITH OR WITHOUT FIX SPEED PUMP	Option to be selected with the unit without pump/s or with fix speed pump/s (4703,4706,4707,4711,4712). The option includes a related controller expansion board and dedicated terminal block.	Guaranteed the start-up of the units with the option U.L.C. even when the critical working condition could generate an alarm. The controller can manage a 3 way mixing valve (not provided from MEHITS) by 0-10V signal for ensuring a dynamic control of the water temperature on user heat exchanger according to the operating limits allowed. This ensures the start-up and correct functioning of the unit into the envelope, also even critical whether condition.	ALL
4962 U.L.C.F. - WITH VARIABLE WATER FLOW	Option to be selected with the unit with variable speed pump/s (4713,4714,4717,4718,4722,4723). The option includes a related controller expansion board and dedicated terminal block.	Guaranteed the start-up of the units with the option U.L.C. even when the critical working condition could generate an alarm. The controller can manage a 3 way mixing valve (not provided from MEHITS) by 0-10V signal for ensuring a dynamic control of the water temperature on user heat exchanger according to the operating limits allowed. This ensures the start-up and correct functioning of the unit into the envelope, also even critical whether condition.	ALL
1510 SOFT-STARTER			
1511 UNIT WITH SOFT-START	Electronic device adopted to manage the inrush current. The device controls 2 phases.	Break down of the inrush current compared to the direct motor start, lower motor windings' mechanical wear, avoidance of mains voltage fluctuations during starting, favourable sizing for the electrical system.	ALL
1440 USER INTERFACE			
1441 KIPLink + COMPACT KEYBOARD	In addition to KIPLink, the innovative user interface based on WiFi technology, the unit is equipped with the Compact keyboard with LCD display and buttons.		ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
1442 KIPLink +7 INCH TOUCH SCREEN	In addition to KIPLink, the innovative user interface based on WiFi technology, the unit is equipped with the Touch interface, with a 7" WVGA colour display and a front USB port (WARNING: with outdoor temperature below 0°C the display response time may visibly increase).		ALL
6195 7 INCH TOUCH SCREEN	The unit is equipped with the Touch interface, with a 7" WVGA colour display and a front USB port (WARNING: with outdoor temperature below 0°C the display response time may visibly increase).	The touch-screen's technology is characterized by an easy-to-access data, and it allows an effective graphical representation of the main figures protecting the access through 3 privilege levels.	ALL
5920 MANAGEMENT & CONTROL SYSTEMS			
5922 ClimaPRO ModBUS RS485 - MID	This option includes the following devices on-board the unit panel: - MID certified network analyzer operating on ModBUS over RS-485 - Current transformers - Software release LA09 or later version.	This accessory allows to acquire the electrical data and the power absorbed by the unit and communicate with ClimaPRO via high level communication interface based on ModBUS over EIA RS-485. More specifically, the data collected are: power supply, current, frequency, power factor (cos), electrical power consumption, energy consumption. This specific energy meter model is MID certified and can therefore be used for billing applications. This option also ensures the compatibility between the units and ClimaPRO, thus allowing ClimaPRO to acquire all the main unit's operating variables and status by means of a high level communication interface to the controller installed onboard the unit panel.	ALL
5923 ClimaPRO BacNET over IP	This option includes the following devices on-board the unit panel: - network analyzer operating on BACnet over IP - Current transformers - Software release LA09 or later version.	This accessory allows to acquire the electrical data and the power absorbed by the unit and communicate with ClimaPRO via high level communication interface based on BACnet over IP. More specifically, the data collected are: power supply, current, frequency, power factor (cos), electrical power consumption, energy consumption. This network analyzer is not MID certified and cannot therefore be used for billing applications. This option also ensures the compatibility between the units and ClimaPRO, thus allowing ClimaPRO to acquire all the main unit's operating variables and status by means of a high level communication interface to the controller installed onboard the unit panel.	ALL
5924 ENERGY METER FOR BMS	This option includes the following devices on-board the unit panel: - network analyzer with display operating on ModBUS protocol over RS-485 (without certification MID) - current transformers.	This accessory allows to acquire the electrical data and the power absorbed by the unit and send them via RS-485 bus to the BMS for energy metering.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
5925 ENERGY METER FOR W3000	This option includes all following devices on-board the unit panel: - network analyzer with display, already cabled to unit's controller - current transformers.	This option allows to acquire the electrical data and the power absorbed by the unit. The figures are accessible through the unit's W3000 interface, and be sent to the BMS via several protocols by selecting the dedicated serial card in the option list.	ALL
1540 ON BOARD MULTI MANAGER			
1541 MM PRIORITY MASTER MM_PR	Multi Manager - Priority Master: integrated control of a group of chillers and chillers with free-cooling with up to 8 units with LAN logics and dynamic master. The unit is identified and parameterized as a Priority Master; therefore it is given preference in case of election of a new Master (in case of a failure of the current Master). At least one Priority Master must be present in the group. The maximum number of Priority Master units coincides with the number of connected units (up to 8). If you want to equip the group of chiller with auxiliary functions (e.g. 4-20 mA set point variation, pressure transducer for VPF system), each Priority Master requires auxiliary input signals. Consequently, for each Priority Master it is necessary to select these accessories from the price list and proceed with their wiring onsite. More details can be found in the data book and in the controls technical documentation.	It allows the management of a group of chillers and chillers with free-cooling (up to 8 units) via LAN with master/slave operating logic with dynamic master which always guarantees a back-up function to the network. The system makes other functions available such as load and stand-by unit management, resource use priority, unit start-up in sequence and group fast restart (when Fast Restart option is available). For more details refer to the dedicated section of the data book.	ALL
1542 MM NON PRIORITY MASTER MM_N-PR	Multi Manager - Non Priority Master: integrated control of a group of chillers and chillers with free-cooling with up to 8 units with LAN logics and dynamic master. The unit is identified and parameterized as a Non-Priority Master. Non-Priority Master units can become Masters (in case of a failure of the current Master) if there are no more Priority Master units available. In this case, the functions provided by the auxiliary signals are suspended (e.g. 4-20 mA set point variation, VPF); these signals can only be processed by Priority Master units. More details can be found in the data book and in the controls technical documentation.	It allows the management of a group of chillers and chillers with free-cooling (up to 8 units) via LAN with master/slave operating logic with dynamic master which always guarantees a back-up function to the network. The system makes other functions available such as load and stand-by unit management, resource use priority, unit start-up in sequence and group fast restart (when Fast Restart option is available). For more details refer to the dedicated section of the data book.	ALL
5940 SETP. COMPENSATION OUT. TEMP.			
5941 WITH SETPOINT COMPENSATION	This option includes an outside air sensor to be installed outside the building and enable the climatic curve function.	An outside air temperature probe, available as option, controls the system water temperature set point based on heating and cooling (reversible units) climatic curves. Delivering water at different temperatures to the terminals based on the outside air temperature achieves high seasonal efficiency ratios and provides considerable savings in running costs.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
6460 HPC SYSTEM ENABLING			
6461 HPC SOFTWARE ENABLING	MEHITS proprietary operating logics, which allows the optimization of a chilled water system for applications related to the world of data centers. It allows communication and perfect synergy in operation between water-cooled indoor units and chillers outdoor units. The patent pending logics guarantees optimal functioning of the chillers + CRAHs system, always guaranteeing maximum safety and reliability for the correct functioning of the servers. The algorithm guarantees significant energy savings thanks to the proprietary operating logics that optimizes the operation of the entire system.	It allows to optimize a chilled water system, for data center applications, consisting of indoor units and chillers.	ALL
3420 LIGHTS ON ELECTRIC BOARD			
3422 LIGHTS EL. BOARD+POWER SOCKET	230V power socket in the electrical board, CEE 7/3 type (Schuko). The maximum power available is 500VA. Electrical board equipped with lights.	It allows to power small electrical/electronic devices (lights, notebooks, tablets, etc.) during maintenance operations. The interior lighting simplifies maintenance and operations to the electrical panel.	ALL
3450 ELECTR. COMP. AS IEC 61000-6			
3451 EMC COMP. FOR RESIDENTIAL APP.	EMC compatibility for residential applications as per EN61000-6-3	Assure units' EMC compatibility as per EN61000-6-3, for residential, commercial and light industrial applications.	ALL
3430 REFRIGERANT LEAK DETECTOR			
3431 REFRIG. LEAK DETECTOR	Refrigerant leak detection system, supplied factory mounted and wired in the electrical board. In case of leak detection it will raise an alarm.	It promptly detects gas leakages	ALL
3433 GAS LEAK CONTACT + COMPR. OFF	Refrigerant leak detection system, supplied factory mounted and wired in the electrical board. In case of leak detection it will raise an alarm and stop the unit.	It promptly detects gas leakages and stops the unit	ALL
990 CONDENSING COIL			
876 E-COATING MICROCHANNEL COILS	The heat exchanger is completely treated by electrolysis so as to create a protective layer of epoxy polymer on the surface, with the following characteristics: - over 3120 hours of salt spray protection as per ASTM G85-02 A3 (SWAAT); - polyurethane surface protection against UV rays.	Provides a very high resistance against corrosion, also in very aggressive environments. For further information please refer to the Guidelines "Finned coil heat exchangers and protection against corrosion", available in the download section of the website www.melcohit.com/EN/Download/Corporate/GUIDELINES or contact our sales department.	ALL
879 COPPER/ALUMINIUM COILS	Finned coil heat exchanger made from suitably-spaced copper tubes and aluminum fins designed to ensure maximum heat exchange efficiency.	Provide a good resistance against corrosion. For further information please refer to the Guidelines "Finned coil heat exchangers and protection against corrosion", available in the download section of the website www.melcohit.com/EN/Download/Corporate/GUIDELINES or contact our sales department.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
894 Cu PIPES/PREPAINTED ALL. FINS	Finned coil heat exchanger made from copper tubes and aluminum fins with chemical cleaning treatment to remove impurities, and then coated with protective paint with the following characteristics: - fins treated with protective polyester resin paint; - over 1000 hours of salt spray protection as per ASTM B117 (fins without cross and protected edges); - excellent resistance to UV rays.	Provide a good resistance against corrosion. For further information please refer to the Guidelines "Finned coil heat exchangers and protection against corrosion", available in the download section of the website www.melcohit.com/EN/Download/Corporate/GUIDELINES or contact our sales department.	ALL
895 FIN GUARD SILVER TREATM	Copper-aluminum heat exchanger coils with polyurethane paint Fin Guard Silver SB. Coil completely coated by a protective layer of polyurethane paint with the following characteristics: - polyurethane paint with metallic emulsion; - over 3000 hours of salt spray protection as per ASTM B117; - excellent resistance to UV rays; - high-pressure spray painting system.	Provides a very high resistance against corrosion, also in very aggressive environments. For further information please refer to the Guidelines "Finned coil heat exchangers and protection against corrosion", available in the download section of the website www.melcohit.com/EN/Download/Corporate/GUIDELINES or contact our sales department.	ALL
1800 EVAPORATOR WATER FLOW SWITCH			
1803 ELECTRONIC EV H2O FLOW SWITCH			ALL
4700 EV - HYDRONIC MODULE			
4706 EV - 1 PUMP 2P LH (FIX SPEED)	Evaporator hydronic module, compatible with constant flow control. The unit is provided with 1 fixed speed pump, with 2-pole motor. Residual head of 100 kPa approximately. Specifications and characteristic curves are available in the dedicated bulletin section.	The hydronic module includes the pumps and the main water circuit components, thus optimizing hydraulic and electrical installation space, time and costs.	ALL
4707 EV - 1 PUMP 2P HH (FIX SPEED)	Evaporator hydronic module, compatible with constant flow control. The unit is provided with 1 fixed speed pump, with 2-pole motor. Residual head of 200 kPa approximately. Specifications and characteristic curves are available in the dedicated bulletin section.	The hydronic module includes the pumps and the main water circuit components, thus optimizing hydraulic and electrical installation space, time and costs.	ALL
4713 EV - RELAY 1 PUMP + 0-10V SIG	Evaporator hydronic module, compatible with constant or variable flow control. The unit is provided with 1 relay and a 0-10V signal terminal to control the activation and the speed of 1 external variable speed pump.	The hydronic module controls the external pumps with the unit controller logic.	ALL
4714 EV - RELAY 2 PUMPS + 0-10V SIG	Evaporator hydronic module, compatible with constant or variable flow control. The unit is provided with 2 relays and a 0-10V signal terminal to control the activation and the speed of 2 external variable speed pump. The pumps are controlled in duty/standby, with running hours equalization and changeover on device failure.	The hydronic module controls the external pumps with the unit controller logic.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4717 EV - 1 PUMP 2P LH (VAR SPEED)	Evaporator hydronic module, compatible with constant or variable flow control. The unit is provided with 1 variable speed pump, with 2-pole motor. Residual head of 100 kPa approximately. Specifications and characteristic curves are available in the dedicated bulletin section.	The hydronic module includes the pumps and the main water circuit components, thus optimizing hydraulic and electrical installation space, time and costs.	ALL
4718 EV - 1 PUMP 2P HH (VAR SPEED)	Evaporator hydronic module, compatible with constant or variable flow control. The unit is provided with 1 variable speed pump, with 2-pole motor. Residual head of 200 kPa approximately. Specifications and characteristic curves are available in the dedicated bulletin section.	The hydronic module includes the pumps and the main water circuit components, thus optimizing hydraulic and electrical installation space, time and costs.	ALL
4722 EV - 2 PUMPS 2P LH (VAR SPEED)	Evaporator hydronic module, compatible with constant or variable flow control. The unit is provided with 2 variable speed pumps, with 2-pole motor. Residual head of 100 kPa approximately. The pumps are controlled in duty/standby, with running hours equalization and changeover on device failure. Specifications and characteristic curves are available in the dedicated bulletin section.	The hydronic module includes the pumps and the main water circuit components, thus optimizing hydraulic and electrical installation space, time and costs.	ALL
4723 EV - 2 PUMPS 2P HH (VAR SPEED)	Evaporator hydronic module, compatible with constant or variable flow control. The unit is provided with 2 variable speed pumps, with 2-pole motor. Residual head of 200 kPa approximately. The pumps are controlled in duty/standby, with running hours equalization and changeover on device failure. Specifications and characteristic curves are available in the dedicated bulletin section.	The hydronic module includes the pumps and the main water circuit components, thus optimizing hydraulic and electrical installation space, time and costs.	ALL
4860 EV - PRIMARY FLOW CONTROL			
4861 EV - CONSTANT FLOW	Evaporator water flow control (plant primary circuit): constant flow. Compatible with hydronic modules without regulation devices (no pumps, no contacts), with ON/OFF regulation devices (relays) or with fixed speed pumps (codes: 4701, 4702, 4703, 4704, 4705, 4706, 4707, 4708, 4709, 4711, 4712 - hydronic modules availability depends on unit model).	The unit is set up to operate with a constant water flow in the heat exchanger (plant primary circuit). This is the only option available in case of unit without any water flow regulation devices (no pumps, no contacts), which means with water flow control provided by others. In case of unit with ON/OFF regulation devices or fixed speed pumps, the unit controller manages the pump activation to reduce pump consumption.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4862 EV - CONSTANT FLOW (PARAMETER)	Evaporator water flow control (plant primary circuit): constant flow (parameter set). Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model).	The unit is set up to operate with a constant water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides the possibility to set the pump speed with a controller parameter. Once set, the speed pump remains constant until the next parameter adjustment. The parameter set constant flow control is useful during the unit installation and commissioning, to adjust water flow and pressure head according to the real plant characteristics.	ALL
4864 EV – VPF (w/o DP)(SU, MM_PR)	Evaporator water flow control (plant primary circuit): variable flow (delta P control). Only for single unit systems or unit with option 1541 (Multi Manager - Priority Master) if available. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model). The option includes: differential pressure transducer on the unit's heat exchanger and related controller expansion board, controller expansion board to read the plant side differential pressure transducer (4-20mA signal) and manage the hydraulic by-pass valve opening (0-10V signal). Compulsory equipment, supplied by others: plant side differential pressure transducer, plant side hydraulic by-pass valve.	The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides a pump speed management based on the VPF (Variable Primary Flow) function. It keeps the delta P constant on the plant side (primary circuit), thus bringing significant pump consumption reduction during part load operation. The VPF function is applicable in systems with only the primary circuit. Further information available in the dedicated bulletin section.	ALL
4865 EV – VPF (w DP)(SU, MM_PR)	Evaporator water flow control (plant primary circuit): variable flow (delta P control). Only for single unit systems or unit with option 1541 (Multi Manager - Priority Master) if available. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model). The option includes: differential pressure transducer on the unit's heat exchanger and related controller expansion board, plant side differential pressure transducer (installation by others), controller expansion board to read the plant side differential pressure transducer (4-20mA signal) and manage the hydraulic by-pass valve opening (0-10V signal). Compulsory equipment, supplied by others: plant side hydraulic by-pass valve.	The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides a pump speed management based on the VPF (Variable Primary Flow) function. It keeps the delta P constant on the plant side (primary circuit), thus bringing significant pump consumption reduction during part load operation. The VPF function is applicable in systems with only the primary circuit. Further information available in the dedicated bulletin section.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4866 EV – VPF (M3000, CPRO, MM_N-PR)	Evaporator water flow control (plant primary circuit): variable flow (delta P control). Only for multi-unit systems with external controller (Manager3000 or ClimaPRO) or unit with option 1542 (Multi Manager - Non Priority Master) if available. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model). The option includes: differential pressure transducer on the unit's heat exchanger and related controller expansion board. It shall be the customer responsibility to configure the multi-unit control system (Manager3000, ClimaPRO or Multi Manager Priority Master) with option VPF.	The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides a pump speed management based on the VPF (Variable Primary Flow) function. It keeps the delta P constant on the plant side (primary circuit), thus bringing significant pump consumption reduction during part load operation. The VPF function is applicable in systems with only the primary circuit. Further information available in the dedicated bulletin section.	ALL
4867 EV - VPF.D (SU, MM_PR)	Evaporator water flow control (plant primary circuit): variable flow (delta T control). Only for single unit systems or unit with option 1541 (Multi Manager - Priority Master) if available. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model). The option includes: 2 plant side NTC temperature sensors (installation by others).	The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides a pump speed management based on the VPF.D (Variable Primary Flow with Decoupler) function. It keeps the delta T constant on the plant side (primary circuit), thus bringing significant pump consumption reduction during part load operation. The VPF.D function is applicable in systems with the primary and secondary circuits separated by a hydraulic decoupler. Further information available in the dedicated bulletin section.	ALL
4868 EV - VPF.D(M3000, CPRO, MM_N-PR)	Evaporator water flow control (plant primary circuit): variable flow (delta T control). Only for multi-unit systems with external controller (Manager3000 or ClimaPRO) or unit with option 1542 (Multi Manager - Non Priority Master) if available. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model). It shall be the customer responsibility to configure the multi-unit control system (Manager3000, ClimaPRO or Multi Manager - Priority Master) with option VPF.D.	The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides a pump speed management based on the VPF.D (Variable Primary Flow with Decoupler) function. It keeps the delta T constant on the plant side (primary circuit), thus bringing significant pump consumption reduction during part load operation. The VPF.D function is applicable in systems with the primary and secondary circuits separated by a hydraulic decoupler. Further information available in the dedicated bulletin section.	ALL

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4869 EV - VPF.E	Evaporator water flow control (plant primary circuit): variable flow (delta T control). Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4713, 4714, 4715, 4716, 4717, 4718, 4719, 4721, 4722, 4723 - hydronic modules availability depends on unit model).	The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit). The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal. The option provides a pump speed management based on the VPF.E function. It keeps the delta T constant on the plant side (primary circuit), thus bringing significant pump consumption reduction during part load operation. The VPF.E function is applicable in systems with only the primary circuit and with the hydraulic terminals equipped 3 way valve (by-pass). Further information available in the dedicated bulletin section.	ALL
4940 BUFFER TANK			
4941 EV - WITH BUFFER TANK	Buffer tank covered by a 20 mm thick of insulation lining in closed-cell reticulated foam, which capacity depends on the unit size (see the dedicated table). In the dedicated section are described all the factory-mounted components included in the buffer tank system.	It helps to reach the plant water content required for the correct unit operation (see dedicated section "Hydraulic Data").	ALL
2630 INSULATION ON EXCHANGERS			
2631 DOUBLE INSULATION ON EXCHANGERS	Thermal insulation in closed-cell flexible elastomeric foam (FEF) of 16 mm coupled with a 3 mm layer of reticulated foam in PE and an exterior embossed finishing PE film. This option is mandatory if the unit is supposed to work with outdoor temperature below -10°C.	Reduces heat losses and prevent from condensate problems.	ALL
1400 HP AND LP GAUGES			
1401 HP AND LP GAUGES	High and low pressure gauges	Allows immediate reading of the pressure values on both low and high pressure circuits	ALL
5040 COMPRESSOR SUCTION AND DISCHARGE VALVE			
5042 COMPRESSOR SUCTION AND DISCHARGE VALVE	Shut-off valve on compressor's suction and discharge circuit.	Simplifies maintenance activities	ALL
2430 PIPING KIT ANTIFREEZE HEATER			
2431 ANTIFREEZE PIPING	Electrical heaters on pipes .This option is mandatory if the unit is supposed to work with outdoor temperature below 0°C	It protects the unit against ice formation on its hydraulic components.	ALL
2432 ANTIFREEZE PIPING, PUMPS	Electrical heaters on pipes and other hydraulic unit's components. This option is mandatory if the unit is supposed to work with outdoor temperature below 0°C. Only for units provided with on-board pumps.	It protects the unit against ice formation on its hydraulic components.	ALL

OPTIONS

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
2433 ANTIFREEZE PIPING, PUMPS, TANK	Electrical heaters on pipes and other hydraulic unit's components. This option is mandatory if the unit is supposed to work with outdoor temperature below 0°C. Only for units provided with on-board pumps.		ALL
9120 MECHANICAL FILTER			
9121 WITH MECHANICAL FILTER	Metal mesh water filter, to be installed at the unit's inlet.		ALL
2100 ANTIVIBRATION MOUNTING			
2101 RUBBER TYPE ANTIVIBR.MOUNTING			ALL
2020 ANTI-INTRUSION GRILLS			
2021 ANTI-INTRUSION GRILLS	Anti-intrusions grills	Avoid the intrusion of solid bodies into the unit's structure.	ALL
9970 PACKING			
9969 NYLON + WOODEN CRATE PACKING	Unit provided with wooden cage and covered with nylon		ALL
9979 CONTAINER PACKING	Unit provided with container slides and covered with nylon		ALL
9999 SUPPORTS AND NYLON	Unit provided with plastic supports and covered with nylon		ALL
9920 BRACKETS FOR LATERAL LIFTING			
9921 BRACKETS FOR LATERAL LIFTING	Metal brackets to forklift the unit	This option allows easy lifting and handling of the unit.	ALL

6.2 Options - Additional information

1541 – Multi Manager – Priority Master

1542 – Multi Manager – Non-Priority Master

These options are not compatible with options:
5922 - ClimaPRO ModBUS RS485 – MID

1541 – Multi Manager – Priority Master

This option is not compatible with options:

4866 – EV-VPF (M3000, CPRO, MM N-PR) (VPF option for plants with Manager3000, ClimaPro and Non-Priority Master)

4868 – EV-VPF.D(M3000, CPRO, MM N-PR) (VPF option for plants with Manager3000, ClimaPro and Non-Priority Master).

1542 – Multi Manager – Non-Priority Master

This option is not compatible with options:

4864 – EV-VPF (w/o DP)(SU, MM PR) (VPF option for plants with a Single Unit or for Priority Master units – plant side differential pressure transducer excluded).

4865 – EV-VPF (w DP)(SU, MM PR) (VPF option for plants with a Single Unit or for Priority Master units – plant side differential pressure transducer included).

4867 – EV-VPF.D (SU, MM PR) (VPF.D option for plants with a Single Unit or for Priority Master units).

6461 - HPC

This option requires the accessories Multi Manager (options 1541 or 1542) and KIPLink (options 6196* or 1441* or 1442* or 1443* or 1444*)

(*if available)

1540 - LAN Multi Manager

Up to 8 units (chillers or free-cooling chillers, with the same firmware version) can communicate via serial connection.

All the group functions are implemented with master/slave logic, with dynamic master.

Hereunder is a brief description of the main group functions, further details are available in the dedicated user manual.

- Load management

There are two possible load management logics: load sharing and sequencing.

- Load sharing: the load is distributed equally among the active units of the group.

- Sequencing: the units are activated one after the other. When the first unit is saturated (all the available resources are used), the second unit is activated, and so forth until the load is fully covered.

- Dynamic master

In case of disconnection of the master unit, a new master is automatically elected among the other units, and the group functions remain active. The dynamic master function grants a backup solution to the net, overcoming the single point of failure typical of the static master architecture. Besides, it is possible to set the "master succession priority": in case of the master unit disconnection, the new master is elected among the units set as priority.

- Stand-by unit management

It is possible to set the number of unit that remain in stand-by, the load will be managed (with load sharing or sequencing) among the other units of the group. The stand-by unit rotation is automatic, according to the running hours equalization. A stand-by unit is immediately activated in case of total failure or disconnection of one of the active units of the group, or in case the water temperature exceeds the safety threshold.

- Restart in sequence

After a power black-out, this group function coordinates the compressor activation time of the different units and prevents from dangerous current picks due to simultaneous start-ups. Besides, it is possible to set the activation sequence of the units.

- Resource priority management

To make the most of the available cooling resources, it is possible to set the usage priority of each unit. The load management function will be adjusted accordingly. When available, the free-cooling is always given priority and is fully exploited before activating any compressor. Then the activation of the compressors follows the priority level assigned to the units.

- Auxiliary input

The auxiliary inputs are applied at a group level:

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

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

- Demand limit: remote signal to limit the unit's activable resources (digital input).

6461 – HPC

HPC is the new advanced and fully integrated control function designed by MEHITS for hydronic plant optimization. It connects MEHITS chillers and indoor CRAH units without any external devices.

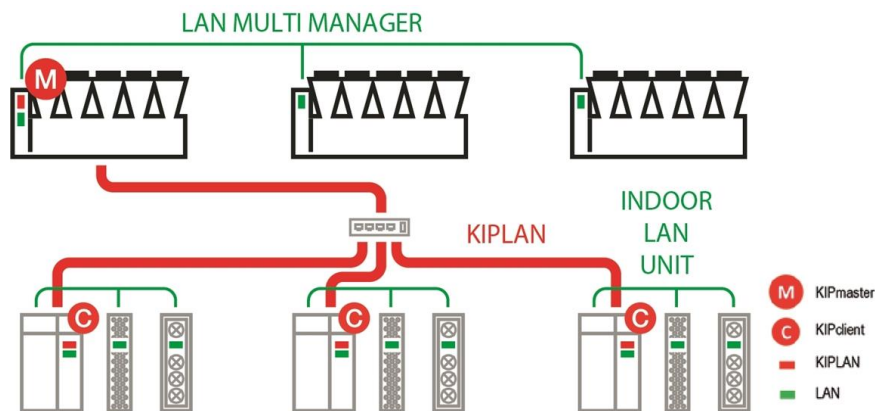
INFRASTRUCTURE

The HPC function is based on LAN groups and the KIPLink network (KIPLAN).

- Every indoor and outdoor unit must be equipped with KIPLink.
- Every outdoor unit must be equipped with Multi Manager.
- HPC supports up to 20 LAN groups of indoor air conditioners (max 15 units per group) and 1 LAN group of outdoor chillers (max 8 units).
- HPC requires a KIPLAN (KIPLink network) made up of one unit per each LAN group.
- The result is a KIPLAN made of 1 chiller unit (KIP Master), and up to 20 indoor units (KIP Clients).
- KIPLAN network allows HPC data communication between the different LAN groups (indoor and outdoor).

KIPLink allows direct access to all HPC variables and parameters with devoted menus and pages. The most important parameters are also available on the Compact/Large Keyboard.

Further information is available in the dedicated Manuals (W3000+, Evolution+, KIPLink).



WORKING LOGICS

The HPC control logics enhance the system efficiency leveraging on partial loads, redundant units, and favourable ambient conditions.

HPC acts on time intervals. The time lapse between each HPC action can be set from 1 to 500 minutes. The time left until the next action is visible in the KIPlink group interface section.

According to the instantaneous operating conditions detected in the chilled water system, HPC regulates: the chillers' set-point, the pumps' speed, and the indoor air conditioners' valves and fans.

The main variables taken into consideration are:

- Cooling demand of each indoor unit group (room temperature, fans' speed, valve opening),
- Chilled water temperature,
- Pumps' speed,
- Chillers' group operating status (outdoor air temperature, FC availability)

The highest benefits are achieved in systems with VSD pumps and free-cooling chillers.

IT cooling load satisfaction is paramount. HPC always gives priority to room cooling dependability. Therefore, actions are taken on the basis of the indoor unit groups' status.

There are 4 operating modes, in order of priority:

1. Reset

When the cooling demand of at least one group of indoor units suddenly increases.

HPC contribution is reset and suspended until the Reset message is active.

The system immediately increases the cooling capacity.

2. Reduce

When the cooling demand of at least one group of indoor units slightly increases.

HPC contribution is reduced. The system increases the cooling capacity.

3. Optimization On

When the cooling demand of all groups of indoor units remains stable or decreases.

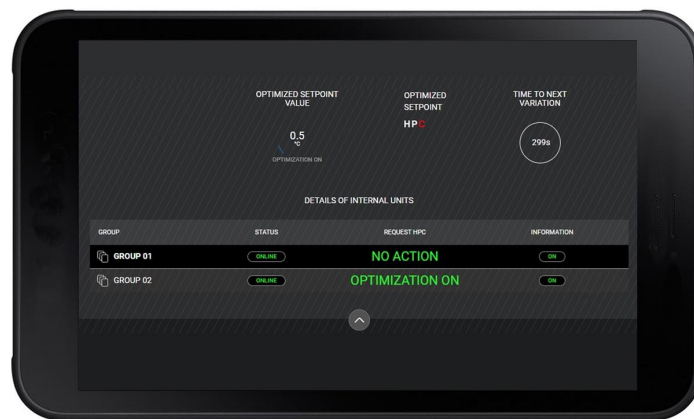
HPC optimizes the system by increasing its contribution.

4. No Action

When the cooling demand of all groups of indoor units remains stable or decreases, but HPC has already pushed the system to the best performance achievable in the current conditions.

No further action is taken.

Further information is available in the dedicated Manuals (W3000+, Evolution+).



- ✓ **PLUS:**
 - Fully in house developed and patent pending
 - Completely integrated, no need for any external devices
 - Based on proprietary logics and devices (Multi Manager, KIPLink)
 - Energy simulations, comparisons, and payback analysis available on ELCA software
 - Ideal to complete the package of a MEHITS chilled water system (chillers and CRAHs)

Chiller Plant Control with Active Optimization System

ClimaPRO+ System Manager

ClimaPRO+ System Manager represents the state-of-the-art platform for chiller plant management and control.

ClimaPRO+ ensures to actively optimize the entire chiller plant by managing and adjusting each component directly involved in the production and the distribution of the heating and the cooling energies, therefore involving chillers and heat pumps, pumping groups as well as the source-side devices like, for example, the cooling towers.

In particular, ClimaPRO+ measures in real-time all the operating variables from the field, for each individual device and each of the main system branche, by using serial communication lines as well as dedicated analogue signals.

The acquired data are then compared with the design data of each single unit at any different working conditions, thus allowing to implement control strategies based on dynamic algorithms which take into account the real operating conditions.

On the basis of these values, an advanced diagnostic module also allows to assess the level of efficiency for each individual unit, translating data into easy-to-read information in order to simplify and optimize the maintenance activities.

The "Chart Builder" software module allows to display the trends of the main operating variables. The "Reporting" module allows to send reports to selected users, including data and system's status of the main devices as well as to perform calculation of the energy indexes for each single unit and for the entire chiller plant.

The accessibility to ClimaPRO+ System Manager is ensured by an integrated web server that makes it visible from any computer equipped with a web browser, either locally or remotely.



7 GENERAL TECHNICAL DATA

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

[SI System]

I-NX2-G07				0051	0061	0071	0082	0092	0102	0112
Power supply		V/ph/Hz 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50								
PERFORMANCE										
COOLING ONLY (GROSS VALUE)										
Cooling capacity	(1)	kW	50,09	60,11	70,14	80,14	90,23	100,2	110,2	
Total power input	(1)	kW	15,16	19,13	26,89	26,24	32,57	31,43	37,90	
EER	(1)	kW/kW	3,296	3,147	2,606	3,057	2,767	3,191	2,908	
COOLING ONLY (EN14511 VALUE)										
Cooling capacity	(1)(4)	kW	50,00	60,00	70,00	80,00	90,00	100,0	110,0	
EER	(1)(4)	kW/kW	3,280	3,110	2,580	3,020	2,740	3,150	2,870	
COOLING WITH PARTIAL RECOVERY										
Cooling capacity	(5)	kW	51,97	62,36	72,77	83,15	93,61	104,0	114,3	
Total power input	(5)	kW	14,66	18,50	25,99	25,37	31,48	30,39	36,64	
Desuperheater heating capacity	(5)	kW	12,68	16,19	23,11	22,16	27,82	26,37	32,15	
EXCHANGERS										
HEAT EXCHANGER USER SIDE IN COOLING										
Water flow	(1)	l/s	2,395	2,874	3,354	3,833	4,315	4,792	5,270	
Pressure drop at the heat exchanger	(1)(4)	kPa	15,6	22,5	30,6	23,6	29,9	28,3	34,2	
PARTIAL RECOVERY USER SIDE IN REFRIGERATION										
Water flow	(1)	l/s	0,612	0,781	1,116	1,070	1,343	1,273	1,552	
Pressure drop at the heat exchanger	(1)	kPa	8,57	14,0	28,5	12,9	20,4	12,9	19,1	
PERFORMANCE										
COOLING ONLY (GROSS VALUE)										
16°C/10°C										
Cooling capacity	(2)	kW	54,69	65,32	75,82	87,60	98,20	109,4	120,1	
Total power input	(2)	kW	15,47	19,61	27,69	26,82	33,41	32,06	38,73	
EER	(2)	kW/kW	3,529	3,332	2,736	3,269	2,940	3,408	3,103	
23°C/15°C										
Cooling capacity	(3)	kW	62,37	73,93	85,00	100,1	111,5	124,7	136,4	
Total power input	(3)	kW	15,86	20,25	28,85	27,55	34,52	32,81	39,78	
EER	(3)	kW/kW	3,925	3,640	2,941	3,640	3,232	3,802	3,427	
EXCHANGERS										
16°C/10°C										
Water flow	(2)	l/s	2,181	2,605	3,024	3,494	3,917	4,362	4,788	
Pressure drop at the heat exchanger	(2)	kPa	12,9	18,5	24,9	19,6	24,7	23,4	28,2	
23°C/15°C										
Water flow	(3)	l/s	1,868	2,215	2,546	2,999	3,339	3,735	4,086	
Pressure drop at the heat exchanger	(3)	kPa	9,50	13,3	17,6	14,5	17,9	17,2	20,6	
REFRIGERANT CIRCUIT										
Compressors nr.		N°	1	1	1	2	2	2	2	
Number of capacity steps		N°	0	0	0	0	0	0	0	
No. Circuits		N°	1	1	1	1	1	1	1	
Regulation		Stepless Stepless Stepless Stepless Stepless Stepless Stepless								
Min. capacity step		%	27	27	27	22	22	20	20	
Refrigerant			R32	R32	R32	R32	R32	R32	R32	
Theoretical refrigerant charge		kg	8,00	8,00	8,00	11,0	11,0	13,0	13,0	
Oil charge		kg	3,50	3,50	3,50	7,00	7,00	7,00	7,00	
Rc (ASHRAE)	(6)	kg/kW	0,16	0,13	0,12	0,14	0,12	0,13	0,12	
FANS										
Quantity		N°	2	2	2	3	3	4	4	
Air flow		m³/s	6,86	7,01	7,01	9,84	9,84	12,97	12,97	
Total fans power input		kW	0,96	1,00	1,00	1,41	1,41	1,88	1,88	
NOISE LEVEL										
Total sound Pressure	(7)	dB(A)	45	46	48	48	49	50	50	
Total sound power level in cooling	(8)(9)	dB(A)	77	78	80	80	81	82	82	
SIZE AND WEIGHT										
A	(10)	mm	2085	2085	2085	2600	2600	3225	3225	
B	(10)	mm	1100	1100	1100	1100	1100	1100	1100	
H	(10)	mm	2400	2400	2400	2400	2400	2400	2400	
Operating weight	(10)	kg	660	660	660	860	860	940	940	

Notes:

1 Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.

2 Plant (side) cooling exchanger water (in/out) 16,00°C/10,00°C; Source (side) heat exchanger air (in) 35,0°C.

3 Plant (side) cooling exchanger water (in/out) 23,00°C/15,00°C; Source (side) heat exchanger air (in) 35,0°C.

4 Values in compliance with EN14511

5 Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C; Plant (side) heat exchanger recovery water (in/out) 40,00°C/45,00°C.

6 Rated in accordance with AHRI Standard 550/590

7 Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

8 Sound power on the basis of measurements taken in compliance with ISO 9614.

9 Sound power level in cooling, outdoors.

10 Unit in standard configuration, without optional accessories.

- Not available

Data certified in EUROVENT

8 TECHNICAL DATA SEASONAL EFFICIENCY IN COOLING (EN14825 VALUE)

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

[SI System]

ENERGY EFFICIENCY

SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)

Ambient refrigeration

i-NX2-G07			0051	0061	0071	0082	0092	0102	0112			
Prated,c	(1)	kW	50,0	60,0	70,0	80,0	90,0	100,0	110,0			
SEER	(1) (2)	-	5,29	5,28	4,98	5,15	5,12	5,32	5,29			
Performance η_s	(1) (3)	%	209,0	208,0	196,0	203,0	202,0	210,0	209,0			

Notes:

(1) Parameter calculated according to [REGULATION (EU) N. 2016/2281]

(2) Seasonal energy efficiency ratio

(3) Seasonal space cooling energy efficiency

The units highlighted in this publication contain R32 [GWP₁₀₀ 677] fluorinated greenhouse gases.

Data certified in EUROVENT

ENERGY EFFICIENCY

SEASONAL EFFICIENCY IN COOLING (Reg. EU 2016/2281)

High temperature process cooling

i-NX2-G07			0051	0061	0071	0082	0092	0102	0112			
Prated,c	(1)	kW	50,00	60,00	70,00	80,00	90,00	100,00	109,96			
SEPR HT	(1) (3)	-	6,29	5,96	5,18	6,27	6,04	5,98	5,89			

Notes:

(1) Seasonal energy efficiency of high temperature process cooling [REGULATION (EU) N. 2016/2281]

(3) Seasonal energy efficiency ratio

The units highlighted in this publication contain R32 [GWP₁₀₀ 677] fluorinated greenhouse gases.

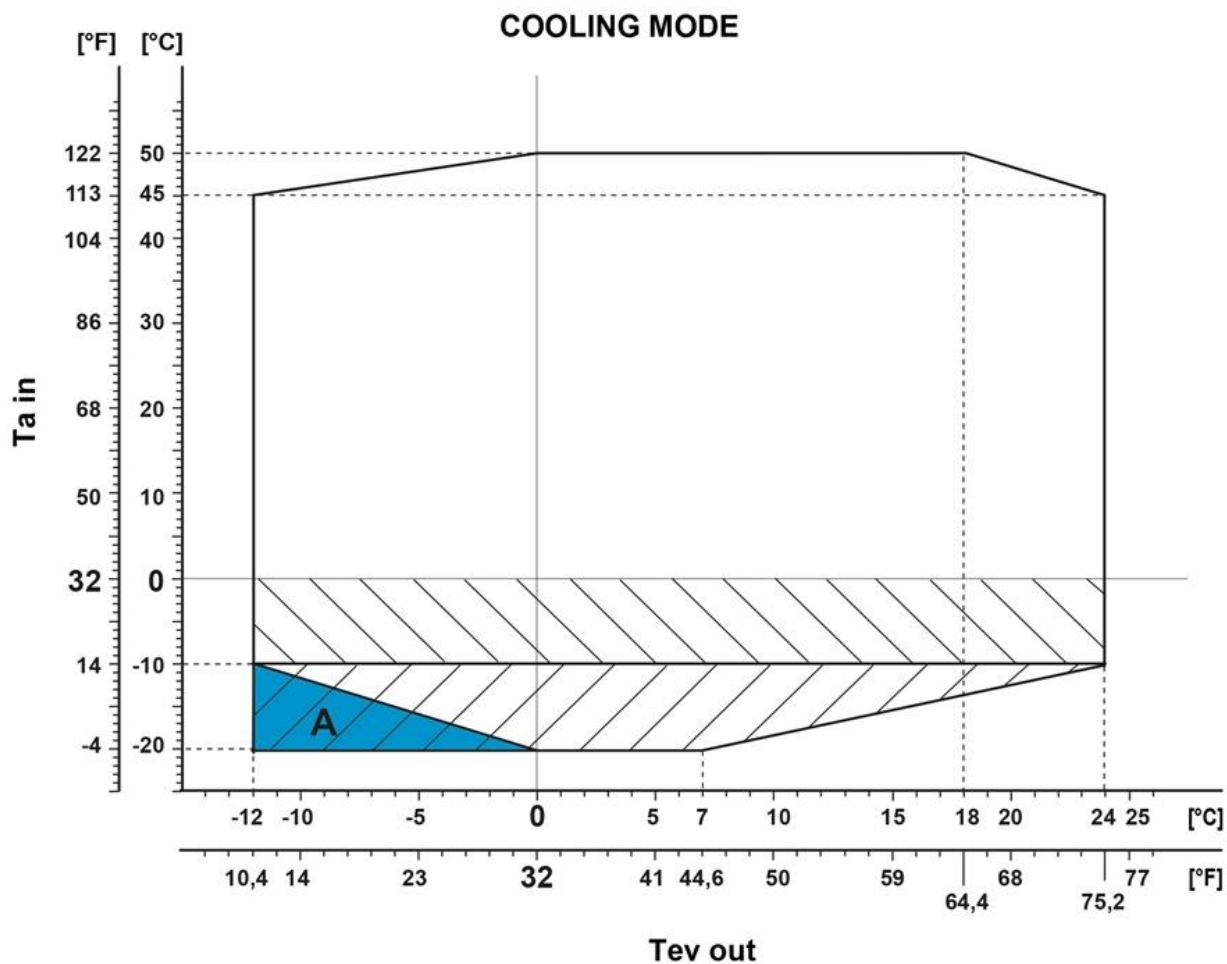
Data certified in EUROVENT

9 OPERATING LIMITS

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

9.1 Operating limits - Graphs



$T_{a\ in}$ Outdoor air temperature

$T_{ev\ out}$ Evaporator leaving water temperature



Required: Antifreeze heaters on pipes (opt. 2431)
Antifreeze heaters on pipes, pumps*, and buffer tank* (opt. 2432 or 2433) *if present.



Required: Antifreeze heaters on pipes (opt. 2431)
Antifreeze heaters on pipes, pumps*, and buffer tank* (opt. 2432 or 2433) *if present.
Extra insulation on heat exchangers (opt. 2641)



Operation between $-10^{\circ}C / 14^{\circ}F$ and $-20^{\circ}C / -4^{\circ}F$ of outdoor air temperature is allowed for wind protected installations (wind speed lower than 2 m/s - 6,56 ft/s)

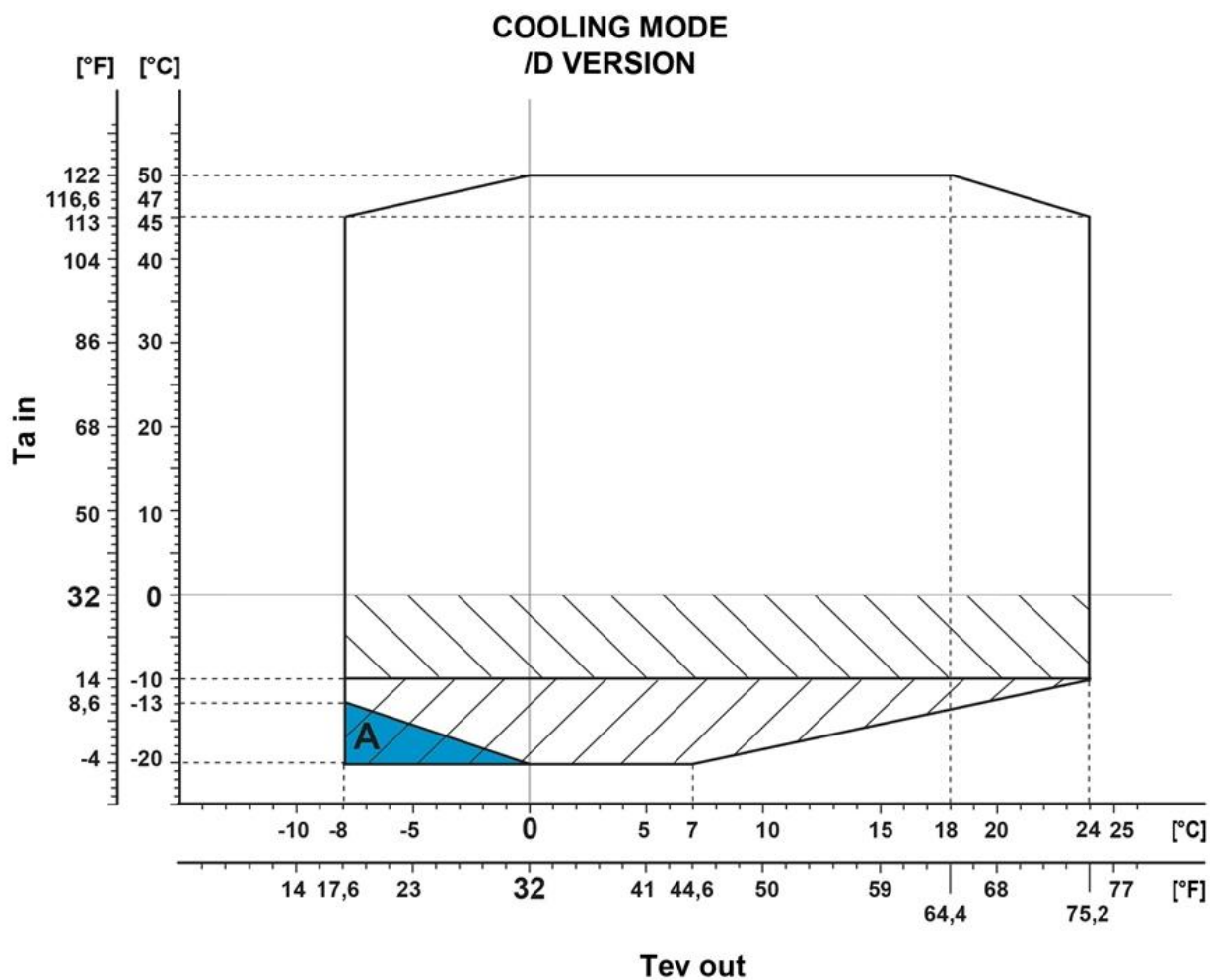
In particular operating conditions the unit can work with forced ventilation, at partial loads or with derating compressors. For any specific information please refer to the ElcaWorld software selection.

For the specific temperature limits of each model please refer to the selection software ElcaWorld.

OPERATING LIMITS

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32



Ta in Outdoor air temperature

Tev out Evaporator leaving water temperature



Required: Antifreeze heaters on pipes (opt. 2431)
Antifreeze heaters on pipes, pumps*, and buffer tank* (opt. 2432 or 2433) *if present.



Required: Antifreeze heaters on pipes (opt. 2431)
Antifreeze heaters on pipes, pumps*, and buffer tank* (opt. 2432 or 2433) *if present.
Extra insulation on heat exchangers (opt. 2641)



Operation between -10 °C / 14 °F and -20 °C / -4 °F of outdoor air temperature is allowed for
wind protected installations (wind speed lower than 2 m/s - 6,56 ft/s)

In particular operating conditions the unit can work with forced ventilation, at partial loads or with derating compressors. For any specific information please refer to the ElcaWorld software selection.

For the specific temperature limits of each model please refer to the selection software ElcaWorld.

9 OPERATING LIMITS

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

9.2 ETHYLENE GLYCOL MIXTURE

Ethylene glycol and water mixture, used as a heat-conveying fluid, cause a variation in unit performance. For correct data, use the factors indicated in the following tabel.

	Freezing point (°C)							
	0	-5	-10	-15	-20	-25	-30	-35
	Ethylene glycol percentage by weight							
	0%	12%	20%	30%	35%	40%	45%	50%
cPf	1	0,985	0,98	0,974	0,97	0,965	0,964	0,96
cQ	1	1,02	1,04	1,075	1,11	1,14	1,17	1,2
cdp	1	1,07	1,11	1,18	1,22	1,24	1,27	1,3

cPf: cooling power correction factor

cQ: flow correction factor

cdp: pressure drop correction factor

For data concerning other kind of anti-freeze solutions (e.g, propylene glycol) please contact our Sale Department.

9.3 FOULING FACTORS

Performances are based on clean condition of tubes (fouling factor = 1). For different fouling values, performance should be adjusted using the correction factors shown in the following table.

SERIES	FOULING FACTORS	EVAPORATOR			CONDENSER/RECOVERY			DESUPERHEATER
	ff (m ² °CW)	F1	FK1	KE [°C]	F2	FK2	KC [°C]	R3
VARIOUS	0	1,000	1,000	0,0	1,000	1,000	0,0	1,000
VARIOUS	1,80 x 10 ⁻⁵	1,000	1,000	0,0	1,000	1,000	0,0	1,000
VARIOUS	4,40 x 10 ⁻⁵	1,000	1,000	0,0	0,990	1,030	1,0	0,990
VARIOUS	8,80 x 10 ⁻⁵	0,960	0,990	0,7	0,980	1,040	1,5	0,980
VARIOUS	13,20 x 10 ⁻⁵	0,944	0,985	1,0	0,964	1,050	2,3	0,964
VARIOUS	17,20 x 10 ⁻⁵	0,930	0,980	1,5	0,950	1,060	3,0	0,950

ff: fouling factors

F1 - F2: potential correction factors

FK1 - FK2: compressor power input correction factors

R3: capacity correction factors

KE: minimum evaporator outlet temperature increase

KC: maximum condenser outlet temperature decrease

10 HYDRAULIC DATA

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

[SI System]

Water flow and pressure drop

Water flow in the plant (side) exchanger is given by:

$$Q = P / (4,186 \times \Delta t)$$

Q: water flow (l/s)

 Δt : difference between inlet and outlet water temp. (°C)

P: heat exchanger capacity (kW)

Pressure drop is given by:

$$\Delta p = K \times (3,6 \times Q)^2 / 1000$$

Q: water flow (l/s)

 Δp : pressure drop (kPa)

K: unit size ratio

SIZE	Power supply V/ph/Hz	HEAT EXCHANGER USER SIDE					HEAT RECOVERY EX. USER SIDE			
		K	Q min l/s	Q max l/s	C.A.S. l	C.a. min l	K	Q min l/s	Q max l/s	C.A.S. l
i-NX2-G07 /0051	400/3/50	210	1,667	3,889	6,22	200	-	-	-	-
i-NX2-G07 /0061	400/3/50	210	1,667	5,556	6,22	200	-	-	-	-
i-NX2-G07 /0071	400/3/50	210	1,667	5,556	6,22	280	-	-	-	-
i-NX2-G07 /0082	400/3/50	124	2,222	7,222	7,07	360	-	-	-	-
i-NX2-G07 /0092	400/3/50	124	2,222	7,222	7,07	360	-	-	-	-
i-NX2-G07 /0102	400/3/50	95,0	2,778	8,889	8,08	440	-	-	-	-
i-NX2-G07 /0112	400/3/50	95,0	2,778	8,889	8,08	440	-	-	-	-
i-NX2-G07 /D /0051	400/3/50	210	1,667	3,889	6,22	200	1767	-	0,806	0,44
i-NX2-G07 /D /0061	400/3/50	210	1,667	5,556	6,22	200	1767	-	1,028	0,44
i-NX2-G07 /D /0071	400/3/50	210	1,667	5,556	6,22	280	1767	-	1,444	0,44
i-NX2-G07 /D /0082	400/3/50	124	2,222	7,222	7,07	360	871	-	1,389	0,63
i-NX2-G07 /D /0092	400/3/50	124	2,222	7,222	7,07	360	871	-	1,722	0,63
i-NX2-G07 /D /0102	400/3/50	95,0	2,778	8,889	8,08	440	613	-	1,639	0,76
i-NX2-G07 /D /0112	400/3/50	95,0	2,778	8,889	8,08	440	613	-	1,972	0,76

Q min: minimum water flow admitted to the heat exchanger
 Q max: maximum water flow admitted to the heat exchanger
 C.a. min: minimum water content admitted in the plant
 C.A.S.: Exchanger water content

11 ELECTRICAL DATA

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

11.1 ELECTRIC DATA

[SI System]

i-NX2-G07

SIZE	Power supply V/ph/Hz	Maximum values								
		Compressor				Fans (1)		Total (1)(2)		
		n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	S.A. [A]
0051	400/3/50	1	1x28.2	1x47.4	-	2x0.92	2x2.5	30,10	52	5
0061	400/3/50	1	1x32.6	1x55.3	-	2x0.92	2x2.5	34,50	60	5
0071	400/3/50	1	1x32.6	1x55.3	-	2x0.92	2x2.5	34,50	60	5
0082	400/3/50	2	1x28.2+1x13.7	1x47.4+1x22.7	1x0+1x90	3x0.92	3x2.5	44,70	78	144,9
0092	400/3/50	2	1x28.2+1x13.7	1x47.4+1x22.7	1x0+1x90	3x0.92	3x2.5	44,70	78	144,9
0102	400/3/50	2	1x32.6+1x15.9	1x55.3+1x27.2	1x0+1x132	4x0.92	4x2.5	52,20	93	197,3
0112	400/3/50	2	1x32.6+1x15.9	1x55.3+1x27.2	1x0+1x132	4x0.92	4x2.5	52,20	93	197,3

F.L.I.: Full load power

F.L.A.: Full load current

L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

(1) Values calculated referring to the version with the maximum number of fans working at the max absorbed current

(1)(2) Safety values to be considered when cabling the unit for power supply and line-protections

Data valid for standard units without any additional option.

Voltage tolerance: 10%

Maximum voltage unbalance: 2%

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:

- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m²

- special climatic conditions negligible

- biological conditions class 4B1 and 4C2: locations in a generic urban area

- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas

- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).

The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

11.2 Dimensions of the electrical connections to the main switch

Maximum cables section connected to main switch and short time current

Size	Main Switch Type	I _{cw} 0,3s	I _{pk}	Cable section [mm ²]	Further technical data
		[kA]	[kA]		
50	VC1P 3x 80A	10	12	50	https://www.technoelectric.it/23-vcp-visulacompact-p-bassa-tensione
60	VC1P 3x 80A	10	12	50	
70	VC1P 3x 80A	10	12	50	
80	VC1P 3x 100A	10	12	50	
90	VC1P 3x 100A	10	12	50	
100	VC1P 3x 125A	10	15	50	
110	VC1P 3x 125A	10	15	50	

12 FULL LOAD SOUND LEVEL**Data Book****i-NX2-G07 0051 - 0112_202206_EN R32**

i-NX2-G07

SOUND POWER LEVEL IN COOLING									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
0051	84	77	76	74	72	69	64	60	77
0061	85	78	77	75	73	70	65	61	78
0071	87	80	79	77	75	72	67	63	80
0082	87	80	79	77	75	72	67	63	80
0092	88	81	80	78	76	73	68	64	81
0102	89	82	81	79	77	74	69	65	82
0112	89	82	81	79	77	74	69	65	82

Working conditions

Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.

Sound power on the basis of measurements taken in compliance with ISO 9614.

Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

Sound power level in cooling, outdoors.

i-NX2-G07

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
0051	52	45	44	42	40	37	32	28	45
0061	53	46	45	43	41	38	33	29	46
0071	55	48	47	45	43	40	35	31	48
0082	55	48	47	45	43	40	35	31	48
0092	56	49	48	46	44	41	36	32	49
0102	57	50	49	47	45	42	37	33	50
0112	57	50	49	47	45	42	37	33	50

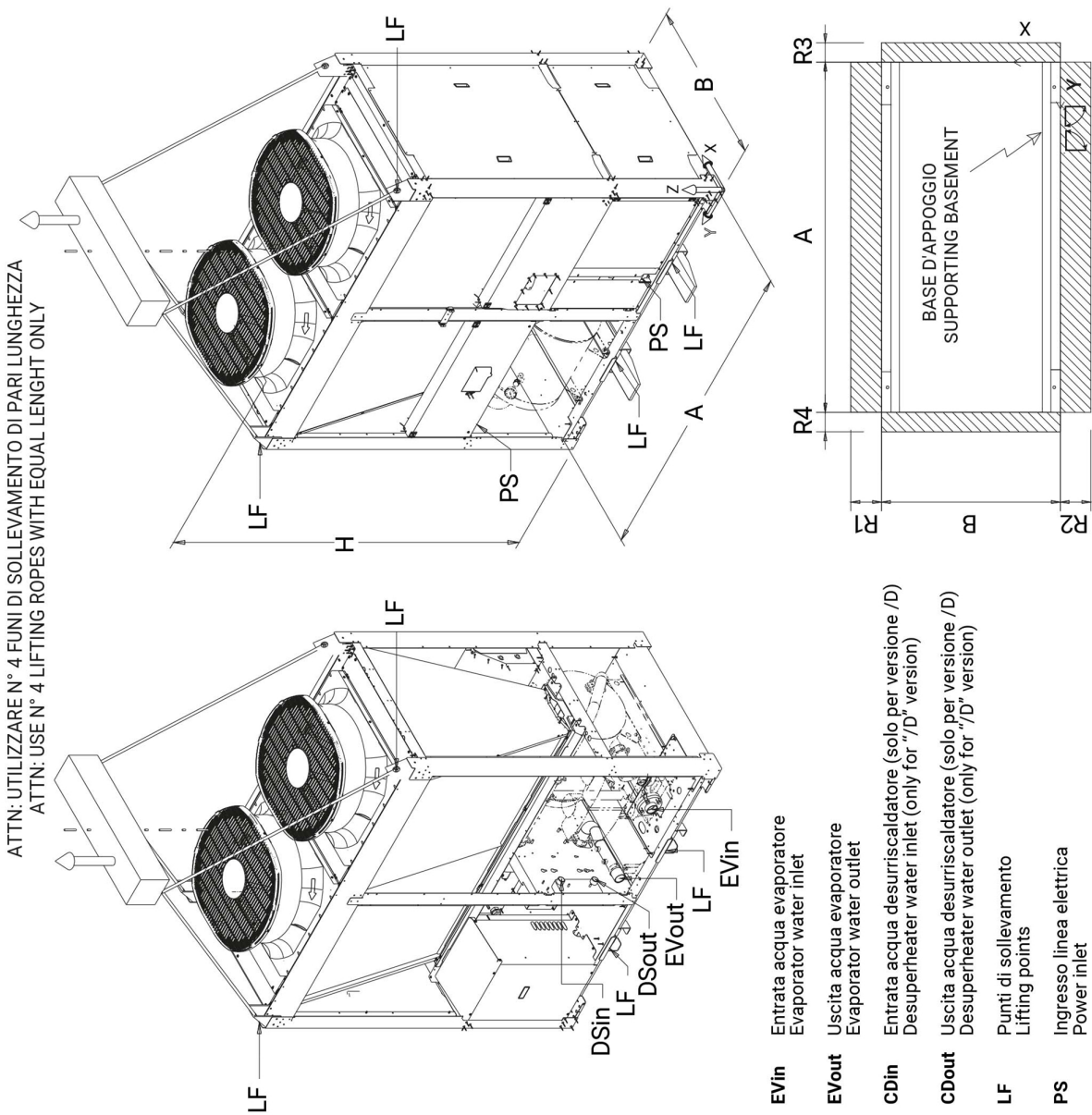
Working conditions

Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.

Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

13 DIMENSIONAL DRAWINGS

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32



REMARKS: For installation purposes, please refer to the documentation sent after the purchase contract. This technical data should be considered as indicative. Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A. may modify them at any moment. Data valid for standard units without any additional option.

DIMENSIONAL DRAWINGS

Data Book

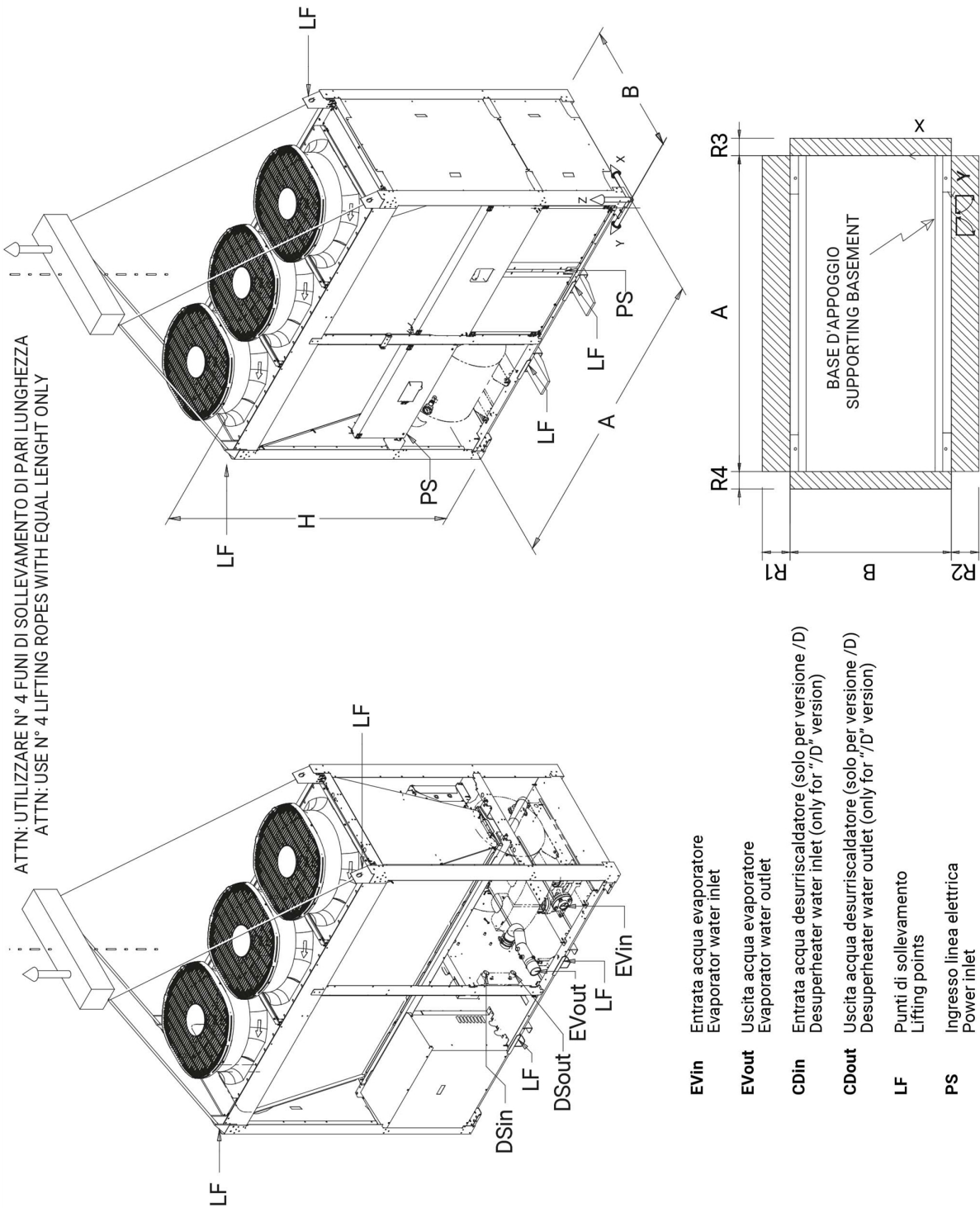
i-NX2-G07 0051 - 0112_202206_EN R32

[SI System]

SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE		HEAT RECOVERY EX. USER SIDE	
	A	B	H	WEIGHT	R1	R2	R3	R4	IN/OUT		IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø	TYPE	Ø
i-NX2-G07 /0051	2085	1100	2400	660	1000	1000	400	400	E1	2"	-	-
i-NX2-G07 /0061	2085	1100	2400	660	1000	1000	400	400	E1	2"	-	-
i-NX2-G07 /0071	2085	1100	2400	660	1000	1000	400	400	E1	2"	-	-
i-NX2-G07 /D /0051	2085	1100	2400	660	1000	1000	400	400	E1	2"	B1	1"1/4
i-NX2-G07 /D /0061	2085	1100	2400	660	1000	1000	400	400	E1	2"	B1	1"1/4
i-NX2-G07 /D /0071	2085	1100	2400	660	1000	1000	400	400	E1	2"	B1	1"1/4

DIMENSIONAL DRAWINGS

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32



REMARKS: For installation purposes, please refer to the documentation sent after the purchase contract. This technical data should be considered as indicative. Mitsubishi Electric Hydraulics & IT Cooling Systems S.p.A. may modify them at any moment. Data valid for standard units without any additional option.

DIMENSIONAL DRAWINGS

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

[SI System]

SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE		HEAT RECOVERY EX. USER SIDE	
	A	B	H	WEIGHT	R1	R2	R3	R4	IN/OUT		IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø	TYPE	Ø
i-NX2-G07 /0082	2600	1100	2400	860	1000	1000	400	400	E1	2"1/2	-	-
i-NX2-G07 /0092	2600	1100	2400	860	1000	1000	400	400	E1	2"1/2	-	-
i-NX2-G07 /D /0082	2600	1100	2400	860	1000	1000	400	400	E1	2"1/2	B1	1"1/4
i-NX2-G07 /D /0092	2600	1100	2400	860	1000	1000	400	400	E1	2"1/2	B1	1"1/4



DIMENSIONAL DRAWINGS

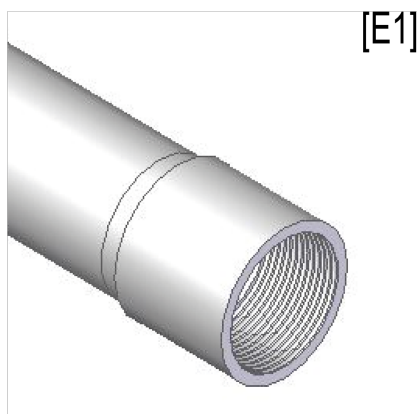
Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

[SI System]

SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE		HEAT RECOVERY EX. USER SIDE	
	A	B	H	WEIGHT	R1	R2	R3	R4	IN/OUT		IN/OUT	
	[mm]	[mm]	[mm]	[kg]	[mm]	[mm]	[mm]	[mm]	TYPE	Ø	TYPE	Ø
i-NX2-G07 /0102	3225	1100	2400	940	1000	1000	400	400	E1	2"1/2	-	-
i-NX2-G07 /0112	3225	1100	2400	940	1000	1000	400	400	E1	2"1/2	-	-
i-NX2-G07 /D /0102	3225	1100	2400	940	1000	1000	400	400	E1	2"1/2	B1	1"1/4
i-NX2-G07 /D /0112	3225	1100	2400	940	1000	1000	400	400	E1	2"1/2	B1	1"1/4

13.2 Legend of pipe connections

**TYPE = E1**

[E1] - Female threaded pipe (UNI ISO 228/1 - G)

NOMINAL PIPE SIZE	PIPE OUTSIDE DIAMETER
ø inches	ø mm
3/4	26,7
1	33,7
1 1/4	42,4
1 1/2	48,3
2	60,3
2 1/2	76,1
3	88,9
3 1/2	101,6

NOMINAL PIPE SIZE	PIPE OUTSIDE DIAMETER
ø inches	ø mm
4	114,3
4 1/2	127,0
5	139,7
6	168,3
8	219,1
10	273,0
12	323,9
14	355,6

UNI ISO 228/13

Pipe threads where pressure-tight joints are not made on the threads - Designation, dimensions and tolerances

Used terminology:

G: Pipe threads where pressure-tight joints are not made on the threads

A: Close tolerance class for external pipe threads where pressure-tight joints are not made on the threads

B: Wider tolerance class for external pipe threads where pressure-tight joints are not made on the threads

Internal threads: G letter followed by thread mark (only tolerance class)

External threads: G letter followed by thread mark and by A letter for A class external threads or by B letter for B class external threads.

UNI EN 10226-1

Pipe threads where pressure-tight joints are made on the threads - Designation, dimensions and tolerances

Used terminology:

Rp: Internal cylindrical threads where pressure-tight joints are made on the threads

Rc: Internal conical threads where pressure-tight joints are made on the threads

R: External conical threads where pressure-tight joints are made on the threads

Internal cylindrical threads: R letter followed by p letter

Internal conical threads: R letter followed by c letter

External conical threads: R letter

NOTE:

Conventional diameter value [in inches] identifies short thread designation, based upon the relative standard.

All relative values are defined by standards.

14.1 Hydronic groups

HYDRONIC GROUP

The units can be fitted with the optional hydronic module that includes the main water circuit components, thus optimizing water circuit and electrical installation space, times and costs.

The built-in hydronic module is available as option with single or twin in-line pump, for achieving low head or high head, fixed (only single pump) or variable speed and with optional buffer tank and expansion vessel.

The flow switch is provided mounted per standard.

The standard configuration of the units feature:

- terminals for external pumps control (relay + 0-10V signal)
- purge valve
- safety valve (8 bar)
- automatic air vent
- flow switch

For the hydronic modules with pumps (the pump enclosure with acoustical insulation is always provided as standard), the factory-mounted components are:

- 1 or 2 pumps, low head or high head, fixed or variable speed
- purge valve
- safety valve (8 bar)
- automatic air vent
- flow switch

For the hydronic modules with pumps and buffer tank (the pump enclosure with acoustical insulation is always provided as standard), the factory-mounted components are:

- 1 or 2 pumps, low head or high head, fixed or variable speed
- buffer tank covered by a 20 mm thick of insulation lining in closed-cell reticulated foam. The buffer tank capacities are shown in the following table
- expansion vessel (membrane made of EPDM) with buffer tank. The expansion vessels capacities are shown in the following table
- purge valve
- pressure gauge
- safety valve (8 bar)
- automatic air vent
- flow switch

Each of the components of the hydraulic group has been designed to optimise hydraulic and electrical installation space, time and costs.

The second pump operates in stand-by to the first.

The relative operating hours of the two pumps are balanced. In case the operating pump breaks down, the reserve pump is automatically enabled.

The electrical panel of the unit is protected with fuses and contactors with thermals cut-out.

Suction, volute and discharge of each pump and all the water pipes are covered with an insulation lining in closed-cell reticulated foam in PE, CFC and HCFC-free.

	Buffer tank	Expansion vessel	
		1 pump	2 pumps
Module 1.	140 l	5 l	6 l
Module 2.	180 l	10 l	8 l
Module 3.	220 l	10 l	10 l

(pre-charge 1.5 bar)

IN-LINE FIXED SPEED SINGLE PUMP SPECIFICATION

Centrifugal pumps with in-line suction and delivery flanges, in single versions Pump body and impeller in cast-iron, entirely laser technology welded. Mechanical seal with components in ceramics, carbon and EPDM elastomers. Three-phase electric motor protected to IP55, insulation class F, suitable for continuous service. "Back pull-out" design, impeller, adapter, and motor can be extracted without disconnecting the pump body from the piping system.



IN-LINE VARIABLE SPEED PUMP SPECIFICATION IN SINGLE OR TWIN VERSION

The pumps with 2-pole motors are fitted with permanent-magnet and electronically speed-controlled which have an efficiency that exceeds the IE4 demands, including the energy consumption of the integrated frequency converter. The resulting in energy savings of up to 50% compared to conventional pumps.

Grundfos single and twin-head pumps, are single-stage, close-coupled pumps with in-line suction and discharge ports of identical diameter. Motor and pump shafts are connected via a rigid two-part coupling. The pumps are equipped with an unbalanced mechanical shaft seal.

The pumps are of the "top-pull-out" design, i.e. the power head (motor, pump head and impeller) can be removed for maintenance or service while the pump housing remains in the pipework.

The twin-head pumps are designed with two parallel power heads. A non-return flap valve in the common discharge port is opened by the flow of the pumped liquid and prevents backflow of liquid into the idle pump head.

**OTHER COMPONENTS**

The following components are excluded from the hydronic kit supply, but their use is mandatory for the correct unit and system operation.

These components are available as accessories and supplied loose, it shall be the customer responsibility to install them.

- Unit inlet water filter

It is also recommended the use of the following components:

- Unit inlet and outlet pressure gauges
- Shut-off valves
- Flexible joints on piping

Possible configurations

PUMP GROUP	Versions
EV - 1 PUMP 2P LH (FIX SPEED)(4706)	X
EV - 1 PUMP 2P HH (FIX SPEED)(4707)	X
EV - 1 PUMP 2P LH (VAR SPEED)(4717)	X
EV - 1 PUMP 2P HH (VAR SPEED)(4718)	X
EV - 2 PUMPS 2P LH (VAR SPEED)(4722)	X
EV - 2 PUMPS 2P HH (VAR SPEED)(4723)	X

Storage tank combinations

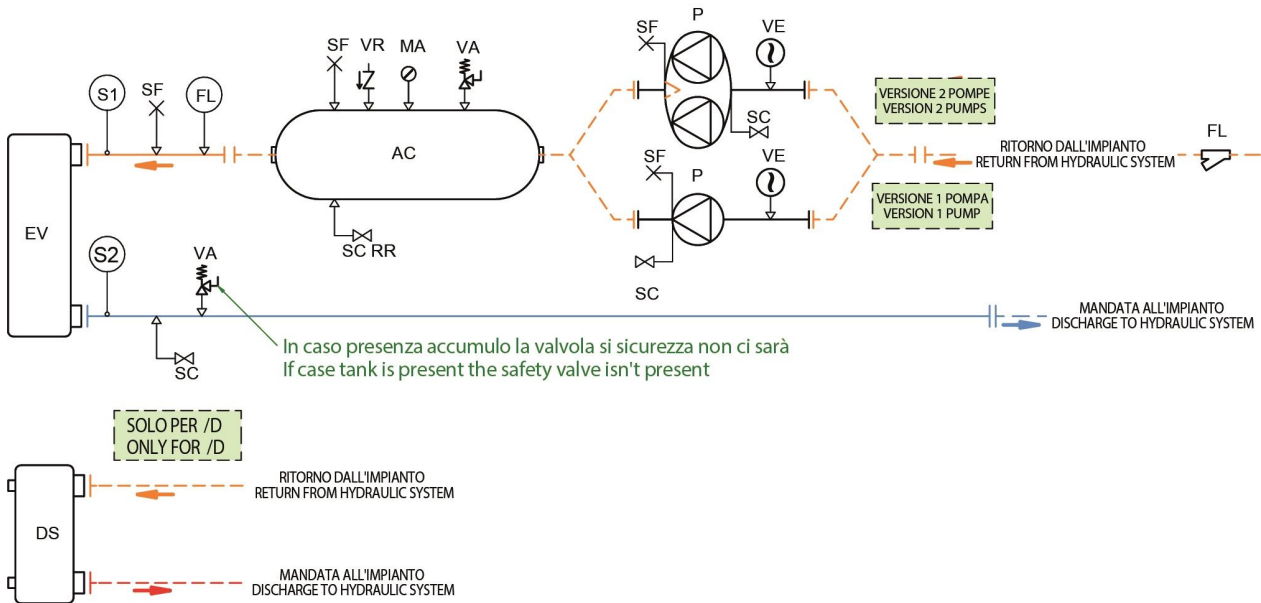
	Version	ACCUMULATION Capacity [l]
0051	-	140
0061	-	140
0071	-	140
0082	-	180
0092	-	180
0102	-	220
0112	-	220

HYDRONIC GROUP

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

Schema idraulico - Unità standard
Hydraulic diagram - Standard unit



LEGENDA - LEGEND

AC	Accumulo (opzionale) Water tank (optional)
DS	Desurriscaldatore (scambiatore a piastre - opzionale) Desuperheater (plate exchanger - optional)
EV	Evaporatore (scambiatore a piastre) Evaporator (plate exchanger)
EV/CD	Evaporatore/Condensatore (scambiatore a piastre) Evaporator/Condenser (plate exchanger)
MA	Manometro Water pressure gauge
P	Pompa di circolazione (opzionale) Available pressure pump (optional)
FL	Flussostato Flow switch
SC	Valvola di scarico Drain valve
SC RR	Valvola di scarico/reintegro Drain/filling valve
SF	Valvola di sfiato aria Purge valve
S1/2	Sonda temperatura acqua Water temperature probe
VA	Valvola di sicurezza Safety valve
VE	Vaso di espansione (opzionale) Expansion tank (optional)
FL	Filtro a rete (fornito a corredo) Mesh filter (supplied)
VR	Valvola rompivuoto (opzionale) Vacuum breaker valve (optional)

HYDRONIC GROUP**Data Book****i-NX2-G07 0051 - 0112_202206_EN R32****Hydronic kit positioning**

	Version	EV - 1 PUMP 2P LH (FIX SPEED) (4706)				EV - 1 PUMP 2P HH (FIX SPEED) (4707)				EV - 1 PUMP 2P LH (VAR SPEED) (4717)				EV - 1 PUMP 2P HH (VAR SPEED) (4718)			
		extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]
0051	-	/	/	/	100	/	/	/	100	/	/	/	100	/	/	/	100
0061	-	/	/	/	100	/	/	/	100	/	/	/	100	/	/	/	100
0071	-	/	/	/	100	/	/	/	100	/	/	/	100	/	/	/	100
0082	-	/	/	/	90	/	/	/	90	/	/	/	90	/	/	/	90
0092	-	/	/	/	90	/	/	/	90	/	/	/	90	/	/	/	90
0102	-	/	/	/	100	/	/	/	100	/	/	/	100	/	/	/	100
0112	-	/	/	/	100	/	/	/	100	/	/	/	100	/	/	/	100

extra L Unit's extra length**extra W** Unit's extra operating width (NOT to be considered for transport)**extra H** Unit's extra height**extra WGT** Unit's extra weight (pumps and piping)**EV - 1 PUMP 2P LH (FIX SPEED)** EV - 1 PUMP 2P LH (FIX SPEED)**EV - 1 PUMP 2P HH (FIX SPEED)** EV - 1 PUMP 2P HH (FIX SPEED)**EV - 1 PUMP 2P LH (VAR SPEED)** EV - 1 PUMP 2P LH (VAR SPEED)**EV - 1 PUMP 2P HH (VAR SPEED)** EV - 1 PUMP 2P HH (VAR SPEED)**-** Not available

HYDRONIC GROUP

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

Hydronic kit positioning

	Version	EV - 2 PUMPS 2P LH (VAR SPEED) (4722)				EV - 2 PUMPS 2P HH (VAR SPEED) (4723)											
		extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]	extra L [mm]	extra W [mm]	extra H [mm]	extra WGT [kg]
0051	-	/	/	/	100	/	/	/	100								
0061	-	/	/	/	100	/	/	/	100								
0071	-	/	/	/	100	/	/	/	100								
0082	-	/	/	/	90	/	/	/	90								
0092	-	/	/	/	90	/	/	/	90								
0102	-	/	/	/	100	/	/	/	100								
0112	-	/	/	/	100	/	/	/	100								

extra L Unit's extra length

extra W Unit's extra operating width (NOT to be considered for transport)

extra H Unit's extra height

extra WGT Unit's extra weight (pumps and piping)

EV - 2 PUMPS 2P LH (VAR SPEED) EV - 2 PUMPS 2P LH (VAR SPEED)

EV - 2 PUMPS 2P HH (VAR SPEED) EV - 2 PUMPS 2P HH (VAR SPEED)

- Not available

HYDRONIC GROUP**Data Book**

i-NX2-G07 0051 - 0112_202206_EN R32

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P HH (FIX SPEED)

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
0051	-	50,09	2,395	A1	TP 40-270/2	2	3	1,500	213
0061	-	60,11	2,874	A2					191
0071	-	70,14	3,354	A3					164
0082	-	80,14	3,833	B1	TP 50-290/2	2	6	3,000	248
0092	-	90,23	4,315	B2					238
0102	-	100,2	4,792	B3					236
0112	-	110,2	5,270	B4					225

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

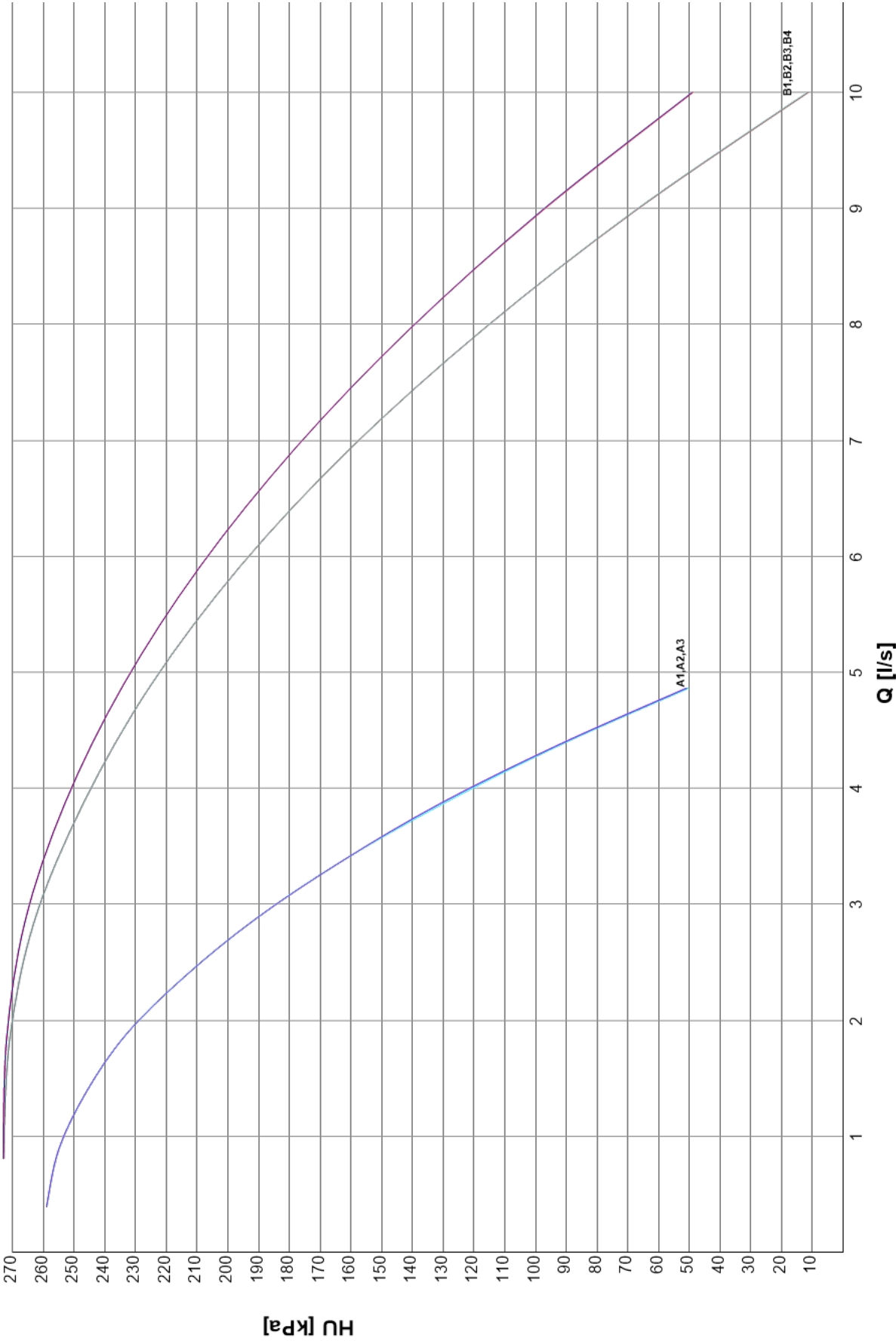
Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P HH (FIX SPEED)



HYDRONIC GROUP**Data Book**

i-NX2-G07 0051 - 0112_202206_EN R32

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P HH (VAR SPEED)

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
0051	-	50,09	2,395	A1	TPE2 40-240-N	0	3	1,500	219
0061	-	60,11	2,874	A2					209
0071	-	70,14	3,354	A3					196
0082	-	80,14	3,833	B1	TPE2 50-240-N	2	4	2,200	207
0092	-	90,23	4,315	B2					200
0102	-	100,2	4,792	B3					200
0112	-	110,2	5,270	B4					193

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

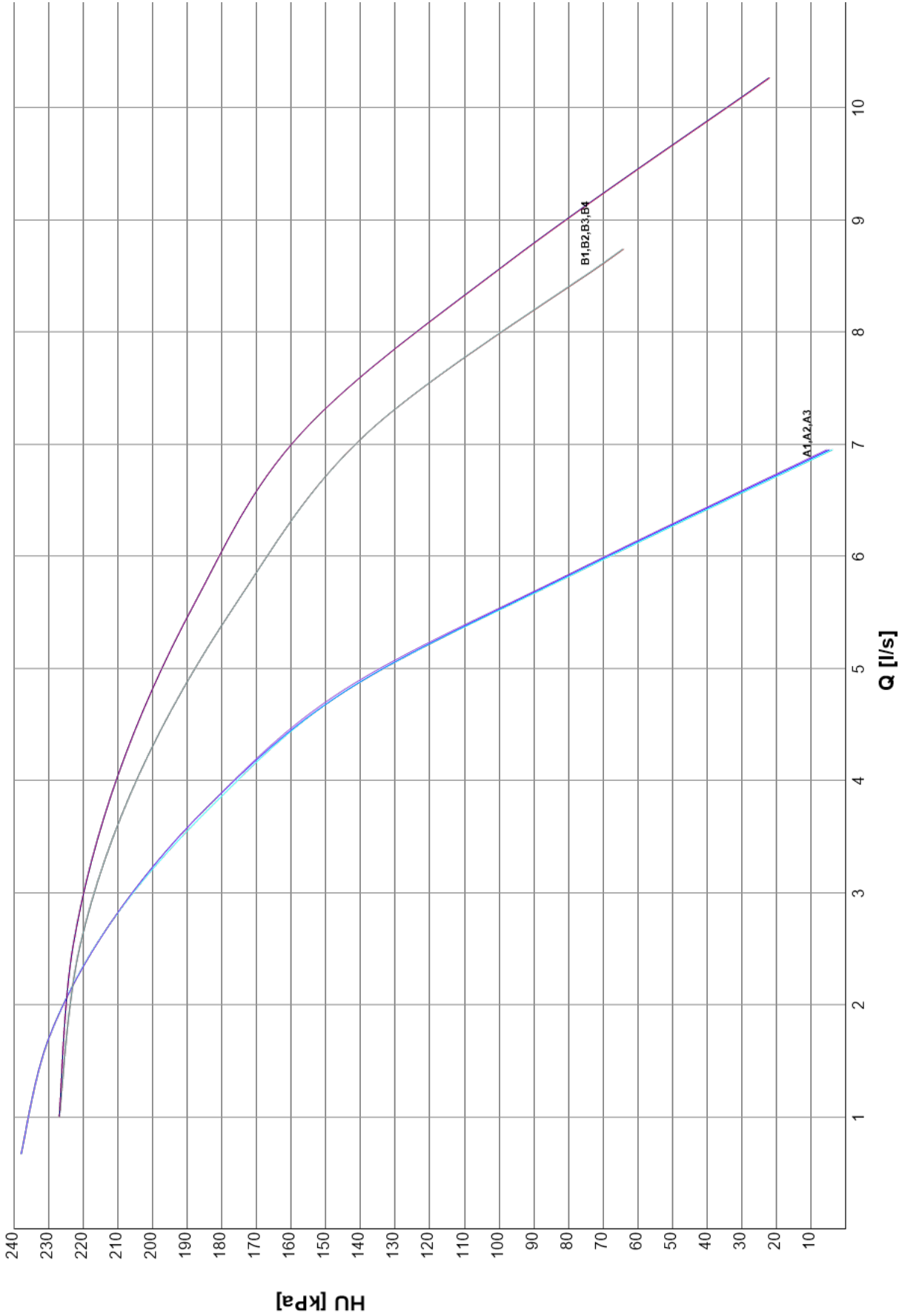
Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P HH (VAR SPEED)



HYDRONIC GROUP**Data Book**

i-NX2-G07 0051 - 0112_202206_EN R32

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P LH (FIX SPEED)

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
0051	-	50,09	2,395	A1	TP 40-190/2	2	2	0,750	125
0061	-	60,11	2,874	A2					103
0071	-	70,14	3,354	B1	TP 40-230/2	2	3	1,100	127
0082	-	80,14	3,833	C1	TP 50-190/2	2	3	1,500	149
0092	-	90,23	4,315	C2					138
0102	-	100,2	4,792	C3					134
0112	-	110,2	5,270	C4					122

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

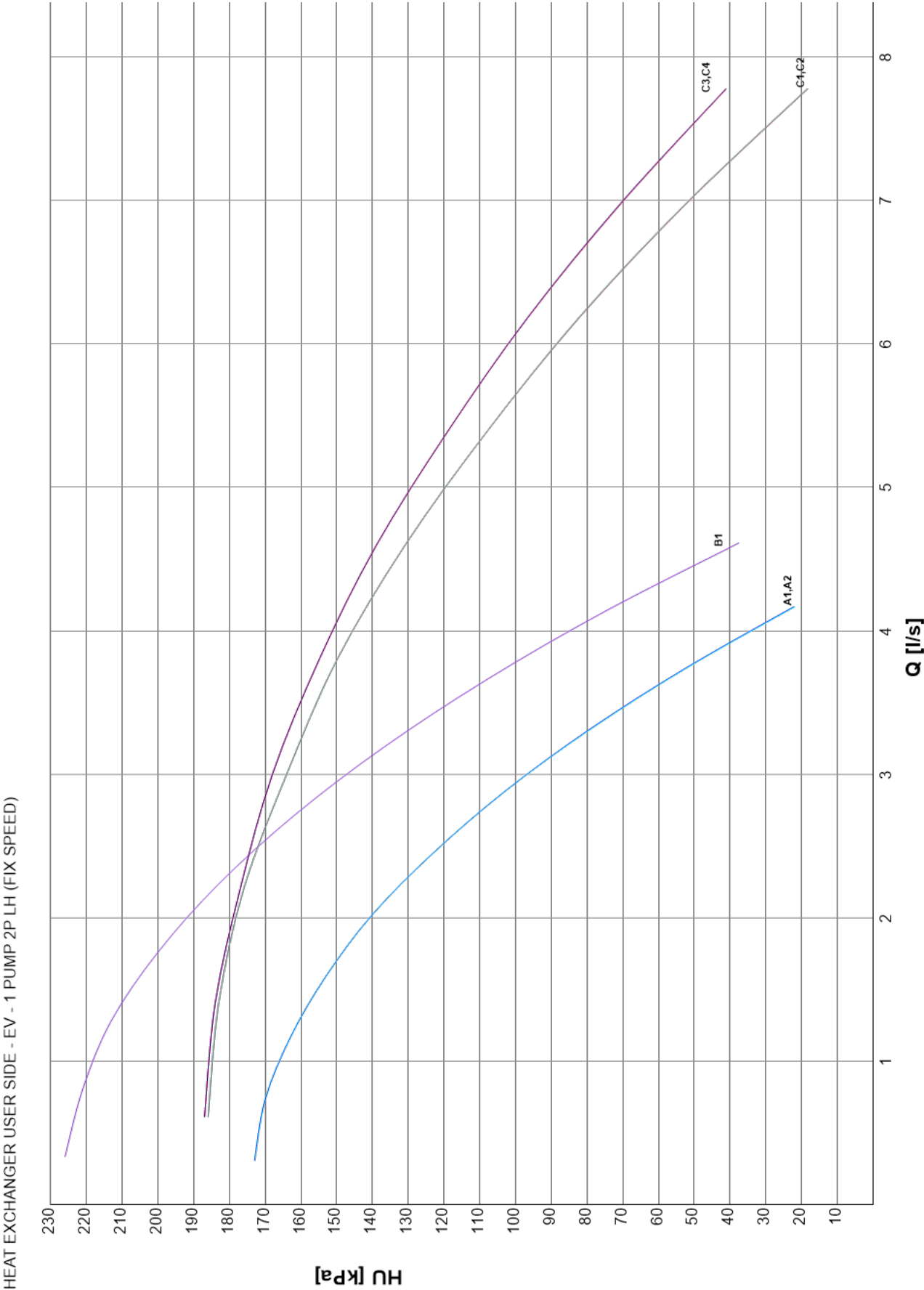
Pt Heating capacity unit (Heating mode)

Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)



HYDRONIC GROUP**Data Book**

i-NX2-G07 0051 - 0112_202206_EN R32

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P LH (VAR SPEED)

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
0051	-	50,09	2,395	A1	TPE2 32-200-N	2	2	0,750	153
0061	-	60,11	2,874	A2					145
0071	-	70,14	3,354	A3					121
0082	-	80,14	3,833	B1	TPE2 50-180-N	2	2	1,100	141
0092	-	90,23	4,315	B2					128
0102	-	100,2	4,792	B3					122
0112	-	110,2	5,270	B4					109

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

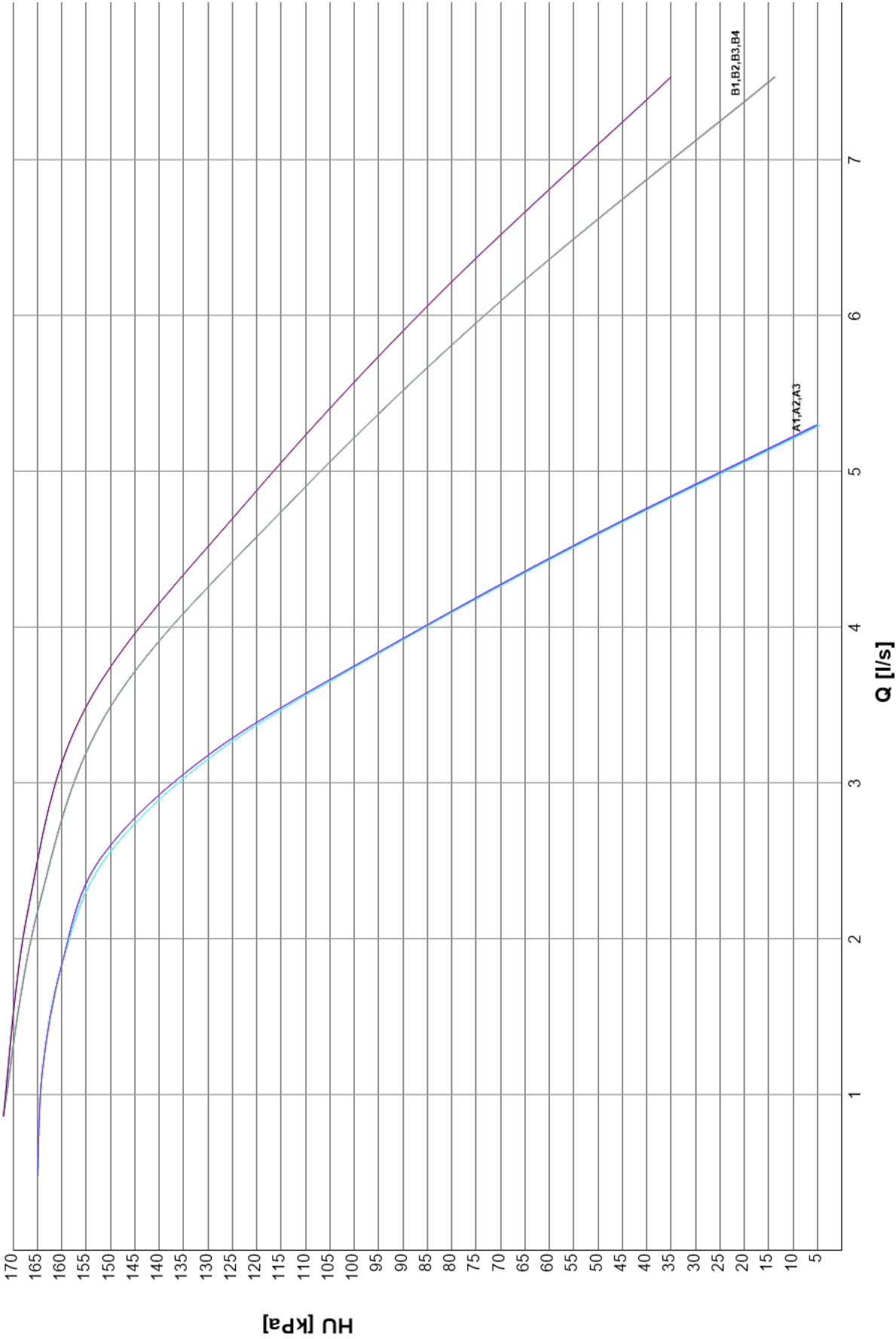
Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)

HEAT EXCHANGER USER SIDE - EV - 1 PUMP 2P LH (VAR SPEED)



HYDRONIC GROUP**Data Book**

i-NX2-G07 0051 - 0112_202206_EN R32

HEAT EXCHANGER USER SIDE - EV - 2 PUMPS 2P HH (VAR SPEED)

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
0051	-	50,09	2,395	A1	TPE2 D 40-240-N	0	3	1,500	220
0061	-	60,11	2,874	A2					210
0071	-	70,14	3,354	A3					197
0082	-	80,14	3,833	B1	TPE2 D 50-240-N	2	4	2,200	210
0092	-	90,23	4,315	B2					204
0102	-	100,2	4,792	B3					205
0112	-	110,2	5,270	B4					198

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

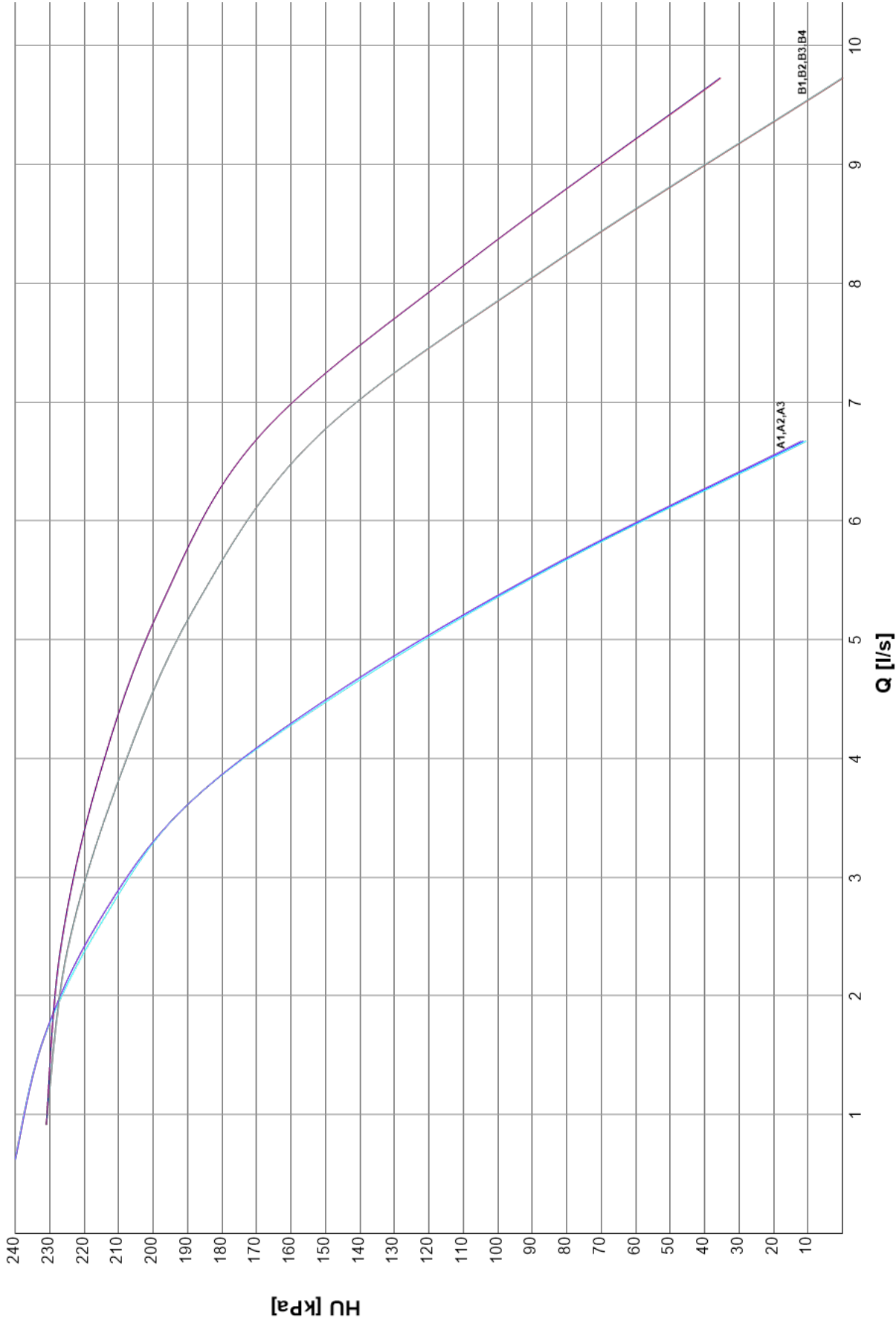
Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)

HEAT EXCHANGER USER SIDE - EV - 2 PUMPS 2P HH (VAR SPEED)



HYDRONIC GROUP**Data Book****i-NX2-G07 0051 - 0112_202206_EN R32****HEAT EXCHANGER USER SIDE - EV - 2 PUMPS 2P LH (VAR SPEED)**

SIZE	Version	CH		PUMP					CH
		Pfgross	Qfgross	Curve	Model	N.	F.L.A.	F.L.I.	HU
		[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]
0051	-	50,09	2,395	A1	TPE2 D 32-200-N	2	2	0,750	154
0061	-	60,11	2,874	A2					137
0071	-	70,14	3,354	A3					111
0082	-	80,14	3,833	B1	TPE2 D 50-180-N	2	2	1,100	141
0092	-	90,23	4,315	B2					127
0102	-	100,2	4,792	B3					121
0112	-	110,2	5,270	B4					107

(1) Values refer to nominal conditions

CH Cooling mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

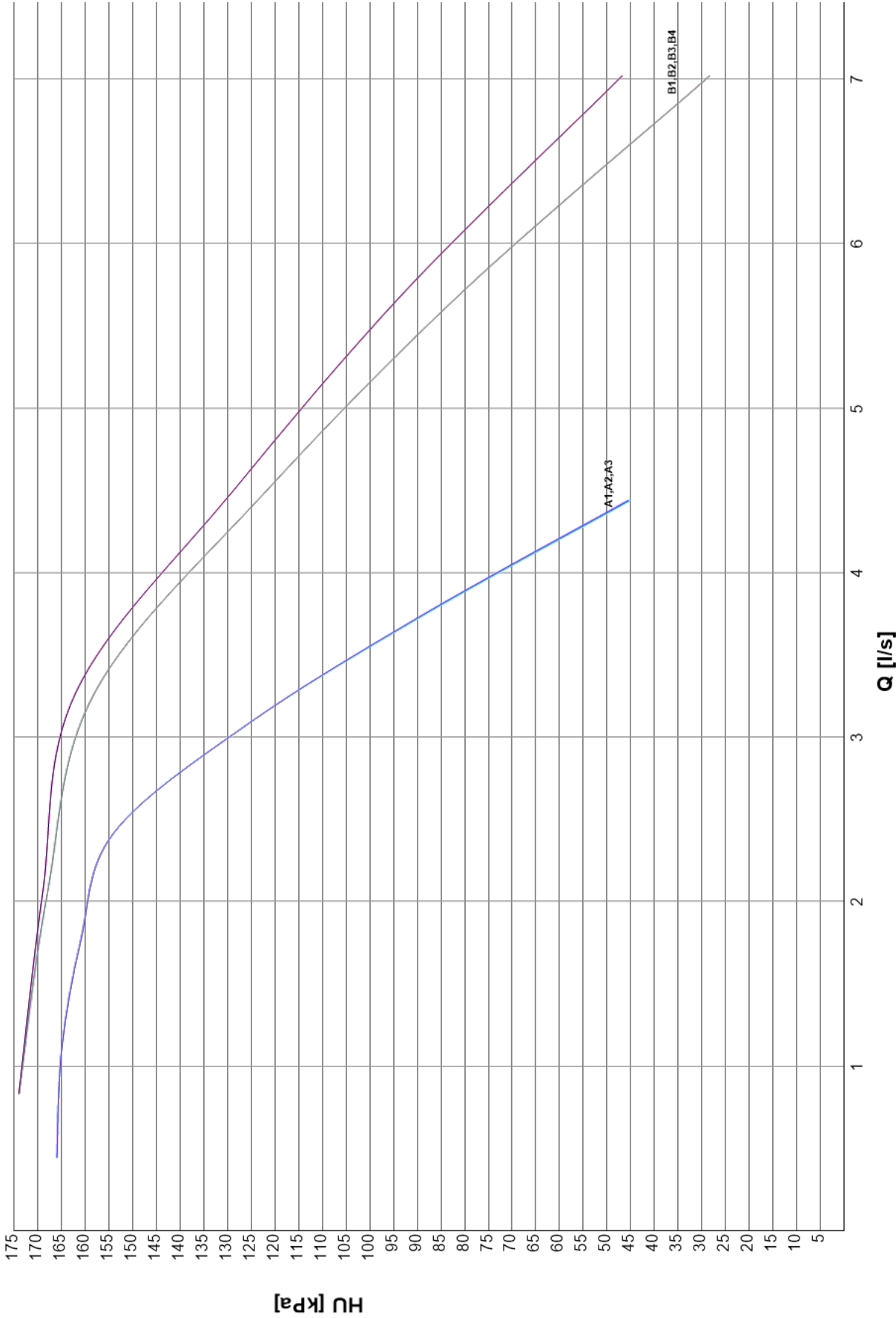
Q Plant (side) exchanger water flow

F.L.I. Pump power input

F.L.A. Pump running current

HU Pump residual pressure head (Units with hydronic group without mains filter)

HEAT EXCHANGER USER SIDE - EV - 2 PUMPS 2P LH (VAR SPEED)



15.1 Variable flow control

Pump energy consumption significantly impacts plant running costs, but it can be considerably reduced thanks to the use of variable speed pumps (inverter driven pumps), capable of adjusting the water flow rate according to the actual plant thermal load.

Mitsubishi Electric Hydronics & Cooling Systems has developed the VPF control series (Variable Primary Flow), that provides different water flow regulation logics specifically devoted to various hydraulic plant solutions: only a primary circuit, primary and secondary circuits, single unit or multi-unit systems controlled with external controller (Manager 3000+, KlimaPRO+) or with 1541, 1542 Multi Manager options.

The VPF systems adjust the pump speeds on the basis of the plant's thermal load and optimize the unit's thermoregulation algorithm for variable flow operation, in a dynamic and simultaneous way. This ensures the highest energy savings, stable operation, and complete reliability.

VPF.E SYSTEM (delta T control) For plants with primary circuit.

VPF.E - Plant and unit requirements

The VPF.E system monitors the temperature difference of the primary circuit (ΔT) and adjusts the primary circuit's pump speed in order to keep it within a defined range (ΔT_{min} ΔT_{max}).

- If $\Delta T_{min} \leq \Delta T \leq \Delta T_{max}$

The plant water flow is appropriate to the thermal load, the pump speed is kept constant.

- If $\Delta T < \Delta T_{min}$

The plant water flow exceeds what is necessary to properly cover the thermal load, the pump speed is reduced to save pump energy.

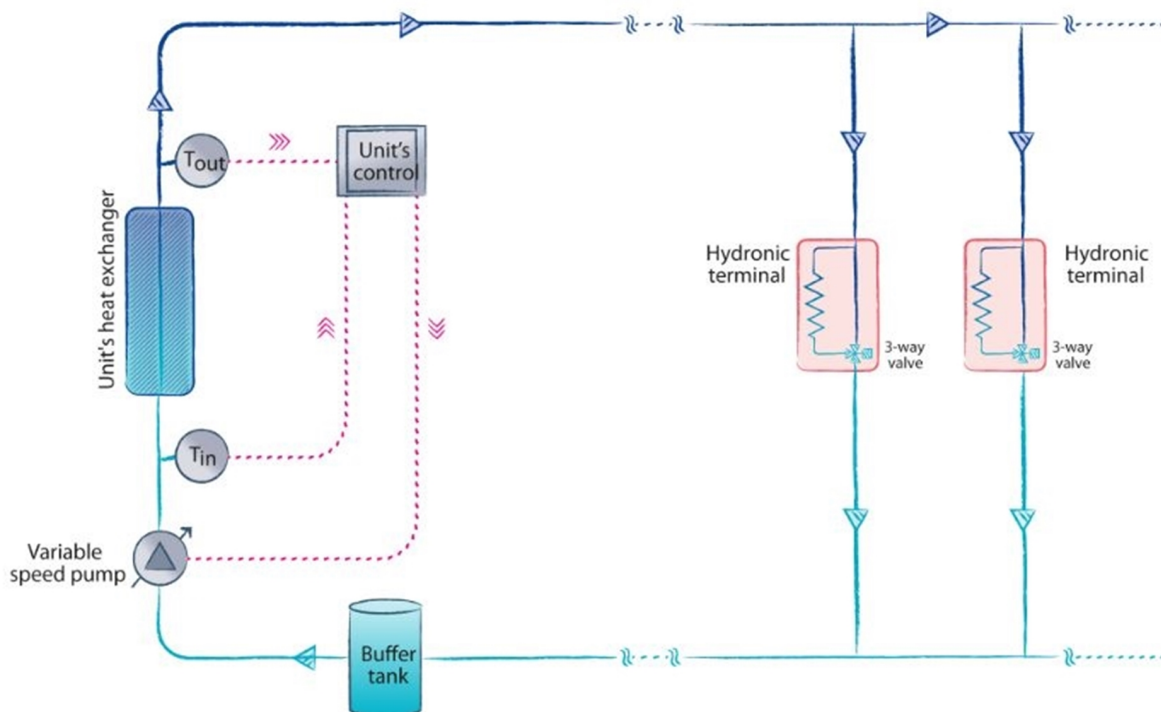
- If $\Delta T > \Delta T_{min}$

The plant water flow is too low to ensure the proper feed to the users, the pump speed is increased.

With the VPF.E 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 (the control of the heat exchanger's minimum water flow is described below).

The pump speed regulation is performed with little progressive adjustments while continuously monitoring the value of the temperature difference on the primary circuit.

The absence of abrupt water flow changes prevents fluctuation due to possible conflicts with the unit's thermoregulation function (compressor regulation).



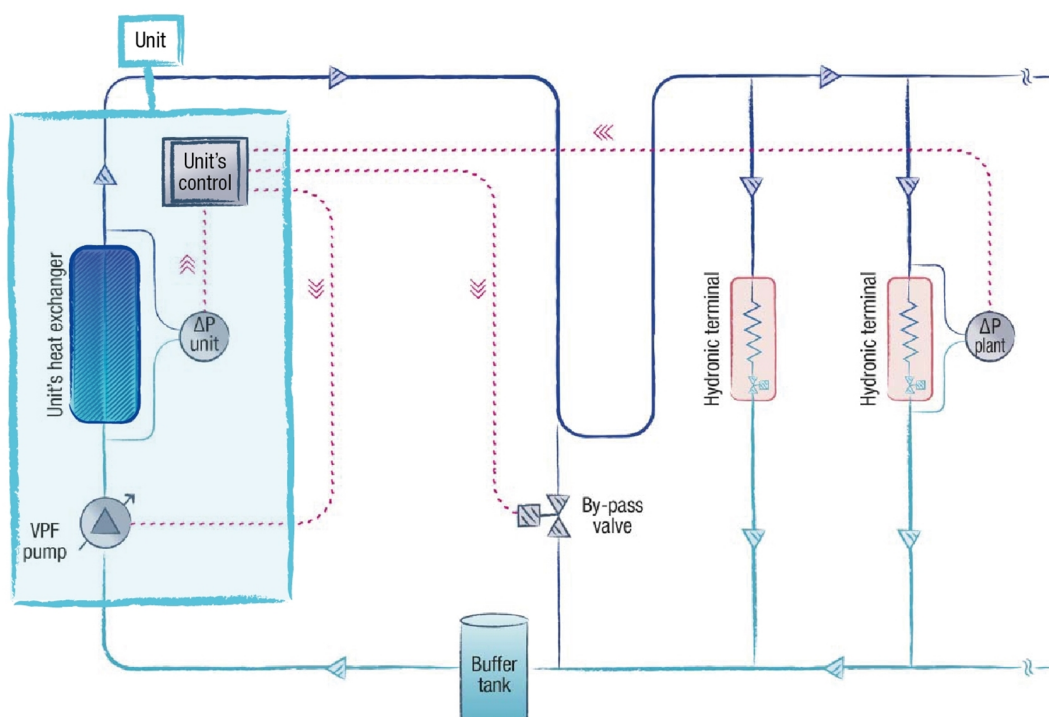
VPF SYSTEM (delta P control) For plants with only a primary circuit

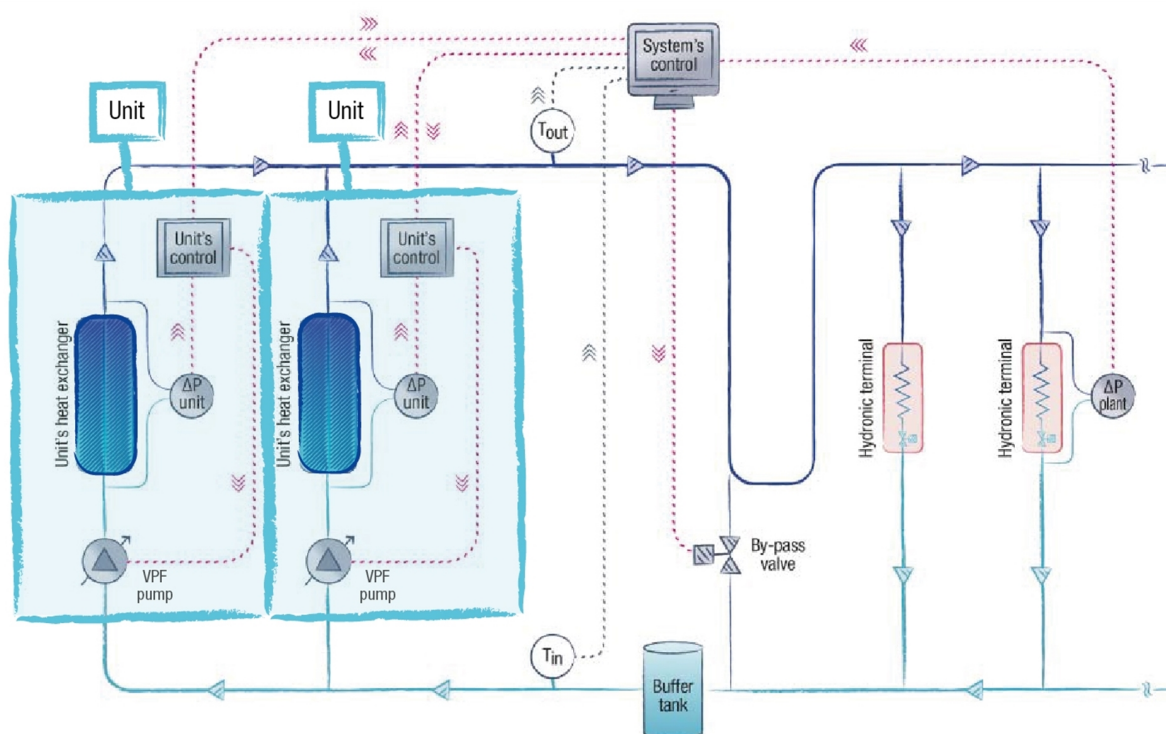
VPF - Plant and unit requirements

The VPF logic provides the variable flow control for the plant's primary circuit.

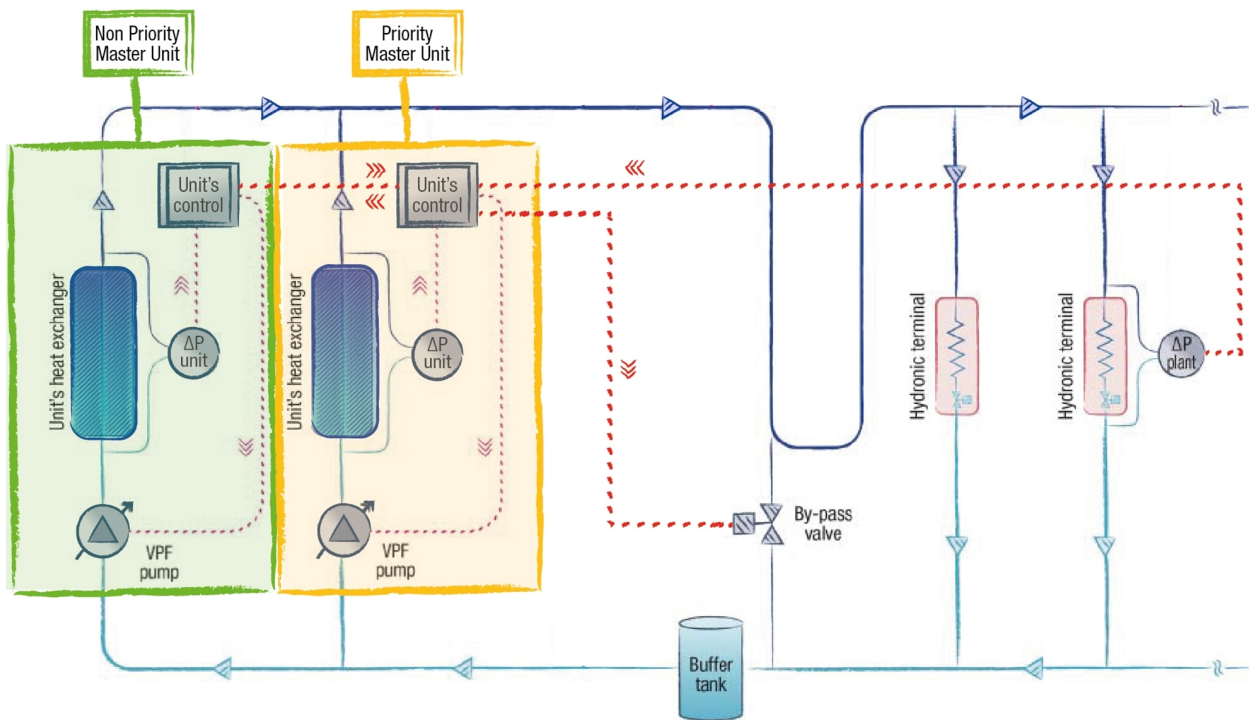
- Type of plant: primary circuit only, that feeds hydronic terminals fitted with a 2-way regulating valve
- Hydronic module: modulating regulation devices (0-10V signal) or variable speed pumps
- Unit thermoregulation: control of the leaving water temperature
- Monitored parameter: delta P on relevant users' hydronic terminal

Plant diagram for single unit system



Plant diagram for multi-unit with external control system (Manager3000+ or ClimaPRO+)

Plant diagram for multi-unit system with Multi Manager



VPF - Operating logic

Water flow regulation

The VPF system monitors the differential pressure on the plant side (ΔP) and adjusts the pump speed in order to keep it within a defined range (ΔP_{min} ΔP_{max}).

- If $\Delta P_{min} \leq \Delta P \leq \Delta P_{max}$

The plant water flow is appropriate to the thermal load, the pump speed is kept constant.

- If $\Delta P > \Delta P_{max}$

The plant water flow exceeds what is necessary to properly cover the thermal load, the pump speed is reduced to save pump energy.

- If $\Delta P < \Delta P_{min}$

The plant water flow is too low to ensure the proper feed to the hydronic terminals, the pump speed is increased.

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 (the control of the heat exchanger's minimum water flow is described below).

The pump speed regulation is performed with little progressive adjustments while continuously monitoring the values of both the delta P on the plant side and the water temperature on the heat exchanger. The absence of abrupt water flow changes prevents fluctuation due to possible conflicts with the unit's thermoregulation function (compressor regulation).

Control of the unit's minimum water flow

Under no circumstances can the primary circuit water flow be reduced below the minimum water flow required by the unit's heat exchanger.

The monitoring of the unit's water flow is performed through a factory installed differential pressure transducer on the unit's heat exchanger.

If the differential pressure on the plant side requests a users' water flow lower than the unit's minimum water flow, the VPF system commands the gradual opening of the hydraulic by-pass valve (safety function). This ensures that the minimum water flow required by the unit's heat exchanger is always provided. As soon as the hydronic terminals request an increase of the water flow ($\Delta P < \Delta P_{min}$), the VPF closes the by-pass valve.

Multi-unit systems

The VPF control logic is also the same for multi-unit systems.

The plant side differential pressure transducer reading and the by-pass valve opening are managed by the multi-unit control system (Manager3000+, ClimaPRO+, Multi Manager Master).

Each unit autonomously adjusts its pump speed on the basis of the information provided by the multi-unit control system.

When the plant load requests the activation of a stand-by unit, the multi-unit control system calculates the starting speed of its pump in order to avoid excessive water flow variation of the running units.

In case of multi-unit system with Multi Manager, at least one unit must be set as Priority Master (opt 1541). To grant redundancy to the system, more than one unit can be configured as Priority Master. All the Priority Masters must be connected to the differential pressure transducer and the by-pass valve. The Multi Manager system only takes into account the signal read and sent by the Master of the moment (a specific filtering device is part of the supply; see the table below, note (8)).

The Non Priority Master cannot be connected to differential pressure transducer and by-pass valve and cannot managed the VPF function. In the event that a Non Priority Master is elected as the Master of the system, the VPF function is suspended.

ATTACHMENTS

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

VPF - Devices and installation

Device	Accessory name		
	VPF (w/o DP)(SU, MM_PR) ⁽¹⁾	VPF (w DP)(SU, MM_PR) ⁽²⁾	VPF (M3000, CPRO, MM_N-PR) ⁽³⁾
Differential pressure transducer on the unit's heat exchanger and related controller expansion board	Factory installed	Factory installed	Factory installed
Controller expansion board to read the plant side differential pressure transducer (4-20mA signal) and manage the hydraulic by-pass valve opening (0-10V signal)	Factory installed	Factory installed	Factory installed on the multi-unit external control system (Manager3000, ClimaPRO); Not included with option 1542 (Non Priority Master unit) ⁽⁵⁾
Plant side differential pressure transducer	Not included (the supply is the customer's responsibility) ⁽⁴⁾	Factory supplied, installation is the client's responsibility ⁽⁴⁾⁽⁵⁾	Factory supplied with the multi-unit external control system (Manager3000, ClimaPRO); installation is the client's responsibility Not included with option 1542 (Non Priority Master unit) ⁽⁴⁾⁽⁶⁾
Plant side hydraulic by-pass valve	Not included (the supply is the customer's responsibility) ⁽⁷⁾⁽⁸⁾	Not included (the supply is the customer's responsibility) ⁽⁷⁾⁽⁸⁾	Not included (the supply is the customer's responsibility) ⁽⁷⁾

(1) VPF for unit without plant differential pressure transducer included (for single unit plant and Priority Master unit)

(2) VPF for unit with plant differential pressure transducer included (for single unit plant and Priority Master unit)

(3) VPF for multi-unit plant with external controller (Manager3000+, ClimaPRO+) and Non Priority Master unit

(4) It is recommended to install the differential pressure transducer on the most hydraulically critical hydronic terminal, to ensure it has a proper water flow in any load condition.

(5) Technical features of the differential pressure transducer supplied:

Model: Huba Control 692.9 120071C1

Pressure range: 0 ... + 1 bar

Output: 4-20mA

Electrical connection: DIN EN 175301-803-A (IP 65)

Pressure connection adapters: male threaded G 1/8"

(6) It is the customer's responsibility to configure the multi-unit control system (Manager3000+, ClimaPRO+ or Multi Manager) with option VPF.

(7) See attached table for information on the hydraulic by-pass design.

(8) In case of a multi-unit plant with more than one Master Priority unit (opt 1541) please specify it when emailing our sales. An additional device will be added to manage the multiple signals coming from unit's controller to the by-pass valve.

ATTACHMENTS

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32

The following table provides the indications for a correct hydraulic by-pass design.

Heat exchanger minimum flow (m ³ /h) ⁽¹⁾	Minimum by-pass diameter	Minimum by-pass valve diameter	Suggested valve model	Kvs	Suggested actuator model
From 19 to 30	DN50 (2")	DN50 (2")	VVG41.50	40	SKB60
Up to 37	DN65 (2" ½)	DN65 (2" ½)	VVF31.65	49	SKB60
Up to 60	DN80 (3")	DN80 (3")	VVF31.80	78	SKB60
Up to 95	DN100 (4")	DN100 (4")	VVF31.90	124	SKC60
Up to 150	DN125 (5")	DN125 (5")	VVF31.91	200	SKC60
Up to 230	DN150 (6")	DN150 (6")	VVF31.92	300	SKC60

((1) In case of a multi-unit system, the unit with the highest minimum water flow should be the reference.

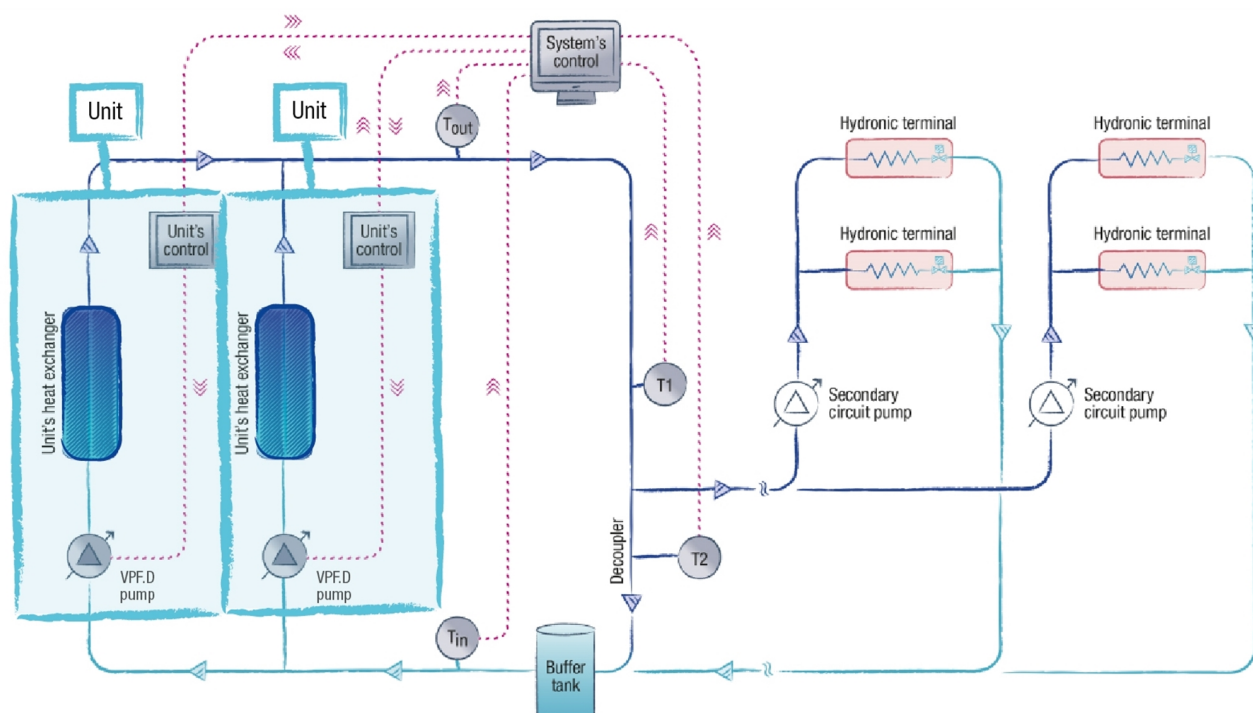
VPF.D SYSTEM (delta T control)

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

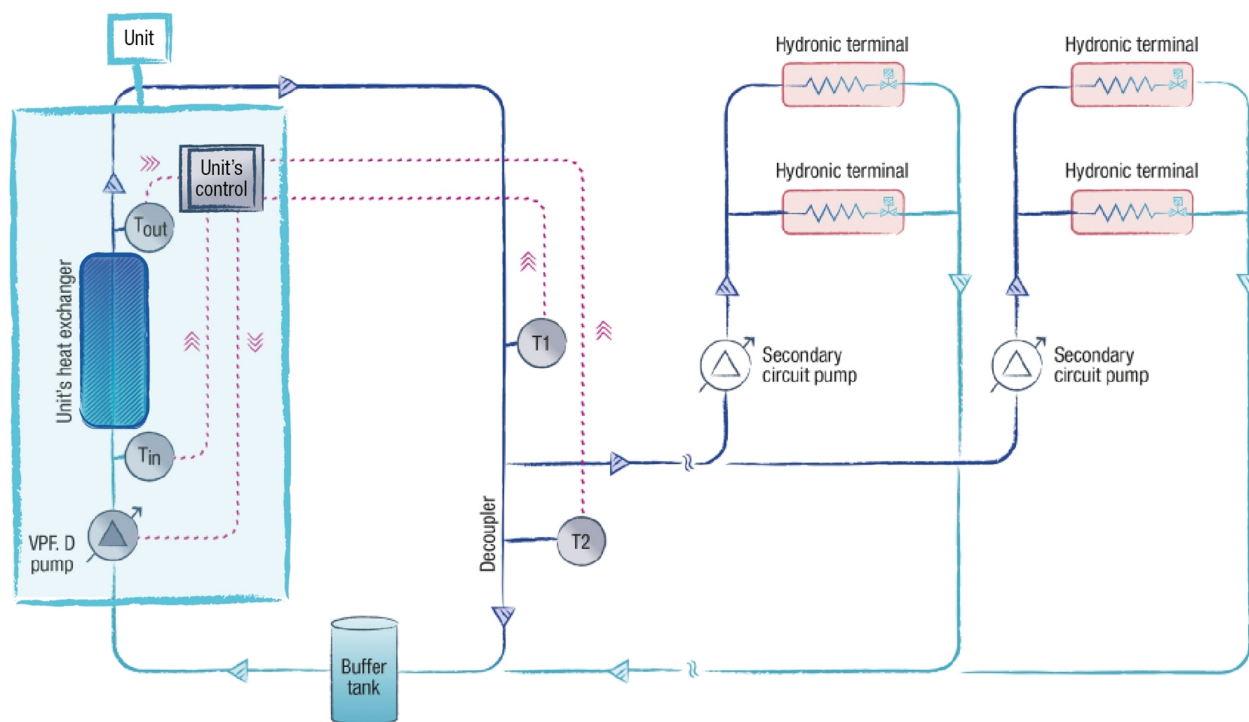
VPF.D - Plant and unit requirements

The VPF.D logic provides the variable flow control for the plant's primary circuit.

- Type of plant: primary and secondary circuits separated by a hydraulic decoupler
- Hydronic module: modulating regulation devices (0-10V signal) or variable speed pumps
- Unit thermoregulation: control of the leaving water temperature
- Monitored parameter: delta T on primary circuit

Plant diagram for multi-unit with external control system (Manager3000+ or ClimaPRO+)

Plant diagram for single unit system

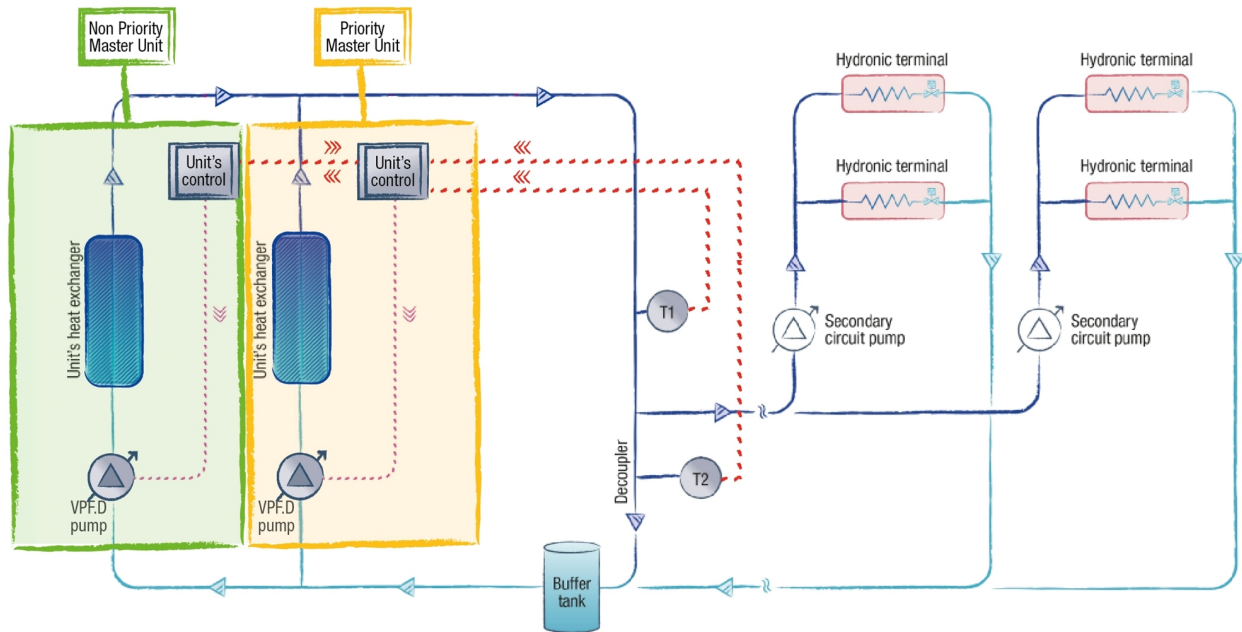


ATTACHMENTS

Data Book

i-NX2-G07 0051 - 0112_202206_EN R32

Plant diagram for multi-unit system with Multi Manager



VPF.D - Operating logic

Water flow regulation

The VPF.D system monitors the temperature difference of the primary circuit (ΔT) (that corresponds to the temperature difference of the unit's heat exchanger in the case of a single unit system), and adjusts the primary circuit's pump speed in order to keep it within a defined range ($\Delta T_{min} \leq \Delta T \leq \Delta T_{max}$). The secondary circuit water flow is completely independent and is to be managed by the client.

- If $\Delta T_{min} \leq \Delta T \leq \Delta T_{max}$

The plant water flow is appropriate to the thermal load, the pump speed is kept constant.

- If $\Delta T < \Delta T_{min}$

The plant water flow exceeds what is necessary to properly cover the thermal load, the pump speed is reduced to save pump energy.

- If $\Delta T > \Delta T_{min}$

The plant water flow is too low to ensure the proper feed to the users, the pump speed is increased.

To prevent the returning water of the secondary circuit from recirculating through the decoupler and mixing with the delivery water, which would cause serious plant regulation problems, the VPF.D provides a safety function based on the temperatures, which are detected by two probes on the plant side: T1 on the unit delivery line and T2 on the hydraulic decoupler. If during the water flow regulation of the circuits, the flow direction in the decoupler reverses (detected temperatures $T1 < T2$), the system forces a quick increase of the primary water flow until the correct direction of the flow in the decoupler is restored (detected temperatures $T1 = T2$).

With the VPF.D 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 (the control of the heat exchanger's minimum water flow is described below).

The pump speed regulation is performed with little progressive adjustments while continuously monitoring the values of both the temperature difference on the primary circuit and the temperatures of the probes T1 and T2. The absence of abrupt water flow changes prevents fluctuation due to possible conflicts with the unit's thermoregulation function (compressor regulation).

Control of the unit's minimum water flow

Under no circumstances can the primary circuit water flow be reduced below the minimum water flow required by the unit's heat exchanger.

The unit's minimum water flow is ensured by setting the minimum pump speed (service menu parameter).

Multi-unit systems

The VPF.D control logic is also the same for multi-unit systems.

The reading of the temperature difference on the primary circuit and the reading of the temperature probes T1 and T2 is managed by the multi-unit control system (Manager3000+, ClimaPRO+, Multi Manager Master). Each unit autonomously adjusts its pump speed on the basis of the information provided by the multi-unit control system.

When the plant load requests the activation of a stand-by unit, the multi-unit control system calculates the starting speed of its pump in order to avoid excessive water flow variation of the running units.

In case of multi-unit system with Multi Manager, at least one unit must be set as Priority Master (opt 1541). To grant redundancy to the system, more than one unit can be configured as Priority Master. All the Priority Masters must be connected to the temperature probes T1 and T2. The Multi Manager system only takes into account the signal read and sent by the Master of the moment.

The Non Priority Master cannot be connected to the temperature probes T1 and T2, and cannot managed the VPF.D function. In the event that a Non Priority Master is elected as the Master of the system, the VPF.D function is suspended.

VPF.D - Devices and installation

Dispositivo	Accessory name	
	VPF.D (SU, MM_PR) ⁽¹⁾	VPF.D(M3000, CPRO, MM_N-PR) ⁽²⁾
2 plant side NTC temperature sensors and related controller expansion board	Factory supplied (probes supplied without wells), installation is the client's responsibility ⁽³⁾	Factory supplied with the multi-unit external control system, Manager3000 or ClimaPRO (probes supplied without wells); installation is the client's responsibility Not included with option 1542 (Non Priority Master unit) ^{(3)/(4)}

(1) VPF.D for single unit plant and Priority Master unit

(2) VPF.D for multi-unit plant with external controller (Manager3000+ or ClimaPRO+) and Non Priority Master unit

(3) It is recommended to install the temperature probes as shown in the enclosed plant diagrams (T1 on the unit delivery line, T2 on the hydraulic decoupler)

(4) It is the customer's responsibility to configure the multi-unit control system (Manager3000+, ClimaPRO+ or Multi Manager) with option VPF.D.

The following table provides the indications for a correct hydraulic decoupler design.

Heat exchanger minimum flow (m ³ /h) ⁽¹⁾	Minimum hydraulic decoupler diameter
From 25 to 40	DN65 (2" ½)
Up to 60	DN80 (3")
Up to 100	DN100 (4")
Up to 150	DN125 (5")
Up to 225	DN150 (6")
Up to 375	DN200 (8")

(1) In case of a multi-unit system, the unit with the highest minimum water flow should be the reference.

15.2 Compressor rephasing and electromagnetic compatibility

The harmonic distortion due to power frequency conversion

The increasing need for chillers to work with high efficiency at part loads has led to the introduction of the frequency converter (commonly called inverter) in order to drive the compressor.

The frequency converter varies the compressor's rotation speed through the regeneration of the power voltage, keeping its amplitude and frequency under control, through a conversion of the electrical power in two steps: first with a ACDC rectifier and then with a inverter DCAC inverter.

The use of the frequency converter determines an AC current characterized by a non-sine periodic wave form with given frequency f . This wave can be broken out into a sine wave called pure wave and a certain number of waves with greater frequencies (multiples of f), called harmonic waves and numbered with rising odd numbers (3° , 5° , 7° , ...).

Power Factor, Displacement Power Factor and Total Harmonic Distortion

The harmonic waves do not contribute to the absorption of active power from the power source, but their presence causes:

- The presence of voltage harmonics that worsen the quality of the grid power voltage thus leading to possible malfunctions of the loads connected to this power grid.
- The worsening of the unit power factor PF, resulting in higher charges for the client from the electricity distribution company.

The Power Factor PF of a system is equal to the ratio between the active power and the apparent power and it is formulated in the following way:

$$PF = \frac{1}{\sqrt{1 + THD_i^2}} DPF$$

DPF (Displacement Power Factor) is equal to the cosφ of the pure current wave.

THD (Total Harmonic Distorsion) is the rate which describes the amount of the harmonic distortion. In particular THDi refers to the current wave and THDv to the voltage wave.

ATTACHMENTS

Data Book
i-NX2-G07 0051 - 0112_202206_EN R32

It is therefore clear that, whenever harmonics are present, the Power Factor PF is different from the Displacement Power Factor, and that the heavier the harmonics are, the greater the difference is.

In general, frequency converters are characterized by an intrinsic constant DPF (Displacement Power Factor) value between 0.97 and 0.99, while the Power Factor PF varies according to the load conditions, usually becoming worse when load partialization increases.

The following table displays the values of Power Factor PF and current Total Harmonic Distortion for the units:

Size	MAXIMUM	
	PF	THD _i [%]
0051	0,92	38
0061	0,92	38
0071	0,93	34
0082	0,91	32
0092	0,91	32
0102	0,90	37
0112	0,91	34

MAXIMUM: Values calculated at Maximum conditions (considering toughest possible load conditions)

The data shown above refer to measurement performed with the unit powered by 3% THDv electricity grid. Grids with different characteristics can lead to results that differ from those shown in the table.

For installations where the control of the THDi values is crucial, active harmonic modular filters are available: they're a device that analyzes the line current harmonics drawn by the loads and generates a compensation current at an opposite phase angle thereby neutralizing the harmonic currents, to obtain a THDi less than 5%. The harmonic current is reduced in all the working conditions of the unit.

Active harmonic modular filters are subject to RFQ (feasibility and quote request).

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