ACCORRONI
Climate Technology

Air / water inverter heat pumps with axial fans with double refrigerant circuit

HPE 66÷115 INVERTER

INSTALLATION MANUAL

HPE 66÷115 INVERTER

05	10-2019	AL.B.	A.R.	Update of the technical data
04	03-2019	M.P.	M.P.	Indication of power supply cable section paragraph 7.6 – identification of fairleads power supply cables
03	05-2018	AL.B.	A.R.	Upgrade of data, envelope, wiring, new version of CI and adding the paragraph 7.4.1.
02	02-2018	A.B	F.M.	Upgrade of the data and others. Correction of water IN/OUT indications.
01	11-2017	F.M.	F.M.	General revision of the content
00	06-2017	F.M.	F.M.	First release – Preliminary data
Rev	**Date**	**Author**	**Supervisor**	
Catalogo / Catalogue / Katalog / Catalogue **MUI01110H8120-05**				Serie / Series / Serie / Serie / Série **HPE 66 - 115 INVERTER** **INDUSTRIAL INVERTER AIR/WATER HEAT PUMPS WITH AXIAL FANS**

Possible wasted electrical or electronic devices/products should not be located together with normal domestic waste, but disposed according to the current WEEE law in compliance with the European Directive 2002/96/EC and following modifications 2003/108/EC. Please inform yourself at your local Administration or at your reseller in case the product will be replaced with a similar one.

INDEX

CE CONFORMITY DECLARATION

DICHIARAZIONE DI CONFORMITÁ CE

The company A2B ACCORRONI E.G. – Via Ancona, 37 – 60027 – Osimo - (AN) - Italy

DECLARES

DICHIARA

that the unit:
che la macchina

Definition:
Definizione:

Industrial inverter air/water heat pump with axial fan */ Pompa di calore industriale aria/acqua inverter con ventilatore assiale*
Industrial inverter air/water heat pump with vapour injection and axial fan */ Pompa di calore industriale aria/acqua inverter con iniezione di vapore e ventilatore assiale*

Model N°:
N° modello:

HPE 66 INVERTER
HPE 75 INVERTER
HPE 85 INVERTER
HPE 95 INVERTER
HPE 105 INVERTER
HPE 115 INVERTER

Serie N°:
N° di serie:

MEETS THE REQUIREMENTS OF DIRECTIVE 2006/42/CE

È CONFORME AI REQUISITI DELLA DIRETTIVA 2006/42/CE

1. The unit is in CAT. I, so it's free from the application of Directive 2014/68/UE (Reference to Art. I, paragraph 2, point f)
L'attrezzatura a pressione rientra nella CAT. I. L'unità è quindi esente dall'applicazione della normativa PED 2014/68/UE (Riferimento Art. I, paragrafo 2 punto f).

2. Harmonized standards applied to designing and manufacture : **UNI EN 378-1, UNI EN378-2, UNI EN 12735-1**
Norme armonizzate applicate alla progettazione ed alla costruzione : ***UNI EN 378-1, UNI EN378-2, UNI EN 12735-1***

3. Others European Directives and harmonized standards applied to the equipment : **2014/35/UE, 2014/30/UE, 2011/65/UE, 2012/19/UE, CEI EN 60204-1, UNI EN ISO 12100, UNI EN ISO 13857, CEI EN 61000-6-3, CEI EN 61000-6-2**
Eventuali altre Direttive Europee e norme armonizzate applicate all'attrezzatura : ***2014/35/UE, 2014/30/UE, 2011/65/UE, 2012/19/UE, CEI EN 60204-1, UNI EN ISO 12100, UNI EN ISO 13857,*** **CEI EN 61000-6-3, CEI EN 61000-6-2**

Osimo, Settembre/September 2017

A2B ACCORRONI E.G.

This manual of HPE units collects all the necessary information for the better use of the appliance under safety conditions for the operator thus meeting the requirements listed in the 2006/42/CE Equipment Directive and following amendments.

1 PURPOSES AND CONTENTS OF THIS MANUAL

This manual provides the basic information as for the selection, installation, operation and maintenance of HPE units. It is addressed to the installer and the user of the appliance and it includes the necessary indications allowing the user to operate the unit efficiently, even without any previous specific knowledge of it.
The manual describes the characteristics of the appliance at the time of its marketing; therefore, it must be considered adequate respecting the state of the art in terms of potentiality, ergonomics, safety and functionality.
The company introduces also technological improvements and is not constrained to update the manuals for previous versions of appliances that could not be compatible. So make sure to use, for the installed unit, the supplied manual.
It's recommended that, the user must follow the instructions contained in this booklet, especially those concerning the safety and routine maintenance.

1.1 CONSERVATION OF THE MANUAL

The manual has to be always kept for future reference. It has to be stored in a safe place, away from dusts and moisture. It has to be also available and accessible to all users who shall consult it any time they are in doubt on how to operate the equipment.
The company reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. It declines also any responsibility for possible inaccuracies in the manual if due to printing or transcription errors.
The customer must keep any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.
The company is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

1.2 GRAPHIC SYMBOLS

	***Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment.***
	***Indicates prohibited operations.***
	Indicates important information that the operator has to follow in order to guarantee the correct operation of the equipment in complete safety.

2 SAFETY LAWS

The units have been designed in accordance with the following directives and harmonised standards:

- EU Directives 2014/68/UE, 2006/42/EC, 2014/35/UE, 2014/30/EU, 2011/65/EU, 2012/19/EU
- UNI EN 378-1, 378-2, EN 12735-1
- UNI EN ISO 12100, EN 60204-1, UNI EN ISO 13857
- CEI EN 61000-6-3, IEC 61000-6-2.

3 PERMITTED USES

- The company excludes any contractual and extra-contractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.
- These units have been designed only for heating and/or cooling of water. Any other use not expressly authorized by the manufacturer is considered improper and therefore not allowed.
- The location of the plant, the hydraulic and electrical circuits must be established by the planting designer and must take into account both technical requirements as well as any applicable local laws and authorized specifications.
- The execution of all works must be performed by skilled and qualified personnel, competent in the existing rules in different countries.
  The execution of all works must be performed by skilled and qualified personnel and competent in the existing rules in the country in which the appliance will be installed.

4 GENERAL SAFETY GUIDELINES

Before beginning to operate on i-MAX units every user has to be perfectly knowledgeable about the functions of the equipment and its controls and has to have read and understood the information listed in this manual.

	***It's strictly forbidden to remove and/or tamper with any safety device.***
	Children or unassisted disabled persons are not allowed to use the appliance.
	Do not touch the appliance when barefoot or parts of the body are wet or damp.
	Do not clean the unit when the power supply is 'ON'.
	Do not pull, remove or twist the electrical cables coming out from the unit, even if it is disconnected from the main power supply.
	Do not step with your feet on the appliance, sit down and/or place any type of object.
	Do not spray or pour water directly on the unit.
	Do not dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent an environmental and life hazard.
	***Any routine and/or not-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric and pneumatic power sources and after its pneumatic system has been discharged.***
	***Do not put neither your hands nor insert screwdrivers, spanners or other tools into moving parts of the equipment.***
	***The equipment supervisor and the maintenance man have to receive suitable training for the performance of their tasks in safety.***
	***Operators have to know how to use personal protective devices and have to know the accident-prevention guidelines contained in national and international laws and norms.***

4.1 WORKERS' HEALTH AND SAFETY

The European Community has adopted a number of directives on workplace's health and safety, including **89/391/CEE**, **89/686/CEE, 89/655/CEE, 2009/104/CE, 86/188/CEE** and **77/576/CEE** directives. Every employer shall implement such norms and ensure that workers to respect them. It points out that:

	***Do not tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorised operations.***
	***Using components, expendable materials or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the equipment***
	***The operator's workplace has to be kept clean, tidy and free from objects that may prevent free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks.***
	***Ensure that work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force.***

4.2 PERSONAL SAFETY EQUIPMENT

When operating and maintaining the i-MAX units, use the following personal protective equipment.

		***Protective clothing: Maintenance man and operators have to wear protective clothing that complies with the basic safety requirements currently in force. In case of slippery floors, users have to wear safety shoes with non-slip soles.***
		***Gloves: During maintenance or cleaning operation protection gloves have to be used.***
		***Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.***

4.3 SAFETY SYMBOLS

The unit features the following safety signs, which has to be complied with:

	***General hazards***
	**Electric *shock* hazard**
	***Presence of moving organs***
	***Presence of surfaces that may cause injures***
	***Presence of hot surfaces that can cause burns***

4.4 REFRIGERANT SAFETY DATA SHEET

Name:	R410A (50% Difluoromethane (R32); 50% Pentafluoroethane (R125).
	RISKS INDICATIONS
Major risks:	Asphyxia
Specific risks:	The rapid evaporation may cause freezing.
	FIRST AID
General information:	Never give anything by mouth to an unconscious person.
Inhalation:	Move to fresh air. Oxygen or artificial respiration if necessary. Do not administer adrenaline or similar drugs.
Eyes contact:	Rinse carefully with water for at least 15 minutes and consult a doctor.
Contact with skin:	Wash immediately with plenty of water. Take off immediately the contaminated clothing.
	FIRE PREVENTION
Extinguishing Media:	Whatever.
Specific risks:	Increase in pressure.
Specific methods:	Use water spray to cool containers
	ACCIDENTAL RELEASE ACTIONS
Personal precautions:	Evacuate personnel to safe areas. Provide adequate ventilation. Use personal protective equipment.
Environmental precautions:	Evaporate.
Cleaning method:	Evaporate.
	HANDLING AND STORAGE
Manipulation Action/technical	Provide sufficient air exchange and/or suction in work places.
Recommendations for safe	Do not breathe vapors or aerosol.
Storage:	Close tightly and store in a cool, dry and well ventilated place. Store in original container. Incompatible products: explosive, flammable materials, Organic peroxide.
	EXPOSURE CONTROL / PERSONAL PROTECTION
Control parameters:	AEL (8-h e 12-h TWA) = 1000 ml/m³ for each of the two components.
Respiratory protection:	For rescue and maintenance operation in storage tanks use self-contained respirator The vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Eyes protection:	Safety glasses.
Protection of hands:	Rubber gloves.
Hygiene measures:	Do not smoke.
	PHYSICAL AND CHEMICAL PROPERTIES
Colour:	Colourless
Odor:	Light.
Boiling point:	-52.8°C at atmospheric pressure.
Lighting point:	It does not ignite.
Density:	1.08 kg/l at 25°C.
Solubility in water:	Negligible.
	STABILITY AND REACTIVITY
Stability:	No reactivity when used with the appropriate instructions.
Materials to avoid:	Highly oxidizing materials. Incompatible with magnesium, zinc, sodium, potassium and aluminum. The incompatibility is more serious if the metal is present in powdered form or if the surfaces were, recently, unprotected.
Decomposition products Risks:	These products are halogenated compounds, hydrogen fluoride, carbon oxides (CO, CO_2),
	TOXICOLOGICAL INFORMATION
Acute toxicity:	(R32) LC50/ inhalation /4 hours/on rat >760 ml/l (R125) LC50/ inhalation /4 hours/on rat >3480 mg/l
Local effects:	Concentrations substantially above the TLV may cause narcotic effects. Inhalation of decomposed products of high concentrations may cause respiratory failure (pulmonary edema).
Long term toxicity:	Did not show carcinogenic, teratogenic or mutagenic effects in animal experiments.
	ECOLOGICAL INFORMATION
Global Warming Potential GWP (R744=1):	2088
Ozone Depletion Potential ODP (R11=1):	0
Disposal considerations:	Usable with reconditioning.

5 TECHNICAL CHARACTERISTICS

The HPE water chillers and heat pumps series are designed for commercial and industrial applications, these units are extremely versatile and can operate in heat pump mode with the ability of hot water production at a temperature up to 57°C for environmental heating and sanitary applications.
The use of scroll compressor technology, especially designed for operating with R410A, matched with brushless inverter compressor. The adoption with the fan motors and integrated circulating pumps with variable speed blower motorized with inverter, together with the electronic expansion valve are generally used to optimize the power consumption and the operative efficiency of the whole system.

5.1 FRAME

The HPE units are all made up of hot-galvanised thick sheet metal, painted with polyurethane powder enamels at 180°C for ensuring the best resistance against atmospheric agents. The removable front panels allow the inspection and the easier servicing of all internal components as well as the access to the compressor casing. The screws and the inserts are made up of galvanized steel.

5.2 REFRIGERANT CIRCUIT

The refrigerant circuit is manufactured according to the UNI EN 13134 directive concerning welding procedures. The refrigerant gas employed in these units is R410A type. Each refrigerant circuit includes in its basic version: 4-way reversing cycle valve, electronic expansion valve, liquid separator, liquid receiver, solenoid valves and non-return valves for the optimized management of oil level balancing in compressors, non-return valves for pass of the components not used according to the mode of operation, pressure check and maintenance valves, pressure safety device (high pressure switch), and pressure transducers to accurately adjust the evaporating and condensing pressures, accuracy sensors for measuring the intake and exhaust temperatures, drier filter with high absorption capacity and mechanical filters and to prevent the clogging of the lamination valve.

5.3 COMPRESSORS

The compressors are scroll type DC inverter designed for use with R410A refrigerant, and are mounted on a rubber material acting as a shock absorber. Every 2 refrigerant circuits adopt a DC inverter compressor with modulating capacity (difference between minimum and maximum output capacities) equal to that of an on-off compressor, in this way, it is possible, to continuously modulate between the minimum capacity of the inverter compressor only and the sum of the maximum output capacities of all the other compressors in each circuit. On all the units, it is therefore possible to carry out the partialization between the output and the absorbed capacities up to 8% of the maximum one for the case of the models with 4 compressors and up to 6% for the models with 6-compressors.
The crankcase heater operates when the compressor remains off for at least 30 minutes and if the discharge temperature is below 20°C (with hysteresis of 2.0°C). When the compressor restarts, the crankcase heater will stop operation. We recommend to turn on the unit and to put it in standby mode at least 6 hours before beginning the operation.
The inspection of the compressors could be done through the side and bottom front panels of the unit.

5.4 AIR-SIDE EXCHANGER

The air-side heat exchanger is made up of copper pipes and aluminium fins. The copper pipes diameter is 7,94 mm in the models with number of rows equal 2 and 9.52 mm in the models with number of rows equal to 3, the thickness of the aluminium fins is 0,12 mm. The pipes are mechanically expanded into the aluminium fins in order to improve the heat transfer coefficient. The geometry of this heat exchanger ensures a low value air-side pressure drop and then it allows the use of fans with low number of revolutions (with the advantage of reducing the unit noise level).

5.5 FAN MOTOR

The fan motor is axial type with polypropylene plastic. It is statically and dynamically balanced and supplied with a safety fan guard. The implemented fan motor is EC type. The protection class of the motor is IP 54 according to CEI EN 60529.

5.6 USER-SIDE HEAT EXCHANGER

The user-side heat exchanger is made up of AISI 304 stainless steel braze-welded plates type, and is factory insulated with flexible close cell material and is equipped with an antifreeze electric heater (optional accessory: KA). Each evaporator is equipped with a temperature sensor for antifreeze protection that activates the circulator, even in the case where the unit is turned off when meeting the setting parameters by controller.

5.7 ELECTRICAL CONTROL PANEL

The electrical control panel board is manufactured according to European Union directives currently in force. To access to the electrical control panel board, put the disconnect switch in the Off position, (presence of a door lock system) and wait until fan

blades have come to a complete stop, open the front panel by removing the six screws, turn to open quarter-turn the two locks of the electric control panel board. The protection degree is IP54. The electric box is supplied with a terminal block completed with free contacts for remote ON-OFF, and for winter/summer change over. The addition of the optional module GI enables the management of further plant's functionalities.

5.8 CONTROL SYSTEM

The "HPE" units are all equipped with a microprocessor with overheating control logic program through the electronic thermostatic valve managed by the pressure transducers signals and temperature sensor. The CPU also manages the following functions: water temperature regulation, antifreeze protection, compressors' time setting, alarm reset, alarms management and operation LED. Upon request, the microprocessor can be connected to a BMS remote control system and to the simpler HNS system with our terminal units. The control system together with the INVERTER technology and the on board sensors can continuously monitor and adapt the performance of the inverter compressor, of the circulator pump and of the fan motor.

5.9 MONITORING AND PROTECTION DEVICES

The units are standard equipped with the following control and protection devices: return water temperature sensor, operating and antifreeze sensor, high pressure transducer, low pressure transducer, compressor's inlet and outlet temperature sensors, overload protection of inverter compressors, fans and pump, on-off compressors magneto thermal protection, water side water flow switch to protect the evaporator, high pressure HP flow switch.

5.10 HYDRAULIC CIRCUIT

The heap pump chillers of i-MAX series are supplied with an integrated hydronic kit including: plate heat exchanger having two refrigerant circuits and one hydraulic circuit, a pressure gauges at the inlet and outlet of the heat exchanger for evaluating the load losses, service valve and flow switch for protection, automatic air release valve and safety valve (6 bar) to be connected to the collection system. The version with integrated circulator also provides two options regarding a pump with AC motor regulated by an inverter for controlling the water flow between 60 and 100% (GI module default), or the same AC pump without modulation.

5.11 FAN SPEED CONTROL

This type of regulation, performed by the microprocessor, is necessary for optimizing the evaporation/condensation pressure during summer/winter operation in order to allow the correct operation of the appliance.

6 AVAILABLE VERSIONS WITH SIZES AND ACCESSORIES

Some described accessories couldn't be available during the order the units.

The code unit is composed of:

- ✓ no. 7 fixed digits (the first two digits identify the series i-MAX in its eventual customizations)
- ✓ the # symbol as a separator
- ✓ no. 10 variables digits (fields) identify the sizes, versions and factory installed accessories
- ✓ no. 1 fixed digit equal to 0, for now it is not used
- ✓ nr. 2 digits which identify the eventual customizations

0110616#(CT)(TA)(IV)(CI)(KA)(GI)(FAN)(SIL)(TR)0(MC)

FATHER CODE	SIZE	VERSION	
0110616#	CT	TA	CI
	Output capacity	Water pipes configuration	Hydronic configuration
	10 66 kW 11 75 kW 12 85 kW 13 95 kW 14 105 kW 15 115 kW		
		0 2 pipes	
			0 No parallel external pump 6 Integrated inverter pump 7 Integrated AC pump

CODE							
XX10514#(CT)(TA)(IV)	KA	GI	FAN	SIL	TR	AC1	
	Antifreeze Kit	Management module for plant*	Type of fan	Silencing	Battery treatment	Accessory 1	Accessory 2
	0 Without antifreeze kit 1 With antifreeze kit						
		0 GI Module not present					
		1 GI Module present* 2 Modbus communication 3 Modbus communication and with presence of GI module					
			0 DC fan				
				0 Not silenced 1 Silenced 2 Super silenced			
					0 Coil without treatment 2 Coil with Finguard treatment		
						0 None 1 Switch magneto-thermic circuit breaker	0 None 1 Phase protection relay

(*) is standard in case the kit CI=6 (integrated inverter pump)

The “CT” field identifies the size of the unit. The name of each unit includes the heating capacity anticipated by the number of compressors. For example the unit with CT = 0 (66 kW) is called i-MAX 0466.

Field	Variant	Description
CT	10, 11, 12, 13, 14, 15	Nominal heating capacity of the unit.
TA	0	The version of 2 pipes provides only Plant water Inlet and Outlet.
CI	0	The configuration with external pump without management in parallel includes the installation of a piece of pipe in the place of the pump. N.B.: the external pump is not supplied.
	6	The configuration with integrated circulator provides a modulating pump with AC motor powered from the inverter with integrated overload protection, suitable for chilled water utilizations and directly managed by the on-board controller.
KA	0	Unit not equipped with anti-freeze kit.
	1	The antifreeze kit uses a self-heating cable wrapped around the basement of the unit near the condensing coil and two in PET heaters placed on the faces of the plate heat exchanger.
GI	0	Unit not equipped with the plant management module.
	1	The additional module implements some useful functions for the plant management, such as domestic hot water DHW, double setpoint, management of the electric heaters of the plant, etc.
	2	Serial communication protocol for Modbus supervisor.
	3	Integration of both “GI additional module and the Modbus communication protocol.
FAN	0	Unit provided with DC modulating fan with brushless motor (standard and always present).
SIL	0	The unit is not provided with silencing kit.
	1	The standard silenced unit provides a plate carter covered with a thermal-acoustic and sound-absorbing material sealant applied at the compressors zone (standard and always present).
	2	The super silenced unit includes in addition to the thermo-acoustic insulator carter on the compressors, a special diffuser installed on the fan which reduces the noise level.
TR	0	Heat exchanger without treatment.
	2	Heat exchanger with anti-corrosion finguard treatment.
AC1	0	Without accessory.
	1	Presence of a magneto-thermic switch circuit breaker (2 pieces).
	9	Gas discharged out from the unit
AC2	0	Without accessory.
	1	Presence of monitoring relay and phase sequence, minimum and maximum voltage with two independent adjustable set points and settable delay for three-phase networks with and without neutral line.

The “TA” field identifies the version that is actually available:

- 2-pipes without recoveries.

The remaining fields (CI, KA, GI, FAN, SIL, TR, AC1) identify the accessories mounted at the factory, that should be requested at the time of order.

The variant 0 of these fields identifies the standard configuration of each size and version.

Example: The code of the configuration with integrated AC pump (without other accessories) of the model **i-MAX-SSL 0475 with SSL** accessory is obtained as in following mode:

0110616#(CT)(TA)(CI)(KA)(GI)(FAN)(SIL)(TR)(AC1)(AC2)01 → 0110616#(11)(0)(7)(0)(0)(0)(2)(0)(0)(0)01 → **0110616#1107000200001**

6.1 OPTIONAL ACCESSORIES

Hi-T2	Multifunction touch screen remote control with centralized management of i-MAX and HNS system, functions of USB port, temperature and humidity sensors. It has also an extremely intuitive interface simplifying the use of the controller.
AG	Anti-vibration rubber pad to be installed in the chassis of the unit for possible shock absorption.
MW	Wi-Fi module

IMPORTANT NOTE
ONLY THE OPTIONAL ACCESSORIES CAN BE REQUIRED AFTER THE ORDER OF THE UNIT,
WHILE THE FACTORY INSTALLED ACCESSORIES CANNOT BE REQUIRED AFTER THE ORDER OF THE UNIT.

Refer to the following table to obtain the codes of the standard configurations of the various models (for selecting the accessories, just set the corresponding variant to the desired value according to the TABLE FIELDS/VARIANTS described above):

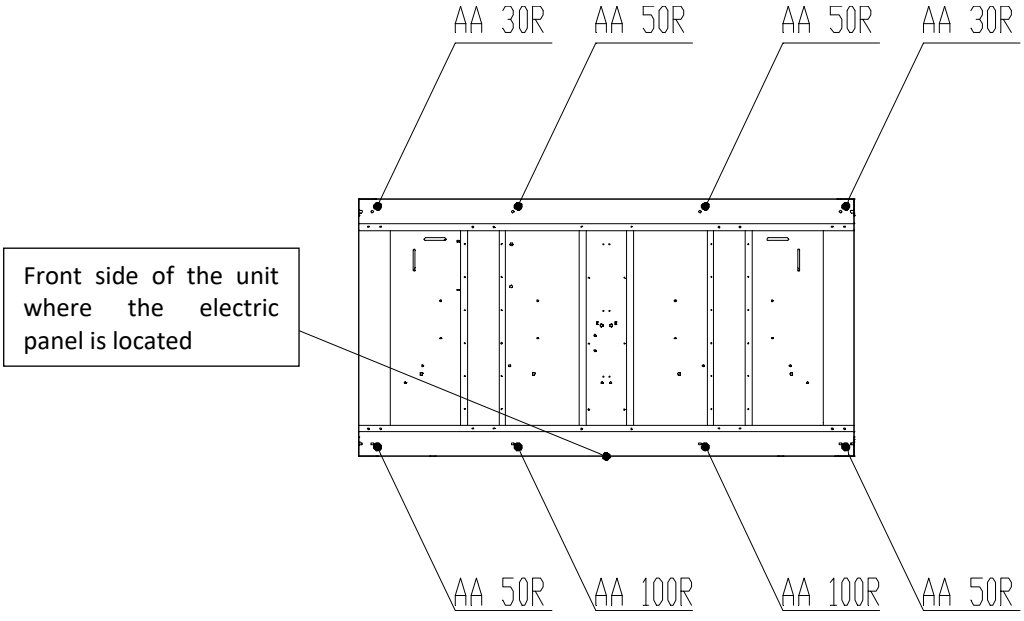
Model	Description	Standard configuration
HPE 66 INV.	Output 66 kW	0110616#1000000000001
HPE 75 INV.	Output 75 kW	0110616#1100000000001
HPE 85 INV.	Output 85 kW	0110616#1200000000001
HPE 95 INV.	Output 95 kW	0110616#1300000000001
HPE 105 INV.	Output 105 kW	0110616#1400000000001
HPE 115 INV.	Output 115 kW	0110616#1500000000001

Denomination of factory-fitted accessories:

Field	Variant	Description	Name
CI	6	Integrated inverter pump	CI1
CI	7	Integrated AC pump	CI7
KA	1	Antifreeze kit	KA
GI	1	Management plant module	GI
MW	1	Modulo WiFi	
SIL	1	Silencing	SL
SIL	2	Super silencing	SSL
TR	2	Heat exchanger treatment finguard with	TR2
AC1	1	Magnothermic switch	
AC2	1	Monitoring relay	

6.1.1 Installation of the anti-vibrations kit

Note that, the anti-vibration kit is not the same for all sizes, when purchasing this accessory; it must be installed correctly depending on the weight of the unit. Then follow the indications in the figure below.



7 INSTALLATION

	WARNING: All the operation described in next chapters MUST BE DONE BY TRAINED PEOPLE ONLY. Before any operation on the unit, be sure that the electric supply is disconnected.

7.1 GENERALITY

When installing or servicing the unit, it is necessary to strictly follow the rules listed in this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions. Not observing the rules reported on this manual can create dangerous situations.

	After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage has to be questioned to the carrier and recorded on the Delivery Note before signing it.

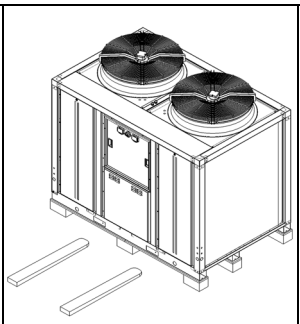
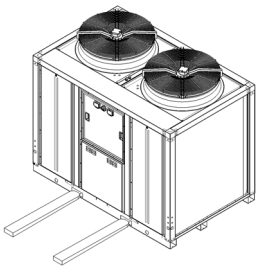
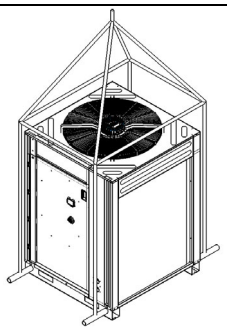
The company has to be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.

	WARNING: The "HPE" units are designed for outdoor installation and for places not directly accessible to unqualified personnel. The place of installation must be entirely far away from fire risk. All the necessary measures should be adopted in order to prevent the fire risk in the place of installation. The outdoor ambient temperature shall not exceed 46°C. Above this value, the unit is no longer covered by the directives in force in the area of pressure equipment.
	WARNING: The unit should be installed so that adequate clearance is available for maintenance and repair. The warranty does not cover costs related to platforms or handling equipment necessary for any maintenance.
	All maintenance and testing operations should be carried out only by QUALIFIED PERSONNEL.
	Before any operation on the unit, make sure the power supply is disconnected.
	WARNING: MOVING PARTS, RISK OF DEATH. ***Disconnect the power supply and ensure that the fan is stopped before opening the front panel.***
	The top part and discharge pipes of the compressor operate at high temperatures. Be sure to let the unit to become cool before beginning any maintenance work.
	Be careful when working near condensing coils. ***The aluminum fins are very sharp and can cause serious injuries.***
	After the maintenance operations, close the panels tightly with the fastening screws.

7.2 LIFTING AND HANDLING

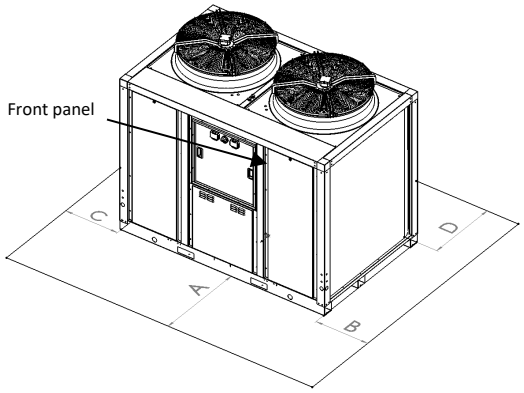
The handling must be performed by qualified personnel, properly equipped with appropriate equipment to the weight and the encumbrance of the unit, in compliance with safety regulations of accident preventing.

	WARNING: All the handling images in this manual are for explanation purpose only.

During the unloading and the positioning of the unit, it is highly recommended to avoid any sudden or violent motion in order to protect the inner components and the panelling. The units can be lifted by mean of a forklift or, otherwise by mean of belts, paying attention not to damage the lateral panels the unit using a structure of spacers as shown in the drawing. However, it is necessary to hook not directly the unit to the basement but on two steel pipes of adequate dimensions that to pass into the appropriate holes situated in the basement itself. It is important to keep the unit horizontal during these operations.	 1) Handling with forklift under the pallet	 2) Handling with forklift under the unit using the appropriate windows of passing forks	 3) Handling by mean of belts **N.B. The pipes must have passages pivots or other fasteners to prevent the straps from being released.**

7.3 LOCATION AND MINIMUM TECHNICAL CLEARANCES

The units "i-MAX" are all designed for outdoor installations; <u>any cover with roof over the unit</u> or locating near trees (even if they partially cover the unit) <u>must be avoided</u> in order to allow the air recirculation. It is advisable to realize a supporting basement, with adequate size similar to unit foot-print. The unit vibration level is very low: it is advisable however, to fit a rigid rubber band between basement and unit base-frame. It is also possible to install anti-vibration supports (springs or rubbers) to keep vibrations at a very low level. An absolute care should be taken in order to ensure an adequate air volume to the condenser. The re-circulation of the discharged air has to be avoided; failure to observe this point will result in poor performance or activation of safety controls. For these reasons, it is necessary to observe the following clearances:



MODELS	A	B	C	D
HPE 66 INV.	1500	850	850	1000
HPE 75 INV.				
HPE 85 INV.				
HPE 95 INV.				
HPE 105 INV.				
HPE 115 INV.				

The recommended minimum distance for installation, maintenance and operation.

In any case, don't cover the upper part of the unit.

N.B. Suspended installations are prohibited.

7.4 HYDRAULIC CONNECTIONS

The hydraulic connections have to be installed in accordance with national and local regulations; pipes can be made up of steel, galvanized steel or PVC. Pipes have to be designed depending on the nominal water flow and on the hydraulic pressure drops of the system. All the hydraulic connections must to be insulated with closed-cell material of adequate thickness. Chillers have to be connected to piping by means of flexible joints. The hydraulic circuit should include the following components:

- Hole thermometers for monitoring the hydraulic circuit's temperature.
- Manual gate valves to separate the chiller from the hydraulic circuit.
- Y-shaped metallic filter (to be mounted on the return pipe from the plant) with a metallic mesh not larger than 1mm.
- Loading group and discharge valve, where it's necessary.

WARNING: Make sure that, when designing the pipe length and diameter do not exceed the maximum head loss on the plant side, please see the technical data given in the table of Paragraph 13 (available head pressure).

WARNING: In the models of i-MAX series, the expansion vessel is not integrated on the plant side. The actual capacity of plant circuit should be checked by the installer in order to provide an expansion tank with adequate volume.

WARNING: Unit water inlet pipe have to be in correspondence with the connection labelled: "WATER INLET", otherwise the evaporator may freeze.

WARNING: It is compulsory to install on the WATER INLET connection a metallic filter with a mesh not larger than 1mm and a sludge remover. If the water flow switch is handled or altered or if the metallic filter and the sludge remover are not installed, the warranty will no longer be valid. The filter and the sludge remover must be kept clean, so make sure that are clean after the installation of unit, and then check them periodically.

All units are standard supplied with the water flow switch (factory installed). Should the water flow switch be altered, removed, or should the water filter not be installed on the unit, the warranty will be invalidated. Please refer to the wiring diagram for the water flow switch electric connections.

The water on the charging/topping up pipe must be opportunely pre-filtered from any suspended particles and impurities through the use cartridge filter (washable, wrapped wire, etc.) of at least 100 microns.

Check the water hardness with which you load and top up the plant circuit. With particularly hard water, in this case it is necessary to utilize a water softener. For treating water for the plant, please refer to UNI 8065.

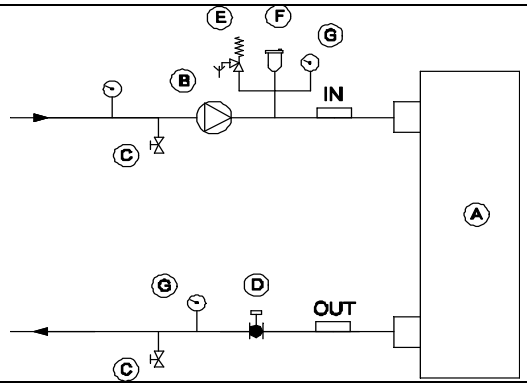
7.4.1 Characteristics of water of the plant circuit

To ensure the correct operation of the unit, the water should be adequately filtered (see what is reported at the beginning of this paragraph) and that the amounts of dissolved substances should minimal. The maximum permitted values are given here below.

MAXIMUM PHYSICAL AND CHEMICAL CHARACTERISTICS ALLOWED BY THE WATER OF THE PLANT CIRCUIT	
PH	7,5 - 9
Electrical conductivity	100 - 500 µS/cm
Total hardness	4,5 – 8,5 dH
Temperature	< 65°C
Oxygen content	< 0,1 ppm
Maximum glycol content	50 %
Phosphates (PO4)	< 2ppm
Manganese (Mn)	< 0,05 ppm
Iron (Fe)	< 0,3 ppm
Alkalinity (HCO3)	70 – 300 ppm
Chloride ions (Cl-)	< 50 ppm
sulfate ions (SO4)	< 50 ppm
Sulfide ion (S)	None
Ammonium ions (NH4)	None
Silica (SiO2)	< 30 ppm

7.4.2 Hydraulic circuit

HPE 66	HPE 95
HPE 75	HPE 105
HPE 85	HPE 115



A	Plate heat exchanger
B	Circulating pump
C	Service valve
D	Water flow switch
E	Safety valve
F	Air vent valve
G	Pressure gauge (Manometer)
IN	Side water inlet temperature sensor
OUT	Side water outlet temperature sensor

At the highest point of the plant circuit it is necessary to install an automatic air vent valve.
Provide an auxiliary expansion tank (not supplied) in order to control the volume changes in the plant side.

7.4.3 Drainage connection

All i-MAX units are adopt drain holes on the basement for the discharge of the condensate that may leach from the pipes of the hydraulic and refrigerant circuits, and to discharge the water generated during defrosting cycles.

7.4.4 Plant circuit loading

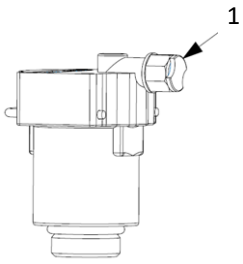
WARNING: Verify all the charging/topping up operations.

WARNING: Before beginning the charging/topping up operation of the plant circuit, disconnect the unit from the electric power supply.

WARNING: The charging/topping up of the plant circuit must always be done under controlled conditions of pressure (max 1 bar). Make sure that you have installed on the line of charging/topping up a pressure reducer and a relief valve.

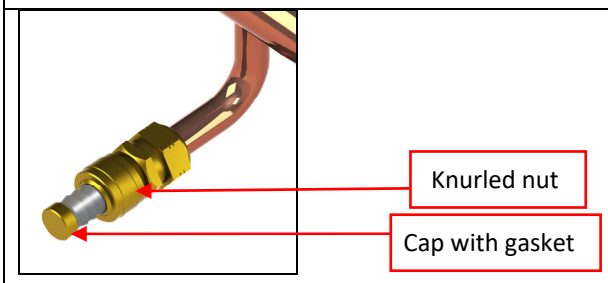
WARNING: The water on the charging/topping up pipe must be suitably pre-filtered from any impurities and suspended particles. Make sure that you have installed a cartridge filter removable.

WARNING: Before beginning the charging/topping up operation, unscrew the plugs of the air vent valve. Tighten the plugs after finishing the operation of charging/topping up of the plant circuit system.



During the operations of charging/topping up, the plugs of the air vent valves must be partially unscrewed to allow air to flow freely out of the valves.

(1) Plug of the air vent valve



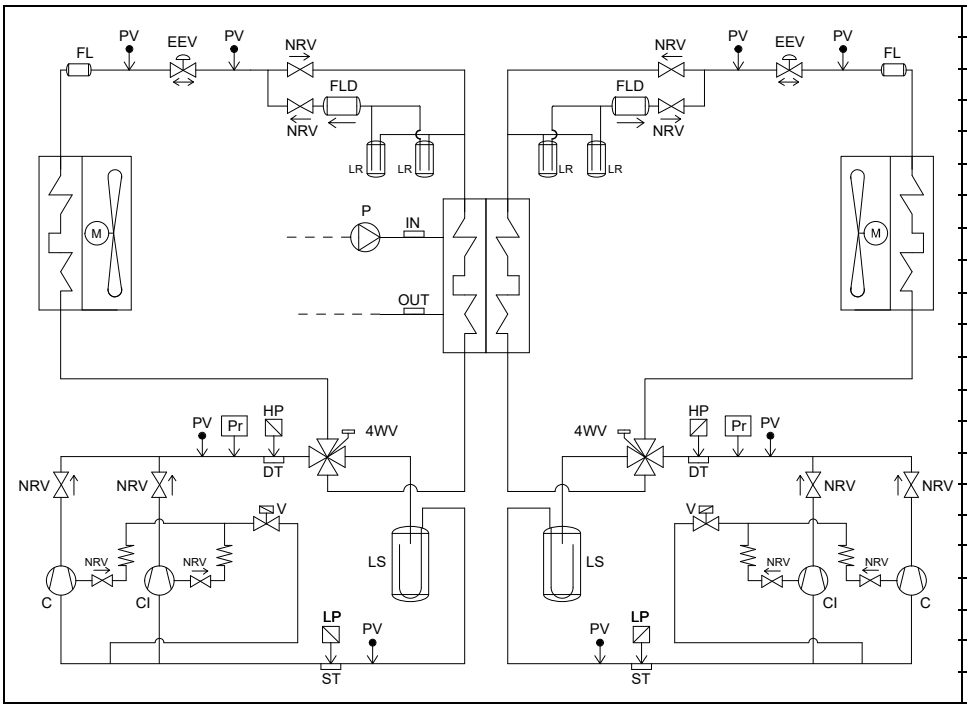
You can use the service valve, when it is necessary to refill the plant or adapt the concentration of glycol. Unscrew the plug (cap) of the service valve and connect to the hose a pipe of 14 mm (inner diameter) connected to the water network, and then fill the system by unscrewing the knurled nut. When the operation is concluded, retighten the knurled nut and screw on the plug. In any case, we recommend you to use for the water loading of the plant an external tap whose arrangement is by the installer.

7.4.5 Plant draining

In the case when it is necessary to unload the plant, close at first the inlet and outlet manual gate valves (not supplied) and then remove the pipes that are disposed externally on the water inlet and on the water outlet in order to spill away the liquid contained in the unit (in order to make easy the operation, it is recommended to install externally two draining valves, on the water inlet and on the water outlet, between the unit and the manual gate valves).

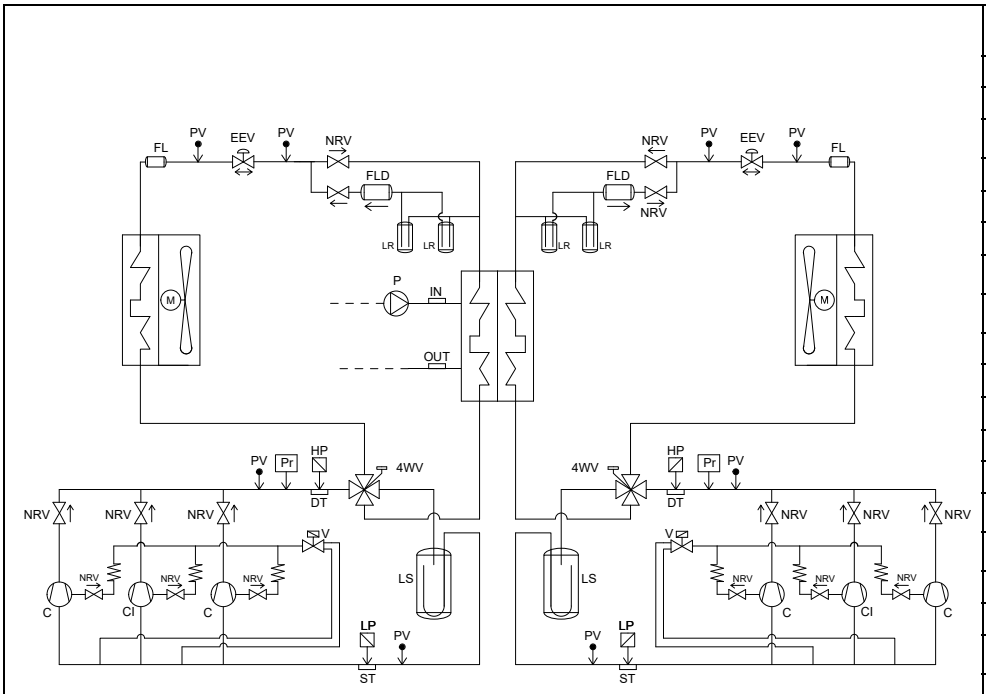
7.5 REFRIGERANT DIAGRAMS

7.5.1 Refrigerant diagram of i-MAX 0466 / i-MAX 0475 / i-MAX 0485



4WV	CYCLE REVERSING VALVE
C	ON/OFF COMPRESSOR
CI	INVERTER COMPRESSOR
CP	CAPILLARY
DT	COMPRESSOR OUTLET TEMPERATURE
EEV	ELECTRONIC EXPANSION VALVE
FL	FILTER
FLD	UNIDIRECTIONAL DEHYDRATOR
HP	HIGH PRESSURE TRANSDUCER
IN	WATER INLET TEMPERATURE
LP	LOW PRESSURE TRANSDUCER
LR	LIQUID RECEIVER
LS	LIQUID SEPARATOR
M	AXIAL FAN
NRV	NO RETURN VALVE
OUT	WATER OUTLET TEMPERATURE
P	CIRCULATOR ON BOARD UNIT
Pr	HIGH PRESSURE FLOW SWITCH
PV	PRESSURE CHECK VALVE
SE	OUTDOOR AIR TEMPERATURE SENSOR
ST	COMPRESSOR INLET TEMPERATURE
V	CAPACITY EXTENSION On-off VALVE

7.5.2 Refrigerant diagram of i-MAX 0695 / i-MAX 06105 / i-MAX 06115



4WV	CYCLE REVERSING VALVE
C	ON/OFF COMPRESSOR
CI	INVERTER COMPRESSOR
CP	CAPILLARY
DT	COMPRESSOR OUTLET TEMPERATURE
EEV	ELECTRONIC EXPANSION VALVE
FL	FILTER
FLD	UNIDIRECTIONAL DEHYDRATOR
HP	HIGH PRESSURE TRANSDUCER
IN	WATER INLET TEMPERATURE
LP	LOW PRESSURE TRANSDUCER
LR	LIQUID RECEIVER
LS	LIQUID SEPARATOR
M	AXIAL FAN
NRV	NO RETURN VALVE
OUT	WATER OUTLET TEMPERATURE
P	CIRCULATOR ON BOARD UNIT
Pr	HIGH PRESSURE FLOW SWITCH
PV	PRESSURE CHECK VALVE
SE	OUTDOOR AIR TEMPERATURE SENSOR
ST	COMPRESSOR INLET TEMPERATURE
V	CAPACITY EXTENSION On-off VALVE

7.6 ELECTRICAL CONNECTIONS

Check if the power supply circuit meets the unit's electric nominal data (voltage, phases, frequency) reported on the label attached on the right-side panel of the unit. The wiring must be done in accordance to the wiring diagram attached to the unit and in conformity with the national and international norms in force (attempting to provide a general magneto-thermic circuit breaker, differential circuit breakers for each electric line, proper grounding for the plant, etc.). Power cables, electric protections and line fuses have to be sized according to the specifications listed in the wiring diagram enclosed with the unit and in the electrical data contained in the table of technical characteristics (see Paragraph 13) – power supply cable with maximum cross section of up to 30mm.

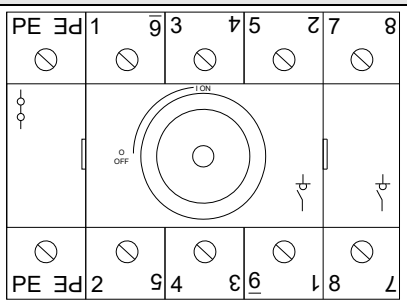
⚠	***Because of the presence, inside the machine, of EMC filters for compliance with EMC limits (interference emission and interference immunity), earth fault currents up to 250 mA of intensity can be detected.*** ***For proper installation, electrically connect the unit with a dedicated line; if you use a residual current circuit breaker, choose a four-pole one, with a trigger threshold of 300 mA and delayed triggering (super-resistant, characteristic K).*** ***The machine must be installed in TN-S/TT power supply grounding systems.***

	The electrical installation must be carried out in accordance with norms in force.
	WARNING: The supply voltage's fluctuations cannot exceed ±5% of the nominal value. Should this tolerance not be respected, please contact our technical department.
	WARNING: The power supply have to respect the listed limits: failing this, warranty will terminate immediately. Before any operation on the unit, be sure that the power supply is disconnected. ***WARNING: The water flow switch (B component in the previous hydraulic circuit and factory installed) has ALWAYS to be connected following the indications listed in the wiring diagram. Never bridge the water flow switch connections in the terminal board. The guarantee will not be valid if the water flow switch connections are altered or not correctly performed.***
	Install upstream of each unit an adequate protection and disconnection device of the electric power with delayed characteristic curve, with at least 3 mm contact opening and with an adequate capacity of breaking and differential protection. ***A good grounding is required; the manufacturer is not responsible for damage caused in case of lack of good grounding.*** ***Use cables that meet the regulations in force in different countries.***
	If the lightning risk is high, the unit must be protected, the risk assessment must comply with the CEI EN 62305-2 regulation. ***If there is a possibility that a lightning can strike the area around the appliance, shut down the unit and disconnect the system upstream switch.*** ***Make sure to ground the unit.*** ***Do not ground the unit with pipes or lightning rods*** ***A poor grounding of the unit can result in electrocution.*** ***Warning: Electrostatic discharges can damage the electronic components, before performing any work; ground the electrostatic charge by touching objects such as water or heating pipes.*** ***Before working on the control panel it is OBLIGATORY to:*** • ***Turn off the units from control panel (displayed "OFF").*** • ***Place the general differential QF switch in "OFF" state.*** • ***Wait for 90 seconds before attempting to access to electrical panel.*** • ***Be sure that the grounding connection is good before carrying out any repairs.*** • ***Be sure that you are well insulated from the ground, with dry hands and feet, or by using insulating platforms and gloves.*** • ***Check that there is no foreign material near the system.***
	WARNING: The remote control panel is connected to the water chiller by means of no.4 wires having a 1,5mm² section. The power supply cables have to be separated from the remote control wires. The maximum distance is 50m.
	WARNING: The remote control panel cannot be installed in areas with strong vibrations, corrosive gases, and excess of dirtiness or high humidity levels. Leave free the area near the cooling openings.

7.6.1 Power supply terminal block

The power supply of the units is 3-Ph/N/PE 400V, 50Hz. The power cables should be brought inside the electrical panel of the unit and connected to the disconnecting switch inside the electric panel itself, in the bottom at the left, as shown in the following figure:

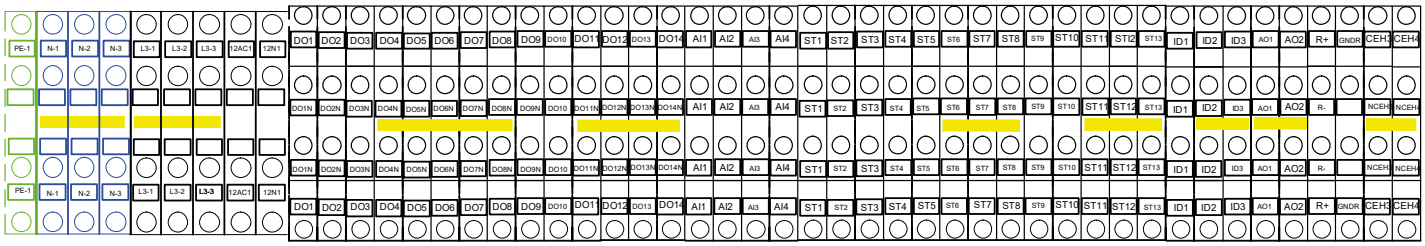
	Electrical wiring has to be done only by qualified personnel.



PE L1 L2 L3 N

The connections of the power supply cables to the disconnecting switch should be done in order from left to right as following: protective earth (PE), phase conductor 1 (L1), phase conductor 2 (L2), phase conductor 3 (L3), neutral conductor (N).

7.6.2 User's terminal block



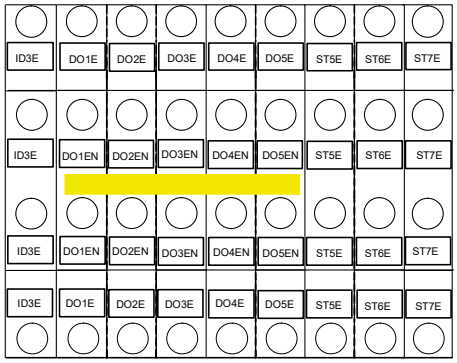
TERMINAL	TYPE	CONNECTION
12N1	Power supply 12 Vac	POWER SUPPLY FOR REMOTE CONTROL PANEL (KEYBOARD)
12AC1	Power supply 12 Vac	POWER SUPPLY FOR REMOTE CONTROL PANEL (KEYBOARD)
DI2	"DI2" digital input	Remote switch on/off input (closed=unit is ON / open = unit is off)
GNDR	Serial communication	Modbus ground reference connection terminal for remote supervision
R+	Serial communication	Modbus + signal connection terminal for supervision
R-	Serial communication	Modbus - signal connection terminal for supervision
N-3/N-4	Neutral line 230Vac	Filtered
L3-3	Phase line 230Vac	Filtered
PEA	Grounding reference	

7.6.3 PM Module phase protection

The PM module detects the correct sequence of the 3-phases (L1, L2, and L3) power supply. The 3-phases power supply must be connected with the correct sequence of the phases so as to ensure the right direction of rotation at the compressor start-up and during operation. When the PM module acts for lack of phase, the controller will receive a signal to interrupt it from the power supply.

7.6.4 Plant management optional module's terminal block

Where the plant management kit (optional) is present, a third controller is located inside the electric panel, which acts as I/O resource expansion module. With this controller, it is therefore possible to increase the number of logics handled by the main controller; in particular these logics are used to manage the plant system and are reported below. The functions described below can be activated by the on-board unit controller that is located on the unit's (i-MAX) front panel.
For the configuration of the functionalities, please check the control manual supplied with the unit.



TERMINAL	TYPE
ST5E	NTC sensor -10kΩ at 25°C β3435
ST6E	NTC sensor 10kΩ at 25°C β3435
ID3E	Voltage free contact digital input
DO1E(Phase), DO1E N(Neutral)	Under-voltage output 230V ac, 50Hz, 5A resistive, 1A inductive.
DO2E(Phase), DO2E N(Neutral)	Under-voltage output 230V ac, 50Hz, 5A resistive, 1A inductive.
DO3E(Phase), DO3E N(Neutral)	Under-voltage output 230V ac, 50Hz, 5A resistive, 1A inductive.
DO4E(Phase), DO4E N(Neutral)	Under-voltage output 230V ac, 50Hz, 5A resistive, 1A inductive.
DO5E(Phase), DO5E N(Neutral)	Under-voltage output 230V ac, 50Hz, 5A resistive, 1A inductive.

8 START UP

Before start-up:

- Check out the availability of the supplied wiring diagrams and manuals of the installed appliance.
- Check out the availability of the electrical and hydraulic diagrams of the plant in which the unit is installed.
- Check that the shut-off valves of the hydraulic circuits are open.
- Verify that the hydraulic circuit has been charged under pressure and air vented.
- Check out that all hydraulic connections are properly installed and all indications on unit labels are respected.
- Check if all power cables are properly connected and all terminals are tightly fixed.
- Check if the electrical connections are performed according to the norms in force including the grounding connection.
- Check if the voltage is that shown in the unit labels.
- Make sure the voltage is within the limits (±5%) of tolerance range.
- Check if the electric heaters of the compressors are powered correctly.
- Make sure that there is no refrigerant leak.
- Be sure that all the cover panels are installed in their proper positions and locked with fastening screws before start up.
- If the first start-up of the machine does not turn the display on of the controller, you must reverse the phase sequence of the power supply cable.

	WARNING: The unit must be connected to the electrical network and should be in STAND-BY mode (powered) closing the general switch in order to operate the crankcase heaters of the compressor for a minimum of 12 hours before start up. (the electric heaters are automatically powered when the main switch is switched off). The crankcase heaters are working properly if, after some minutes, the temperature of crankcase's compressor is about 10°C ÷ 15°C higher than ambient temperature.
	***WARNING: Never switch off the unit (for a temporary stop) by switching off the main switch: this component should be used to disconnect the unit from the power supply only for lengthy stoppages (e.g. seasonal stoppages). Besides, failing the power supply, the crankcase's heaters are not supplied thus resulting in a possible breakdown of the compressors once the unit is switched on.***
	WARNING: Do not modify the internal wiring of the unit otherwise the warranty will terminate immediately. ***WARNING: The summer/winter operating mode has to be selected at the beginning of the related season. Frequent and sudden changes of this seasonal operating mode have to be avoided in order to prevent severe damages to compressors.***
	WARNING: When you first install and start-up the unit make sure that the unit is working properly in both cooling and heating modes.

8.1 POWER-ON OF THE UNIT

For powering on the appliance, rotate the outer handle of the disconnector to the ON position (indicated with "I").
The display on the machine is turned on only if the phase sequence is correct (verification to be done during initial startup).
Between a shutdown and subsequent power on, wait a minimum time of 1 minute.

9 INDICATIONS FOR THE USER

It's important to take note of the identification data of the unit in order to provide them to the Technical Assistance Service in case of assistance request.

	The identification plate fixed on the unit shows the technical specifications and the performance of the equipment. In case of manumission, removal or deterioration, please ask a duplicate to the Technical Assistance Service.
	The manumission, removal or damaging of the nameplate makes difficult any operation of installation, maintenance and spare parts request.

It is recommended to keep track of assistance operations done on the unit; this will make easy searching any troubleshooting.
In case breakdown or malfunction situations:

- check the type of alarm to communicate it to the service center;
- contact an authorized service center;
- if required by the service center, turn off the unit immediately without resetting the alarm;
- Ask the use of original spare parts.

10 SHUTDOWNS FOR LONG PERIODS

• Turn off the unit by placing the switch of each unit to "OFF" position.
• Close the water valves.
• Place the general differential circuit breaker to "OFF" position.

	***If the temperature drops below 0°C there is a serious risk of frost: add a mixture of water and glycol in the plant, otherwise drain the hydraulic circuits of the plant and of the heat pump.***
	***WARNING: if the ambient temperature becomes lower than -15°C, in such case the unit must be turned off and disconnected from power supply even for short periods, it's compulsory to drain the mixture of water and glycol of the plant and the hydraulic circuit of the unit. Otherwise, the circulator may be irreversibly damaged.***
	***WARNING: with water temperatures below than +5°C, although the transient operation is not guaranteed regarding the limits set out in Paragraph 18.4. Before you turn the unit on after a long off period, make sure that the temperature of the mixture of water and glycol is higher than or at least equal to +5°C.***

11 MAINTENANCE AND PERIODICAL CONTROLS

	***WARNING: All the operations described in this chapter HAVE TO BE CARRIED OUT BY TRAINED STAFF ONLY. Before any operation or before entering the inner components of the unit, be sure that the power supply is disconnected. The compressor's heads and discharge pipes are usually at high temperature levels. Be very careful when operating in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Be very careful when operating in near them. After maintenance operations, re-install the cover panels, and fix them by means of screws.***
	WARNING: The compressors' diver boards and inverter controllers of the fan and pump motors are equipped with high capacity capacitors, therefore always wait at least 90 seconds after switching off the voltage to allow the capacitors to discharge itself before opening the cover of the electric panel.
	***The refrigerant circuits must not be filled with different gas other than that indicated on the nameplate. The use of a different refrigerant can cause severe damage to the compressor.***
	It's forbidden to use oils other than those specified in this manual. The use of different oil can cause serious damage to the compressor.
	***WARNING: MOVING PARTS, RISK OF DEATH.*** ***Disconnect the power supply and ensure that the fan is stopped before opening the front panel.***
	***The temperatures of heads and exhaust piping of the compressor are usually high.*** ***Pay attention to the surfaces of the driver boards heat sinks, which can become very hot.***
	***Be careful when working near condensing coils.*** ***The aluminum fins are very sharp and can cause serious injuries.***

It is a good rule to carry out periodic checks in order to verify the proper operation of the unit.

OPERATION	1 month	4 month	6 month
Charging the water circuit.	x		
Presence of bubbles in the water circuit.	x		
Check if the safety and control devices work correctly	x		
Check if there is oil leakage from compressor.	x		
Check if there is water leakage from the hydraulic circuit.	x		
Check the proper working of the flow switches.	x		
Check that the crankcase electric heaters are properly supplied and functioning.	x		
Clean the metallic filters of the hydraulic circuit.	x		
Clean the finned coil by means of compressed air or water jet.	x		
Check if all the terminals on the electric board as well as on the terminals of the compressor are properly fixed.		x	
Check the tightening of water connections.		x	
Check the tightening and the balancing of the fan blades.		x	
If the voltage is correct.			x
Check the Correct absorption.			x
Check the refrigerant charge.			x
Check the operating pressure, and superheat and sub-cooling			x
Check of the efficiency of circulation pump.			x
Check the expansion tank.			x
If the unit should be out of service for a long period, discharge water from the piping and from heat exchanger. This operation is necessary if, during seasonal stoppages, ambient temperature is expected to go down below the freezing point of the employed fluid.			x

11.1 ENVIRONMENTAL PROTECTION

According to the norms dealing with the use of depleting stratospheric ozone substances, it is forbidden to disperse refrigerants fluids in the atmosphere. They have to be collected and delivered to the seller or to proper gathering points at the end of their operating life. Refrigerant R410A is mentioned among controlled substances and for this reason it has to be subjected to the mentioned norms. **A particular care is recommended during service operations in order to reduce as much as possible any refrigerant loss.**

12 DISPOSAL OF THE UNIT

Once the unit comes to the end of its life cycle and needs to be removed or replaced, the following operations are recommended:

- The refrigerant has to be collected by trained people and sent to proper collecting centre;
- Compressors' lubricating oil has to be collected and sent to proper collecting centre;
- The frame and the various components, if not serviceable any longer, have to be dismantled and divided according to their nature, particularly copper and aluminium, which are present in conspicuous quantity in the unit. These operations allow easy material recover and recycling process, thus reducing the environmental impact.

The user is responsible of the proper disposal of this product, according to national regulations in the country of destination of the appliance. For more information you should contact the installation company or local competent authority.

	***An incorrect decommissioning of the appliance may create serious environmental damage and endanger people's safety. Therefore, it's recommended that the unit shall be disposed only by authorized persons and technical training who have followed training courses recognized by the competent authorities.***
	It is required to follow the same precautions described in the previous paragraphs.
	Pay special attention during the disposal operation of the refrigerant gas.
	The illegal disposal of the product by the end user leads to the application of the penalties in accordance with the law in the country where the disposal takes place.
	***The crossed bin symbol applied on the appliance indicates that the product, at the end of its useful life, must be collected separately from other wastes.***

13 TECHNICAL DATA

TECHNICAL CHARACTERISTICS		Unit	Model HPE INVERTER					
			66	75	85	95	105	115
Cooling	Cooling capacity (1)	kW	65,59	74,6	83,9	94,7	105,6	114,3
	Power input (1)	kW	22,62	25,72	28,83	32,66	36,16	39,4
	EER. (1)	W/W	2,90	2,90	2,91	2,90	2,92	2,90
	Cooling capacity (2)	kW	79,6	90,16	102,8	113,3	127,3	139,3
	Power input (2)	kW	21,81	24,64	28,16	31,04	34,88	38,16
	EER. (2)	W/W	3,65	3,66	3,65	3,65	3,65	3,65
	ESEER. (5)	W/W	3,82	3,85	3,81	3,8	3,83	3,81
	Water flow rate (1)	l/s	3,14	3,57	4,01	4,53	5,05	5,47
	Load losses on user's side H-exchanger (1)	kPa	32	36	37	34	33	38
Heating	Heating capacity (3)	kW	68,40	74,7	85,6	93,34	102,47	111,47
	Power input (3)	kW	16,85	18,44	21,14	23,87	25,3	28,58
	COP. (3)	W/W	4,06	4,05	4,05	3,91	4,05	3,90
	Heating capacity (4)	kW	65,86	71,0	82,12	88,57	97,13	108,28
	Power input (4)	kW	20,52	22,19	25,66	27,68	30,35	36,09
	COP. (4)	W/W	3,21	3,20	3,20	3,20	3,20	3,00
	SCOP (6)	W/W	3,58	3,55	3,53	3,54	3,58	3,50
	Water flow rate (4)		3,15	3,40	3,93	4,24	4,65	5,18
	Load losses on user's side H-exchanger (4)		30	31	31	32	27	27
	Energetic class Water temp. 35°C/55°C		A+/A+	A+/A+	A+/A+	A+/A+	A+/A+	A++/A+
Compressor	Type		Scroll					
	Quantity		2 DC Inverter + 2 on off			2 DC inverter + 4 on off		
	Number of frigorific circuits		2					
	Oil type	mL	FVC68D					
	Oil quantity (circuit 1)	l	4	4	4	5,7	5,7	5,7
	Oil quantity (circuit 2)	l	4	4	4	5,7	5,7	5,7
Refrigerant	Type		R410A		R410A		R410A	
	Refrigerant load (circuit 1) (7)	kg	10,2	9,6	13,2	13,4	14,2	14,3
	Refrigerant load (Circuit 2) (7)	kg	10,2	9,6	13,2	13,4	14,2	14,3
	Equivalent amount of CO_2 (7)	ton	42,6	40,1	55,1	56,0	59,3	59,7
	Design pressure (high/low)	bar	41,5/27	41,5/27	41,5/27	41,5/27	41,5/27	41,5/27
External fan motors	Type		EC Assiale					
	Number		2		2		2	
	Rated power input (1)	kW	2,4	2,7	3,0	3,4	3,8	4,1
	Max power input	kW	3,9			6,4		
	Max current input	A	6,6			10		
	Rated air flow	m^3/s	6,5 x2	7 x2	7,5 x2	8 x2	8,5 x2	9 x2
Internal heat exchanger	Type of internal heat exchanger		A piastre					
	N° internal heat exchangers		1	1	1	1	1	1
	Volume of water	l	4,35	4,76	5,59	6	7,24	8,07
Hydraulic circuit	Maximum pressure of hydronic kit (relief valve calibration)	bar	6					
	Hydraulic connections	inch	2" ½ F		2" ½ F		2" ½ F	
	Minimum volume of water (8)	L	200			260		
Features of the hydraulic circuit with integrated AC pump accessory	Available head pressure (1)	kPa	83	79	78	81	82	77
	Nominal power of the AC pump (1)	kW	1	1	1	1,2	1,2	1,2
	Maximum power of the AC pump	kW	1,10			1,32		
	Maximum current input the AC pump	A	1,96			2,35		
Noise level	Sound power level (9)	dB(A	82,5	83	83,5	84	84	84,5
	Potenza sonora SL / SSL (9)	dB	81 /	81,5 /	82 / 81,2	82,2 /	82,2/ 81,7	82,7 / 82,2
	Sound pressure level at 10m (10)	dB(A	50,7	51,2	51,7	52,2	52,5	52,7
Electric data	Power supply		400V/3P+N+T/50Hz					
	Maximum power input (basic version)	kW	39,9	42,3	46,7	52,3	55,8	63,0
	Maximum starting current(basic version)	A	64,2	71,2	72,8	81,7	92,7	96,3
	Maximum current input (basic version)	A	112,8	119,8	121,4	130,3	141,3	144,9
Dimensions and weight	Dimensions (W×H×L)	mm	1170x1985x2250				1450x2010x2250	
	Dimensions (W×H×L) with SSL kit	mm	1170x2180x2250				1450x2270x2250	
	Max. Packing dimensions (L×H×W)	mm	1200x2150x2250				1480x2170x2250	
	Packing dimensions (W×H×L) kit SSL	mm	1200x2340x2250				1480x2430x2250	
	Shipment weight	kg	943	955	1011	1026	1128	1142
	Operating weight	kg	923	946	996	1011	1105	1120

Test conditions:

(1) Water in the internal heat exchanger at 12/7°C, heat exchanger air inlet temp 35°C.

(2) Water in the internal heat exchanger at 23/18°C, heat exchanger air inlet temp 35°C.

(3) Water in the internal heat exchanger at 30/35°C, heat exchanger air inlet temp 7°C DB 6°C WB.

(4) Water in the internal heat exchanger at 40/45°C, heat exchanger air inlet temp 7°C DB 6°C WB.

(5) Reference temperature of water inside the internal heat exchanger: 12/7°C.

(6) Average climatic conditions for heating: T_{biv}=-7°C; Water in the internal heat exchanger at 30/35°C.

(7) Indicative data and subject to change. For the correct data, please always refer to the technical label sticked on the unit.

(8) The calculated value of the minimum water volume in the plant does not take into account the volume of the water contained in the internal heat exchanger (evaporator). With low outdoor air temperature applications or low average loads required, therefore the minimum water volume to the plant is two times the indicated value.

(9) Sound power level: Heat mode condition (3) measured value performed according to UNI EN ISO 9614-2, as required for Eurovent certification.
(10) Sound pressure level: Heat mode cond. (3); value obtained from the sound power level considering ISO 3744:2010 for the standard unit (without SL or SSL kit)
N.B. The performance data are indicative and could be subject to change, please refer to the technical label on the unit. In addition, the performances declared in apex (1), (2), (3) and (4) refer to the instantaneous power according to EN 14511. The declared data stated in the apex (5) and (6) is determined according to the UNI EN 14825.

WARNING: The minimum temperature allowed for storing the unit is 5°C.

14 ELECTRIC DATA OF THE UNIT AND AUXILIARIES ELEMENTS

Power supply of the unit	V/~/Hz	400/3/50	**Remote control circuit**	V/~/Hz	12/1/50
Control board circuit	V/~/Hz	12/1/50	**Fans power supply**	V/~/Hz	230/1/50

Note: Electric data may change for updating. It is therefore necessary to refer always to the technical data label sticked on right-side panel of the unit.

15 AVAILABLE HEAD PRESSURE FOR UNIT WITH PUMP

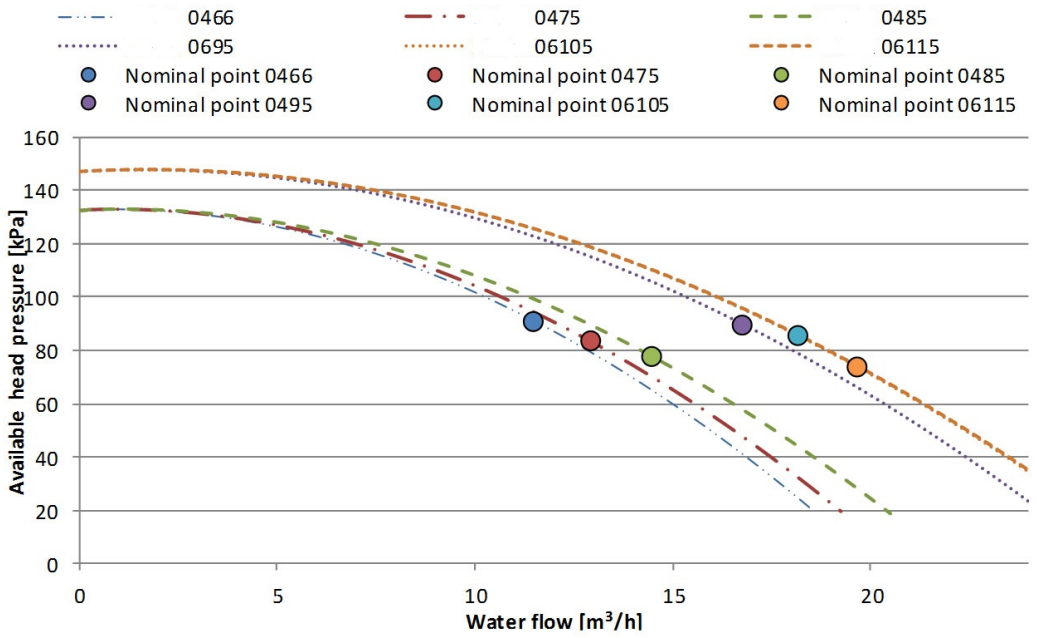
Below the characteristic curves corresponding to Head pressure - Water flow without head losses of the hydronic kit (which is composed of the components describe in the Paragraph 5.10) at the maximum speed of the circulator. The optimal operating point is shown on each curve under the specified conditions at the apex (1) p. 21.

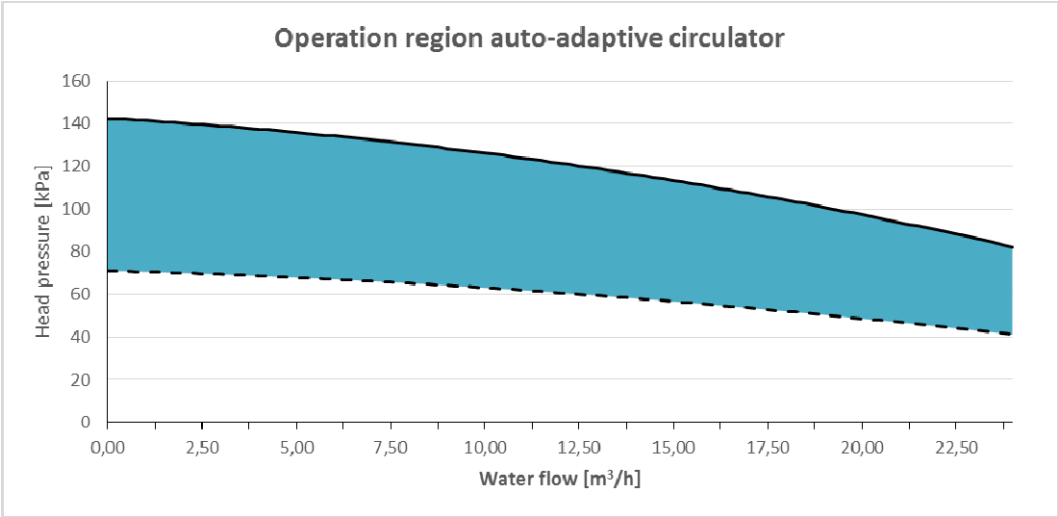
The circuit's plant must be designed so as to ensure the nominal water flow rate corresponding to the operating points indicated below.

Since the operation of the AC pump can be adjusted during its operation, therefore the respective operating areas will be indicated in the performance curve pressure head/flowrate.

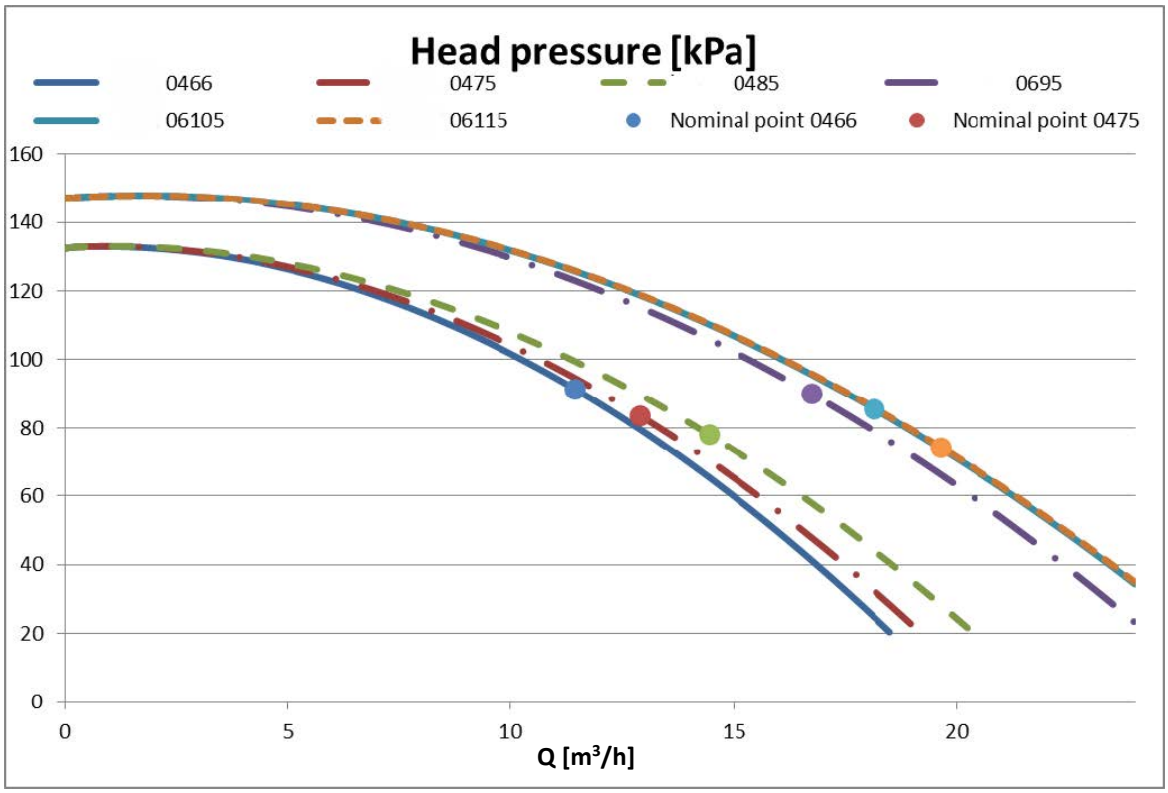
In case of selecting a pump without modulation, the operating areas are not considered.

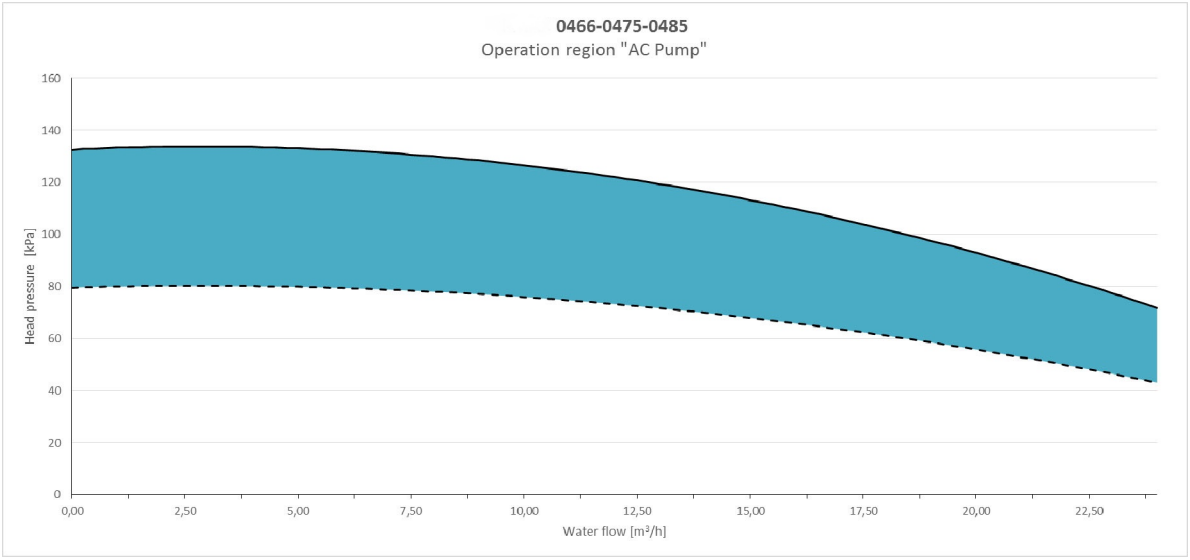
WARNING: The operating areas are reported without considering the head losses of the hydronic circuits. It is possible to obtain the corresponding available head pressure data by subtracting the value of the head loses from the value of the head available pressure at the same point for a given flowrate.

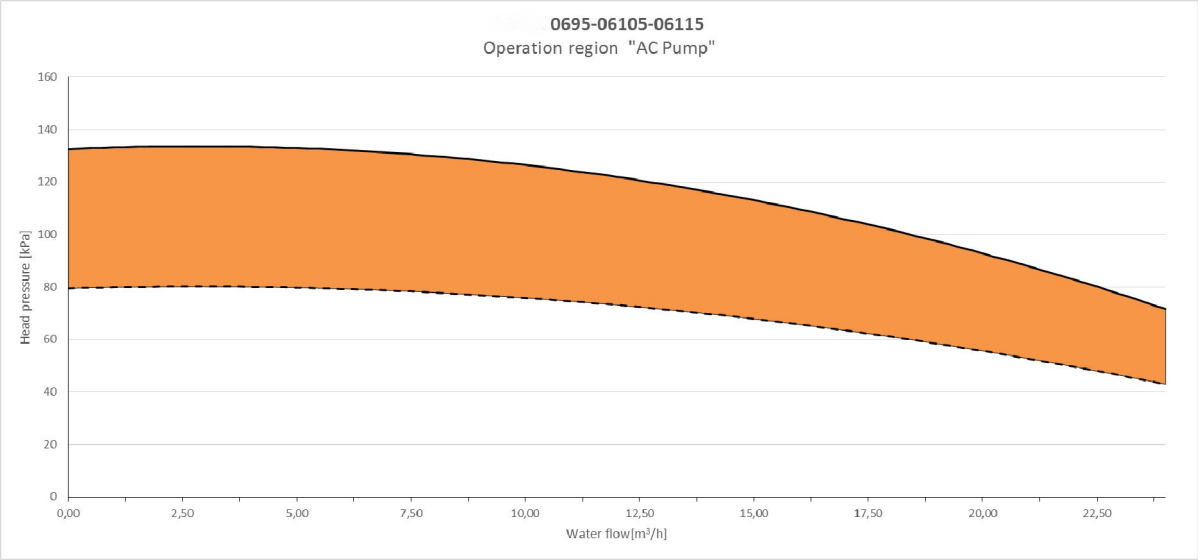




15.1 INTEGRATED PUMP

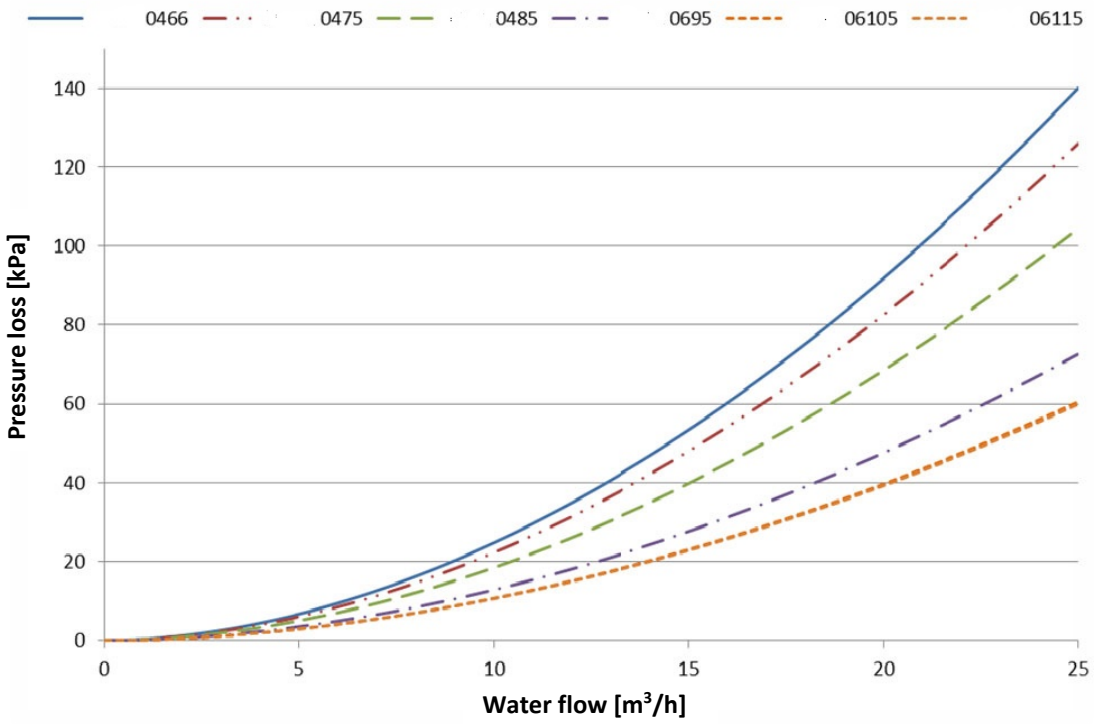






16 HEAD LOSS CURVES OF THE HYDRONIC CIRCUIT

If the integrated pump is not included, you can refer to the following curves in order to select the right pump.

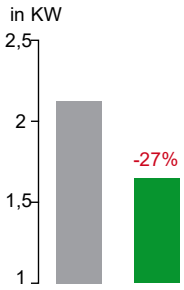


17 ACCESSORIES TO REDUCE THE NOISE LEVEL

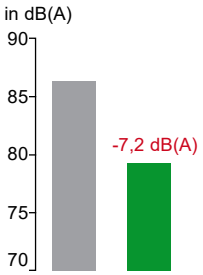
17.1 SSL

The super silenced unit (with SSL accessory) is provided not only with the thermo-acoustic shells on compressors but also with a special diffuser installed on the fan. The diffuser structure improves the air flow efficiency and allows a fan speed reduction, lowering the acoustic pressure by up to 7,2dB(A) and energy consumption by up to 27% with unchanged airflow. That could lead to a saving up of a lot of money in energy costs per fan per year. Alternatively, you could make use of the greater efficiency to boost air performance by up to 9% with comparable energy consumption.

AxiTop Diffuser



Less energy consumption at constant air volume



Reduced noise at equal at constant volume

18 OPERATING LIMITS

18.1 EVAPORATOR WATER FLOW RATE

The nominal water flow rate is referred to a ΔT equal to 5°C, between the evaporator's inlet and outlet temperatures. The allowed maximum flow rate is corresponding to ΔT=3°C. Higher values may produce too high pressure drops. The allowed minimum water flow rate is corresponding to ΔT=8°C. Insufficient values of water flow may produce too low evaporating temperatures according to the operating status with the intervention of safety devices which would stop the unit and, in some particular cases, the water can freeze in the evaporator coil which can breakdown the refrigeration circuit or causes the increasing of the condensing pressure with the shutdown risk of the appliance and the compressor could be damaged.
We enclosed below a most accurate table showing the minimum water flow that should be ensured for the plate heat exchanger in order to have the proper operation of unit as a function of the model (**note:** the water flow switch is used for preventing the freezing sensor from failure in the case of insufficient water flow but it does not ensure the minimum flow rate required in order the unit can work properly).

Models	i-MAX					
	0466	0475	0485	0695	06105	06115
Cooling capacity for reference [kW]	65,6	74,6	83,9	94,7	105,6	114,3
Minimum water flow rate that to ensure [L/s]	2	2,2	2,5	2,8	3,2	3,4

As a first approach, and in the absence of other detection systems, the proper flow rate for getting the best performance from your unit can be found at maximum speed of the circulator, using the pressure gauges for controlling the pressure difference between the return and the delivery water on the outside water connections of the unit and make sure that such value is equal or less than the static pressure indicated on the curves shown in paragraph 15 for the respective models and if it's necessary change the settings (for the related circulator) that are reported in the control manual.

18.2 CHILLED WATER TEMPERATURE (SUMMER OPERATION)

The minimum temperature that is allowed at the evaporator's outlet is 5°C: for lowest temperatures, the unit should undergo some necessaries structural modifications and different setting parameters of the controller with microprocessor. In this case, please contact our company for the feasibility study and evaluation of changes to be made according to your requests. The maximum temperature that can be maintained at the outlet of the evaporator is 25°C. Higher temperatures (up to a maximum of 40°C) can anyway be tolerated during transitions and start-up phases of the system. At any case, the maximum electric absorption is obtained during the operation at outside temperature of -10°C and at water outlet temperature of the heat pump at 55°C.

18.3 HOT WATER PRODUCTION (WINTER OPERATION)

Once the system is working at the right temperature, the inlet hot water temperature should not be lower than 25°C; the lowest values that are not related to transitional or start-up stages may cause system's malfunction and possible compressor breakdowns. The maximum outlet water temperature should not exceed 58°C. At this temperature, the power consumption and performance in terms of C.O.P. are enhanced if the outdoor temperature is higher than 5°C, even if the unit is still able to work up to the limit of -15°C.
For higher temperatures than those pointed out, especially if have a concomitant with the reduction of the water flow rate, it may cause abnormalities to the normal operating of the unit, or the safety devices act in critical cases.

The maximum power consumption of the heat pump itself will take place during the operation with outlet water temperature of 58°C and outdoor temperature of -15°C.

18.4 AMBIENT AIR TEMPERATURE AND RECAPITULATIVE TABLE

The units are designed and manufactured to operate, in summer mode, with the condensate control in the range of outdoor air temperatures comprised between -10°C and 46°C. However during heat pump operation, the allowed range of the outdoor temperature goes from -15°C to 40°C depending on the water outlet temperature as indicated in the below table.

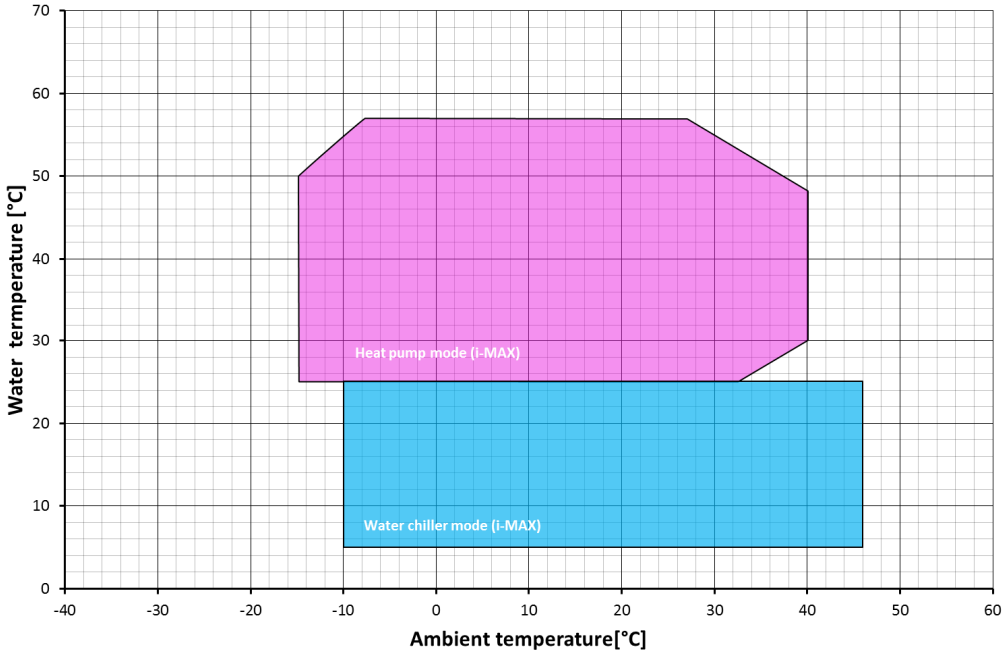
Operation limits

Water chiller mode	
Ambient temperature	Min.-10°C Max. +46°C
Water outlet temperature	Min. +5°C Max. +25°C
Heat pump mode	
Ambient temperature	Min. -15°C Max. +30°C
Water outlet temperature	Min. +25°C Max. +57°C/+65°C*
Heat pump mode for sanitary hot water	
Ambient temperature with maximum water temperature 48°C	Min. -15°C Max. +43°C
Ambient temperature with maximum water temperature 55°C	Min. -15 Max. +30°C
Water outlet temperature.	Min. +20°C Max. +57°C/+65°C*

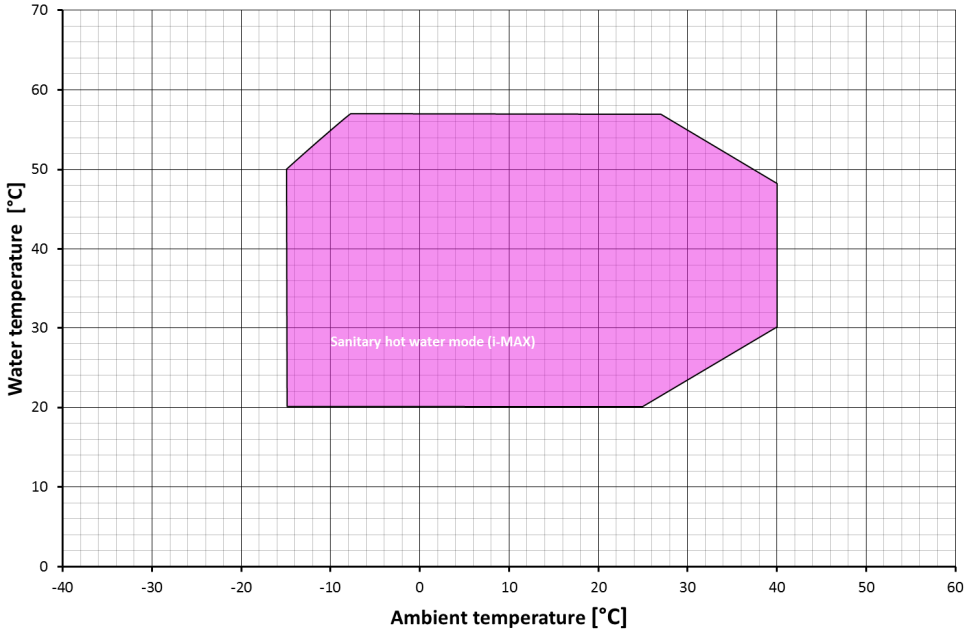
(*) With additional electric heater (not supplied)

Below we are report the operation limits, in the case of air conditioning and sanitary hot water production.

WATER CHILLER/HEAT PUMP MODE



DOMESTIC HOT WATER MODE



19 CORRECTION FACTORS FOR USE OF GLYCOL

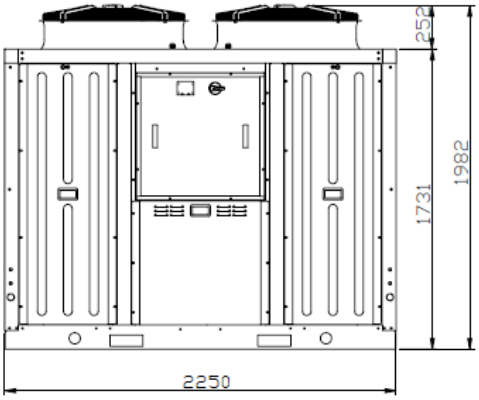
Glycol rate	Freezing point (°C)	CCF	IPCF	WFCF	PDCF
10%	-3,2	0,985	1	1,02	1,08
20%	-7,8	0,98	0,99	1,05	1,12
30%	-14,1	0,97	0,98	1,10	1,22
40%	-22,3	0,965	0,97	1,14	1,25
50%	-33,8	0,955	0,965	1,2	1,33

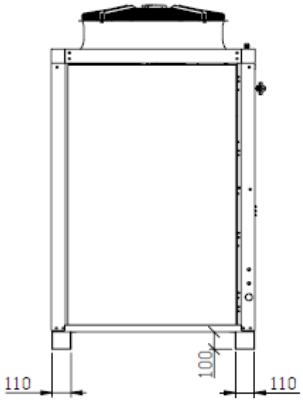
CCF: Capacity correction factor
IPCF: Input power correction factor
WFCF: Water flow rate correction factor
PDCF: Pressure drops correction factor.

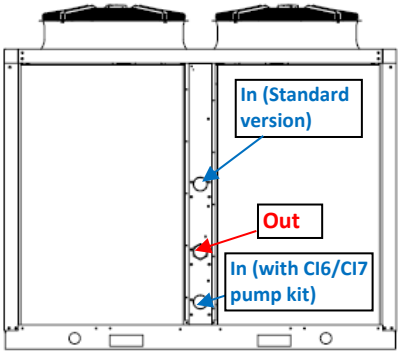
The water flow rate and pressure drop correction factors are to be applied directly to the values given for operation without glycol. The water flow rate correction factor is calculated in order to get the same temperature's difference that would be obtained without glycol. The pressure drops' correction factor takes into account the different water flow rate obtained from the application of the water flow rate correction factor.

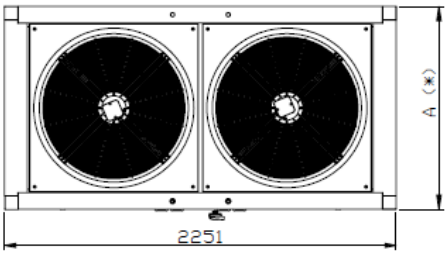
20 DIMENSIONS

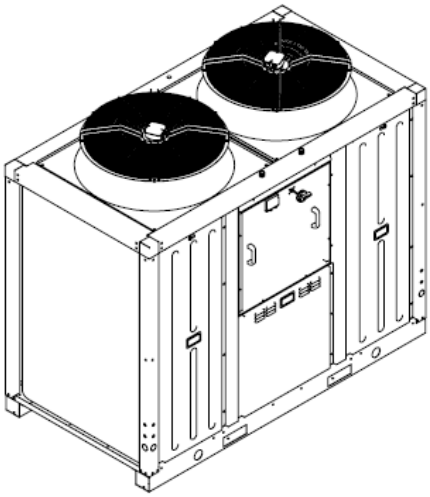
IN/OUT: 2"1/2 F











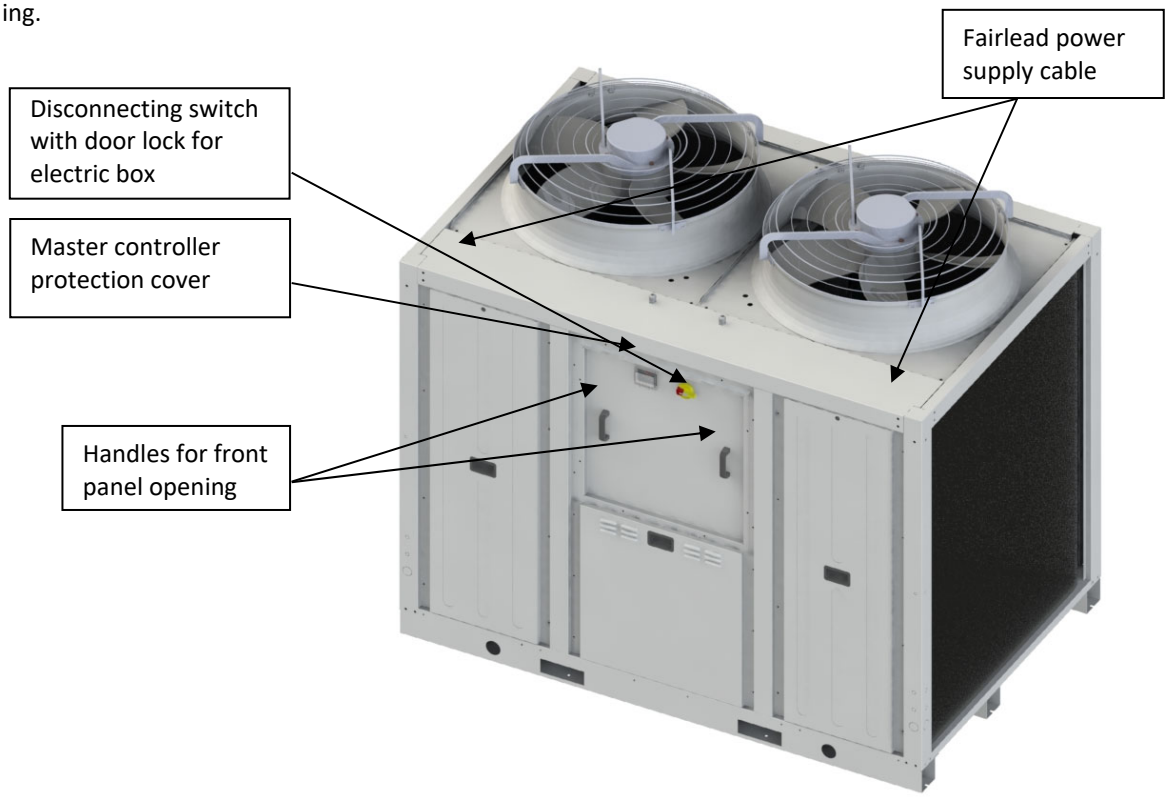
Models	A
HPE 66 / HPE-SSL 0466	**1170**
HPE 75 / HPE-SSL 0475	**1170**
HPE 85 / HPE-SSL 0485	**1170**
HPE 95 / HPE-SSL 0695	**1170**
HPE 105 / HPE-SSL 06105	**1450**
HPE 115 / HPE-SSL 06115	**1450**

Model	With AxiTop accessory	Height H [mm]	Max Packing height [mm]
HPE 0466 / HPE 0475 HPE 0485 / HPE 0695	no	1985	2150
	si	2180	2340
HPE 06105 / HPE 06115	no	2010	2170
	si	2270	2430

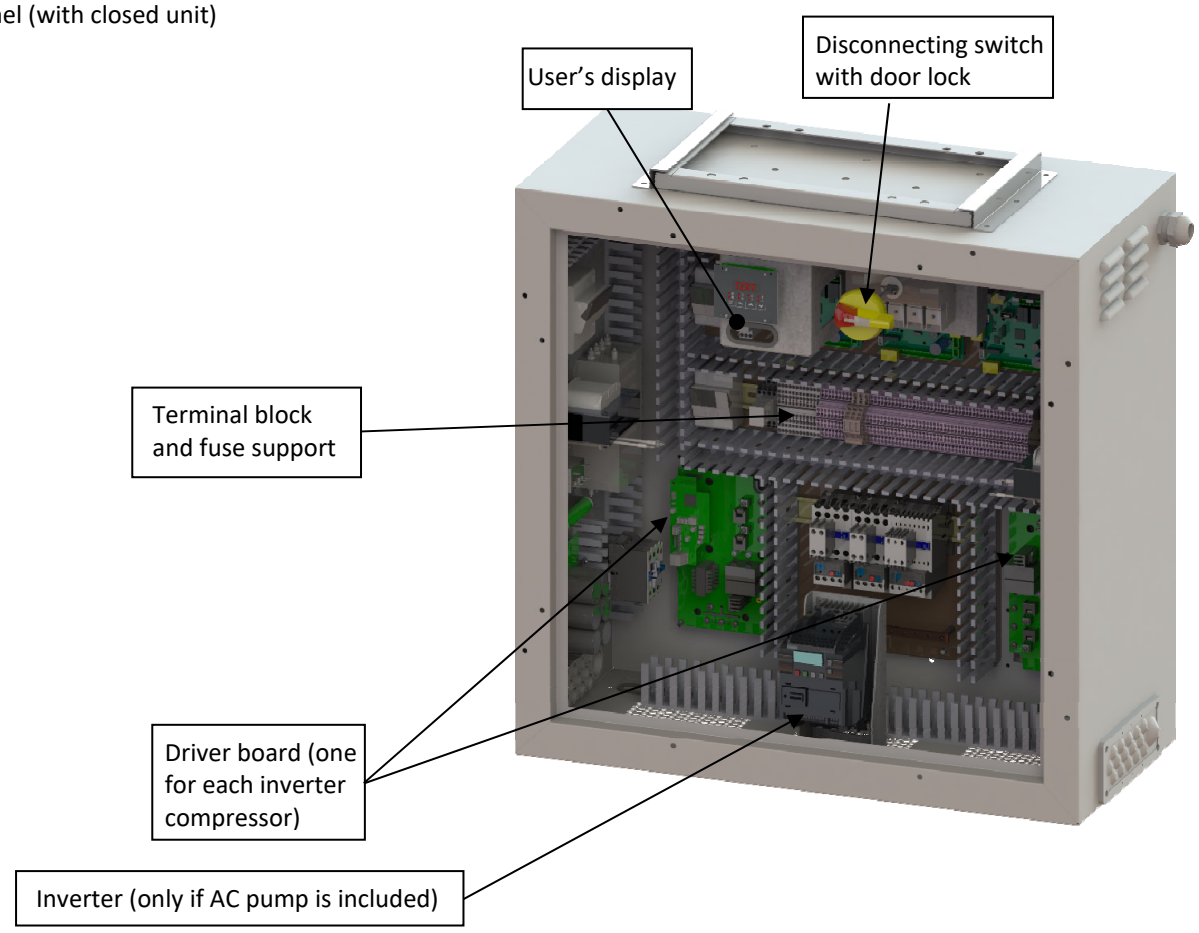
21 ELECTRIC PANEL

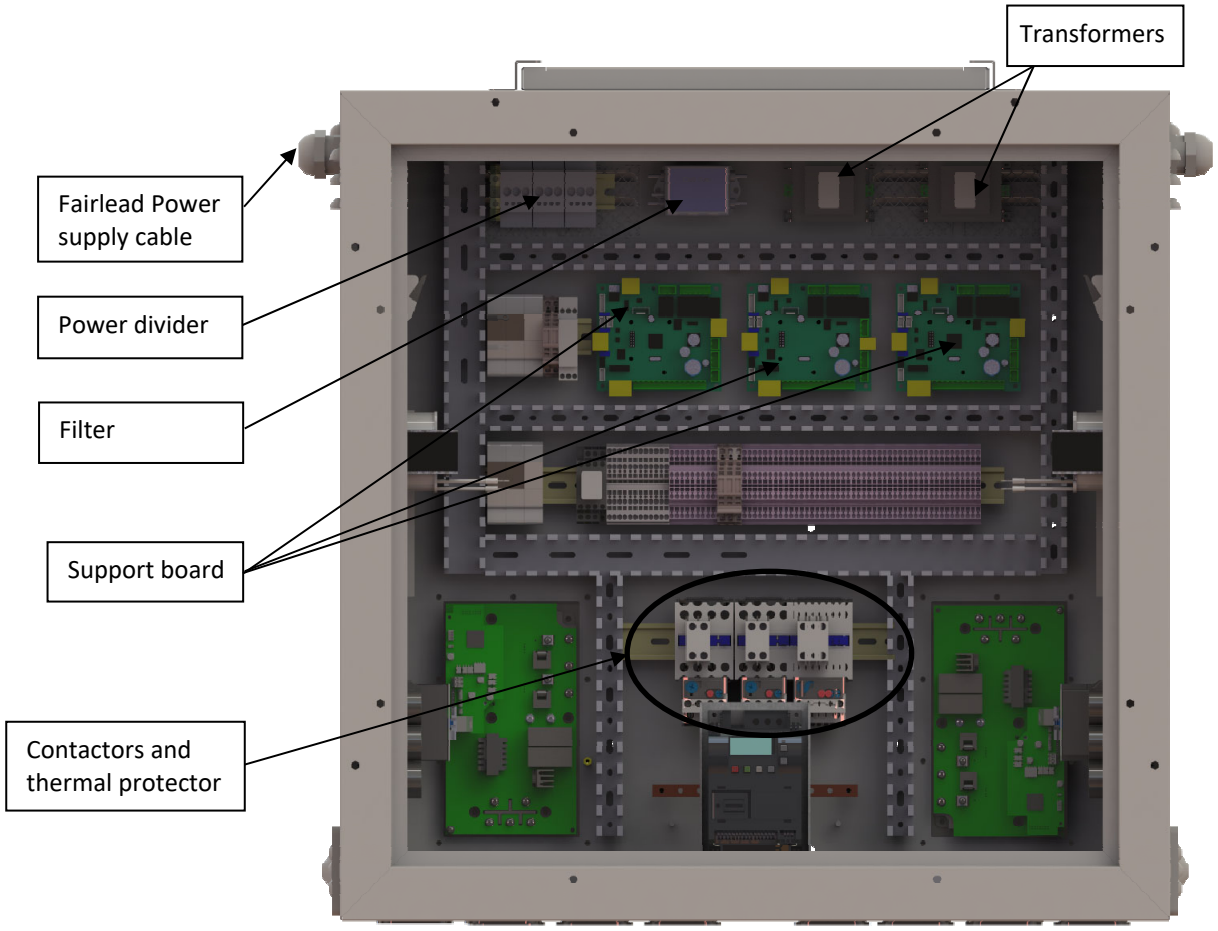
The number of indicated components can vary depending on the model.
The representation of the units is indicative and useful to present the main components and can therefore vary from the purchased one.

Unit with closed front panel
The accessibility to the electrical panel is possible by removing the screws (after putting the disconnector in OFF position) and removing the panelling.

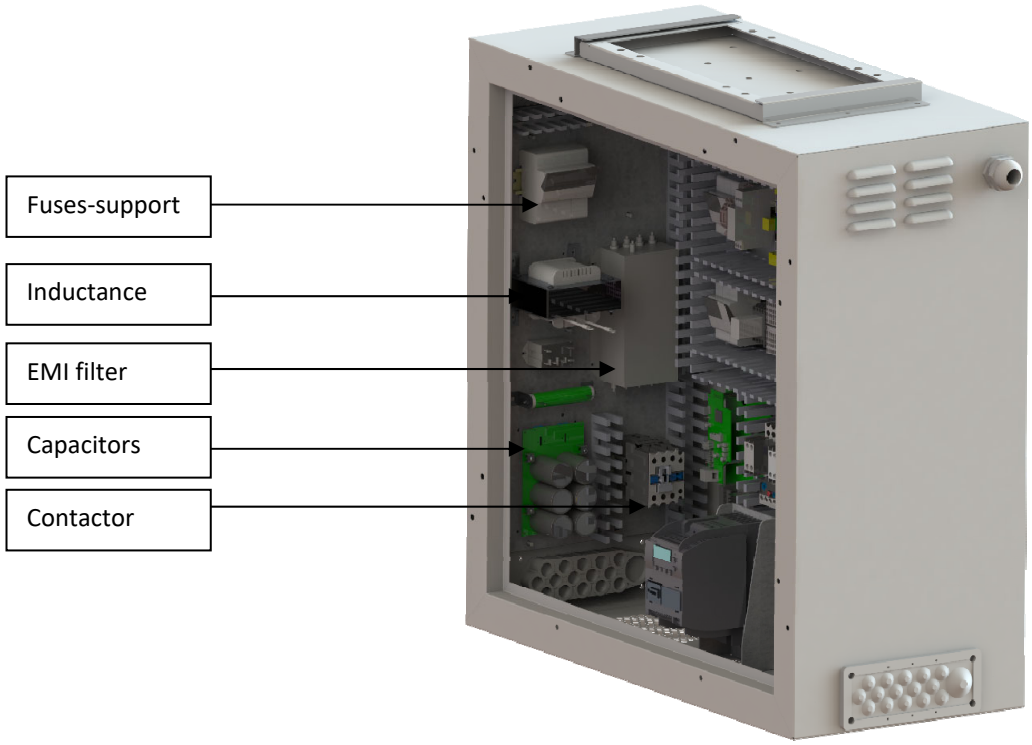


The accessibility to the electrical box is from the front enclosure panel (with closed unit)





View of one of the two sides (the components are the same for both sides)



22 CONTROL LOGIC

For the control logic, you can see the control manual supplied with the unit.

23 HANDBOOK FOR SOME CONFIGURATIONS OF INSTALLATIONS

For more information about some available configurations, you can contact our office to ask for the handbook of some recommended drawings of plants that have been highlighted regarding the installation configuration of our high efficiency heat pumps. The "Handbook" shows the symbiotic potential with some of our products in the catalogue.

A2B ACCORRONI E.G.
VIA ANCONA, 37
60027 OSIMO (AN)
www.accorroni.it
a2b@accorroni.it