

Data Book



i-FX-N-G05 0472 - 1152_202010_EN R513A
ELCA_Engine ver.4.4.6.0

i-FX-N-G05 0472 - 1152

444-1154 kW

Reversible unit, air source, VSD screw compressors and EC fans,
for outdoor installation.



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

- ✓ HIGH EFFICIENCY
- ✓ ErP COMPLIANT 2021
- ✓ LOW GWP REFRIGERANT
- ✓ COMPACTNESS

- ✓ HOT WATER SUPPLY
- ✓ ADAPTABILITY
- ✓ UNIT AND PLANT HARMONY
- ✓ VARIABLE PRIMARY FLOW



CERTIFICATIONS

Product certifications



Voluntary product certifications

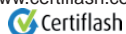


Check ongoing validity of certificate:

www.eurovent-certification.com

or

www.certiflash.com



System certifications



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

Quality System complying with the requirements of UNI EN ISO 9001:2008 regulation
Environmental Management System complying with the requirements of UNI EN ISO 14001:2004 regulation
Occupational Health and Safety Management System complying with the requirements of BS OHSAS 18001:2007

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The units highlighted in this publication contain R513A [GWP₁₀₀ 631] fluorinated greenhouse gases.

Functions

-  **COOLING** Cooling
-  **HEATING** Heating

Refrigerant

-  **R513A** R513A

Compressors

-  **SCREW** Screw compressor

Fan

-  **EC AXIAL** EC axial fan

Exchangers


-  **SHELL & TUBES** Shell & Tubes

Other features

-  Eurovent

-  **INVERTER**
DRIVEN COMPRESSOR Inverter Driven Compressor

-  **VPF**
Variable Primary Flow VPF

-  **EEV**
ELECTRONIC EXPANSION VALVE Electronic Expansion Valve

1.1 PRODUCT PRESENTATION

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/



PRODUCT PRESENTATION

Outdoor heat pump unit for the production of chilled/hot water with semi-hermetic variable-speed screw compressors optimized for R513A, EC fans, external coil with copper tubes and aluminium fins, shell and tubes heat exchanger designed by Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A. and electronic expansion valve. The screw compressors feature the variable speed technology thanks to the integrated refrigerant cooled inverter, for the maximum compactness and operating flexibility. Moreover, they feature the Variable Vi (compression ratio) technology, to change the internal geometry according to the operating conditions. Thanks to the accurate sizing of all internal components and the use of variable speed technology, the unit ensures flexibility, reliability and maximum efficiency in every operating condition. These units are designed for two-pipes systems and are able to produce hot or cold water, according to the selected operation mode.

1.3 HIGH EFFICIENCY

High full load and partial load efficiency in both heating and cooling, using inverter technology to continuously modulate compressors operation and EC fans as standard, in order to deliver the exact amount of energy based on the actual needs of the plant. High efficiency means reduced energy consumption throughout the entire year, for any operation mode and any outdoor condition.

1.4 ErP COMPLIANT 2021

Thanks to the inverter technology and the accurate design, the units already comply and exceed the minimum seasonal energy efficiency requirements that will start from 2021, imposed by the eco-sustainable design Directive 2009/125/EC.

1.5 LOW GWP REFRIGERANT

New generation refrigerant R513A, with reduced greenhouse effect in comparison with traditional HFC refrigerants (Global Warming Potential GWP of R513A = 572, GWP of R134a = 1300 as per IPCC rev. 5) and zero impact on the ozone layer. Non-flammable (ASHRAE 34, ISO 817: class A1).

1.6 COMPACTNESS

Compactness in terms of overall size and weight, improving installation and on-site maintenance.

1.7 HOT WATER SUPPLY

Supply of hot water in use up to 60°C, offering maximum versatility with respect to different plant engineering solutions.

1.8 ADAPTABILITY

Can adapt to the building's heating request thanks to the continuous capacity regulation, assured by the control's sophisticated logic.

1.9 UNIT AND PLANT HARMONY

Low inrush current and a higher power factor than similar fixed speed units, provide an easy electrical installation which is not stressed during start-up nor are extra devices for power factor correction needed. The use of VSD technology allows the unit to partialize in a stepless way, with consequent lower leaving water temperature fluctuations.

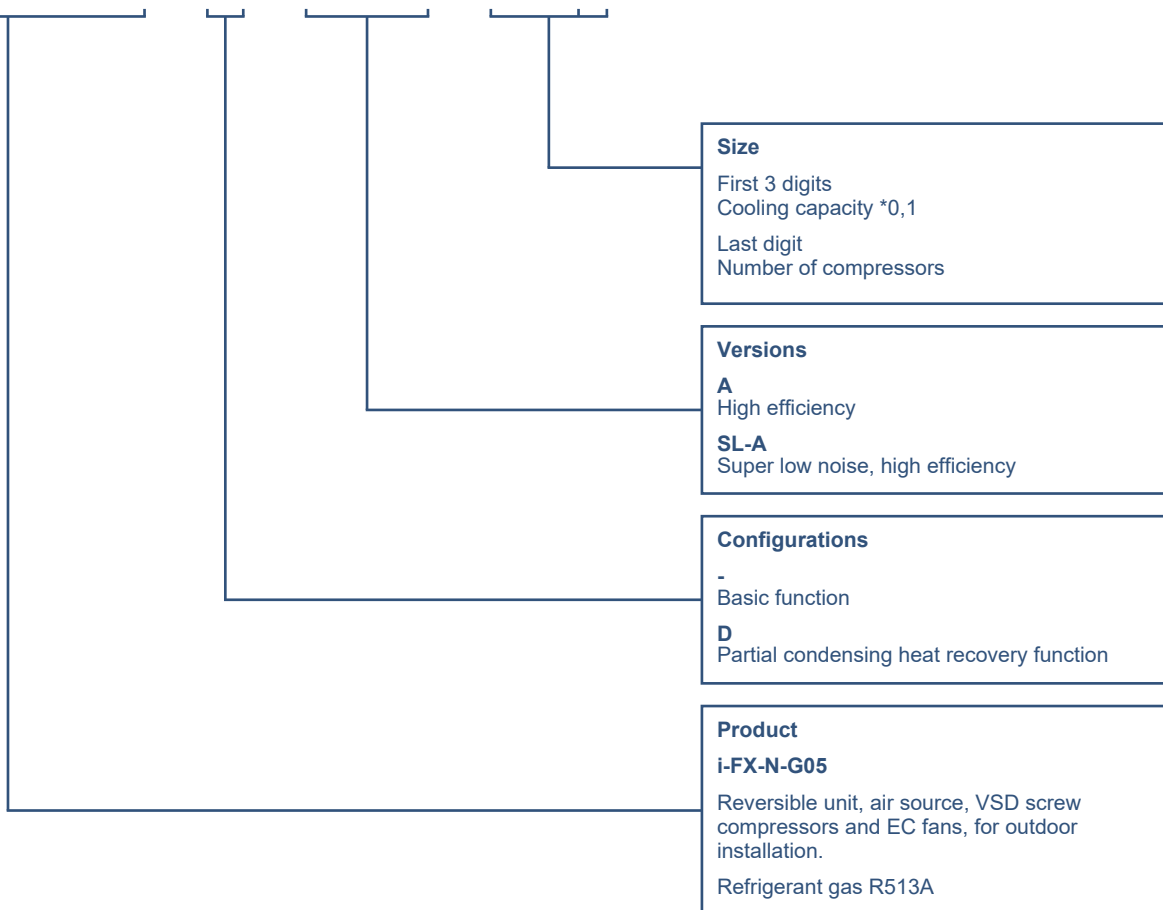
1.10 VARIABLE PRIMARY FLOW

Energy savings due to variable pump speed management based on load demand and the variable flow ensures the units also function in critical working conditions.

1.11 WIDE OPERATING RANGE

Unit's operation guaranteed with external air temperature down to -12°C during winter and up to 50°C during summer. Production of hot water up to 60°C without accessories and chilled water from -8°C to +20°C in order to suit any possible application.

i-FX-N-G05 / D / SL-A / 1152



3.1 UNIT STANDARD COMPOSITION

3.2 Reversible unit, air source, VSD screw compressors and EC fans, for outdoor installation.

Outdoor heat pump unit for the production of chilled/hot water with semi-hermetic variable-speed screw compressors optimized for R513A, EC fans, external coil with copper tubes and aluminium fins, shell and tubes heat exchanger designed by Mitsubishi Electric Hydraulics & IT Cooling Systems S.p.A. and electronic expansion valve. The screw compressors feature the variable speed technology thanks to the integrated refrigerant cooled inverter, for the maximum compactness and operating flexibility. Moreover, they feature the Variable Vi (compression ratio) technology, to change the internal geometry according to the operating conditions. Thanks to the accurate sizing of all internal components and the use of variable speed technology, the unit ensures flexibility, reliability and maximum efficiency in every operating condition. These units are designed for two-pipes systems and are able to produce hot or cold water, according to the selected operation mode.

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

3.3 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. Painting: RAL 7035 textured finish. The self-supporting frame is built to guarantee maximum accessibility for servicing and maintenance operations.

3.4 Refrigerant circuit

Unit designed with separate and independent refrigerant circuits in order to ensure continuous operation and easy maintenance. In addition to the main components described in the following sections, each refrigerant circuit is fitted as standard with:

- Electronic expansion valve
- high and low pressure transducers
- High pressure switches
- High and low pressure safety valve
- liquid line shut-off device (function performed by electronic expansion valve with ultracap)
- non -return valve in compressor's discharge line integrated in the compressor
- compressor's discharge valve
- liquid line shut-off valve
- drier filter with replaceable cartridge
- crankcase heater on each compressor
- 4-way reverse cycle valve
- Liquid receivers
- Liquid separators
- differential pressure switch, water side
- antifreeze electric heater for heat exchangers

3.5 Inverter-screw compressors

CSCV screw-compressors designed according to Mitsubishi Electric Hydraulics & IT Cooling Systems S.p.A. specifications and for its exclusive use.

Extremely compact compressors, with oil separator, frequency modulation inverter and inverter cooling system integrated in a single casing.

Semi-hermetic screw-compressors with 2 five and six-lobe rotors: the five-lobe rotor is directly splined onto the motor, without the use of overgears. The motor activates the male screw at a speed varying from 1 to 6 thanks to the coupling with the dedicated inverter.

The cooling of the inverter is performed by an integrated plate: a coolant passes through and its flow is controlled by special valves. Only a connection with the refrigerant liquid line is necessary. The presence of additional heat exchangers is not required.

The bearings placed on the axle of the rotors in a special chamber, separated from the compression chamber, are made of carbon steel to obtain maximum strength and ensure long lifetime (> 150.000 h) at any speed. Lubrication: the oil is distributed to the mechanic components without using an oil pump so that compression is optimised. The oil separator is incorporated to achieve maximum compactness. It performs a three-stage separation using a 10 micron steel mesh filter that ensures the constant presence of oil in the compressor.

Innovative mechanic design with inner slider, managed according to specific proprietary parameters, for the variation of Vi depending on the different operating conditions. This allows to achieve maximum efficiency even in case of considerable load partialization.

High reliability ensured by the continuous control of the operating parameters and by automatic functions that bring the compressor back into the envelope in case the unit gets too close to operating limit values.

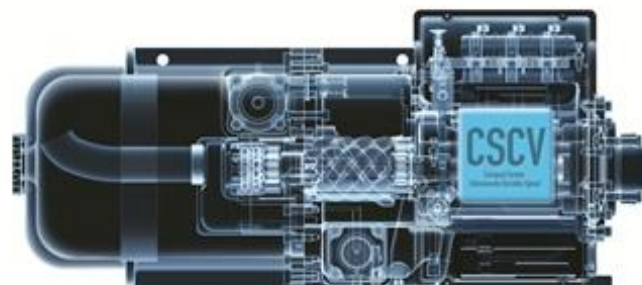
Each compressor is fitted with manual-reset motor thermal protection, delivery gas temperature control, oil level and an electric heater for heating the oil when the compressor is stopped.

The inverter power circuit is equipped with a line reactor used to control the emissions of the power line and ensure conformity to standard EN 61000-6-4 for industrial environments.

Check valve fitted on the refrigerant delivery line to prevent the rotor from reversing after stopping. Shut off valve fitted on the delivery line of each compressor in order to confine the coolant charge in the exchangers, if required.

Liquid injection circuit.

Compressor soft-start function with steady current increase without peaks.



- The compressors' enclosures are provided as standard.

3.6 Plant side heat exchanger

Shell and tube heat exchanger; it acts as an evaporator or as a condenser depending to the unit's commutation; refrigerant flows inside the pipes and water flow on the shell side. The tubes have asymmetrical flows that maintain the correct speed of the refrigerant in the tubes during phase transition. The water flows on the shell side is fitted with baffles to increase turbulence and therefore the efficiency of exchange. The steel shell has external foamed closed-cell elastomer insulating lining 10 mm thick and thermal conductivity of 0.033 W/mK at 0°C. The tube nest is manufactured using copper tubes with internal grooves for favouring heat exchange and mechanically expanded onto the tube plates. The heat exchanger is fitted with a differential pressure switch which controls the flow of water when the unit is working, in this way preventing anomalies and overheating. The heat exchanger is made in compliance with PED standard work pressure requisites.

3.7 Source side heat exchanger

Air-refrigerant heat exchanger, working as a condenser or an evaporator depending to the specific operating mode. Made with copper tubes and aluminium fins. The aluminium fins are spaced to guarantee the best heat exchange efficiency. The lower part of the exchanger works as a subcooling circuit increasing the cooling capacity, when it is working as a condenser.

3.8 Fan section source side

Axial electronically commutated fans (EC fans), 800 mm diameter, protected to IP 54 and with insulation class 'F', featuring an external rotor and profiled blades. Housed in an aerodynamic hood complete with safety guard. The fan + outlet set satisfies the efficiency requirements provided for by EcoDesign directive 327/11. The brushless motor, governed by a special controller, continuously adjust fans' speed to minimize energy consumption, electromagnetic noises and current's absorption even during start-up phase. Rotational speed: 900 rpm (chiller) or 680 rpm (heat pumps) for /A versions, 680 rpm for versions with optional NR kit, 610 rpm for /SL-A versions.

3.9 Features of the optional silenced units

Units with optional "compressor soundproofing insulation" feature:

- Soundproofing insulation characteristics: multilayer lining of polyurethane foam and sound-insulating gaiter, total thickness 32 mm.
- If the hydronic is present, the pump enclosure is acoustically insulated: 30 mm thick Fiberform (polyester fibres)

Units with optional "NR kit" (Noise Reducer kit) feature:

- Reduced fan speed (the fan speed is automatically increased in case of particularly tough environmental conditions)
- Soundproofing insulation characteristics: multilayer lining of polyurethane foam and sound-insulating gaiter, total thickness 32 mm. Fan speed reduction.
- If the hydronic is present, the pump enclosure is acoustically insulated: 30 mm thick Fiberform (polyester fibres).

The super low noise units (SL-A versions) feature:

UNIT STANDARD COMPOSITION

- Reduced fan speed (the fan speed is automatically increased in case of particularly tough environmental conditions)
- Special soundproofing insulation of the compressors enclosure (multilayer lining of polyurethane foam and double sound-insulating gaiter, total thickness 52 mm)

- Soundproofing lining of suction and delivery pipes of the compressors with anti-condensation mat, insulating viscous coating and cross-linked polyethylene foam coating.
- If the hydronic is present, the pump enclosure is acoustically insulated: 30 mm thick Fiberform (polyester fibres)

3.10 Electrical and control panel

Electrical and control panel built to EN60204-1 and EC204-1 standards, complete with:

- Electronic control W3000+
- power circuit with electric bus bar distribution system
- general door lock isolator
- electrical heaters on external coils
- control circuit transformer
- spring-type control circuit terminal board
- remote ON/OFF terminals
- electronic controller
- terminals for cumulative alarm block
- compressors protection with internal thermal overload
- kit on the power circuits of the compressors for conducted emissions on the power line compliant with EN61000-6-4 for industrial environments
- sectionable extra-rapid fuses to protect compressors
- forced ventilation of the electrical board
- discharge temperature probe for each compressor
- Power supply 400V/3ph/50Hz
- 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)

3.11 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
- EAC Product quality certificate for Russian Federation
- ISO 14001 Company Environmental Management System certification
- ISO 9001 Company Quality Management System certification

3.12 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.

3.13 Electronic control W3000+

W3000+ control is available with the new KIPLink (Keyboard In your Pocket) user interface. Based on WiFi technology, it 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 and the pumps (if present) and display and reset the possible alarms. The regulation features the continuous modulation of capacity, based on sequential adjustment + DIP referring to the leaving water temperature. Diagnostics include complete alarm management, with "blackbox" functions (via PC) and alarm log (display or PC) for best analysis of unit behaviour. The built-in clock can be used to create an operating profile containing up to 4 typical days and 10 time bands, essential for efficient programming of energy production. Optional

proprietary devices can perform the adjustment of the 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 is available with different options, using proprietary devices or by integration into third party systems using ModBus, BACnet, BACnet-over-IP and Echelon LonWorks protocols. A dedicated wall-mounted keypad can be used for remote control of all the functions.



3.14 Versions

/A - High efficiency

High efficiency unit, both at full and part load, which minimizes the investment payback time thanks to high performing heat exchangers, generous heat exchanger's surfaces and EC brushless fans.

/SL-A - Super low noise, high efficiency

High efficiency, super silenced units. High performing heat exchangers and EC brushless fans.

This version features a special soundproofing for the compressor compartment and the pumps (if present) and a reduced fan speed.

The fan speed is automatically increased in case of particularly tough environmental conditions.

3.15 Configurations

- , standard unit

Reversible standard unit for production of chilled/hot water according to the selected operation mode.

/D, unit with partial heat recovery

Unit for the production of water for the primary circuit and for sanitary purposes.

This version features an additional water/coolant heat exchanger on the gas delivery line, fitted in series with the traditional cooling circuit condenser. This allows to recover the de-superheating heat for the production of medium-to-high temperature water (secondary or recovery circuit). Hot water can be produced in the recovery circuit for domestic hot water and the like both in summer and winter. The heating capacity of this circuit is approximately equal to the power input of the compressor.

4.1 OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
1020 REGULATIONS			
1019 HEAT EXCHANGERS AS1210 CERTIFIED	Heat exchangers AS1210 compliant (Australia Standard)		ALL
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
3410 AUTOMATIC CIRCUIT BREAKERS			
3414 AUTOM. CIRCUIT BREAK. ON LOADS (COMPR. EXCL.)	Over-current switch on the major electrical loads, compressors excluded.	In case of overcurrent allows resetting of the switch without the replacement of relative fuses.	ALL
3600 COMPRESSOR RUN STATUS SIGNAL			
3601 COMPRESSOR OPERATION SIGNAL	Auxiliary contacts providing a voltage-free signal.	Allows remote signalling of compressor's activation or remote control of any auxiliary loads.	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			
6171 INPUT REMOTE DEMAND LIMIT	Digital input (voltage free)	It permits to limit the unit's power absorption for safety reasons or in temporary situation.	ALL

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4160 WINTER/SUMMER SWITCHOVER			
4161 REMOTE SUMMER/WINTER SWITCH	Digital input (voltage free)	Allows to change the operating mode (Cooling/Heating) according to a remote switch	ALL
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
1471 4951 + 1431	The option includes a related controller expansion board and dedicated terminal block.	Enables the functions corresponding to the indicated accessory codes.	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
1473 4951 + 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
1474 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
1475 4962 + 4951	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
1476 4962 + 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
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 W3000+ 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

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
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 W3000+ 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
1440 USER INTERFACE			
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
1444 KIPLink + LARGE KEYBOARD	The unit is equipped with KIPLink, the innovative user interface based on WiFi technology, and, in addition, the physical LCD keyboard.		ALL
6194 LARGE KEYBOARD	The unit is equipped with the Large keyboard with a wide LCD display and led icons.		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
6196 KIPLink	The unit is equipped with KIPLink, the innovative user interface based on WiFi technology		ALL
3420 LIGHTS ON ELECTRIC BOARD			
3421 LIGHTS ON ELECTRIC BOARD	Electrical board equipped with lights.	Facilitate electrical board maintenance interventions.	ALL
3390 ANTICONDENSATE HEATER EL.BOARD			
3391 ELECTRIC HEATER ON EL. BOARD	Electrical heater fed directly from the unit, is automatically activated at temperatures internal QE below 30 ° C (off state at T higher than 40 ° C).	It avoids the risk of humidity condensation on the electrical panel.	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 ϕ), 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

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
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 ($\cos\phi$), 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
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
1570 POWER SOCKET			
1571 POWER SOCKET 230V MAX 500VA	230V power socket in the electrical board, CEE 7/3 type (Schuko). The maximum power available is 500VA.	It allows to supply power to small electric/electronic devices (lights, notebook, tablet, etc.) during maintenance operation.	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
820 FAN CONTROL			
818 OVERSIZED EC FANS	Fans with oversized EC motor	Extends the operating limits of the unit. Further information in the dedicated databook section.	ALL
1960 PRESSURE RELIEF VALVES			
1961 DUAL RELIEF VALVES WITH SWITCH	Dual relief valve with switch	Allows to unselect a relief valve in order to service the unit avoiding medium or long inoperative periods	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
2880 EVAPORATOR WATER DELTA 10°C			
2881 EVAPORATOR FOR DELTA T>8°C	Evaporator dedicated to work with low primary circuit waterflow.	The heat exchange takes place under efficient conditions and the favorable sizing of primary pumps allows a considerable pumping energy saving.	ALL

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
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
2633 DOUBLE INSULATION ON EXCH+PIPES+PUMPS	Thermal insulation on heat exchangers 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. Thermal insulation on pumps and pipes in closed-cell reticulated foam in PE of 20 mm. 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
1800 EVAPORATOR WATER FLOW SWITCH			
1801 EVAPORATOR WATER FLOW SWITCH	Flow switch with stainless scoop AISI 316L and IP65 protection suitable for installation in industrial plant pipes. It should be installed in a straight pipe without filters, valves, etc., long at least 5 times its diameter, both upstream and downstream.	Signaling of lack of or excessive reduction of flow, it generates an alarm that is in automatic or manual reset depending on n ° alarms per hour and the maximum time of operation of the pump under conditions of low flow rate.	ALL
990 CONDENSING COIL			
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/ or contact our sales department.	ALL GUIDELINES
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/ or contact our sales department.	ALL GUIDELINES
4730 U - HYDRONIC MODULE			
4738 U - 2 PUMPS 4P LH (FIX SPEED)	User side heat exchanger hydronic module, compatible with constant flow control. The unit is provided with 2 fixed speed pumps, with 4-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

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4739 U - 2 PUMPS 4P HH (FIX SPEED)	User side heat exchanger hydronic module, compatible with constant flow control. The unit is provided with 2 fixed speed pumps, with 4-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
4741 U - 2 PUMPS 2P LH (FIX SPEED)	User side heat exchanger hydronic module, compatible with constant flow control. The unit is provided with 2 fixed 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
4742 U - 2 PUMPS 2P HH (FIX SPEED)	User side heat exchanger hydronic module, compatible with constant flow control. The unit is provided with 2 fixed 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
4744 U - RELAY 2 PUMPS + 0-10V SIG	User side heat exchanger 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
4749 U - 2 PUMPS 4P LH (VAR SPEED)	User side heat exchanger hydronic module, compatible with constant or variable flow control. The unit is provided with 2 variable speed pumps, with 4-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
4751 U - 2 PUMPS 4P HH (VAR SPEED)	User side heat exchanger hydronic module, compatible with constant or variable flow control. The unit is provided with 2 variable speed pumps, with 4-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

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4752 U - 2 PUMPS 2P LH (VAR SPEED)	User side heat exchanger 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
4753 U - 2 PUMPS 2P HH (VAR SPEED)	User side heat exchanger 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
4870 U - PRIMARY FLOW CONTROL			
4871 U - CONSTANT FLOW	User side heat exchanger 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: 4731, 4732, 4733, 4734, 4735, 4736, 4737, 4738, 4739, 4741, 4742 - 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/FF regulation devices or fixed speed pumps, the unit controller manages the pump activation to reduce pump consumption.	ALL
4872 U - CONSTANT FLOW (PARAMETER)	User side heat exchanger 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: 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4751, 4752, 4753 - 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

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
<p>4874 U - VPF (plant DP trans excl)</p>	<p>User side heat exchanger water flow control (plant primary circuit): variable flow (delta P control). Only for single unit systems. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4751, 4752, 4753 - 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.</p>	<p>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.</p>	<p>ALL</p>
<p>4875 U - VPF (plant DP trans incl)</p>	<p>User side heat exchanger water flow control (plant primary circuit): variable flow (delta P control). Only for single unit systems. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4751, 4752, 4753 - 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.</p>	<p>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.</p>	<p>ALL</p>
<p>4876 U - VPF MULTI-UNIT SYSTEM</p>	<p>User side heat exchanger water flow control (plant primary circuit): variable flow (delta P control). Only for multi-unit systems. Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4751, 4752, 4753 - 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 or ClimaPRO) with option VPF.</p>	<p>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.</p>	<p>ALL</p>

OPTIONS

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
4877 U - VPF.D	<p>User side heat exchanger water flow control (plant primary circuit): variable flow (delta T control). Only for single unit systems.</p> <p>Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4751, 4752, 4753 - hydronic modules availability depends on unit model).</p> <p>The option includes: 2 plant side NTC temperature sensors (installation by others).</p>	<p>The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit).</p> <p>The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal.</p> <p>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.</p> <p>The VPF.D function is applicable in systems with the primary and secondary circuits separated by a hydraulic decoupler.</p> <p>Further information available in the dedicated bulletin section.</p>	ALL
4878 U - VPF.D MULTI-UNIT SYSTEM	<p>User side heat exchanger water flow control (plant primary circuit): variable flow (delta T control). Only for multi-unit systems.</p> <p>Compatible with hydronic modules with modulating regulation devices (0-10V signal) or with variable speed pumps (codes: 4743, 4744, 4745, 4746, 4747, 4748, 4749, 4751, 4752, 4753 - hydronic modules availability depends on unit model).</p> <p>It shall be the customer responsibility to configure the multi-unit control system (Manager3000 or ClimaPRO) with option VPF.D.</p>	<p>The unit is set up to operate with a variable water flow in the heat exchanger (plant primary circuit).</p> <p>The unit controller manages the pump activation to reduce pump consumption. The pump speed is adjusted via 0-10V signal.</p> <p>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.</p> <p>The VPF.D function is applicable in systems with the primary and secondary circuits separated by a hydraulic decoupler.</p> <p>Further information available in the dedicated bulletin section.</p>	ALL
2910 HYDRAULIC CONNECTIONS			
2911 FLANGED HYDRAULIC CONNECTIONS	Grooved coupling with flanged counter-pipe user/source side.		ALL
3370 D - HYDRONIC MODULE			
3371 D - RELAY 1 PUMP (ON/OFF)	Desuperheater hydronic module. The unit is provided with 1 relay to control the activation of 1 external pump via single ON/OFF signal.	<p>The hydronic module allows to control the external pumps with the unit controller logic.</p> <p>The partial heat recovery pumps are activated only when heat recovery is actually possible: compressors on, hot storage tank temperature lower than set-point and than compressor outlet gas temperature. The option minimizes pump consumption.</p>	ALL
2430 PIPING KIT ANTIFREEZE HEATER			
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

OPTIONS	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
2340 UNIT ENCLOSURE			
2315 NOISE REDUCER	The option includes the fan speed reduction and the compressors' acoustical enclosure	The dedicated fans' speed calibration together with the soundproofing of the most critical components permit a significant noise reduction (for the precise performance of the unit with the Noise Reducer kit please refer to the selection software ELCA Studio).	ALL
2316 COMPRESSORS SOUNDPROOFING	Compressors soundproofing covering	Reduction of the total sound power.	ALL
2020 ANTI-INTRUSION GRILLS			
2021 ANTI-INTRUSION GRILLS	Anti-intrusions grills	Avoid the intrusion of solid bodies into the unit's structure.	ALL
2000 COIL PROTECTION			
2001 COIL PROT.GRILLS IN PERALUMAN	Coil protecting grilles	Protects against the intrusion of solid bodies with mediumlarge dimensions.	ALL
2100 ANTIVIBRATION MOUNTING			
2101 RUBBER TYPE ANTIVIBR.MOUNTING			ALL
2102 SPRING TYPE ANTIVIBR.MOUNTING			ALL
1970 LONG DISTANCE TRANSPORTATION			
1971 REINFORCING BARS	Bars used to reinforce the structure	Improve resistance during long transportation	ALL
9970 PACKING			
9965 NYLON + COIL PROT. PACKING	Unit provided plastic supports, with polypropylene panels for coils protection and covered with nylon		ALL
9979 CONTAINER PACKING	Unit provided with container slides and covered with nylon		ALL
9996 CONTAINER SLIDES	Unit provided with container slides		ALL

OPTIONS

Additional information - IMPORTANT -

1019 - Heat exchangers AS1210 certified

The certification is available for the evaporator only. If the certification is required also for the recovery heat exchanger (versions /D), please contact our sales department.

818 – Oversized EC fans

With this option the unit can work at full load up to 50°C of outdoor air ambient temperature in chiller mode, and down to -12°C in heat pump mode.

2316 – Compressor soundproofing insulation

With this option the sound power of the unit decreases by -2 dB(A).

4738 – U-2 Pumps 4P LH (Fix Speed)

4739 – U-2 Pumps 4P HH (Fix Speed)

4741 – U-2 Pumps 2P LH (Fix Speed)

4742 – U-2 Pumps 2P HH (Fix Speed)

4749 – U-2 Pumps 4P LH (Var Speed)

4751 – U-2 Pumps 4P HH (Var Speed)

4752 – U-2 Pumps 2P LH (Var Speed)

4753 – U-2 Pumps 2P HH (Var Speed)

The selection of these options leads to the increase of the units' length. These extra-lengths are shown in the table in Hydronic group (Hydronic kit positioning) chapter and in the selection software.

9979 - Container packing

9996 - Container slides

The selection of one of these options is mandatory to let the units be shippable via container. These options provide low-profiled fans which are able to reduce the height of the units and permit the transport via container.

OPTIONS

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 branches, 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.



5.1 GENERAL TECHNICAL DATA

i-FX-N-G05/A

[SI System]

i-FX-N-G05/A		0472	0512	0572	0602	0652	0772	0902	1002	1152	
Power supply		V/ph/Hz 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50									
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	465,0	517,9	549,9	590,8	669,9	764,1	899,3	1034	1154
Total power input	(1)	kW	166,0	177,9	194,2	211,1	237,8	265,5	314,0	351,4	390,5
EER	(1)	kW/kW	2,801	2,911	2,832	2,799	2,817	2,878	2,864	2,943	2,955
ESEER	(1)	kW/kW	4,560	4,660	4,660	4,610	4,510	4,550	4,580	4,660	4,710
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	464,6	517,4	549,4	590,4	669,4	763,6	898,8	1033	1153
EER	(1)(2)	kW/kW	2,780	2,880	2,800	2,780	2,850	2,840	2,910	2,930	
ESEER	(1)(2)	kW/kW	4,410	4,490	4,470	4,480	4,360	4,410	4,440	4,500	4,560
HEATING ONLY (GROSS VALUE)											
Total heating capacity	(3)	kW	452,8	506,3	547,4	575,3	663,8	747,6	871,4	1006	1111
Total power input	(3)	kW	139,1	152,6	166,0	174,8	202,2	223,2	261,3	293,8	327,5
COP	(3)	kW/kW	3,255	3,318	3,298	3,291	3,283	3,349	3,335	3,424	3,392
HEATING ONLY (EN14511 VALUE)											
Total heating capacity	(3)(2)	kW	453,2	506,8	547,9	575,7	664,3	748,1	872,0	1007	1112
COP	(3)(2)	kW/kW	3,230	3,290	3,260	3,270	3,260	3,320	3,310	3,390	3,360
COOLING WITH PARTIAL RECOVERY											
Cooling capacity	(4)	kW	482,5	537,3	570,5	613,0	695,0	792,8	933,1	1072	1197
Total power input	(4)	kW	160,8	172,4	188,1	204,5	230,3	257,2	304,2	340,5	378,2
Desuperheater heating capacity	(4)	kW	133,0	140,6	155,2	170,3	191,0	212,8	249,9	277,2	312,1
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN COOLING											
Water flow	(1)	l/s	22,24	24,76	26,29	28,25	32,04	36,54	43,01	49,43	55,17
Pressure drop at the heat exchanger	(1)	kPa	32,0	36,6	41,2	26,9	33,3	34,3	32,4	42,8	37,5
HEAT EXCHANGER USER SIDE IN HEATING											
Water flow	(3)	l/s	21,86	24,44	26,42	27,77	32,04	36,09	42,07	48,56	53,64
Pressure drop at the heat exchanger	(3)	kPa	31,0	35,6	41,6	26,0	33,3	33,4	31,0	41,3	35,4
PARTIAL RECOVERY USER SIDE IN REFRIGERATION											
Water flow	(4)	l/s	6,420	6,786	7,489	8,219	9,221	10,27	12,06	13,38	15,07
Pressure drop at the heat exchanger	(4)	kPa	40,0	44,6	54,4	30,6	38,6	32,9	26,0	32,0	31,5
REFRIGERANT CIRCUIT											
Compressors nr.		N°	2	2	2	2	2	2	2	2	2
Number of capacity steps		N°	0	0	0	0	0	0	0	0	0
No. Circuits		N°	2	2	2	2	2	2	2	2	2
Regulation			STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS								
Min. capacity step		%	-	-	-	-	-	-	-	-	-
Refrigerant			R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A
Refrigerant charge		kg	233	259	253	276	288	391	495	518	618
Oil charge		kg	44,0	44,0	44,0	44,0	38,0	60,0	60,0	60,0	60,0
Rc (ASHRAE)	(5)	kg/kW	0,51	0,51	0,46	0,47	0,43	0,52	0,56	0,51	0,54
FANS											
Quantity		N°	10	12	12	12	14	16	20	24	24
Air flow		m³/s	48,50	58,37	58,37	58,37	69,25	79,14	97,00	121,01	116,73
Fans power input		kW	1,70	1,70	1,70	1,70	1,70	1,70	1,70	1,70	1,70
NOISE LEVEL											
Sound Pressure	(6)	dB(A)	80	81	81	81	81	81	81	82	82
Sound power level in cooling	(7)(8)	dB(A)	100	102	102	102	102	103	103	105	105
Sound power level in heating	(7)(9)	dB(A)	101	103	103	103	103	104	104	106	106
SIZE AND WEIGHT											
A	(10)	mm	4900	5800	5800	5800	7000	7900	10000	11800	11800
B	(10)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(10)	mm	2580	2580	2580	2580	2580	2580	2580	2580	2580
Operating weight	(10)	kg	6400	6894	7033	7256	7518	8551	9835	11578	12651

Notes:

- Plant (side) cooling exchanger water (in/out) 12,00°C/7,00°C; Source (side) heat exchanger air (in) 35,0°C.
- Values in compliance with EN14511
- Plant (side) heat exchanger water (in/out) 40,00°C/45,00°C; Source (side) heat exchanger air (in) 7,0°C - 87% R.H.
- 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.
- Rated in accordance with AHRI Standard 550/590
- Average sound pressure level at 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.
- Sound power on the basis of measurements taken in compliance with ISO 9614.
- Sound power level in cooling, outdoors.
- Sound power level in heating, outdoors.
- Unit in standard configuration, without optional accessories.
- Not available

Data certified in EUROVENT

GENERAL TECHNICAL DATA

i-FX-N-G05/SL-A

[SI System]

i-FX-N-G05/SL-A		0472	0512	0572	0602	0652	0772	0902	1002	1152	
Power supply		V/ph/Hz 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50 400/3/50									
PERFORMANCE											
COOLING ONLY (GROSS VALUE)											
Cooling capacity	(1)	kW	443,9	497,6	531,9	570,7	649,1	740,7	870,1	998,0	1114
Total power input	(1)	kW	168,0	177,8	197,7	217,0	241,6	268,5	317,0	354,5	395,7
EER	(1)	kW/kW	2,642	2,799	2,690	2,630	2,687	2,759	2,745	2,815	2,815
ESEER	(1)	kW/kW	4,530	4,650	4,640	4,580	4,490	4,540	4,570	4,660	4,700
COOLING ONLY (EN14511 VALUE)											
Cooling capacity	(1)(2)	kW	443,6	497,1	531,4	570,3	648,7	740,2	869,6	997,3	1113
EER	(1)(2)	kW/kW	2,620	2,770	2,670	2,610	2,670	2,740	2,730	2,790	2,790
ESEER	(1)(2)	kW/kW	4,400	4,490	4,460	4,460	4,350	4,400	4,450	4,500	4,550
HEATING ONLY (GROSS VALUE)											
Total heating capacity	(3)	kW	448,3	500,0	541,9	567,9	657,4	740,1	862,6	996,6	1100
Total power input	(3)	kW	137,2	150,3	163,6	172,2	199,4	220,1	257,6	289,0	322,8
COP	(3)	kW/kW	3,267	3,327	3,312	3,298	3,297	3,363	3,349	3,448	3,408
HEATING ONLY (EN14511 VALUE)											
Total heating capacity	(3)(2)	kW	448,6	500,4	542,4	568,3	657,9	740,6	863,2	997,3	1101
COP	(3)(2)	kW/kW	3,240	3,300	3,280	3,280	3,270	3,340	3,320	3,420	3,380
COOLING WITH PARTIAL RECOVERY											
Cooling capacity	(4)	kW	460,6	516,2	551,9	592,1	673,5	768,5	902,7	1035	1155
Total power input	(4)	kW	162,4	171,9	191,0	209,7	233,5	259,5	306,4	342,7	382,4
Desuperheater heating capacity	(4)	kW	143,7	151,2	168,9	186,2	206,9	229,7	270,4	301,5	338,2
EXCHANGERS											
HEAT EXCHANGER USER SIDE IN COOLING											
Water flow	(1)	l/s	21,23	23,79	25,44	27,29	31,04	35,42	41,61	47,72	53,26
Pressure drop at the heat exchanger	(1)	kPa	29,2	33,8	38,6	25,1	31,2	32,2	30,3	39,8	34,9
HEAT EXCHANGER USER SIDE IN HEATING											
Water flow	(3)	l/s	21,64	24,14	26,16	27,41	31,74	35,73	41,64	48,11	53,12
Pressure drop at the heat exchanger	(3)	kPa	30,3	34,7	40,8	25,3	32,6	32,8	30,3	40,5	34,7
PARTIAL RECOVERY USER SIDE IN REFRIGERATION											
Water flow	(4)	l/s	6,939	7,299	8,155	8,987	9,987	11,09	13,05	14,55	16,33
Pressure drop at the heat exchanger	(4)	kPa	46,7	51,6	64,5	36,6	45,2	38,4	30,5	37,9	37,0
REFRIGERANT CIRCUIT											
Compressors nr.		N°	2	2	2	2	2	2	2	2	2
Number of capacity steps		N°	0	0	0	0	0	0	0	0	0
No. Circuits		N°	2	2	2	2	2	2	2	2	2
Regulation			STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS STEPLESS								
Min. capacity step		%	-	-	-	-	-	-	-	-	-
Refrigerant			R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A	R513A
Refrigerant charge		kg	243	271	285	307	317	391	541	536	598
Oil charge		kg	44,0	44,0	44,0	44,0	38,0	60,0	60,0	60,0	60,0
Rc (ASHRAE)	(5)	kg/kW	0,55	0,55	0,54	0,54	0,49	0,53	0,63	0,54	0,54
FANS											
Quantity		N°	10	12	12	12	14	16	20	24	24
Air flow		m³/s	33,79	40,55	40,55	40,55	48,43	55,35	67,58	84,96	81,09
Fans power input		kW	0,70	0,70	0,70	0,70	0,70	0,70	0,70	0,70	0,70
NOISE LEVEL											
Sound Pressure	(6)	dB(A)	72	73	73	73	73	73	73	74	74
Sound power level in cooling	(7)(8)	dB(A)	92	94	94	94	94	95	95	97	97
Sound power level in heating	(7)(9)	dB(A)	93	95	95	95	95	96	96	98	98
SIZE AND WEIGHT											
A	(10)	mm	4900	5800	5800	5800	7000	7900	10000	11800	11800
B	(10)	mm	2260	2260	2260	2260	2260	2260	2260	2260	2260
H	(10)	mm	2580	2580	2580	2580	2580	2580	2580	2580	2580
Operating weight	(10)	kg	6672	7155	7307	7550	7791	8921	10101	11840	15158

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 Values in compliance with EN14511
- 3 Plant (side) heat exchanger water (in/out) 40,00°C/45,00°C; Source (side) heat exchanger air (in) 7,0°C - 87% R.H.
- 4 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.
- 5 Rated in accordance with AHRI Standard 550/590
- 6 Average sound pressure level at 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.
- 7 Sound power on the basis of measurements taken in compliance with ISO 9614.
- 8 Sound power level in cooling, outdoors.
- 9 Sound power level in heating, outdoors.
- 10 Unit in standard configuration, without optional accessories.

- Not available

Data certified in EUROVENT

**6.1 TECHNICAL DATA SEASONAL
EFFICIENCY IN HEATING (EN14825
VALUE)**

i-FX-N-G05/A

[SI System]

i-FX-N-G05/A - LOW TEMPERATURE application			0472	0512
Power supply		(V/ph/Hz)	400/3/50	400/3/50
WEATHER CONDITIONS - AVERAGE				
Rated heat output at Tdesignh	(1)(2)	kW	348	384
Bivalent temperature	(1)(2)	°C	-7	-7
SCOP	(1)(2)		4,00	4,03
Seasonal space heating energy efficiency	(1)(2)	%	157	158
Seasonal space heating energy efficiency class	(1)(2)		-	-

1 Seasonal space heating energy efficiency class LOW TEMPERATURE [REGULATION (EU) N. 813/2013]

2 Tipo di calcolo con portata variabile e temperatura variabile.

**TECHNICAL DATA SEASONAL
EFFICIENCY IN HEATING (EN14825
VALUE)**

i-FX-N-G05/SL-A

[SI System]

i-FX-N-G05/SL-A - LOW TEMPERATURE application			0472	0512
Power supply		(V/ph/Hz)	400/3/50	400/3/50
WEATHER CONDITIONS - AVERAGE				
Rated heat output at Tdesignh	(1)(2)	kW	347	383
Bivalent temperature	(1)(2)	°C	-7	-7
SCOP	(1)(2)		4,02	4,03
Seasonal space heating energy efficiency	(1)(2)	%	158	158
Seasonal space heating energy efficiency class	(1)(2)		-	-

1 Seasonal space heating energy efficiency class LOW TEMPERATURE [REGULATION (EU) N. 813/2013]

2 Tipo di calcolo con portata variabile e temperatura variabile.

7.1 TECHNICAL DATA SEASONAL EFFICIENCY IN COOLING (EN14825 VALUE)

[SI System]

ENERGY EFFICIENCY

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

Ambient refrigeration

i-FX-N-G05/A			0472	0512	0572	0602	0652	0772	0902	1002	1152	
Prated,c	(1)	kW	464,6	517,4	549,4	590,4	669,4	763,6	898,8	1033,0	1153,0	
SEER	(1) (2)	-	4,74	4,78	4,83	4,84	4,76	4,82	4,83	4,79	4,84	
Performance η_s	(1) (3)	%	187,0	188,0	190,0	190,0	188,0	190,0	190,0	189,0	191,0	

i-FX-N-G05/SL-A			0472	0512	0572	0602	0652	0772	0902	1002	1152	
Prated,c	(1)	kW	443,6	497,1	531,4	570,3	648,7	740,2	869,6	997,3	1113,0	
SEER	(1) (2)	-	4,71	4,77	4,81	4,80	4,74	4,80	4,82	4,78	4,82	
Performance η_s	(1) (3)	%	185,0	188,0	190,0	189,0	187,0	189,0	190,0	188,0	190,0	

Notes:

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

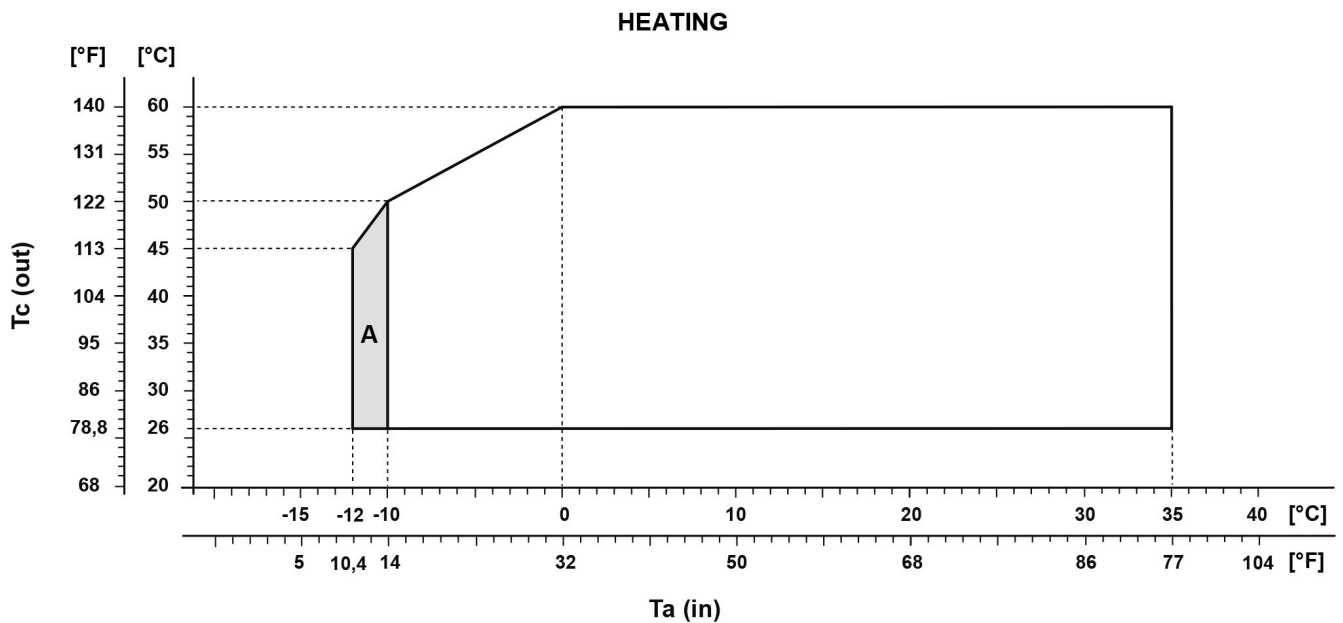
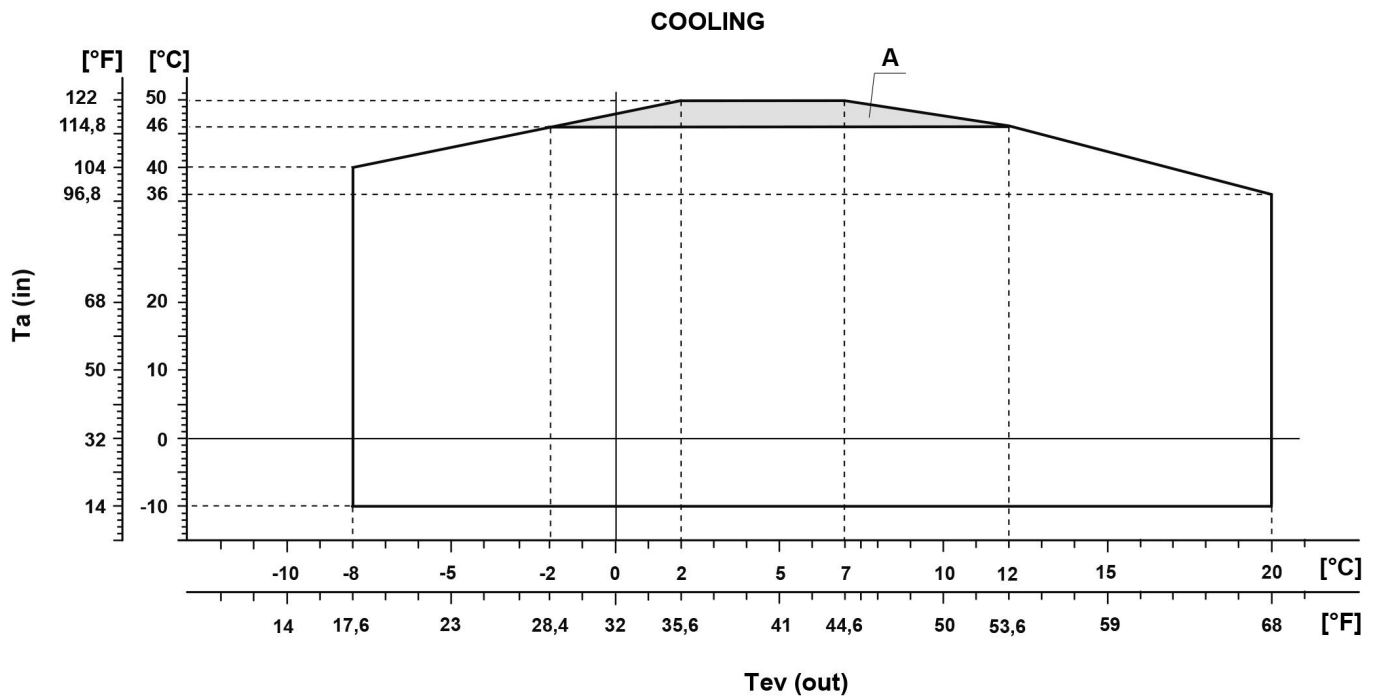
(2) Seasonal energy efficiency ratio

(3) Seasonal space cooling energy efficiency

The units highlighted in this publication contain R513A [GWP₁₀₀ 631] fluorinated greenhouse gases.

Data certified in EUROVENT

8.1 OPERATING LIMITS



- Ta (in) Outdoor air temperature
- Tev (out) Plant side cold heat exchanger leaving water temperature
- Tc (out) Plant side hot heat exchanger leaving water temperature

A Oversized EC fans (opt. 818) required

COOLING MODE

The diagram shows the temperature limits off full load operation.
In case of higher outdoor air temperature, automatically parzialized its resources to ensure uninterrupted operation.

Operating limits above are nominal values.

For the specific temperature limits of each model at the desired rating conditions, please refer to the selection software ElcaWorld.

SIZE
i-FX-N-G05 /A /0472
i-FX-N-G05 /A /0512
i-FX-N-G05 /A /0572
i-FX-N-G05 /A /0602
i-FX-N-G05 /A /0652
i-FX-N-G05 /A /0772
i-FX-N-G05 /A /0902
i-FX-N-G05 /A /1002
i-FX-N-G05 /A /1152
i-FX-N-G05 /D /A /0472
i-FX-N-G05 /D /A /0512
i-FX-N-G05 /D /A /0572
i-FX-N-G05 /D /A /0602
i-FX-N-G05 /D /A /0652
i-FX-N-G05 /D /A /0772
i-FX-N-G05 /D /A /0902
i-FX-N-G05 /D /A /1002
i-FX-N-G05 /D /A /1152
i-FX-N-G05 /SL-A /0472
i-FX-N-G05 /SL-A /0512
i-FX-N-G05 /SL-A /0572
i-FX-N-G05 /SL-A /0602
i-FX-N-G05 /SL-A /0652
i-FX-N-G05 /SL-A /0772
i-FX-N-G05 /SL-A /0902
i-FX-N-G05 /SL-A /1002
i-FX-N-G05 /SL-A /1152
i-FX-N-G05 /D /SL-A /0472
i-FX-N-G05 /D /SL-A /0512
i-FX-N-G05 /D /SL-A /0572
i-FX-N-G05 /D /SL-A /0602
i-FX-N-G05 /D /SL-A /0652
i-FX-N-G05 /D /SL-A /0772
i-FX-N-G05 /D /SL-A /0902
i-FX-N-G05 /D /SL-A /1002
i-FX-N-G05 /D /SL-A /1152

8.2 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.

8.3 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

9.1 HYDRAULIC DATA

[SI System]

Water flow and pressure drop

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

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

Q: water flow (l/s)

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

P: heat exchanger capacity (kW)

Pressure drop is given by:

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

Q: water flow (l/s)

Dp: 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-FX-N-G05 /A /0472	400/3/50	5,00	11,67	45,06	226	1630	-	-	-	-
i-FX-N-G05 /A /0512	400/3/50	4,60	14,69	54,42	194	1800	-	-	-	-
i-FX-N-G05 /A /0572	400/3/50	4,60	14,69	54,42	194	1920	-	-	-	-
i-FX-N-G05 /A /0602	400/3/50	2,60	14,25	53,56	263	2070	-	-	-	-
i-FX-N-G05 /A /0652	400/3/50	2,50	15,50	55,89	255	2340	-	-	-	-
i-FX-N-G05 /A /0772	400/3/50	1,98	18,06	69,44	472	2670	-	-	-	-
i-FX-N-G05 /A /0902	400/3/50	1,35	22,22	79,17	424	3150	-	-	-	-
i-FX-N-G05 /A /1002	400/3/50	1,35	22,22	79,17	424	3620	-	-	-	-
i-FX-N-G05 /A /1152	400/3/50	0,95	27,78	75,00	400	4040	-	-	-	-
i-FX-N-G05 /D /A /0472	400/3/50	5,00	11,67	45,06	226	1630	74,8	-	8,722	5,00
i-FX-N-G05 /D /A /0512	400/3/50	4,60	14,69	54,42	194	1800	74,8	-	8,806	5,00
i-FX-N-G05 /D /A /0572	400/3/50	4,60	14,69	54,42	194	1920	74,8	-	8,778	5,00
i-FX-N-G05 /D /A /0602	400/3/50	2,60	14,25	53,56	263	2070	35,0	-	10,83	6,00
i-FX-N-G05 /D /A /0652	400/3/50	2,50	15,50	55,89	255	2340	35,0	-	10,86	6,00
i-FX-N-G05 /D /A /0772	400/3/50	1,98	18,06	69,44	472	2670	24,1	-	12,97	7,50
i-FX-N-G05 /D /A /0902	400/3/50	1,35	22,22	79,17	424	3150	13,8	-	16,33	11,0
i-FX-N-G05 /D /A /1002	400/3/50	1,35	22,22	79,17	424	3620	13,8	-	16,36	11,0
i-FX-N-G05 /D /A /1152	400/3/50	0,95	27,78	75,00	400	4040	10,7	-	18,42	13,5
i-FX-N-G05 /SL-A /0472	400/3/50	5,00	11,67	45,06	226	1630	-	-	-	-
i-FX-N-G05 /SL-A /0512	400/3/50	4,60	14,69	54,42	194	1800	-	-	-	-
i-FX-N-G05 /SL-A /0572	400/3/50	4,60	14,69	54,42	194	1920	-	-	-	-
i-FX-N-G05 /SL-A /0602	400/3/50	2,60	14,25	53,56	263	2070	-	-	-	-
i-FX-N-G05 /SL-A /0652	400/3/50	2,50	15,50	55,89	255	2340	-	-	-	-
i-FX-N-G05 /SL-A /0772	400/3/50	1,98	18,06	69,44	472	2670	-	-	-	-
i-FX-N-G05 /SL-A /0902	400/3/50	1,35	22,22	79,17	424	3150	-	-	-	-
i-FX-N-G05 /SL-A /1002	400/3/50	1,35	22,22	79,17	424	3620	-	-	-	-
i-FX-N-G05 /SL-A /1152	400/3/50	0,95	27,78	75,00	400	4040	-	-	-	-
i-FX-N-G05 /D /SL-A /0472	400/3/50	5,00	11,67	45,06	226	1630	74,8	-	8,722	5,00
i-FX-N-G05 /D /SL-A /0512	400/3/50	4,60	14,69	54,42	194	1800	74,8	-	8,806	5,00
i-FX-N-G05 /D /SL-A /0572	400/3/50	4,60	14,69	54,42	194	1920	74,8	-	8,778	5,00
i-FX-N-G05 /D /SL-A /0602	400/3/50	2,60	14,25	53,56	263	2070	35,0	-	10,83	6,00
i-FX-N-G05 /D /SL-A /0652	400/3/50	2,50	15,50	55,89	255	2340	35,0	-	10,86	6,00
i-FX-N-G05 /D /SL-A /0772	400/3/50	1,98	18,06	69,44	472	2670	24,1	-	12,97	7,50
i-FX-N-G05 /D /SL-A /0902	400/3/50	1,35	22,22	79,17	424	3150	13,8	-	16,33	11,0
i-FX-N-G05 /D /SL-A /1002	400/3/50	1,35	22,22	79,17	424	3620	13,8	-	16,36	11,0
i-FX-N-G05 /D /SL-A /1152	400/3/50	0,95	27,78	75,00	400	4040	10,7	-	18,42	13,5

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

10.1 ELECTRICAL DATA

i-FX-N-G05/A

[SI System]

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]
0472	400/3/50	2	2 x 97,9	2 x 160,4	2 x 20	1,950	3	215,0	354	-
0512	400/3/50	2	2 x 105,8	2 x 172,4	2 x 20	1,950	3	235,0	384	-
0572	400/3/50	2	2 x 113,2	2 x 183,7	2 x 20	1,950	3	250,0	407	-
0602	400/3/50	2	2 x 120,5	2 x 194,8	2 x 20	1,950	3	264,0	429	-
0652	400/3/50	2	2 x 135,8	2 x 218	2 x 20	1,950	3	299,0	482	-
0772	400/3/50	2	2 x 149,8	2 x 239	2 x 20	1,950	3	331,0	531	-
0902	400/3/50	2	2 x 178,2	2 x 283	2 x 20	1,950	3	395,0	632	-
1002	400/3/50	2	2 x 207	2 x 335	2 x 20	1,950	3	461,0	749	-
1152	400/3/50	2	2 x 231	2 x 371	2 x 20	1,950	3	509,0	821	-

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.

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

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

ELECTRICAL DATA

i-FX-N-G05/SL-A

[SI System]

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]
0472	400/3/50	2	2 x 97,9	2 x 160,4	2 x 20	1,950	3	215,0	354	-
0512	400/3/50	2	2 x 105,8	2 x 172,4	2 x 20	1,950	3	235,0	384	-
0572	400/3/50	2	2 x 113,2	2 x 183,7	2 x 20	1,950	3	250,0	407	-
0602	400/3/50	2	2 x 120,5	2 x 194,8	2 x 20	1,950	3	264,0	429	-
0652	400/3/50	2	2 x 135,8	2 x 218	2 x 20	1,950	3	299,0	482	-
0772	400/3/50	2	2 x 149,8	2 x 239	2 x 20	1,950	3	331,0	531	-
0902	400/3/50	2	2 x 178,2	2 x 283	2 x 20	1,950	3	395,0	632	-
1002	400/3/50	2	2 x 207	2 x 335	2 x 20	1,950	3	461,0	749	-
1152	400/3/50	2	2 x 231	2 x 371	2 x 20	1,950	3	509,0	821	-

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.

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

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

ELECTRICAL DATA

MAXIMUM CABLES/BARS SECTION CONNECTED TO MAIN SWITCH AND SHORT TIME CURRENT STANDARD UNITS

Unit size (all versions)	Main switch type (category AC23A/B)	Cable section	Bar dimensions	ICW (0,25s) Short time current rms	Further technical data
		[mm ²]	□ [mm]	[kA]	
0472	SIRCO 3X500A	min 240 max 240	max 2x40x5	25	https://www.socomec.com/files/live/sites/systemsite/files/DOCUMENTATION/SCP_hors_cata/dcg_145023uk.pdf
0512	SIRCO 3X500A	min 240 max 240	max 2x40x5	25	
0572	SIRCO 3X500A	min 240 max 240	max 2x40x5	25	
0602	SIRCO AC 3X630A	min 2x185 max 2x300	min 2x30x5 max 2x63x5	25	
0652	SIRCO AC 3X630A	min 2x185 max 2x300	min 2x30x5 max 2x63x5	25	
0772	SIRCO CD 3X800A	min 2x185 max 2x300	min 2x40x5 max 2x63x5	25	
0902	SIRCO CD 3X1000A	min 2x240 max 4x185	min 2x50x5 max 2x63x5	25	
1002	SIRCO CD 3X1000A	min 2x240 max 4x185	min 2x50x5 max 2x63x5	25	
1152	SIRCO CD 3X1250A	max 4x185	min 2x60x5 max 2x63x5	27	

Electrical data valid for standard units without any additional option

Voltage tolerance: 10%

Maximum voltage unbalance: 2%

11.1 FULL LOAD SOUND LEVEL

i-FX-N-G05/A

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								
0472	91	98	99	98	96	90	83	73	100
0512	93	100	101	100	98	92	85	75	102
0572	93	100	101	100	98	92	85	75	102
0602	93	100	101	100	98	92	85	75	102
0652	93	100	101	100	98	92	85	75	102
0772	94	101	102	101	99	93	86	76	103
0902	94	101	102	101	99	93	86	76	103
1002	96	103	104	103	101	95	88	78	105
1152	96	103	104	103	101	95	88	78	105

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.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
0472	71	78	79	78	76	70	63	53	80
0512	72	79	80	79	77	71	64	54	81
0572	72	79	80	79	77	71	64	54	81
0602	72	79	80	79	77	71	64	54	81
0652	72	79	80	79	77	71	64	54	81
0772	72	79	80	79	77	71	64	54	81
0902	72	79	80	79	77	71	64	54	81
1002	73	80	81	80	78	72	65	55	82
1152	73	80	81	80	78	72	65	55	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.

Average sound pressure level at 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

FULL LOAD SOUND LEVEL

i-FX-N-G05/A

SOUND POWER LEVEL IN HEATING									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
0472	0	0	0	0	0	0	0	0	101
0512	0	0	0	0	0	0	0	0	103
0572	0	0	0	0	0	0	0	0	103
0602	0	0	0	0	0	0	0	0	103
0652	0	0	0	N. A.			0	0	103
0772	0	0	0	0	0	0	0	0	104
0902	0	0	0	0	0	0	0	0	104
1002	0	0	0	0	0	0	0	0	106
1152	0	0	0	0	0	0	0	0	106

Working conditions

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 heating, outdoors.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
0472	0	0	0	0	0	0	0	0	81
0512	0	0	0	0	0	0	0	0	82
0572	0	0	0	0	0	0	0	0	82
0602	0	0	0	0	0	0	0	0	82
0652	0	0	0	N. A.			0	0	82
0772	0	0	0	0	0	0	0	0	82
0902	0	0	0	0	0	0	0	0	82
1002	0	0	0	0	0	0	0	0	83
1152	0	0	0	0	0	0	0	0	83

Working conditions

Average sound pressure level at 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

FULL LOAD SOUND LEVEL

i-FX-N-G05/SL-A

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								
0472	84	82	85	89	90	81	69	62	92
0512	86	85	89	91	92	80	69	61	94
0572	86	85	89	91	92	80	69	61	94
0602	86	85	89	91	92	80	69	61	94
0652	86	85	89	91	92	80	69	61	94
0772	87	86	90	92	93	81	70	62	95
0902	87	86	90	92	93	81	70	62	95
1002	89	88	92	94	95	83	72	64	97
1152	89	88	92	94	95	83	72	64	97

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.

SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
0472	64	62	65	69	70	61	49	42	72
0512	65	64	68	70	71	59	48	40	73
0572	65	64	68	70	71	59	48	40	73
0602	65	64	68	70	71	59	48	40	73
0652	65	64	68	70	71	59	48	40	73
0772	65	64	68	70	71	59	48	40	73
0902	65	64	68	70	71	59	48	40	73
1002	66	65	69	71	72	60	49	41	74
1152	66	65	69	71	72	60	49	41	74

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 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

FULL LOAD SOUND LEVEL

i-FX-N-G05/SL-A

SOUND POWER LEVEL IN HEATING									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound power level dB								
0472	0	0	0	0	0	0	0	0	93
0512	0	0	0	0	0	0	0	0	95
0572	0	0	0	0	0	0	0	0	95
0602	0	0	0	0	0	0	0	0	95
0652	0	0	0	N. A.			0	0	95
0772	0	0	0	0	0	0	0	0	96
0902	0	0	0	0	0	0	0	0	96
1002	0	0	0	0	0	0	0	0	98
1152	0	0	0	0	0	0	0	0	98

Working conditions

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

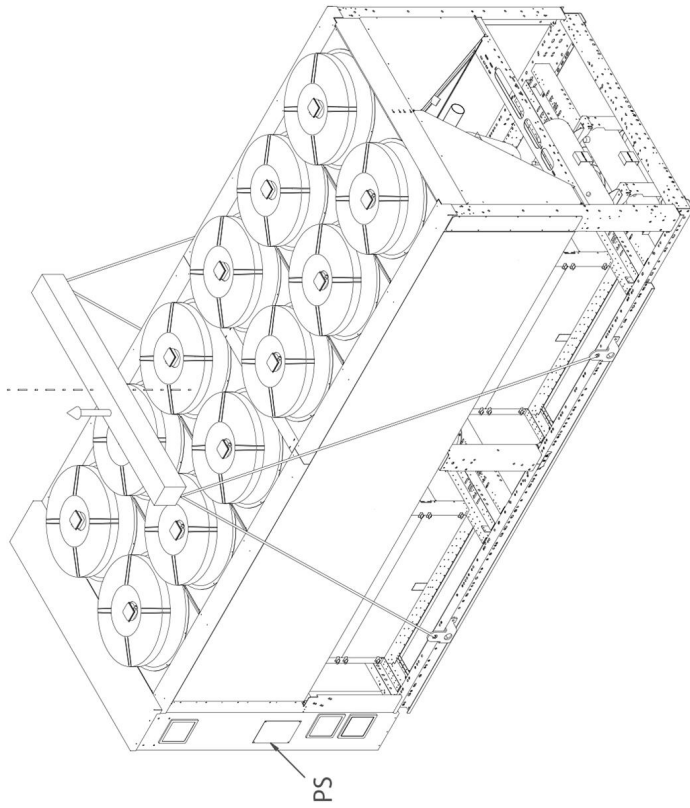
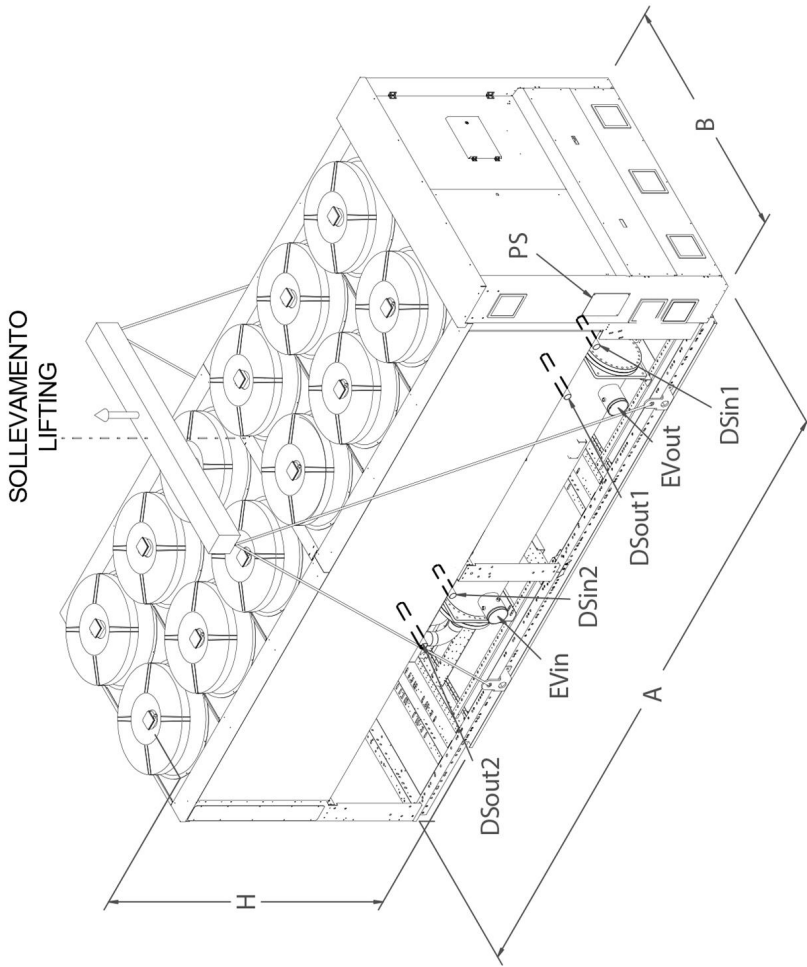
Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

Sound power level in heating, outdoors.

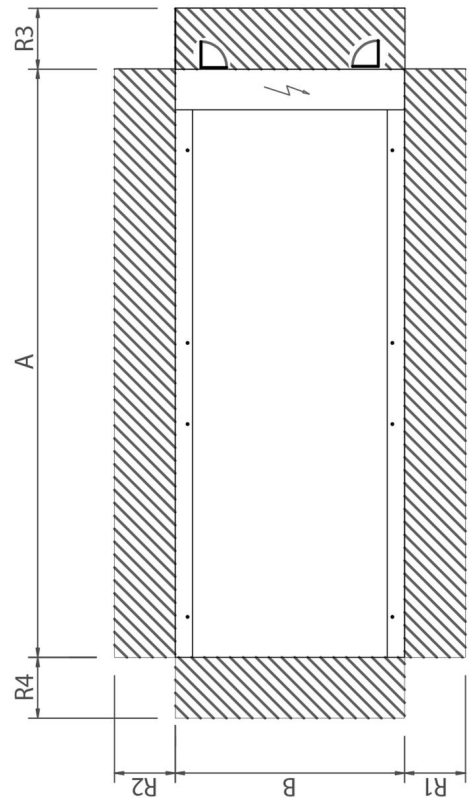
SOUND PRESSURE LEVEL									
SIZE	Octave band [Hz]								Total sound level dB(A)
	63	125	250	500	1000	2000	4000	8000	
	Sound pressure level dB								
0472	0	0	0	0	0	0	0	0	73
0512	0	0	0	0	0	0	0	0	74
0572	0	0	0	0	0	0	0	0	74
0602	0	0	0	0	0	0	0	0	74
0652	0	0	0	N. A.			0	0	74
0772	0	0	0	0	0	0	0	0	74
0902	0	0	0	0	0	0	0	0	74
1002	0	0	0	0	0	0	0	0	75
1152	0	0	0	0	0	0	0	0	75

Working conditions

Average sound pressure level at 1m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.



BASE D'APPOGGIO
SUPPORTING BASEFRAME



- | | |
|-------|---|
| EVin | Entrata acqua evaporatore
Evaporator water inlet |
| EVout | Uscita acqua evaporatore
Evaporator water outlet |
| DSin | Entrata acqua desurriscaldatore
Desuperheater water inlet |
| DSout | Uscita acqua desurriscaldatore
Desuperheater water outlet |
| PS | Ingresso linea di alimentazione elettrica
Power supply cable inlet |

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

i-FX-N-G05 0472 - 1152

[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-FX-N-G05 /A /0472	4900	2260	2580	6400	2000	2000	1800	1500	H	6"	-	-
i-FX-N-G05 /A /0512	5800	2260	2580	6894	2000	2000	1800	1500	H	6"	-	-
i-FX-N-G05 /A /0572	5800	2260	2580	7033	2000	2000	1800	1500	H	6"	-	-
i-FX-N-G05 /A /0602	5800	2260	2580	7256	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /A /0652	7000	2260	2580	7518	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /A /0772	7900	2260	2580	8551	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /A /0902	10000	2260	2580	9835	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /A /1002	11800	2260	2580	11578	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /A /1152	11800	2260	2580	12651	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /D /A /0472	4900	2260	2580	6495	2000	2000	1800	1500	H	6"	H	2"
i-FX-N-G05 /D /A /0512	5800	2260	2580	6979	2000	2000	1800	1500	H	6"	H	2"
i-FX-N-G05 /D /A /0572	5800	2260	2580	7118	2000	2000	1800	1500	H	6"	H	2"
i-FX-N-G05 /D /A /0602	5800	2260	2580	7351	2000	2000	1800	1500	H	8"	H	2"
i-FX-N-G05 /D /A /0652	7000	2260	2580	7613	2000	2000	1800	1500	H	8"	H	2"
i-FX-N-G05 /D /A /0772	7900	2260	2580	8649	2000	2000	1800	1500	H	8"	H	2"
i-FX-N-G05 /D /A /0902	10000	2260	2580	10054	2000	2000	1800	1500	H	8"	E1	2"1/2
i-FX-N-G05 /D /A /1002	11800	2260	2580	11788	2000	2000	1800	1500	H	8"	E1	2"1/2
i-FX-N-G05 /D /A /1152	11800	2260	2580	12883	2000	2000	1800	1500	H	8"	E1	2"1/2
i-FX-N-G05 /SL-A /0472	4900	2260	2580	6672	2000	2000	1800	1500	H	6"	-	-
i-FX-N-G05 /SL-A /0512	5800	2260	2580	7155	2000	2000	1800	1500	H	6"	-	-
i-FX-N-G05 /SL-A /0572	5800	2260	2580	7307	2000	2000	1800	1500	H	6"	-	-
i-FX-N-G05 /SL-A /0602	5800	2260	2580	7550	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /SL-A /0652	7000	2260	2580	7791	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /SL-A /0772	7900	2260	2580	8921	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /SL-A /0902	10000	2260	2580	10101	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /SL-A /1002	11800	2260	2580	11840	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /SL-A /1152	11800	2260	2580	15158	2000	2000	1800	1500	H	8"	-	-
i-FX-N-G05 /D /SL-A /0472	4900	2260	2580	6756	2000	2000	1800	1500	H	6"	H	2"
i-FX-N-G05 /D /SL-A /0512	5800	2260	2580	7241	2000	2000	1800	1500	H	6"	H	2"
i-FX-N-G05 /D /SL-A /0572	5800	2260	2580	7393	2000	2000	1800	1500	H	6"	H	2"
i-FX-N-G05 /D /SL-A /0602	5800	2260	2580	7636	2000	2000	1800	1500	H	8"	H	2"
i-FX-N-G05 /D /SL-A /0652	7000	2260	2580	7878	2000	2000	1800	1500	H	8"	H	2"
i-FX-N-G05 /D /SL-A /0772	7900	2260	2580	9019	2000	2000	1800	1500	H	8"	H	2"
i-FX-N-G05 /D /SL-A /0902	10000	2260	2580	10321	2000	2000	1800	1500	H	8"	E1	2"1/2
i-FX-N-G05 /D /SL-A /1002	11800	2260	2580	12060	2000	2000	1800	1500	H	8"	E1	2"1/2
i-FX-N-G05 /D /SL-A /1152	11800	2260	2580	15380	2000	2000	1800	1500	H	8"	E1	2"1/2

DIMENSIONAL DRAWINGS

LEGEND OF PIPE CONNECTIONS



TYPE = H
Grooved coupling with weld end counter-pipe user side



TYPE = E
Female threaded pipe

NOMINAL PIPE SIZE	PIPE OUTSIDE DIAMETER
ø inches	ø mm
¾	26,7
1	33,7
1 ¼	42,4
1 ½	48,3
2	60,3
2 ½	76,1
3	88,9
3 ½	101,6

NOMINAL PIPE SIZE	PIPE OUTSIDE DIAMETER
ø inches	ø mm
4	114,3
4 ½	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

DESIGNATION	DESCRIPTION
UNI EN 10226-1 - Rp 1 1/2	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 1 1/2"
UNI EN 10226-1 - Rp 2 1/2	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 2 1/2"
UNI EN 10226-1 - Rp 3	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 3"
UNI EN 10226-1 - R 3	External conical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 3"
UNI ISO 228/1 - G 4 B	Internal cylindrical threads where pressure-tight joints are not made on the threads, defined by standard UNI ISO 228/1 Tolerance class B for external thread Conventional ø 4"
DN 80 PN 16	Flange Nominal Diameter: 80 mm Nominal Pressure: 16 bar

NOTE:

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

All relative values are defined by standards.

As example, here below some values:

	UNI EN 10226-1	UNI ISO 228/1
Conventional ø	1"	1"
Pitch	2.309 mm	2.309 mm
External ø	33.249 mm	33.249 mm
Core ø	30.291 mm	30.291 mm
Thread height	1.479 mm	1.479 mm

13.1 HYDRONIC GROUP

13.1 HYDRONIC GROUP

The units can be fitted with the hydronic module 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 twin in-line pump, 2 poles (/A and /A+NR kit versions) or 4 poles (/SL-A versions), for achieving low head or high head, fixed or variable speed.

The standard configuration of the units feature:

- terminals for external pumps control (relays + 0-10V signal)
- differential pressure switch on heat exchanger
- discharge valves on exchanger
- purge valve

For the hydronic modules with pumps, the factory-mounted components are:

- 2 pumps, 2 or 4 poles, low head or high head, fixed or variable speed
- differential pressure switch on heat exchanger
- discharge valves on heat exchanger
- pump inlet / outlet valves
- check valve (Clapet type for in-line pumps)
- purge valve
- drain plug

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

The hydronic group is protected by a special ventilated casing.

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.

13.1 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
- Unit outlet flow-switch

It is also recommended the use of the following components:

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

13.1 SPECIAL PUMPS

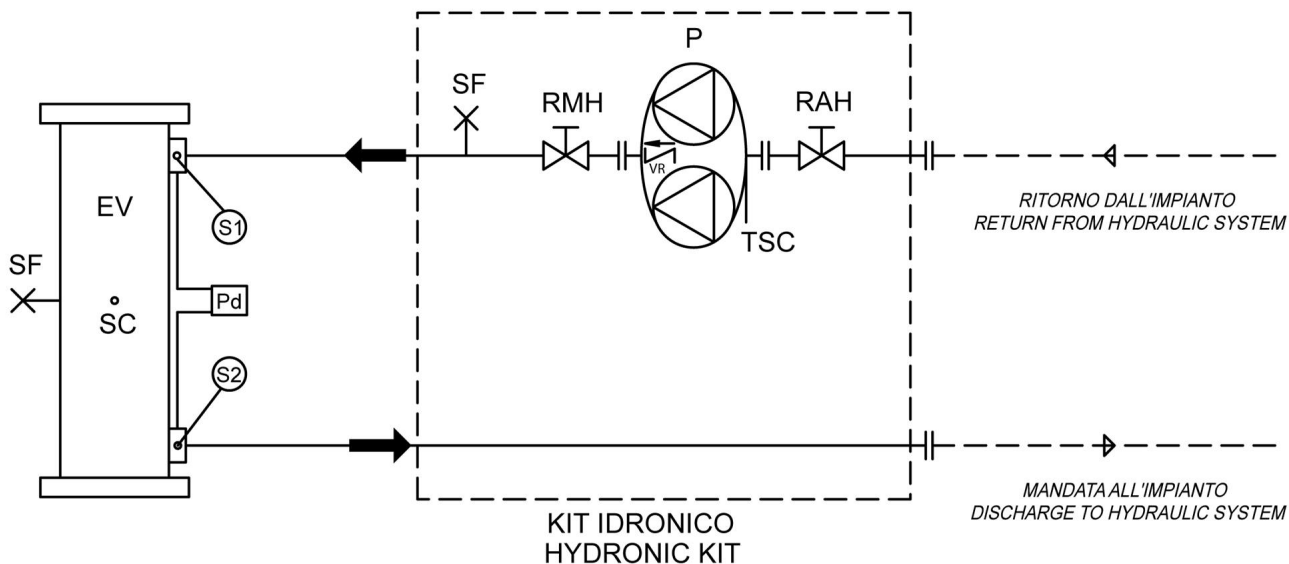
For pumps with different configurations, please contact our sales department.

Possible configurations

PUMP GROUP	Versions	
	A	SL-A
U - 2 PUMPS 4P LH (FIX SPEED)(4738)	n.a.	X
U - 2 PUMPS 4P HH (FIX SPEED)(4739)	n.a.	X
U - 2 PUMPS 2P LH (FIX SPEED)(4741)	X	n.a.
U - 2 PUMPS 2P HH (FIX SPEED)(4742)	X	n.a.
U - 2 PUMPS 4P LH (VAR SPEED)(4749)	n.a.	X
U - 2 PUMPS 4P HH (VAR SPEED)(4751)	n.a.	X
U - 2 PUMPS 2P LH (VAR SPEED)(4752)	X	n.a.
U - 2 PUMPS 2P HH (VAR SPEED)(4753)	X	n.a.

HYDRONIC GROUP

Schema idraulico pompe IN-LINE - configurazione STD
Hydraulic diagram IN-LINE water PUMPS – STD configuration



LEGENDA - LEGEND	
<i>COMPONENTI DEL KIT IDRONICO COMPONENTS OF THE HYDRONIC KIT</i>	
EV	Evaporatore (scambiatore a fascio tubiero) Evaporator (tube exchanger)
P	Pompa gemellare Twin rotor pump
Pd	Pressostato differenziale lato acqua Water Differential pressure switch
RAH	Rubinetto aspirazione Pump suction valve
RMH	Rubinetto mandata Pump discharge valve
SC	Valvola di scarico Drain valve
TSC	Tappo di scarico Drain plug
SF	Valvola di sfiato Purge valve
S1	Sonda ingresso acqua scambiatore Exchanger water inlet probe
S2	Sonda uscita acqua scambiatore Exchanger water outlet probe
VR	Valvola di non ritorno (interna alla pompa) One way valve (pump inside)

HYDRONIC GROUP

Hydronic kit positioning

	Version	U - 2 PUMPS 4P LH (FIX SPEED) (4738)				U - 2 PUMPS 4P HH (FIX SPEED) (4739)				U - 2 PUMPS 2P LH (FIX SPEED) (4741)				U - 2 PUMPS 2P HH (FIX SPEED) (4742)			
		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]
0472	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	395	1000	/	/	475
	SL-A	1000	/	/	555	1300	/	/	710	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0512	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	415	1000	/	/	495
	SL-A	1000	/	/	555	1300	/	/	720	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0572	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	465	1000	/	/	495
	SL-A	1000	/	/	555	1300	/	/	770	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0602	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	475	1000	/	/	515
	SL-A	1300	/	/	590	1300	/	/	770	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0652	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	580	1000	/	/	665
	SL-A	1300	/	/	710	1300	/	/	1030	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0772	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	540	1000	/	/	635
	SL-A	1300	/	/	820	1300	/	/	1030	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0902	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	880	1300	/	/	700
	SL-A	1300	/	/	880	1300	/	/	1060	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1002	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	990	1300	/	/	855
	SL-A	1300	/	/	970	1300	/	/	1190	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1152	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	1050	1300	/	/	1215
	SL-A	1300	/	/	1050	1300	/	/	1215	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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)
U - 2 PUMPS 4P LH (FIX SPEED)	U - 2 PUMPS 4P LH (FIX SPEED)
U - 2 PUMPS 4P HH (FIX SPEED)	U - 2 PUMPS 4P HH (FIX SPEED)
U - 2 PUMPS 2P LH (FIX SPEED)	U - 2 PUMPS 2P LH (FIX SPEED)
U - 2 PUMPS 2P HH (FIX SPEED)	U - 2 PUMPS 2P HH (FIX SPEED)
-	Not available

HYDRONIC GROUP

Hydronic kit positioning

	Version	U - 2 PUMPS 4P LH (VAR SPEED) (4749)				U - 2 PUMPS 4P HH (VAR SPEED) (4751)				U - 2 PUMPS 2P LH (VAR SPEED) (4752)				U - 2 PUMPS 2P HH (VAR SPEED) (4753)			
		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]
0472	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	430	1000	/	/	510
	SL-A	1000	/	/	590	1300	/	/	770	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0512	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	450	1000	/	/	550
	SL-A	1000	/	/	590	1300	/	/	780	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0572	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	520	1000	/	/	550
	SL-A	1000	/	/	590	1300	/	/	830	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0602	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1000	/	/	530	1000	/	/	570
	SL-A	1300	/	/	630	1300	/	/	830	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0652	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	640	1000	/	/	720
	SL-A	1300	/	/	750	1300	/	/	1090	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0772	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	600	1000	/	/	690
	SL-A	1300	/	/	880	1300	/	/	1090	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
0902	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	940	1300	/	/	760
	SL-A	1300	/	/	940	1300	/	/	1120	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1002	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	1050	1300	/	/	940
	SL-A	1300	/	/	1030	1300	/	/	1250	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1152	A	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1300	/	/	1110	1300	/	/	1300
	SL-A	1300	/	/	1110	1300	/	/	1300	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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)
U - 2 PUMPS 4P LH (VAR SPEED)	U - 2 PUMPS 4P LH (VAR SPEED)
U - 2 PUMPS 4P HH (VAR SPEED)	U - 2 PUMPS 4P HH (VAR SPEED)
U - 2 PUMPS 2P LH (VAR SPEED)	U - 2 PUMPS 2P LH (VAR SPEED)
U - 2 PUMPS 2P HH (VAR SPEED)	U - 2 PUMPS 2P HH (VAR SPEED)
-	Not available

HYDRONIC GROUP

HEAT EXCHANGER USER SIDE - U - 2 PUMPS 2P HH (FIX SPEED)

SIZE		CH		HP		PUMP					CH	HP
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	A	465,0	22,24	452,8	21,86	A1	LNTE 80-160/92/2	2	18	9,200	202	206
0512	A	517,9	24,76	506,3	24,44	B1	LNTE 80-160/110/2	2	21	11,00	216	220
0572	A	549,9	26,29	547,4	26,42	B2					199	197
0602	A	590,8	28,25	575,3	27,77	C1	LNTE 100-160/110/2	2	21	11,00	170	173
0652	A	669,9	32,04	663,8	32,04	D1	LNTE 100-160/150/2	2	28	15,00	239	239
0772	A	764,1	36,54	747,6	36,09	D2					206	210
0902	A	899,3	43,01	871,4	42,07	E1	LNTE 100-160/185/2	2	34	18,50	229	235
1002	A	1034	49,43	1006	48,56	F1	LNTS 100-200/220/2	2	41	22,00	270	277
1152	A	1154	55,17	1111	53,64	G1	LNTS 150-315/220/4	4	41	22,00	189	194

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

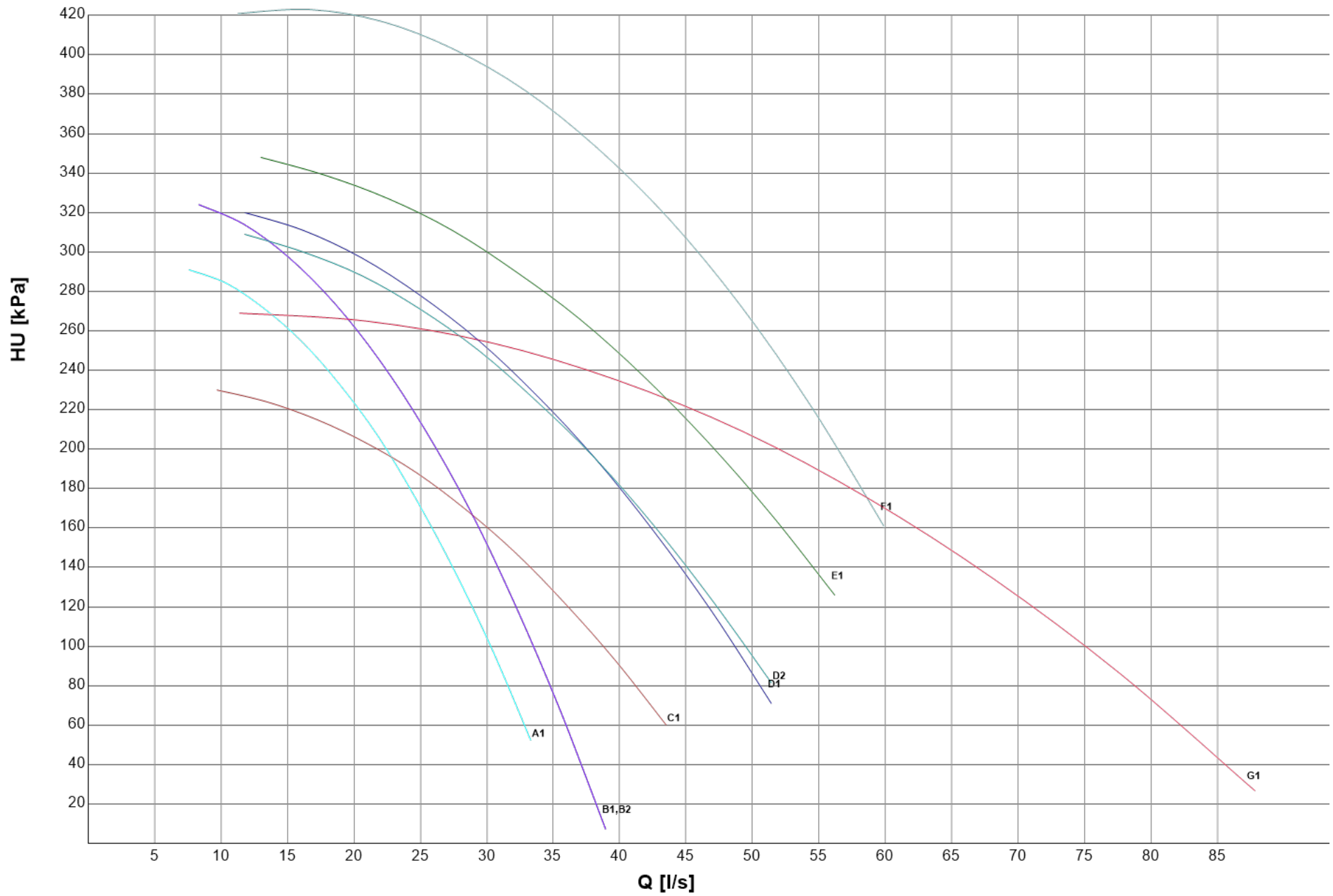
Q Plant (side) exchanger water flow

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 - U - 2 PUMPS 2P HH (FIX SPEED)



HYDRONIC GROUP

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

SIZE		CH		HP		PUMP					CH	HP
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	A	465,0	22,24	452,8	21,86	A1	LNTE 80-160/92/2	2	18	9,200	202	206
0512	A	517,9	24,76	506,3	24,44	B1	LNTE 80-160/110/2	2	21	11,00	216	220
0572	A	549,9	26,29	547,4	26,42	B2					199	197
0602	A	590,8	28,25	575,3	27,77	C1	LNTE 100-160/110/2	2	21	11,00	170	173
0652	A	669,9	32,04	663,8	32,04	D1	LNTE 100-160/150/2	2	28	15,00	221	221
0772	A	764,1	36,54	747,6	36,09	D2					200	203
0902	A	899,3	43,01	871,4	42,07	E1	LNTE 100-160/185/2	2	34	18,50	226	232
1002	A	1034	49,43	1006	48,56	F1	LNTS 100-200/220/2	2	41	22,00	254	261
1152	A	1154	55,17	1111	53,64	G1	LNTS 150-315/220/4	4	41	22,00	189	194

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

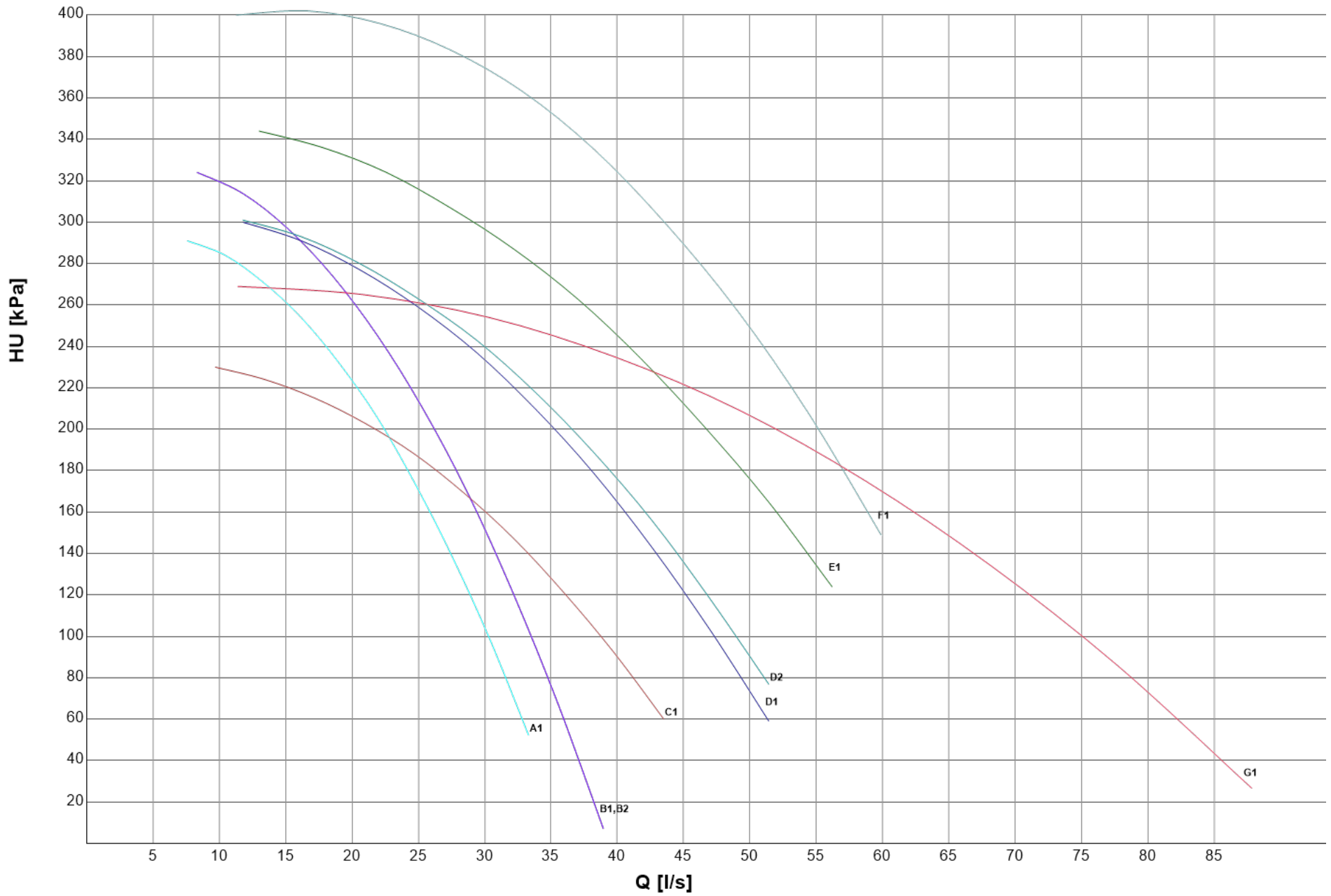
Q Plant (side) exchanger water flow

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



HYDRONIC GROUP

HEAT EXCHANGER USER SIDE - U - 2 PUMPS 2P LH (FIX SPEED)

SIZE		CH		HP		PUMP				CH	HP	
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	A	465,0	22,24	452,8	21,86	A1	LPCD 80-160/7.5/2	2	25	7,500	138	143
0512	A	517,9	24,76	506,3	24,44	A2					112	117
0572	A	549,9	26,29	547,4	26,42	B1	LPCD 80-160/11/2	2	20	11,00	155	153
0602	A	590,8	28,25	575,3	27,77	B2					150	156
0652	A	669,9	32,04	663,8	32,04	C1	LPCD 100-200/11/2	2	20	11,00	140	140
0772	A	764,1	36,54	747,6	36,09	C2					110	114
0902	A	899,3	43,01	871,4	42,07	D1	LNTS 125-250/110/4	4	21	11,00	118	123
1002	A	1034	49,43	1006	48,56	D2					80,6	86,1
1152	A	1154	55,17	1111	53,64	E1	LNTS 150-250/150/4	4	31	15,00	121	126

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

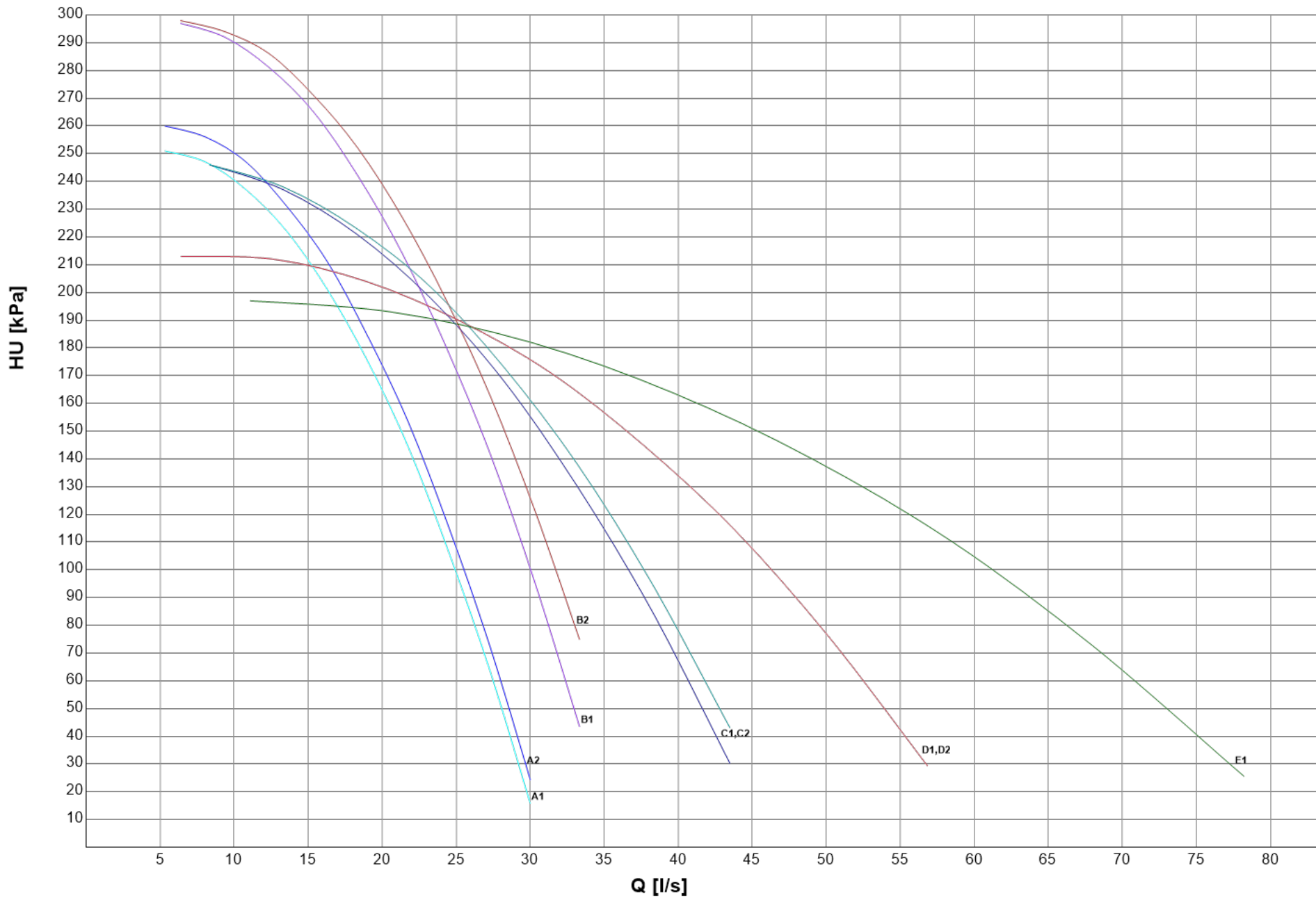
Q Plant (side) exchanger water flow

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 - U - 2 PUMPS 2P LH (FIX SPEED)



HYDRONIC GROUP

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

SIZE		CH		HP		PUMP				CH	HP	
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	A	465,0	22,24	452,8	21,86	A1	LPCD 80-160/7.5/2	2	25	7,500	138	143
0512	A	517,9	24,76	506,3	24,44	A2					106	111
0572	A	549,9	26,29	547,4	26,42	B1	LPCD 80-160/11/2	2	20	11,00	155	153
0602	A	590,8	28,25	575,3	27,77	B2					150	156
0652	A	669,9	32,04	663,8	32,04	C1	LPCD 100-200/11/2	2	20	11,00	140	140
0772	A	764,1	36,54	747,6	36,09	C2					110	114
0902	A	899,3	43,01	871,4	42,07	D1	LNTS 125-250/110/4	4	21	11,00	118	123
1002	A	1034	49,43	1006	48,56	D2					80,6	86,1
1152	A	1154	55,17	1111	53,64	E1	LNTS 150-250/150/4	4	31	15,00	121	126

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

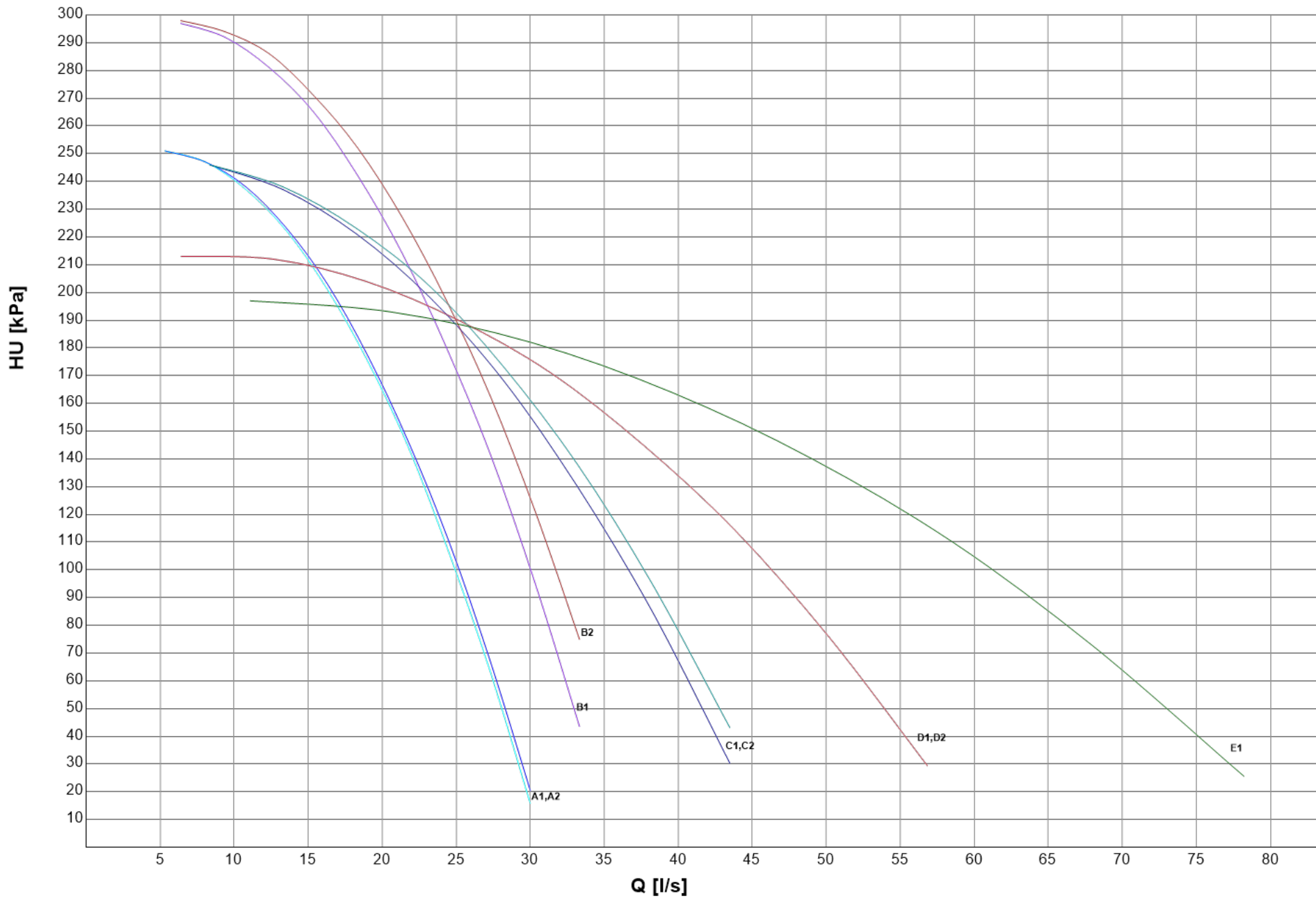
Q Plant (side) exchanger water flow

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



HYDRONIC GROUP

HEAT EXCHANGER USER SIDE - U - 2 PUMPS 4P HH (FIX SPEED)

SIZE		CH		HP		PUMP				CH	HP	
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	SL-A	443,9	21,23	448,3	21,64	A1	LNTS 125-250/110/4	4	21	11,00	177	175
0512	SL-A	497,6	23,79	500,0	24,14	A2					156	154
0572	SL-A	531,9	25,44	541,9	26,16	A3					159	155
0602	SL-A	570,7	27,29	567,9	27,41	A4					168	168
0652	SL-A	649,1	31,04	657,4	31,74	B1	LNTS 150-315/185/4	4	35	18,50	217	215
0772	SL-A	740,7	35,42	740,1	35,73	B2					200	199
0902	SL-A	870,1	41,61	862,6	41,64	B3					191	191
1002	SL-A	998,0	47,72	996,6	48,11	B4					170	169
1152	SL-A	1114	53,26	1100	53,12	C1	LNTS 150-315/220/4	4	41	22,00	195	196

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

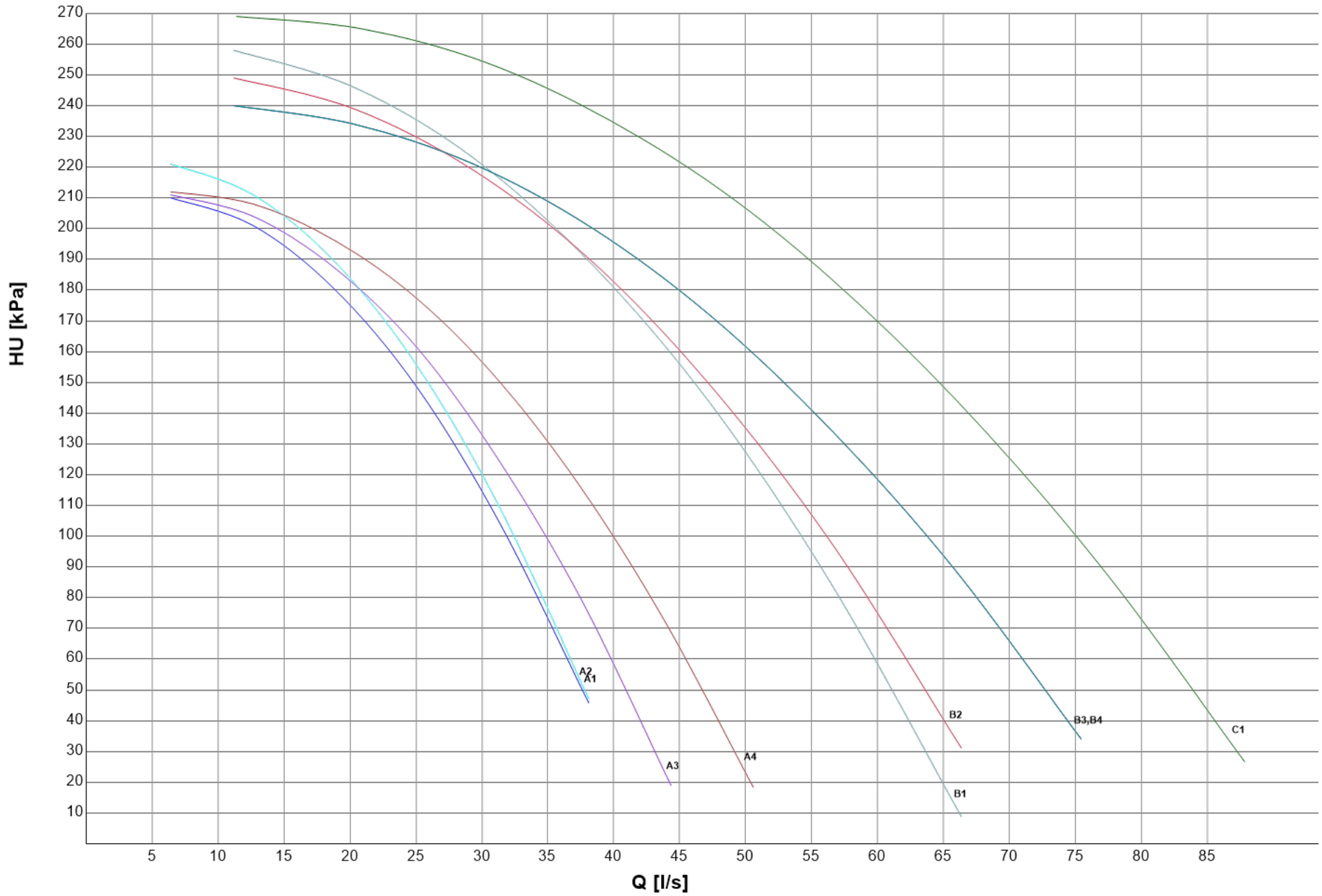
Q Plant (side) exchanger water flow

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 - U - 2 PUMPS 4P HH (FIX SPEED)



HYDRONIC GROUP

HEAT EXCHANGER USER SIDE - U - 2 PUMPS 4P HH (VAR SPEED)

SIZE		CH		HP		PUMP				CH	HP	
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	SL-A	443,9	21,23	448,3	21,64	A1	LNTS 125-250/110/4	4	21	11,00	167	165
0512	SL-A	497,6	23,79	500,0	24,14	A2					156	154
0572	SL-A	531,9	25,44	541,9	26,16	A3					159	155
0602	SL-A	570,7	27,29	567,9	27,41	A4					168	168
0652	SL-A	649,1	31,04	657,4	31,74	B1	LNTS 150-315/185/4	4	35	18,50	197	195
0772	SL-A	740,7	35,42	740,1	35,73	B2					190	188
0902	SL-A	870,1	41,61	862,6	41,64	B3					191	191
1002	SL-A	998,0	47,72	996,6	48,11	B4					170	169
1152	SL-A	1114	53,26	1100	53,12	C1	LNTS 150-315/220/4	4	41	22,00	195	196

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

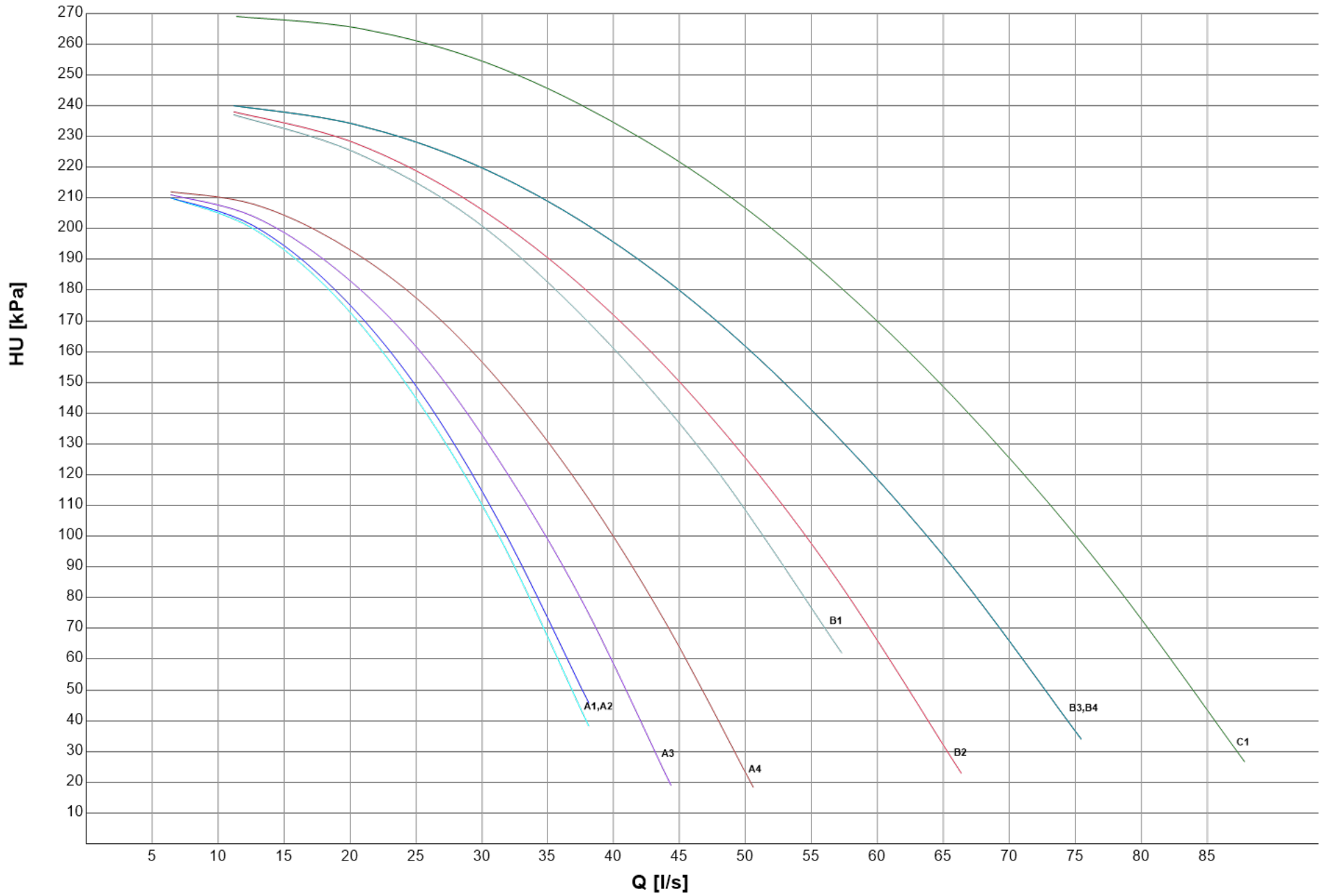
Q Plant (side) exchanger water flow

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 - U - 2 PUMPS 4P HH (VAR SPEED)



HYDRONIC GROUP

HEAT EXCHANGER USER SIDE - U - 2 PUMPS 4P LH (FIX SPEED)

SIZE		CH		HP		PUMP				CH	HP	
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	SL-A	443,9	21,23	448,3	21,64	A1	LNTS 100-250/55/4	4	12	5,500	116	114
0512	SL-A	497,6	23,79	500,0	24,14	A2					102	100
0572	SL-A	531,9	25,44	541,9	26,16	A3					90,7	85,3
0602	SL-A	570,7	27,29	567,9	27,41	A4					107	106
0652	SL-A	649,1	31,04	657,4	31,74	B1	LNTS 125-200/75/4	4	15	7,500	101	97,8
0772	SL-A	740,7	35,42	740,1	35,73	C1	LNTS 125-250/110/4	4	21	11,00	138	137
0902	SL-A	870,1	41,61	862,6	41,64	C2					126	126
1002	SL-A	998,0	47,72	996,6	48,11	D1	LNTS 150-250/110/4	4	21	11,00	87,8	86,5
1152	SL-A	1114	53,26	1100	53,12	E1	LNTS 150-250/150/4	4	31	15,00	127	128

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

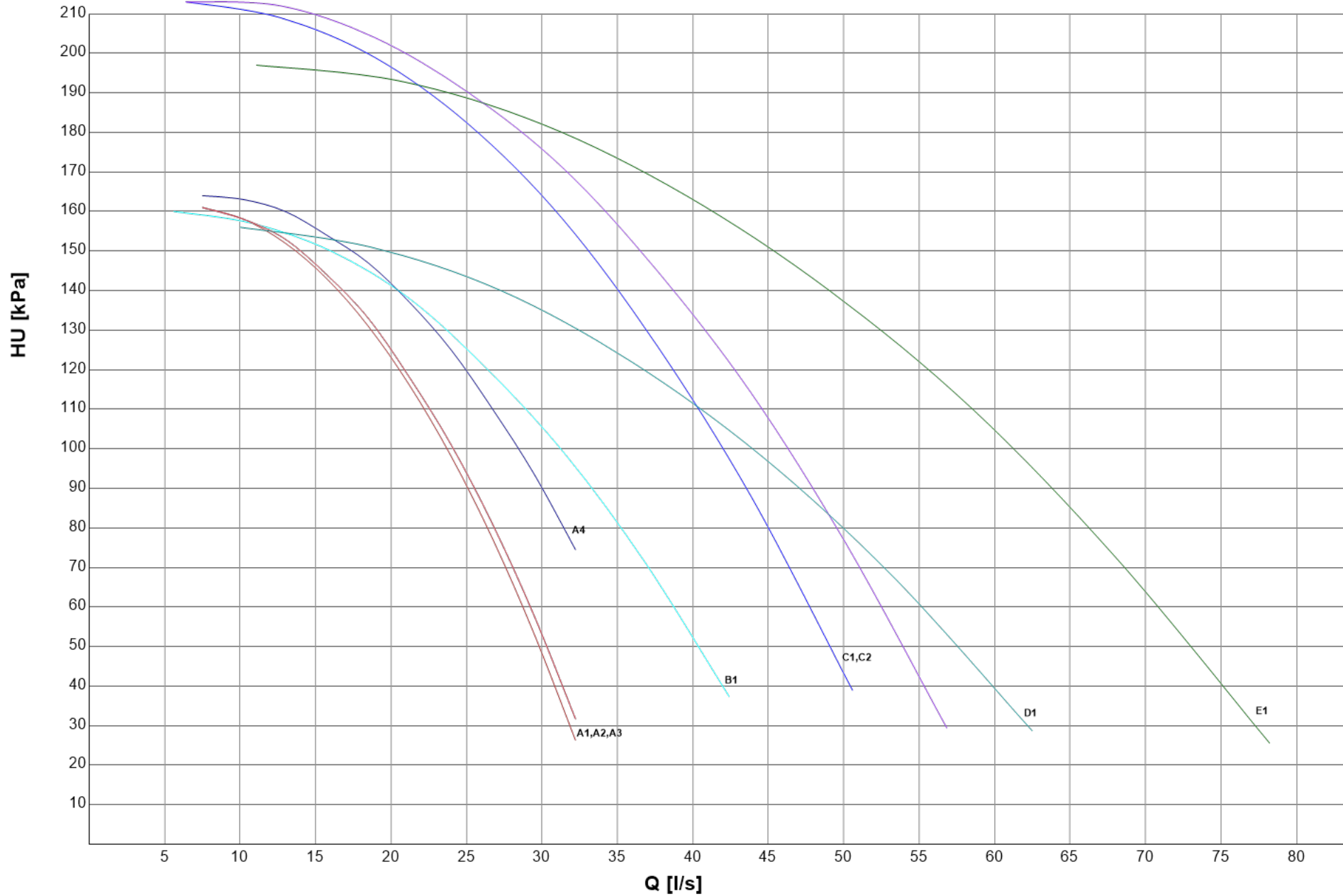
Q Plant (side) exchanger water flow

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 - U - 2 PUMPS 4P LH (FIX SPEED)



HYDRONIC GROUP

HEAT EXCHANGER USER SIDE - U - 2 PUMPS 4P LH (VAR SPEED)

SIZE		CH		HP		PUMP				CH	HP	
		Pfgross	Qfgross	Ptgross	Qcdgross	Curve	Model	N.	F.L.A.	F.L.I.	HU	HU
		[kW] (1)	[l/s] (1)	[kW] (1)	[l/s] (1)			Pole	[A]	[kW]	[kPa]	[kPa]
0472	SL-A	443,9	21,23	448,3	21,64	A1	LNTS 100-250/55/4	4	12	5,500	116	114
0512	SL-A	497,6	23,79	500,0	24,14	A2					102	100
0572	SL-A	531,9	25,44	541,9	26,16	A3					90,7	85,3
0602	SL-A	570,7	27,29	567,9	27,41	A4					107	106
0652	SL-A	649,1	31,04	657,4	31,74	B1	LNTS 125-200/75/4	4	15	7,500	101	97,8
0772	SL-A	740,7	35,42	740,1	35,73	C1	LNTS 125-250/110/4	4	21	11,00	138	137
0902	SL-A	870,1	41,61	862,6	41,64	C2					126	126
1002	SL-A	998,0	47,72	996,6	48,11	D1	LNTS 150-250/110/4	4	21	11,00	87,8	86,5
1152	SL-A	1114	53,26	1100	53,12	E1	LNTS 150-250/150/4	4	31	15,00	127	128

(1) Values refer to nominal conditions

CH Cooling mode

HP HP mode

Pf Cooling capacity unit (Cooling mode)

Pt Heating capacity unit (Heating mode)

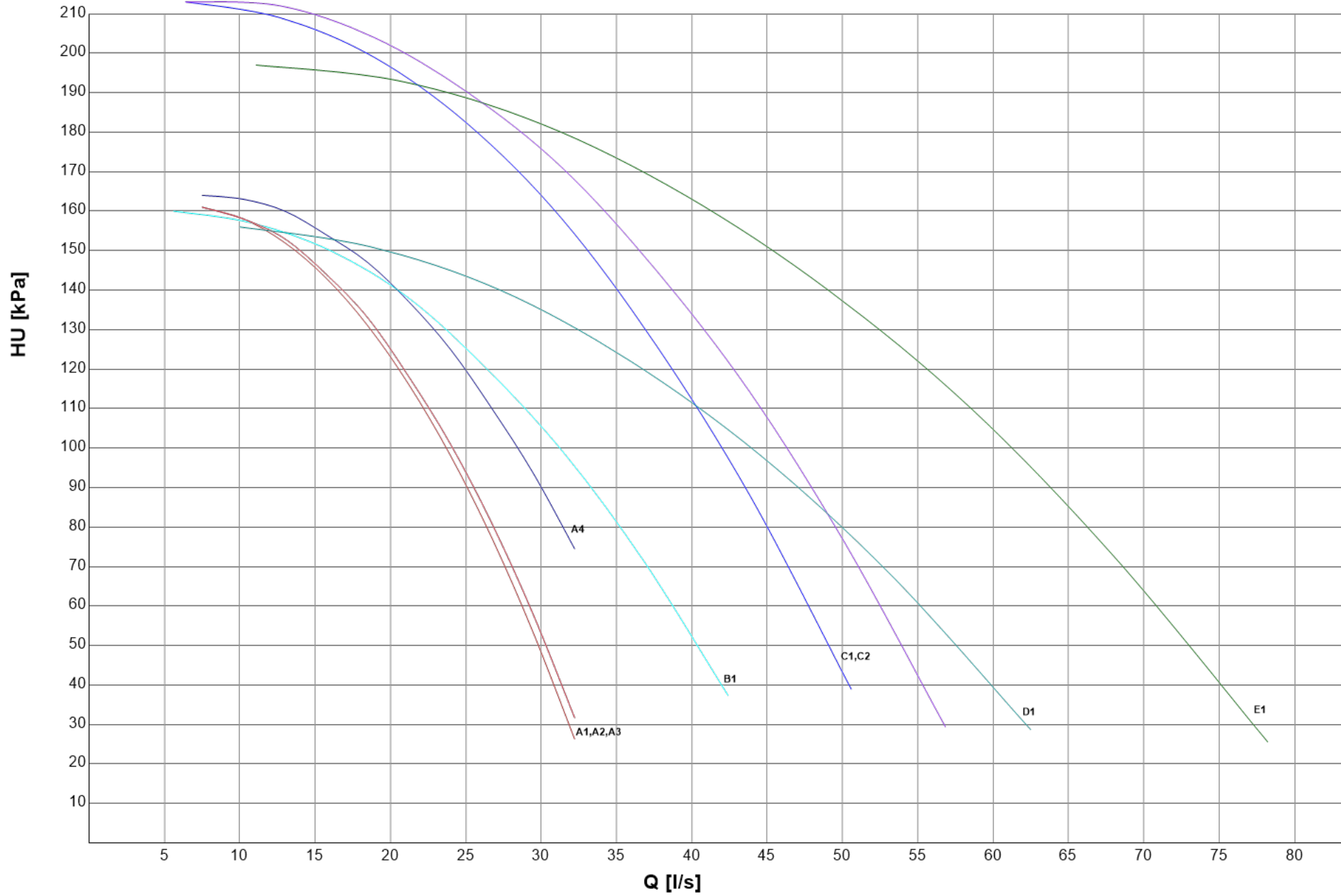
Q Plant (side) exchanger water flow

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 - U - 2 PUMPS 4P LH (VAR SPEED)



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, ClimaPRO) 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 SYSTEM (delta P control)

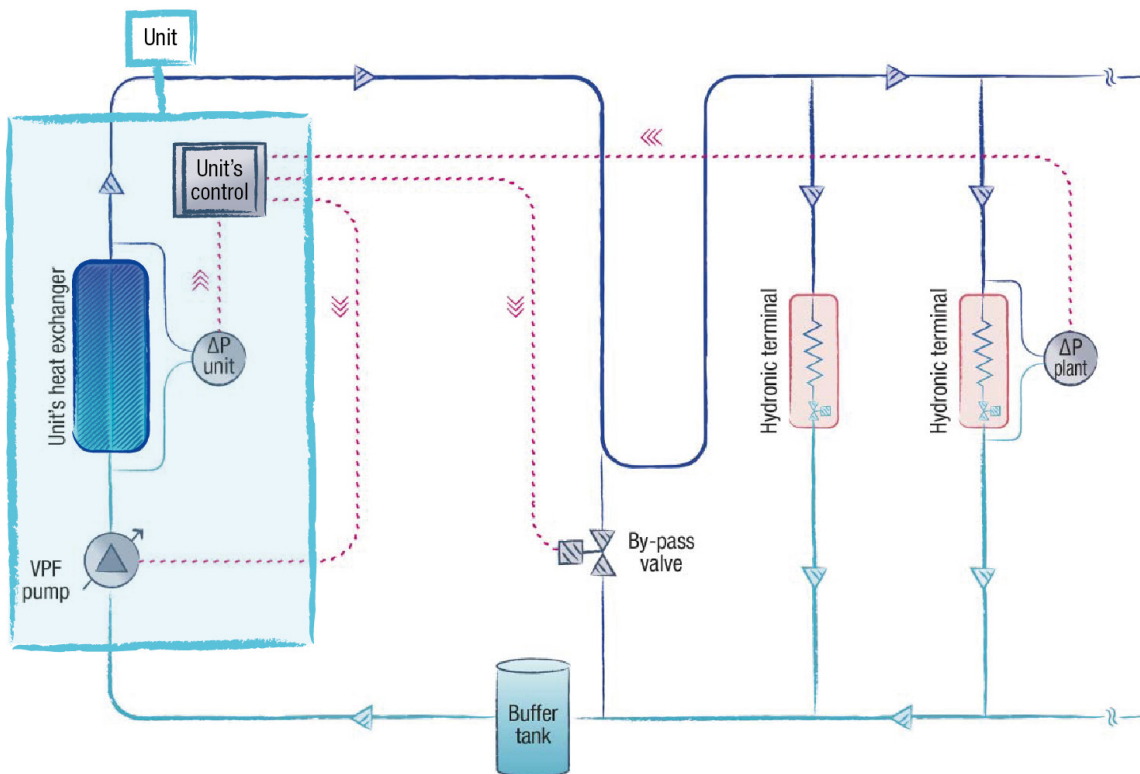
For plants with only a primary circuit

VPF - Plant and unit requirements

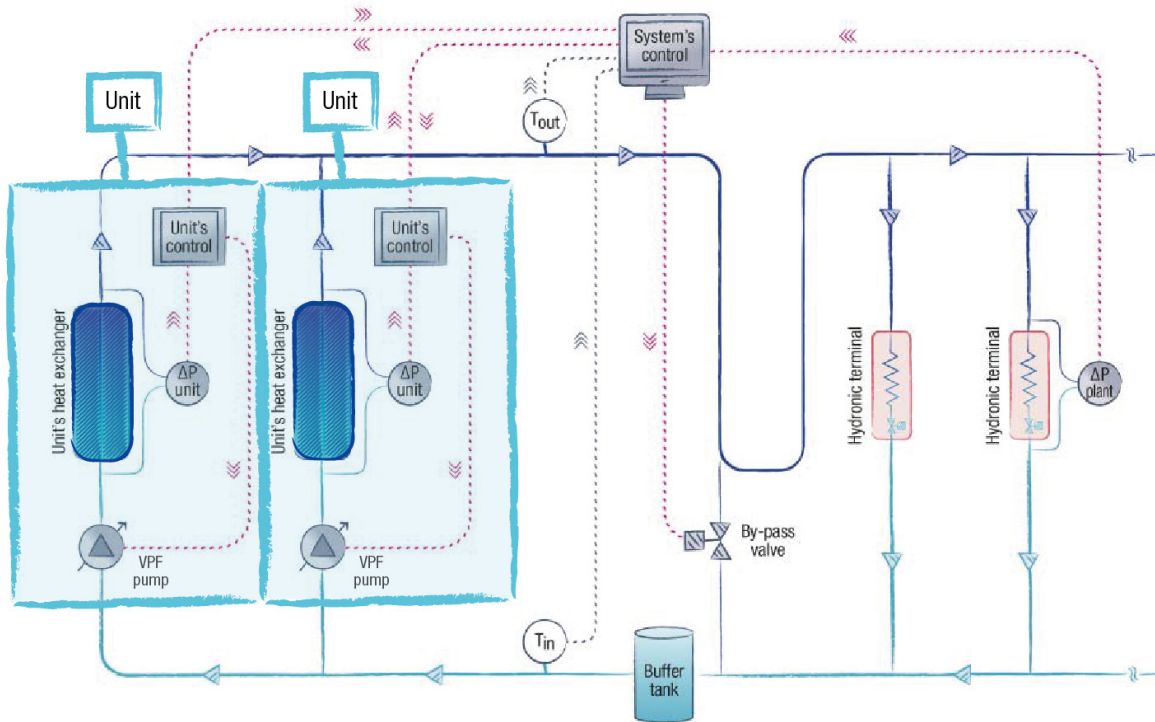
The VPF logic provides the variable flow control for the plant's primary circuit.

- 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

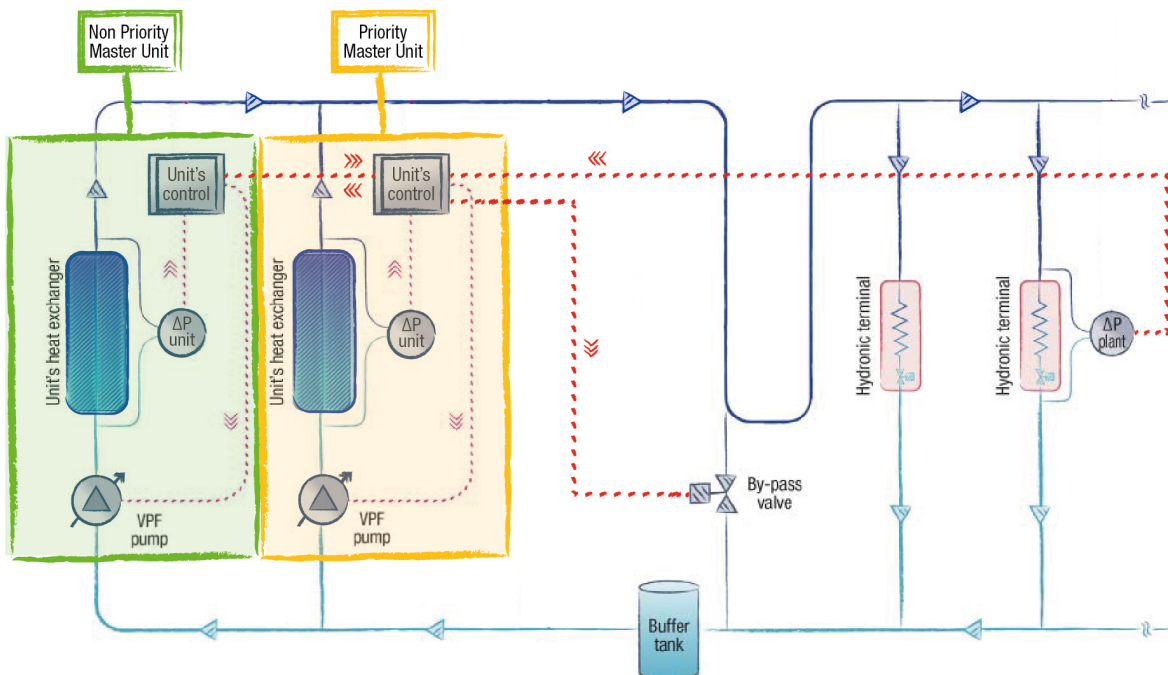
Plant diagram for single unit system



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 ($\Delta P_{min} \leftrightarrow \Delta P_{max}$).

- 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.

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 add to manage the multiple signals coming from unit's controller to the by-pass valve.

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)

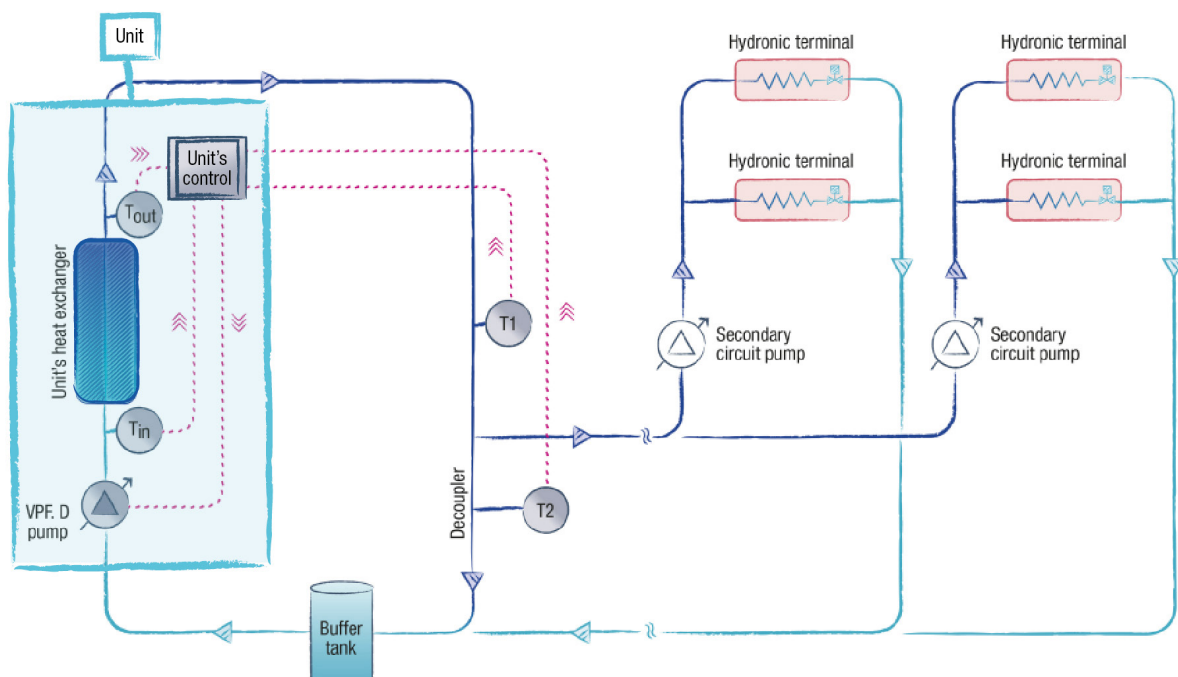
For plants with primary and secondary circuits separated by a hydraulic decoupler.

VPF.D - Plant and unit requirements

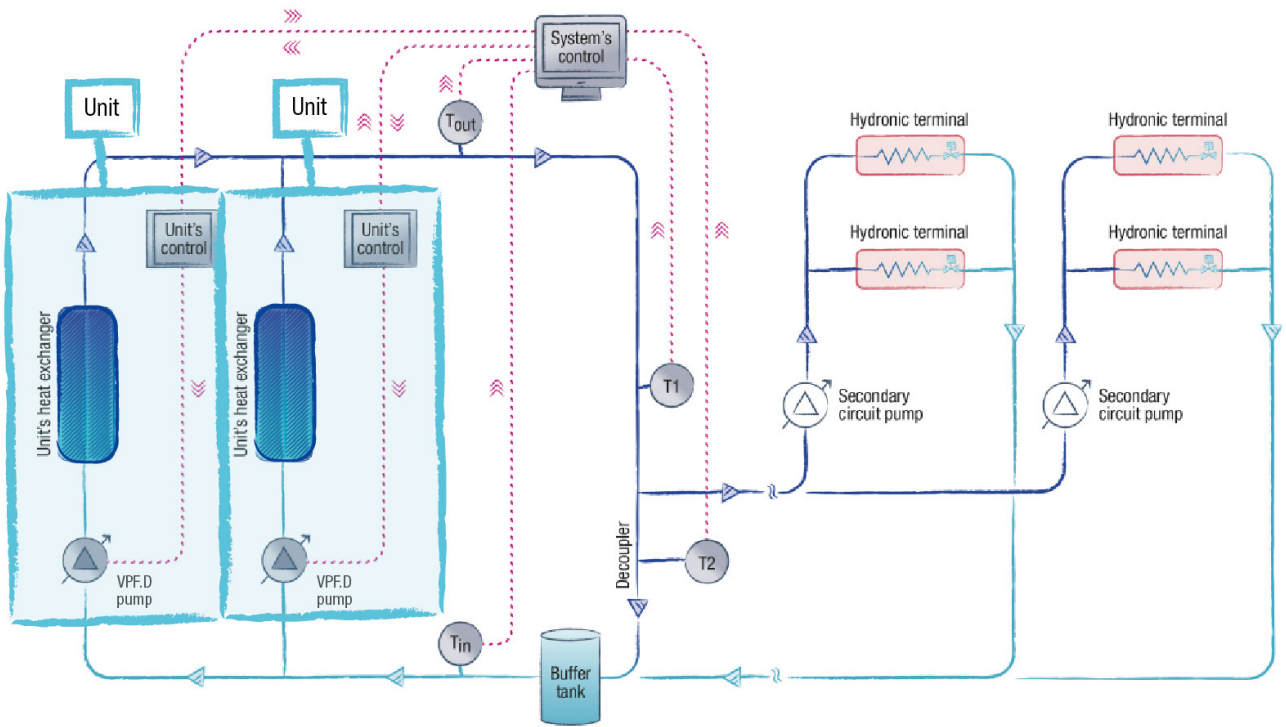
The VPF.D logic provides the variable flow control for the plant's primary circuit.

- 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

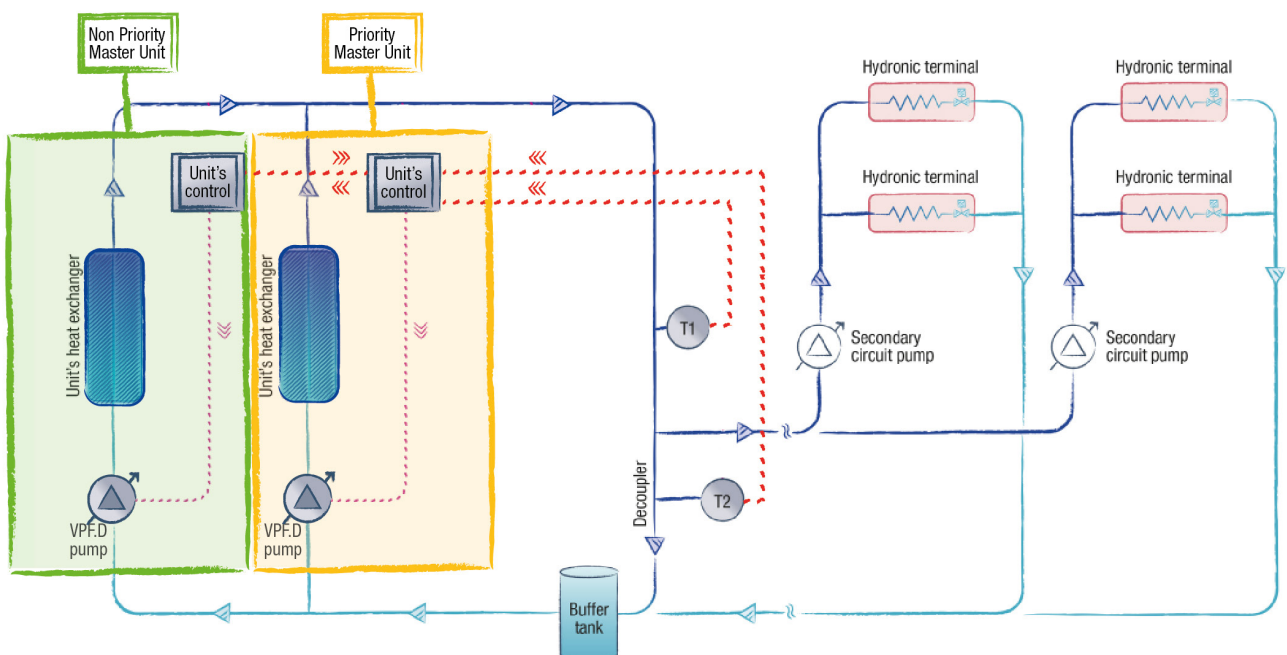
Plant diagram for single unit system



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



Plant diagram for multi-unit system with Multi Manager



VPF.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 ($\Delta T_{min} \leftrightarrow \Delta T_{max}$). 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")

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

B.1 POWER FACTOR AND THDi VALUES

B.2 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 AC→DC rectifier and then with an inverter DC→AC 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°, ...).

B.3 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.

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 /A version	MAXIMUM		100%	
	P.F.	THDi [%]	P.F.	THDi [%]
0472	0,87	42	0,85	49
0512	0,88	40	0,86	47
0572	0,88	38	0,86	44
0602	0,88	38	0,87	42
0652	0,89	34	0,88	40
0772	0,90	31	0,89	38
0902	0,91	40	0,89	48
1002	0,89	37	0,88	45
1152	0,89	34	0,88	41

Size /A + kit NR version	MAXIMUM		100%	
	P.F.	THDi [%]	P.F.	THDi [%]
0472	0,87	42	0,85	47
0512	0,88	40	0,85	45
0572	0,88	38	0,86	43
0602	0,88	38	0,86	41
0652	0,89	34	0,87	40
0772	0,90	31	0,88	38
0902	0,91	40	0,89	43
1002	0,89	37	0,87	44
1152	0,89	34	0,87	40

Size /SL-A version	MAXIMUM		100%	
	P.F.	THDi [%]	P.F.	THDi [%]
0472	0,87	42	0,86	47
0512	0,88	40	0,86	44
0572	0,88	38	0,87	42
0602	0,88	38	0,87	40
0652	0,89	34	0,88	39
0772	0,90	31	0,89	36
0902	0,91	44	0,90	47
1002	0,89	37	0,88	42
1152	0,89	34	0,88	39

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

100%: Values calculated at 12/7 °C, 35 °C outdoor air temperature at the nominal cooling capacity

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).



for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.



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