



USER'S AND INSTALLER'S MANUAL

INVERTER AIR/WATER HEAT PUMP CHILLERS
WITH AXIAL FANS

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**USER'S AND INSTALLER'S MANUAL FOR INVERTER AIR/WATER
INDUSTRIALS 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.



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The i-HP manual contains 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 AIM AND CONTENTS OF THIS MANUAL

This manual provides the basic information as for the selection, installation, operation and maintenance of the i-HP units. It is addressed to the users of the appliance and it enables them to use the unit efficiently, even without any previous specific knowledge of it.

This manual describes the characteristics of the appliance at the time of its market penetration; therefore, it may not capture later technological improvements introduced by the company as part of its constant endeavour to enhance the performance, ergonomics, safety and functionality of its products.

The company, therefore, is not constrained to update the manuals for previous versions of machines.

It's recommended that, the user must follow the instructions contained in this booklet, especially those concerning the safety and routine maintenance.

1.1 HOW TO KEEP THIS MANUAL




The manual has to be always kept with the unit it refers to. It has to be stored in a safe place, away from the dust and moisture. It has to be 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 shall store 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

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

2 SAFETY LAWS

The equipments and their component parts have been designed in compliance with the harmonised EC norms in force and with other European and national norms as required by the Council Directive (2006/42/CE and later amendments).

The equipments meet also the following requirements:

- UNI EN ISO 12100
- UNI EN 378-1, 378-2, UNI EN 12735-1 Rules
- CEI EN 60204-1, CEI EN 50106 Rules
- EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3, EN 62233 Rules
- 97/23/CE, 2006/95/CE, 2004/108/CE, 2011/65/UE, 2012/19/UE Community Directives

3 PERMITTED USES

- The company excludes any contractual and extracontractual 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.

4 GENERAL SAFETY GUIDELINES

Before beginning to operate on i-HP 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.

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





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**, **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:

	<i>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.</i>
	<i>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</i>
	<i>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.</i>
	<i>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.</i>

4.2 PERSONAL SAFETY EQUIPMENTS

When operating and maintaining the i-HP units, use the following personal protective equipments.

	<i>Protective clothing: Maintenance men and operators has 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.</i>	
	<i>Gloves: During maintenance or cleaning operation protection gloves have to be used</i>	
		<i>Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.</i>

4.3 SAFETY SYMBOLS

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

	<i>General hazards</i>
	<i>Electric shock hazard</i>
	<i>Presence of moving organs</i>
	<i>Presence of surfaces that may cause injures</i>

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 informations:	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 precautions:	Provide sufficient air exchange and/or suction in work places.
Recommendations for safe use:	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/m ³ for each of the two components.
Respiratory protection:	For rescue and maintenance operation in storage tanks use self-contained respirator apparatus. 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	These products are halogenated compounds, hydrogen fluoride, carbon oxides (CO, CO ₂), carbonyl halides.
Risks:	
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	1730
GWP (R11=1):	
Potential depletion	0
Ozone ODP (R11=1):	
Disposal considerations:	usable with reconditioning.

5 TECHNICAL CHARACTERISTICS

The i-HP water chillers and heat pumps series are designed for applications in residential and industrial areas, these units are extremely versatile and can operate in heat pump mode with the ability of hot water generation at a temperature of 55°C for environmental heating and sanitary applications. The DC Brushless Inverter compressor technology, matched with the electronic expansion valve, the pump and the variable speed blower are generally used for optimizing the power consumption and efficient operation of the refrigerating components.

5.1 FRAME

All i-HP units are made up of hot-galvanised thick sheet metal, painted with polyurethane powder enamels at 180°C to ensure the best resistance against atmospheric agents. The front panel is hinged to the left side to allow access to the internal components for inspection and maintenance. The screws and the inserts are made up of galvanized steel.

5.2 REFRIGERANT CIRCUIT

The refrigerant circuit has been manufactured according to the UNI EN 13134 directive concerning welding procedures. The refrigerant gas employed in these units is R410A type. The refrigerant circuit includes in its basic version: 4-way reversing cycle valve, electronic expansion valve, liquid separator, liquid receiver, check and maintenance valves, pressure safety device according to PED regulation (high pressure switch), pressure transducers to accurately adjust the evaporating and condensing pressures, filters for expansion valve to prevent its clogging. The versions with vapour injection also include heat exchanger to produce vapour, electronic injector valve, the ON-OFF valves of injection in case of two compressors.

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. The compressors of the injection versions are designed to optimize the efficiency of the refrigerant cycle under low ambient temperatures conditions and are supplied with connection for vapour injection.

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 the first startup.

The checking of the compressors is possible through the front panel of the unit that allows the maintenance of the compressors even if the unit is in operation.

5.4 AIR-SIDE EXCHANGERS

The air-side heat exchanger is made up of copper pipes and aluminium fins. The copper pipes diameter is 7,94 mm, 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 these heat exchangers 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 plastic aerofoil blades. They are statically and dynamically balanced and supplied with a safety fan guard. The fan motor is a modulated brushless type, directly coupled and equipped with an integrated thermal overload protection. The protection class of the motor is IPX4 according to CEI EN 60529.

5.6 USER-SIDE HEAT EXCHANGERS

The user-side heat exchanger are made up of AISI 316 stainless steel braze-welded plates type, and are factory insulated with flexible close cell material and are 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 BOARD

The electrical control panel board is manufactured according to European Union directives currently in force. To access to the electrical control panel board, you must open the front panel, lock the disconnect switch in the Off position, (presence of a door lock system) and by mean of a flat-head screwdriver, turn to open quarter-turn the two locks. The protection degree is IP34. The electric box is supplied with a terminal block completed with free contacts for remote ON-OFF, winter/summer change over, auxiliary heater, sanitary water temperature sensor, management of external 3-way valve and contacts for remote control panel. The addition of the optional module GI enables the management of further functions of the plant.

5.8 CONTROL SYSTEM

The i-HP units are equipped with a microprocessor adopting an overheating control logic program through the thermostatic valve driven by the pressure transducers signals. 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.

The INVERTER system allows to reduce the plant's water content to its minimum from the usual value 12-15 liters/kW to 75 liters for the model i-HP 0125, 105 liters for the model i-HP 0235 and 150 liters for the model i-HP 0250 in ABSOLUTE. Because of the reduced water content, the i-HP units can be installed in plants without water tank with advantages of the reduced size of the appliance, the installation spaces, heat losses and installation and maintenance costs of the plant.

5.9 MONITORING AND PROTECTION DEVICES

The units are standard equipped with the following control and protection devices: return water temperature sensor installed on the return water pipe line from the plant, operating and antifreeze sensor installed on the outlet water pipe to the plant, high pressure transducer, low pressure transducer, compressor's inlet and outlet temperature sensors, thermal protection device for fan motors, water side water flow switch to protect the evaporator, high pressure HP flow switch.



CAUTION: The INVERTER control system is able to manage minimum water contents in the plant up to a value of 75 liters for the model i-HP 0125, of 105 liters for the model i-HP 0235, of 150 liters for the model i-HP 0250, and of 45 liters for the 15 model. This value makes reference to the liters absolute value and not to any kW of installed power.

5.10 HYDRAULIC CIRCUIT

The heat pump chillers of i-HP series are supplied with an integrated hydronic kit including: the safety valve (6 bar) and the automatic air release valve and a pressure gauges at inlet and outlet of the heat exchanger for evaluating the load losses, service valve and flow switch. The version with an integrated modulating type circulator pump adopting a brushless motor, suitable for chilled water utilization and directly managed by the controller on board.

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.

5.12 ENHANCED VAPOUR INJECTION (EVI) TECHNOLOGY

The heat pumps of i-HP-LT series are equipped with scroll compressors with vapor injection (EVI technology) provide maximum efficiency regarding the standard units with scroll compressors.

The EVI technology consists of injecting the refrigerant vapour at the intermediate stage of the compression process which can significantly increase the capacity and the efficiency of the compressor.

Each scroll compressor installed in the heat pumps of the series i-HP-LT is comparable to a two-stage compressor but with an intermediate stage of cooling the refrigerant.

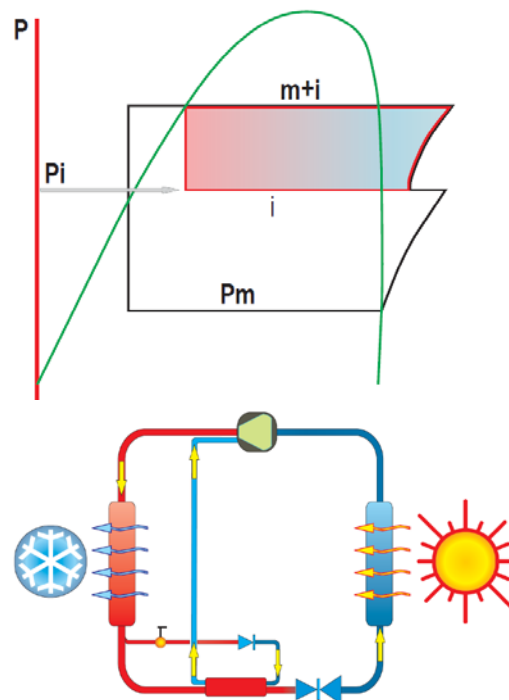
The diagram shows the main stages of the refrigeration cycle of the unit with EVI technology. The stage of high pressure is consisting of the extraction of a part of the liquid refrigerant coming out of the condenser and then expands through an injection valve, in a heat exchanger which functions as a subcooler.

The generated superheated vapour is then injected into the E.V.I. compressor in the middle of the compression cycle (through a special pipe inside the compressor itself).

The additional subcooling of the liquid thus obtained could greatly increase the capacity of the evaporator.

A higher ratio between the condensation and evaporation pressures will significantly increase the performance of this system with respect to all the traditional technologies of gas compression.

This system allows the air/water heat pump of the series i-HP-LT to generate hot water up to 58°C and capable of operating in temperatures up to -25°C.



6 AVAILABLE VERSIONS, SIZES AND ACCESSORIES

The code unit is composed of:

- ✓ no. 7 fixed digits (the first two digits identify the series i-HP in its eventual customizations)
- ✓ the # symbol as a separator
- ✓ no. 9 variables digits (fields) identify the sizes, versions and factory installed accessories
- ✓ no. 2 fixed digits equal to 0, if are not used

XX10514#(CT)(TA)(IV)(CI)(KA)(GI)(FAN)(SIL)(TR)00

FATHER CODE	SIZE	VERSION		FACTORY INSTALLED ACCESSORIES					
XX10514#	CT	TA	IV	CI	KA	GI	FAN	SIL	TR
	Heating capacity	Water pipes configuration	Vapour injection	Hydronic configuration	Antifreeze Kit	Management module for plant	Type of fan	Silencing	Battery treatment
	0 25 kW								
	1 35 kW								
	2 50 kW								
		0 2 pipes	0 Whitout injection 1 With injection	0 Hydraulic pipe 1 Integrated circulator 2 Shutoff valve	0 Without antifreeze kit 1 With antifreeze kit	0 GI Module not present 1 GI Modul present	0 DC fan 1 Not available	0 Not silenced 1 Silenced 2 Super silenced	0 Coil without treatement 1 Varnished coil 2 Coil with Finguard treatment
		1 Not available							
		2 Not available							

Filed	Variant	Description
CT	0, 1, 2	Heating capacity rating of the unit.
TA	0	The version of 2 pipes provides only Plant Inlet and Outlet Water.
	1	Not available.
	2	Not available.
IV	0	Without vapour injection.
	1	The vapour injection allows to increase the efficiency of the compressor especially in the critical conditions (air temp. <7°C or >35°C).
CI	0	The configuration with external pump without management in parallel includes the installation of a piece of pipe in the place of the circulator. N.B.: the external pump is not supplied.
	1	The configuration with integrated circulator provides a modulating pump with brushless motor, suitable for the use of chilled water and directly managed by the controller on-board unit.
	2	The configuration with external pump with management in parallel requests the installation of an ON/OFF motorized valve instead of the circulating pump, in order to exclude the unit if requested by the management of multi unit parallel. N.B.: the external pump is not supplied.
KA	0	Unit not equipped with anti-freeze kit.
	1	The antifreeze kit uses a self-regulating 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 management module for plant
	1	The additional module implements some useful functions for the plant management, such as sanitary hot water SHW, double setpoint, management of the electric heaters of the plant, etc.).
FAN	0	Unit equipped with DC brushless modulating fan motor.
	1	Not available.
SIL	0	Unit not silenced.
	1	The silenced unit (with SL accessory) provides thermo-acoustic insulators on compressors.
	2	The super silenced unit (with SSL accessory) provides thermo-acoustic insulators on compressors and a special diffuser installed on the fan which reduces the noise level.
TR	0	Coil without treatment.
	1	Coil with only varnishing treatment
	2	Coil with anti-corrosion finguard treatment

The CT field identifies the size of the unit. The name of each unit provides the heating capacity anticipated by the number of compressors. For example the unit with CT = 0 (25 kW) is named as HP-0125.

The fields TA and IV identify the 2 versions actually available:

- 2-pipes without injection
- 2-pipes with injection (named LT)

The remaining fields (CI, KA, GI, FAN, SIL, TR) 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 standard configuration of the model **i-HP-LT 0235** has the following code: **XX10514#10100000000**.

6.1 OPTIONAL ACCESSORIES

Hi-T	Multifunction touch screen remote control with centralized management of i-HP and HNS system, functions of USB port, temperature and humidity sensors. It has also an extremely intuitive interface simplifying the use of the controller.
CRH	Remote control panel to be installed in the room for the unit remote controlling, with additional functions in comparison to the one installed on board; it can also manage our hydronic terminal units. N.B.: the functionality of the double setpoint are managed by mean of the Hi-T controller and not by CRH controller.
AG	Anti-vibration rubber pad to be installed in the chassis of the unit for possible shock absorption.

IMPORTANT NOTE

**ONLY THE OPTIONAL ACCESSORIES CAN BE REQUIRED AFTER THE ORDER OF THE UNIT,
WHILE THE FACTORY INSTALLED ACCESSORIES CAN NOT BE REQUIRED AFTER THE ORDER OF THE UNIT.**

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 i-HP units are designed for outdoor installation. 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 repairation. 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: Inside the unit, there are some moving parts. Be especially careful when working near them, even if the unit is off.



The temperatures of heads and exhaust piping of the compressor are usually high. Therefore be careful when working near condensing coils.

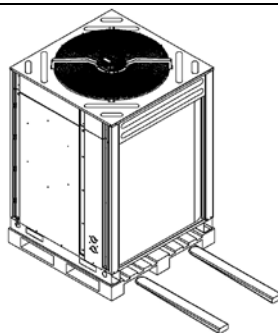
The aluminum fins are very sharp and can cause serious injuries.



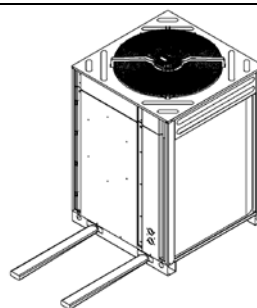
After the maintenance operations, close the panels tightly with the fastening screws.

7.2 LIFTING AND HANDLING

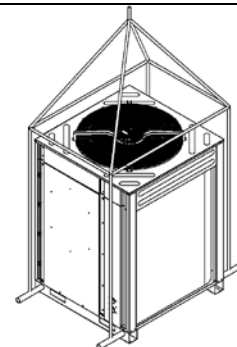
When the unloading and the placement of the unit, it is highly recommended to avoid any sudden or violent motion in order to protect the inner components and the frame. The units can be lifted by mean of a forklift or, otherwise by mean of belts, making sure to damage the lateral panels and the cover of the unit using a structure of spacers as shown in the drawing. In this context, it is necessary to hook indirectly the unit to the basement but on two steel pipes of adequate dimension that to pass into the appropriate holes situated in the same basement of the unit). It is important to keep the unit horizontal during these operations.



1) Handling with forklift under the pallet



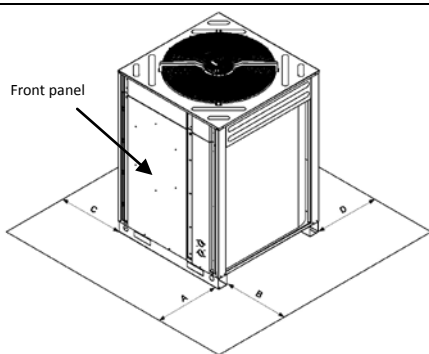
2) Handling with forklift under the unit using the appropriate windows of passing forks



3) Handling by mean of belts

7.3 LOCATION AND MINIMUM TECHNICAL CLEARANCES

All the i-HP models are designed for outdoor installations; any cover over the unit or locating near trees (even if they partially cover the unit) has to be avoided 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 has to be taken to ensure adequate air volume to the condenser. The re-circulation of discharge 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
i-HP 0125	1500	500	1000	850
i-HP 0235	1500	500	1000	850
i-HP 0250	1500	500	1000	850

* The recommended minimum distance for installation, maintenance and operation.

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 12 (available pressure head).
	WARNING: Connect the pipes to the attacks by using always key against key system.
	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. Should the water flow switch be altered or should the filter not be installed, the warranty will no longer be valid. The filter have to be kept clean, so make sure it is clean after the unit has been installed, and then check it 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.

7.4.1 Drainage connection

All i-HP 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.

7.4.2 Service valve

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



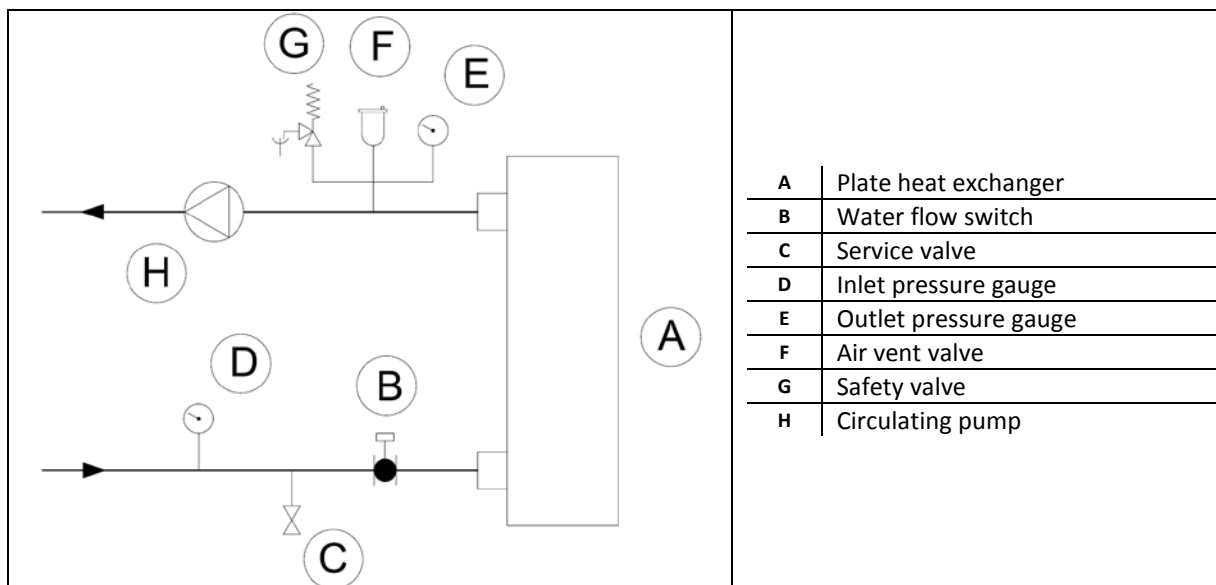
Knurled nut

Cap with gasket

7.4.3 Plant drainage system

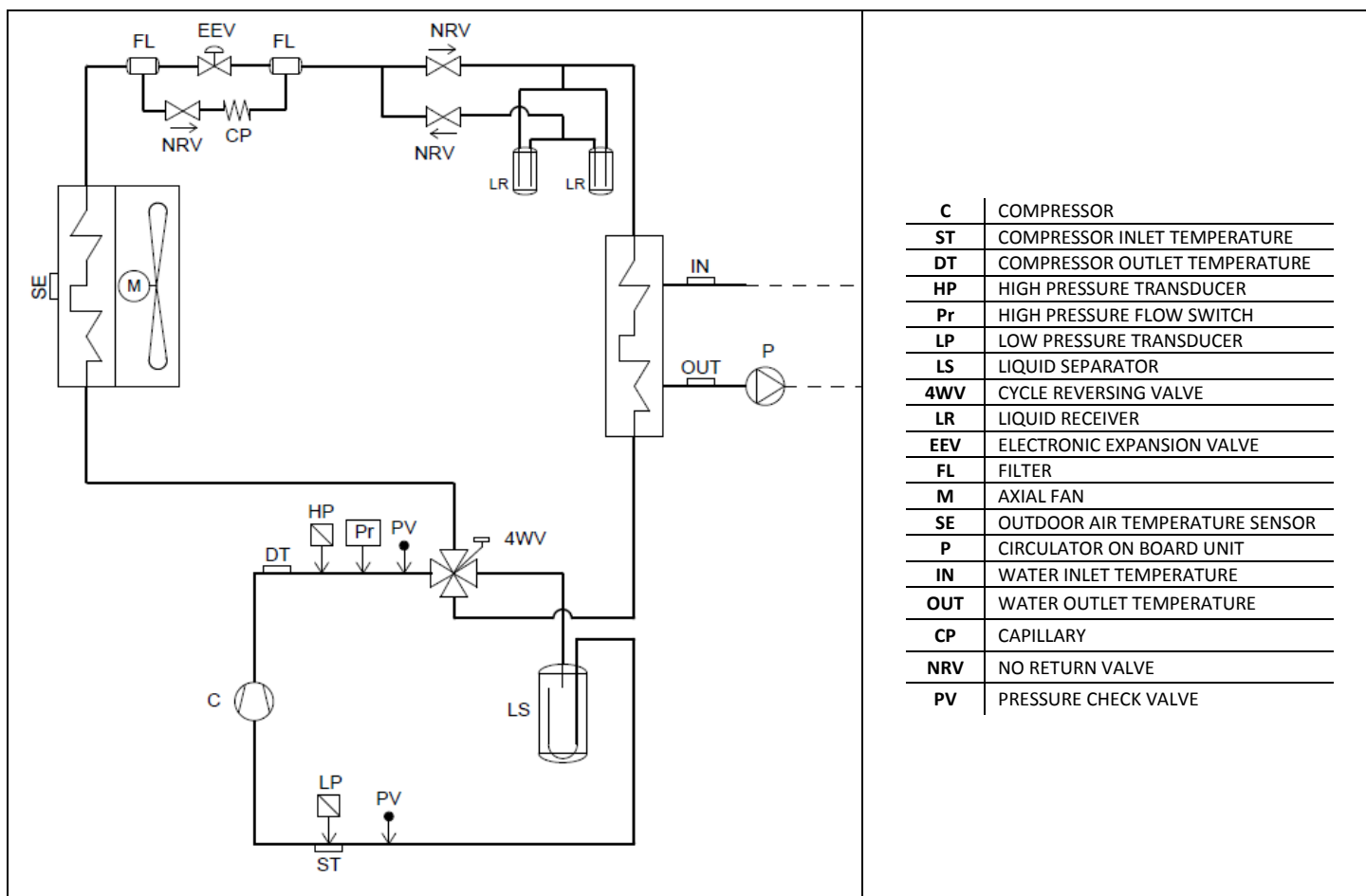
In the case when it is necessary to unload the plant, close at first the inlet and outlet manual gate valves (not supplied) and then remove the pipes that are disposed externally on the water inlet and on the water outlet in order to spill away the liquid contained in the unit (in order to make easy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

7.4.4 Hydraulic circuit

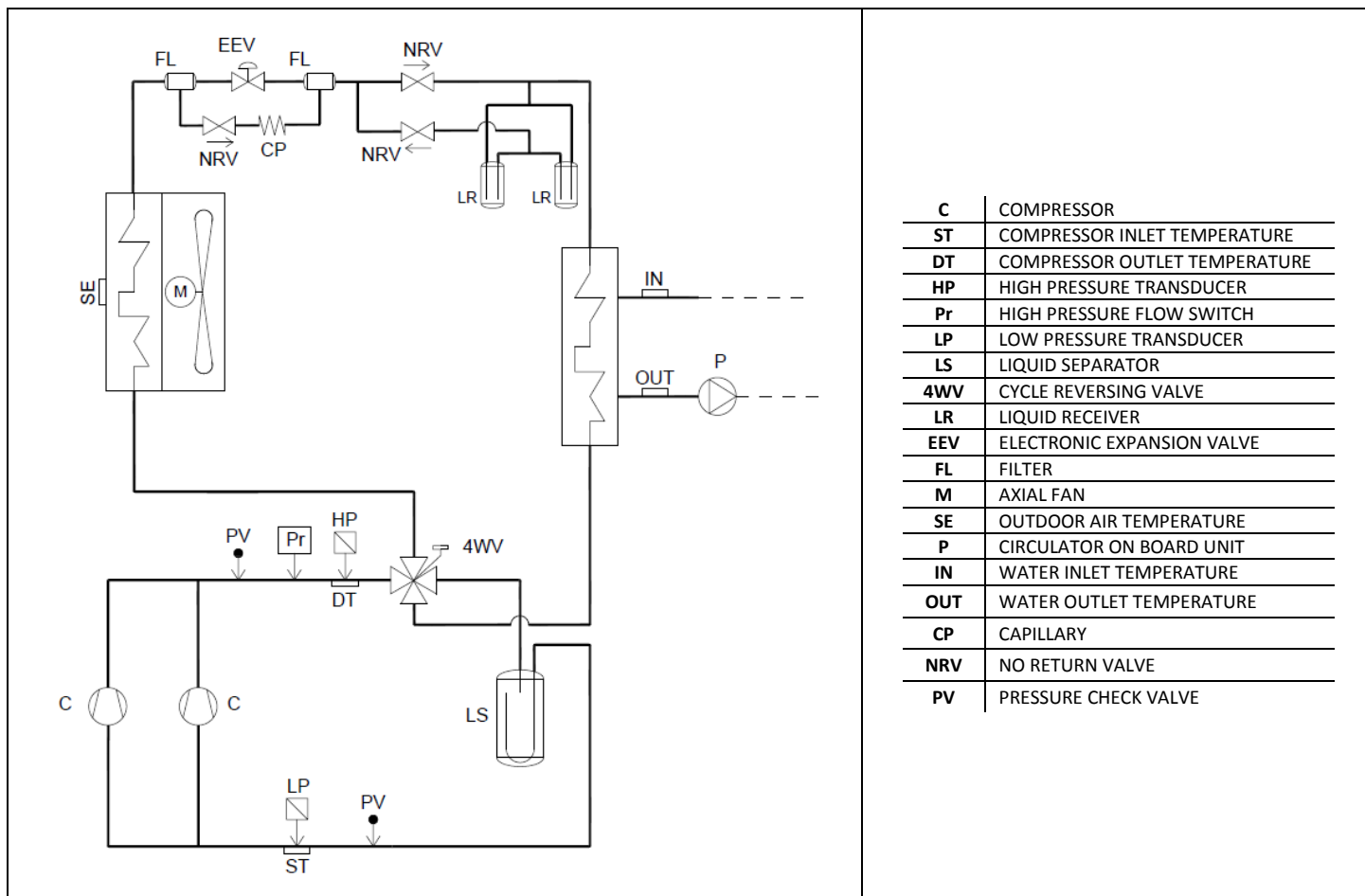


7.5 REFRIGERANT DIAGRAMS

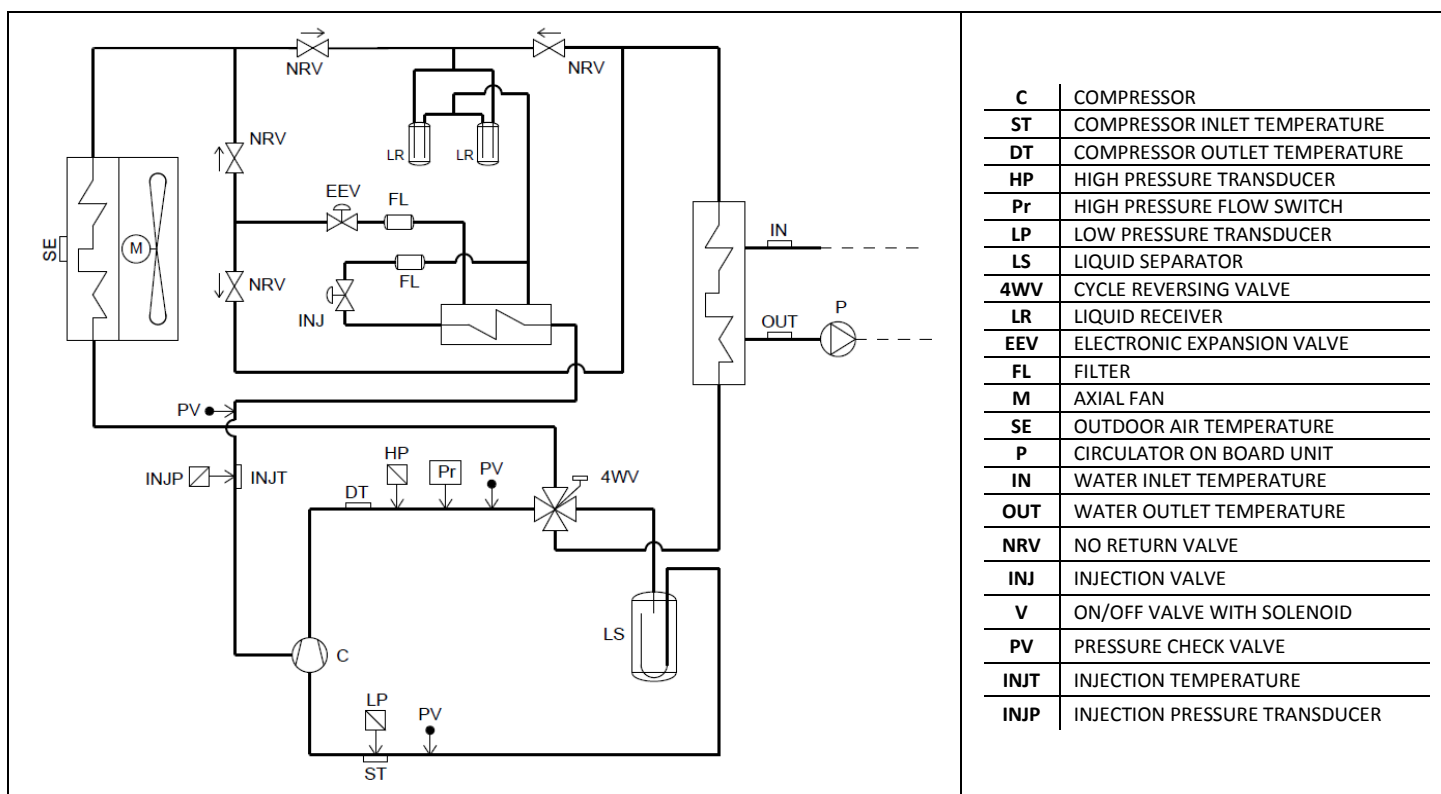
7.5.1 Refrigerant diagram of the model i-HP 0125



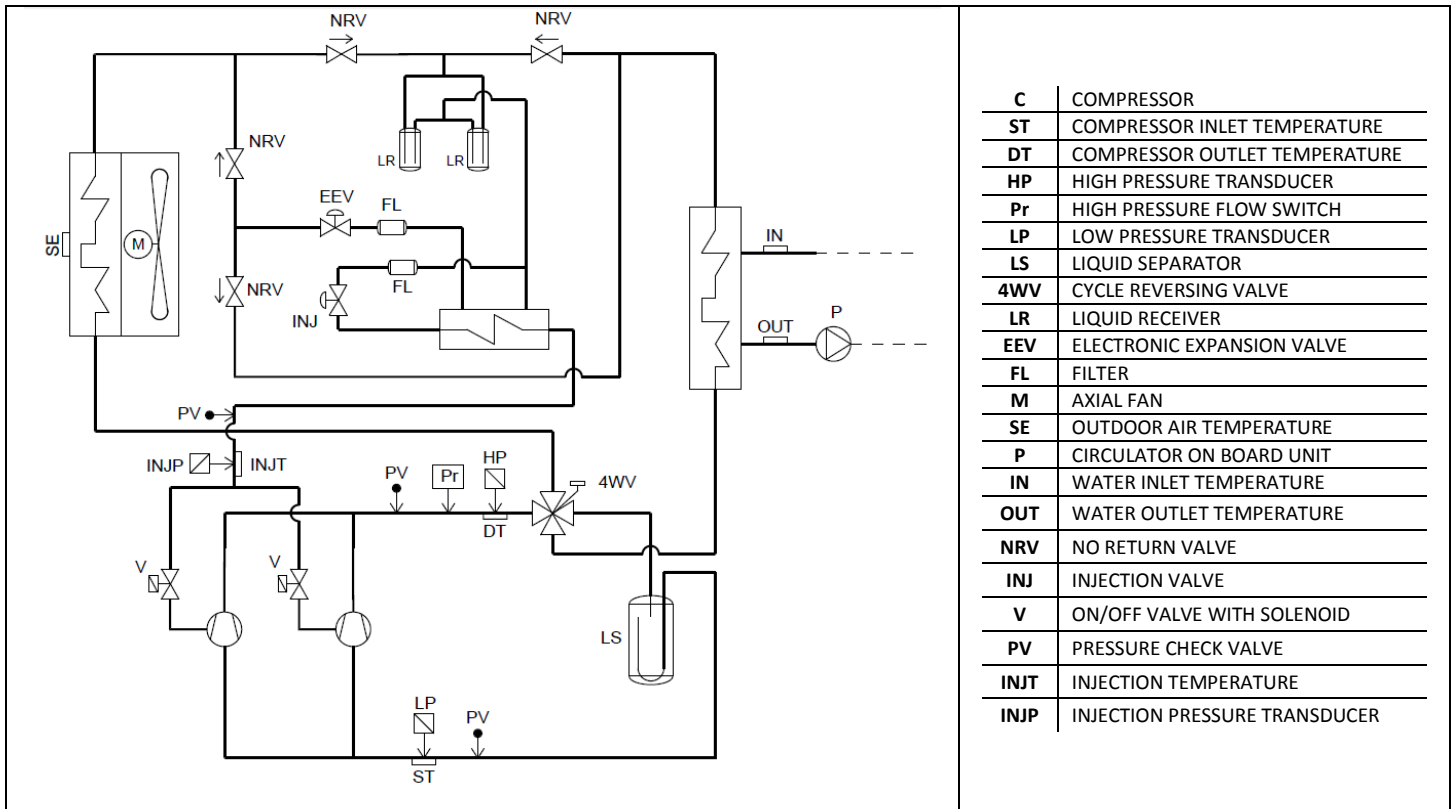
7.5.2 Refrigerant diagram of the model i-HP 0235-0250



7.5.3 Refrigerant diagram of the model i-HP-LT 0125



7.5.4 Refrigerant diagram of the model i-HP-LT 0235-0250



7.6 ELECTRICAL CONNECTIONS

Check if the power supply circuit meets the unit's electric nominal data (tension, phases, frequency) reported on the label stuck 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 magnetothermic 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).

	<p>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.</p> <p>For proper installation, electrically connect the unit with a dedicated line, protected by a four-pole residual current circuit breaker, with a trigger threshold of 300 mA and delayed triggering (super-resistant, characteristic K).</p> <p>Install the machine in power systems with earthed neutral (TN-S/TT power systems) only.</p> <p>The electrical installation must be carried out in accordance with norms in force.</p>
	<p>WARNING: The supply voltage's fluctuations can not exceed $\pm 5\%$ of the nominal value. Should this tolerance not be respected, please contact our technical department.</p>
	<p>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.</p> <p>WARNING: The water flow switch (B component in the previous hydraulic circuit and factory installed) have ALWAYS to be connected following the indications listed in the wiring diagram. Never bridge the water flow switch connections in the terminal board. Should the water flow switch connections altered or not properly made, the guarantee will be invalidated.</p>
	<p>WARNING: The opening of the separating plate between the 1st and 2nd level of the electrical box is permitted only to qualified personnel. When lowering the separating plate, be careful not to damage the wiring harness that connects the inverter boards. Before lowering the separating plate, unplug the communication cables of the inverter boards (see the wiring drawings "Control Signals 1", section 24.2, 24.6, 24.11, 24.15; these cables are marked in the drawings with the words: I-, I+, GND, I2+, I2-, GND2 and are indicated by the numbers: 106,107,108,109,110,111).</p>
	<p>WARNING: The remote control panel is connected to the water chiller by means of no.4 wires having a 1,5 mm² section. The power supply cables have to be separated from the remote control wires. The maximum distance is 50m.</p>
	<p>WARNING: The remote control panel can not 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.</p>

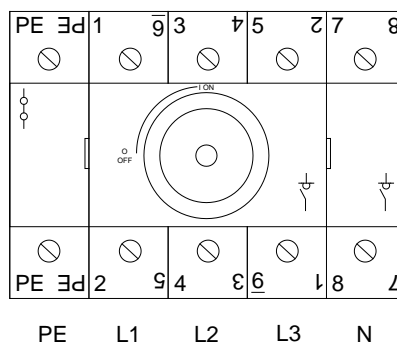
7.6.1 Wiring terminal block



Electrical wiring have to be done only by qualified personnel.

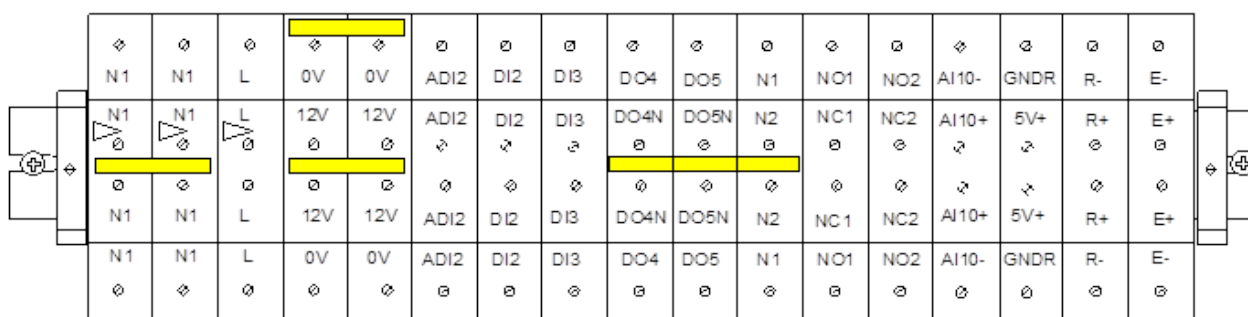
The electrical connections have to be realized by qualified personnel.

The power supply of the appliances 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:



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

The user terminal block (UTB) is located inside the electrical panel. The terminal must be connected according the notes indicated below (the drawing is indicative only).

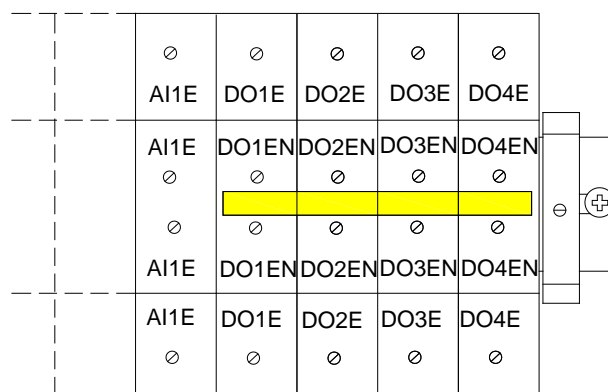


The connections indicated below are standard. Other connections are reported in the manual of the controller (table of configurations that are allowed to user and installer).

TERMINAL	TYPE	CONNECTION
N1	Neutral, 230 Vac, 50/60Hz	Connections made in factory (see wiring diagrams)
L	Phase, 230 Vac, 50/50Hz	Connections made in factory (see wiring diagrams)
0V	Power supply 12 Vac (1)	Power supply 1 for remote keyboard CRH/double set point humidistat kit/Hi-T
12V	Power supply 12 Vac (1)	Power supply 1 for remote keyboard CRH/double set point humidistat kit/Hi-T
0V	Power supply 12 Vac (2)	Power supply 2 for remote keyboard/double set point humidistat kit/Hi-T
12V	Power supply 12 Vac (2)	Power supply 1 for remote keyboard/double set point humidistat kit/Hi-T
ADI2	Analogue input NTC ST8/digital DI7	Sanitary temperature probe inlet/ sanitary call from digital input
ADI2	Analogue input NTC ST8/digital DI7	Sanitary temperature probe inlet/ sanitary call from digital input
DI2	Digital input DI2	Remote ON/OFF input (close=power ON unit / open=power OF unit)
DI2	Digital input DI2	Remote ON/OFF input (close=power ON unit / open=power OF unit)
DI3	Digital input DI3	Summer/winter input from remote call (close=summer mode / open=winter mode)
DI3	Digital input DI3	Summer/winter input from remote call (close=summer mode / open=winter mode)
DO4N	Digital output, neutral 230	Connections made in factory (see wiring diagrams)

	Vac	
DO4	Digital output, phase 230 Vac	Connections made in factory (see wiring diagrams)
DO5N	Digital output, neutral 230 Vac	Connections made in factory (see wiring diagrams)
DO5	Digital output, phase 230 Vac	Connections made in factory (see wiring diagrams)
NC1	Digital output 230 Vac with changeover contact	NC terminal power supply (230V AC) 3-way valve for sanitary storage tank (to be used only in the case of 3-way valve with 3-point turn power plant side)
N1	Digital output 230 Vac with changeover contact	Neutral power supply terminal (230V AC) 3-way valve for sanitary water tank
NO1	Digital output 230 Vac with changeover contact	NO power supply terminal (230V AC) 3-way valve for sanitary water tank (to turn the valve tank side)
NC2	Digital output 230 Vac with changeover contact	NC power supply terminal (230V, 50Hz, 5A resistive, 1 A inductive) alarm
N2	Digital output 230 Vac with changeover contact	Neutral power on terminal (230V, 50Hz, 5A resistive, 1 A inductive) alarm
NO2	Digital output 230 Vac with changeover contact	NO power supply terminal (230V, 50Hz, 5A resistive, 1 A inductive) alarm
AI10+	Analogue input (ST10)	0-10V (+) signal input terminal to change the set point/ratiometric input signal
AI10-	Analogue input (ST10)	0-10V (-) signal input terminal to change the set point/ratiometric input signal
5V+	Power supply 5V dc	Ratiometric signal power supply terminal
GNDR	serial communication	Modbus ground reference terminal connection for CRH remote keyboard / Hi-T
R+	serial communication	Modbus + signal terminal connection for CRH remote keyboard / Hi-T
R-	serial communication	Modbus - signal terminal connection for CRH remote keyboard / Hi-T
E+	serial communication	Connections made in the factory (see wiring diagrams)
E-	serial communication	Connections made in the factory (see wiring diagrams)

The user's terminal for system manage (GITB), if present, it is located inside the electrical panel, as an extension of terminal block.
 The terminal must be connected according the notes below (the drawing is indicative).



The following are present the standard connections. Other connections and configurations are shown in the manual control (the permissible configurations tables for user and installer).


TERMINAL	TYPE	CONNECTION
AI1E	Analogue input NTC ST3E / digital input DI4E expansion board	Terminal input for remote plant temperature probe (optional) / digital input for double set-point managing (optional, if the Hi-T is not present)
AI1E	Analogue input NTC ST3E / digital input DI4E expansion board	Terminal input for remote plant temperature probe (optional) / digital input for double set-point managing (optional, if the Hi-T is not present)

DO1EN	Digital putput 230 Vac (DO1E) expansion board	Neutral terminal (230V, 50Hz, 5A resistive, 1 A inductive) for power on the contactor coil of sanitary integrative heater (not supplied)
DO1E	Digital putput 230 Vac (DO1E) expansion board	Neutral terminal (230V, 50Hz, 5A resistive, 1 A inductive) for power on the contactor coil of sanitary integrative heater (not supplied)
DO2EN	Digital putput 230 Vac (DO2E) expansion board	Neutral terminal (230V, 50Hz, 5A resistive, 1 A inductive) for power on the contactor coil of sanitary integrative heater (not supplied)
DO2E	Digital putput 230 Vac (DO2E) expansion board	Neutral terminal (230V, 50Hz, 5A resistive, 1 A inductive) for power on the contactor coil of sanitary integrative heater (not supplied)
DO3EN	Digital putput 230 Vac (DO3E) expansion board	Neutral terminal (230V, 50Hz, 5A resistive, 1 A inductive) for boiler consent (voltage output, use a relay)
DO3E	Digital putput 230 Vac (DO3E) expansion board	Neutral terminal (230V, 50Hz, 5A resistive, 1 A inductive) for boiler consent (voltage output, use a relay)
DO4EN	Digital putput 230 Vac (DO4E) expansion board	Neutral terminal power supply (230V AC) double setpoint 3 way valve for radiant panels (optional)
DO4E	Digital putput 230 Vac (DO4E) expansion board	Power supply phase terminal (230V, 50Hz, 5A resistive, 1 A inductive) double setpoint 3 way valve for radiant panels (optional) (if the contact is active the valve must be turn to floor side, with disabled contact the valve is in fancoil side)

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 ($\pm 5\%$) 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.

	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 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 $10^{\circ}\text{C} \div 15^{\circ}\text{C}$ 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 have 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.

9 POWER-ON OF THE UNIT

Is below described the ignition process: holding pushed down the green button (located to the right of the switch disconnecter), rotate the switch disconnecter to the ON state.

Both components are located in the outer sheet of the electrical box, will therefore need to open the access door of the unit in order to perform the operation.

The green button is used for manual reset of the main electromechanical components (compressors and fans)

In case of power outage (whether the machine was in operation, whether it was in the OFF mode), it will be necessary to perform the following procedure:

- Turn the the disconnect switch to the OFF state;
- Wait about 20 seconds;
- Perform the standard power-on of the unit presented earlier: press and hold the green button and turn the disconnect switch to the ON mode.

It is pointed out that:

- In case of outage during operation of the unit, the next restart of the power supply, the control shows the error E64, making necessary the procedure described above.
- In case of outage while the unit is in the OFF mode, when the power supply is restarted, the control remains to OFF mode, and thus will be needed to perform the restart procedure described above.

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 serious danger 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.

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 piping 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 their surroundings. After maintenance operations, re-install the cover panels, and fix them by means of screws.



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 a different oil can cause serious damage to the compressor.

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
Filling 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 leakages 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 voltag is correct.			x
Check the Correct absorption.			x
Check the refrigerant charge.			x
Check the operating pressure, and superheat and subcooling			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 WHEN THE UNIT GOES OUT OF SERVICE

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 recovered 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.

13 TECHNICAL DATA (preliminaries)

13.1 STANDARD VERSION

TECHNICAL CHARACTERISTICS		Unit	Modello i-HP					
			0125	0125 Circulator integrated	0235	0235 Circulator integrated	0250	0250 Circulator integrated
Electric data	Power supply		400V/3P+N+T/50Hz		400V/3P+N+T/50Hz		400V/3P+N+T/50Hz	
	Maximum power input	kW	13,77	14,08	21,54	21,85	25,44	25,91
	Maximum starting current	A	12,9	13,2	20,2	20,5	23,9	24,3
	Maximum current input	A	19,9	20,3	31,1	31,6	36,8	37,4
Cooling	Cooling capacity (1)	kW	20,06 (22,1*)	20,1 (22,1*)	28,26 (30,2*)	28,3 (30,2*)	36,18 (38,4*)	36,1 (38,3*)
	Power input (1)	kW	7,24	7,2	10,04	10,0	12,82	12,9
	E.E.R. (1)	W/W	2,77	2,80	2,82	2,83	2,82	2,80
	Cooling capacity (2)	kW	27,48 (29,5*)	27,5 (29,5*)	38,40 (41,2*)	38,4 (41,2*)	48,85 (52,4*)	48,7 (52,2*)
	Power input (2)	kW	6,72	6,7	9,70	9,7	12,65	12,8
	E.E.R. (2)	W/W	4,09	4,10	3,96	3,96	3,86	3,81
Heating	Heating capacity (3)	kW	21,53 (23,1*)	21,5 (23,1*)	32,43 (34,8*)	32,4 (34,8*)	41,30 (43,3*)	41,4 (43,4*)
	Power input (3)	kW	6,43	6,4	9,63	9,6	12,30	12,4
	C.O.P. (3)	W/W	3,35	3,36	3,37	3,38	3,36	3,34
	Heating capacity (4)	kW	25,23 (27,1*)	25,2 (27,1*)	37,91 (40,8*)	37,9 (40,8*)	48,55 (52,1*)	48,7 (52,3*)
	Power input (4)	kW	6,13	6,1	9,21	9,2	11,75	11,9
	C.O.P. (4)	W/W	4,12	4,13	4,12	4,12	4,13	4,10
Compressor	Type		Scroll DC Inverter		Scroll DC Inverter		Scroll DC inverter	
	Number		1		2		2	
	Refrigerant oil (type, quantity)	mL	FV50S, 2300		FV50S, 4000 total		FV50S, 4600 total	
Fan motor	Type		Motore DC Brushless		Motore DC Brushless		Motore DC Brushless	
	Number		1		1		1	
	Rated power input	kW	0.42		0.55		0.91	
	Rated current input	A	0.62		0.83		1.44	
	Speed	r/min	561		620		752	
	Rated air flow	m ³ /s	5.00		5.56		6.94	
Refrigerant	Type		R410A		R410A		R410A	
	Refrigerant quantity	kg	9.5		15.35		15.75	
	Design pressure (high/low)	MPa	4.15/2.7		4.15/2.7		4.15/2.7	
Hydraulic circuit	Water flow rate (4)	L/s	1.21	1.20	1.81	1.81	2.32	2.33
	Available head pressure (4)	kPa	/	85.6	/	54.0	/	42.3
	Internal head loss (4)	kPa	32.9		49.8		61.7	
	Pump rated power input (4)	kW	/	0.30	/	0.31	/	0.47
	Pump max power input	kW	/	0.31	/	0.31	/	0.47
	Pump max current input	A	/	1.37	/	1.37	/	2.05
	Hydraulic connections	inch	2"F		2"F		2"F	
	Minimum volume of water	L	75		105		150	
Noise level	Sound pressure (5)	dB(A)	54,4 / SL 52,4 / SSL 50,7		56,5 / SL 54,7 / SSL 53,0		59,7 / SL 58,7 / SSL 56,5	
Dimensions and weight	Dimensions (LxHxW)	mm	1198x1741x1198		1198x1741x1198		1198x1741x1198	
	Max. Packing dimensions	mm	1210x1917x1210		1210x1917x1210		1210x1917x1210	
	Operating weight	kg	357		363		422	
	Net/Gross weight	kg	349/376		355/382		406/433	

Operating conditions:

- (1) Cooling: Outdoor air temperature 35°C; inlet/outlet water temperature 12/7°C.
 - (2) Cooling : Outdoor air temperature 35°C; inlet/outlet water temperature 23/ 18°C.
 - (3) Heating: Outdoor air temperature 7°C DB 6°C WB; inlet/outlet water temperature 40/45°C.
 - (4) Heating: Outdoor air temperature 7°C DB 6°C WB; inlet/outlet temperature 30/35°C.
 - (5) Sound pressure level measured at 1m from the unit, in free field, according to ISO 3744. Also the values with installed accessories SL or SSL have been reported.
- *with Hz Max function

N.B. The performance data are indicative and could be subject to change. In addition, the performances declared in (1), (2), (3) and (4) are to be understood referring to the instantaneous power according to EN 14511.



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

13.2 LT VERSION

TECHNICAL CHARACTERISTICS		Unit	Models i-HP-LT					
			0125	0125 Circulator integrated	0235	0235 Circulator integrated	0250	0250 Circulator integrated
Electric data	Power supply		400V/3P+N+T/50Hz		400V/3P+N+T/50Hz		400V/3P+N+T/50Hz	
	Maximum power input	kW	13,77	14,08	21,54	21,85	25,44	25,91
	Maximum starting current	A	12,9	13,2	20,2	20,5	23,9	24,3
	Maximum current input	A	19,9	20,3	31,1	31,6	36,8	37,4
Cooling	Cooling capacity (1)	kW	20,06 (22,1*)	20,1 (22,1*)	28,26 (30,2*)	28,3 (30,2*)	36,18 (38,4*)	36,1 (38,3*)
	Power input (1)	kW	7,24	7,2	10,04	10,0	12,82	12,9
	E.E.R. (1)	W/W	2,77	2,80	2,82	2,83	2,82	2,80
	Cooling capacity (2)	kW	27,48 (29,5*)	27,5 (29,5*)	38,40 (41,2*)	38,4 (41,2*)	48,85 (52,4*)	48,7 (52,2*)
	Power input (2)	kW	6,72	6,7	9,70	9,7	12,65	12,8
	E.E.R. (2)	W/W	4,09	4,10	3,96	3,96	3,86	3,81
Heating	Heating capacity (3)	kW	21,53 (23,1*)	21,5 (23,1*)	32,43 (34,8*)	32,4 (34,8*)	41,30 (43,3*)	41,4 (43,4*)
	Power input (3)	kW	6,43	6,4	9,63	9,6	12,30	12,4
	C.O.P. (3)	W/W	3,35	3,36	3,37	3,38	3,36	3,34
	Heating capacity (4)	kW	25,23 (27,1*)	25,2 (27,1*)	37,91 (40,8*)	37,9 (40,8*)	48,55 (52,1*)	48,7 (52,3*)
	Power input (4)	kW	6,13	6,1	9,21	9,2	11,75	11,9
	C.O.P. (4)	W/W	4,12	4,13	4,12	4,12	4,13	4,10
Compressor	Type		Scroll DC Inverter		Scroll DC Inverter		Scroll DC inverter	
	Number		1		2		2	
	Refrigerant oil (type, quantity)	mL	FV50S, 2300		FV50S, 4000 total		FV50S, 4600 total	
Fan motor	Type		Motore DC Brushless		Motore DC Brushless		Motore DC Brushless	
	Number		1		1		1	
	Rated power input	kW	0.42		0.55		0.91	
	Rated current input	A	0.62		0.83		1.44	
	Speed	r/min	561		620		752	
	Rated air flow	m ³ /s	5.00		5.56		6.94	
Refrigerant	Type		R410A		R410A		R410A	
	Refrigerant quantity	kg	9.5		15.35		15.75	
	Design pressure (high/low)	MPa	4.15/2.7		4.15/2.7		4.15/2.7	
Hydraulic circuit	Water flow rate (4)	L/s	1.21	1.20	1.81	1.81	2.32	2.33
	Available head pressure (4)	kPa	/	85.6	/	54.0	/	42.3
	Internal head loss (4)	kPa	32.9	49.8	61.7			
	Pump rated power input (4)	kW	/	0.30	/	0.31	/	0.47
	Pump max power input	kW	/	0.31	/	0.31	/	0.47
	Pump max current input	A	/	1.37	/	1.37	/	2.05
	Hydraulic connections	inch	2"F		2"F		2"F	
	Minimum volume of water	L	75		105		150	
Noise level	Sound pressure (5)	dB(A)	54,4 / SL 52,4 / SSL 50,7		56,5 / SL 54,7 / SSL 53,0		59,7 / SL 58,7 / SSL 56,5	
Dimensions and weight	Dimensions (LxHxW)	mm	1198x1741x1198		1198x1741x1198		1198x1741x1198	
	Max. Packing dimensions	mm	1210x1917x1210		1210x1917x1210		1210x1917x1210	
	Operating weight	kg	363	369	420	426	428	443
	Net/Gross weight	kg	355/382	361/388	412/439	418/445	420/447	435/462

Operating conditions:

(1) Cooling: Outdoor air temperature 35°C; inlet/outlet water temperature 12/7°C.

(2) Cooling : Outdoor air temperature 35°C; inlet/outlet water temperature 23/ 18°C.

(3) Heating: Outdoor air temperature 7°C DB 6°C WB; inlet/outlet water temperature 40/45°C.

(4) Heating: Outdoor air temperature 7°C DB 6°C WB; inlet/outlet temperature 30/35°C.

(5) Sound pressure level measured at 1m from the unit, in free field, according to ISO 3744. Also the values with installed accessories SL or SSL have been reported.

*with Hz Max function

N.B. The performance data are indicative and could be subject to change. In addition, the performances declared in (1), (2), (3) and (4) are to be understood referring to the instantaneous power according to EN 14511.

14 ELECTRIC DATA OF THE UNIT AND AUXILIARIES

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

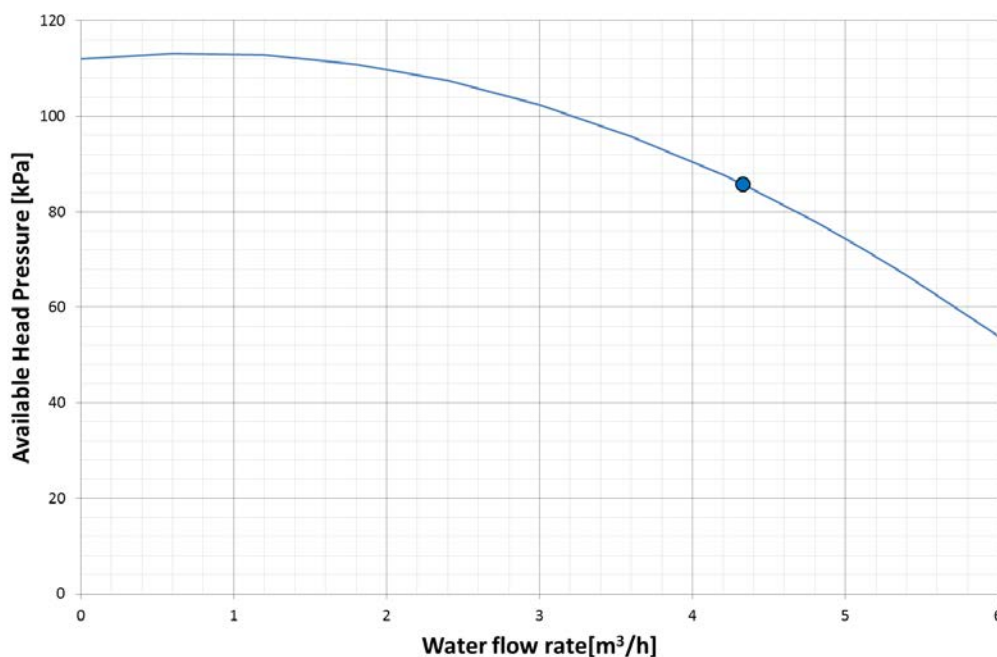
Note: Electric data may change for updating. It is therefore necessary to refer always to the technical data label stuck on right-side panel of the unit.

15 HEAT PUMPS AVAILABLE HEAD PRESSURE WITH INTEGRATED CIRCULATOR

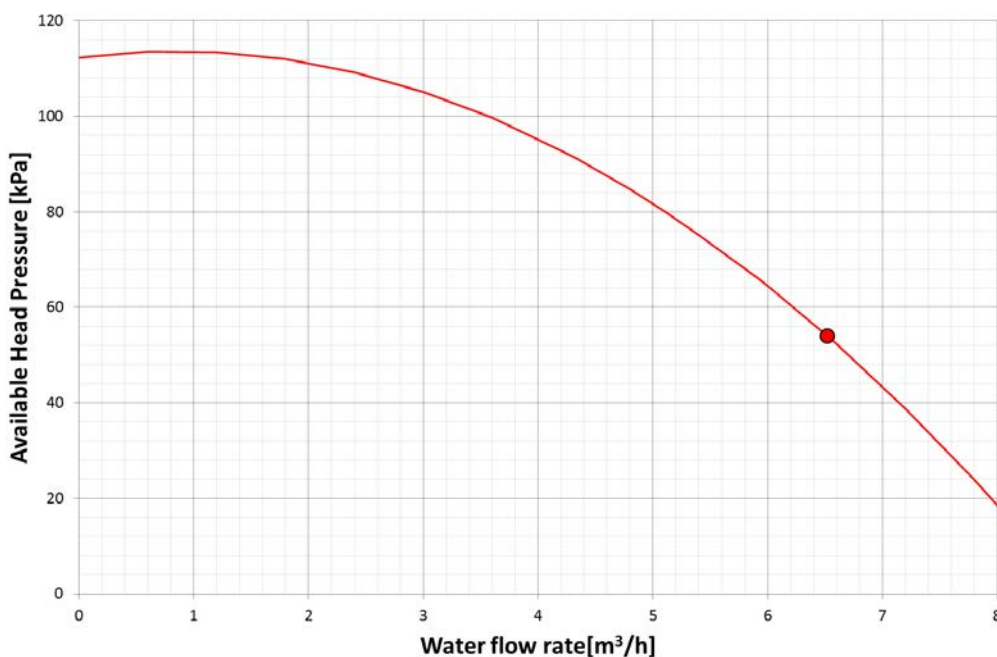
Below the characteristic curves corresponding to Head pressure -Water flow without head losses of the hydronic kit at the maximum speed of the circulator. The optimal operating point is shown on each curve under the specified conditions at the apex (4) p. 20.

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

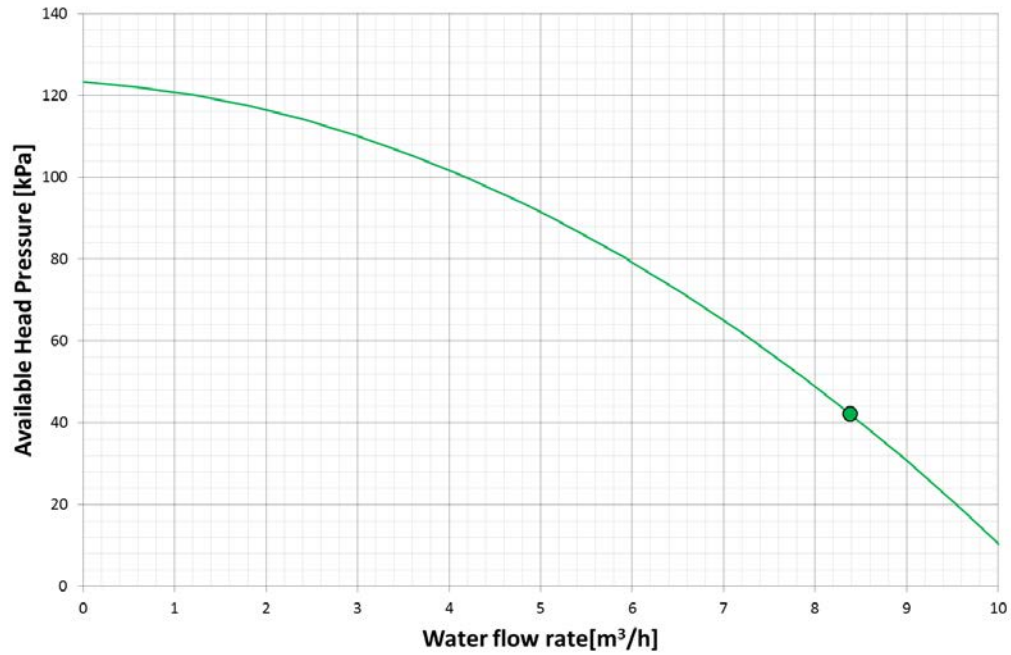
15.1 MODEL i-HP 0125



15.2 MODEL i-HP 0235



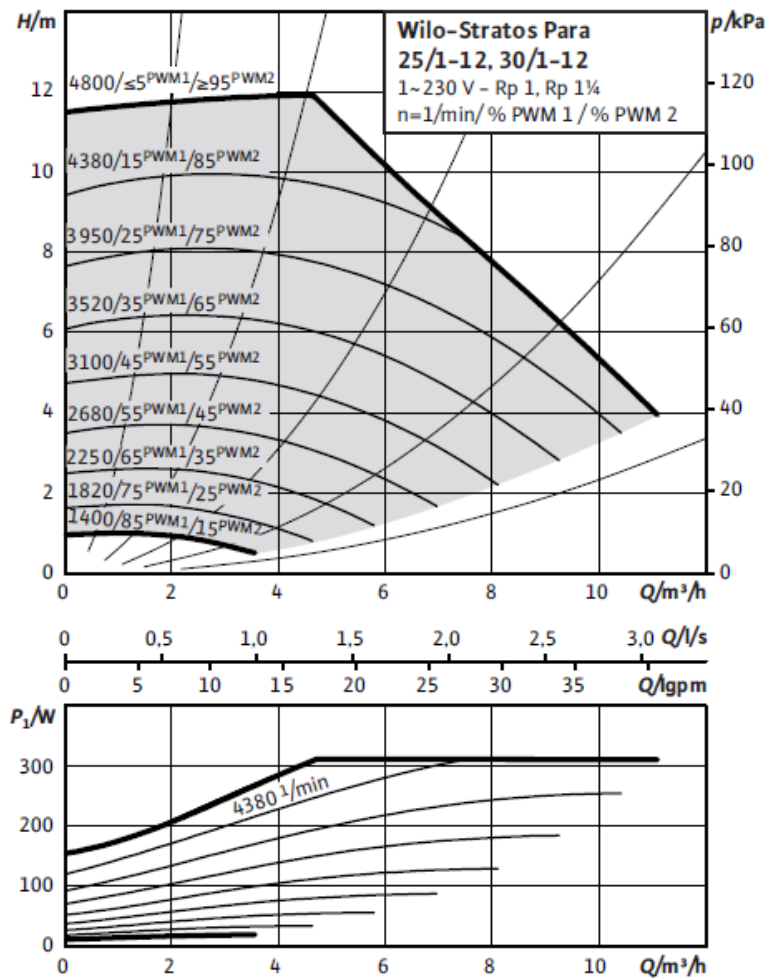
15.3 MODEL i-HP 0250



16 WATER PUMP CURVES

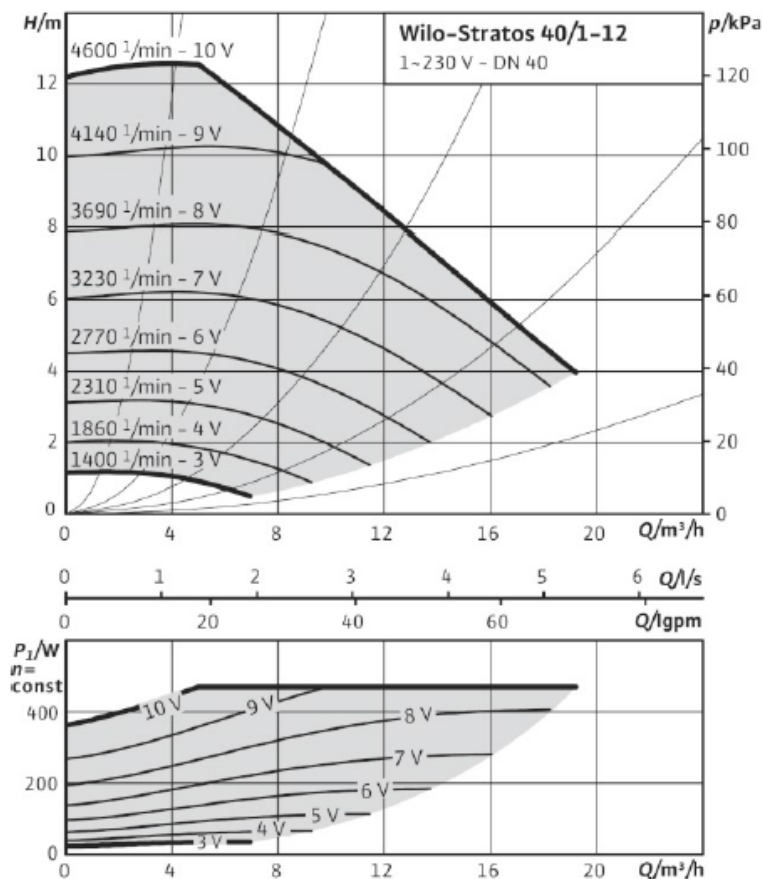
16.1 MODELS i-HP 0125 – 0235

External control via PWM1 signal



16.2 MODEL i-HP 0250

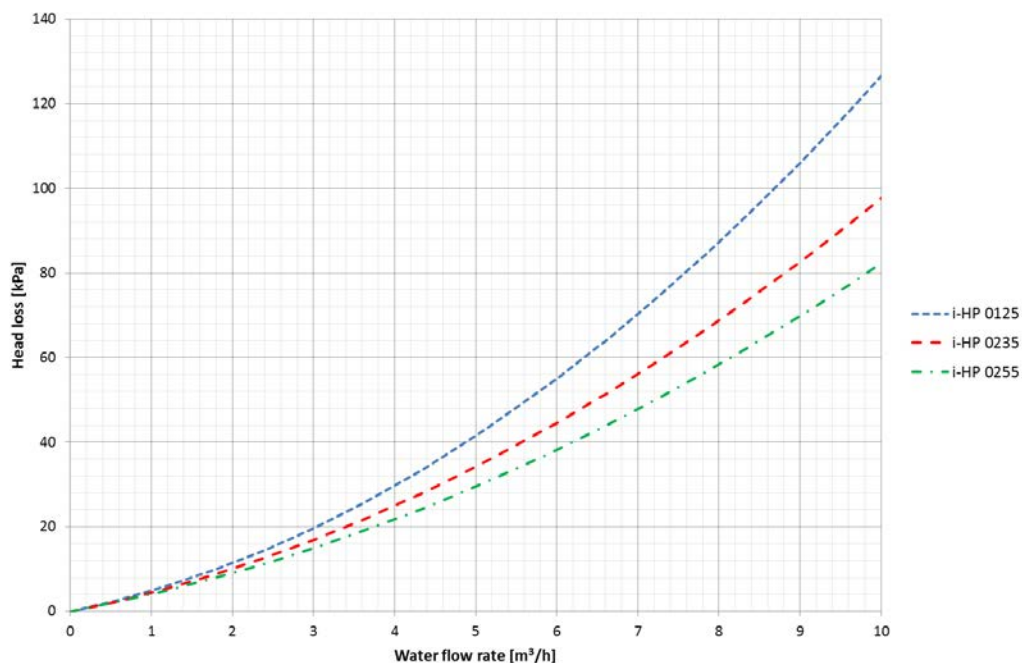
External control via 0-10 V analog signal



17 LOAD LOSSES CURVES OF THE HYDRONIC CIRCUIT

We obtain the pressure head of the circulating pump from the sum of the head losses of the hydronic circuit and the available head pressure.

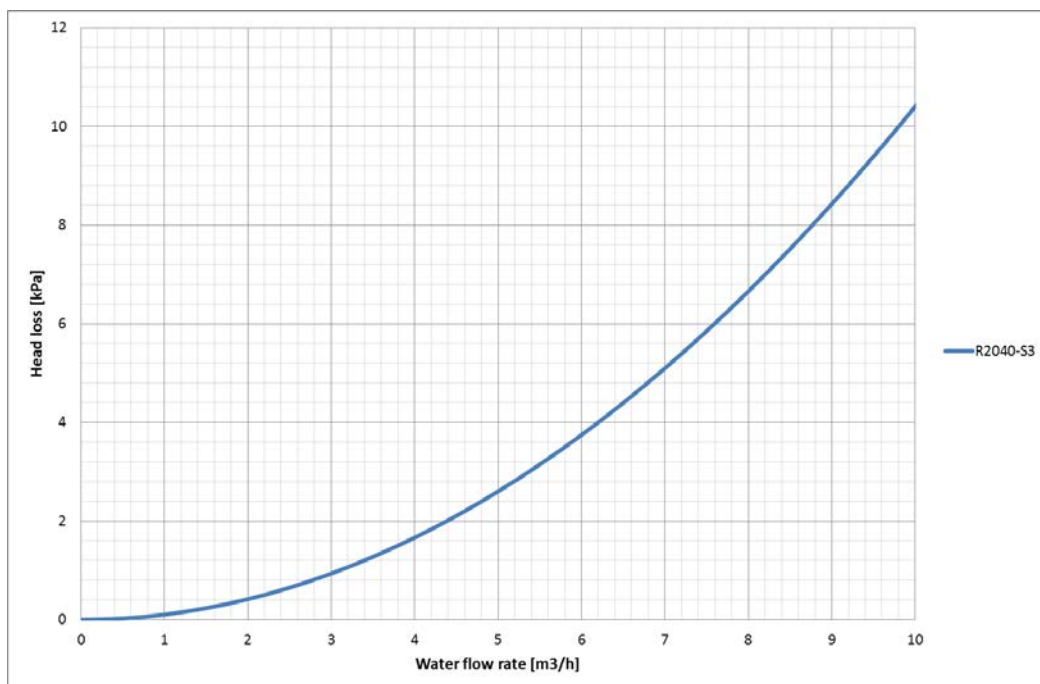
For example: for the model i-HP 0125 with nominal water flow 1,2 L/s (4,3 mc/h) we obtain: 32,9 kPa (head loss) + 85,6 kPa (available head pressure)=118,5 kPa (circulator head pressure).



18 CHARACTERISTIC CURVE OF THE CONTROL VALVE FOR UNIT IN PARALLEL

If the hydronic configuration (CI) is installed on the unit with the variant "shut off valve" (2), the head losses of the ON / OFF motorized valve should be added to those given in the curves of Paragraph 17.

For example: for the model i-HP 0125 with nominal water flow 1,2 L/s (4,3 mc/h) it's obtained: 2,0 kPa (valve head loss) + 32,9 kPa (hydronic circuit head loss)=34,9 kPa (total internal head loss).



19 ACCESSORIES TO REDUCE THE NOISE LEVEL

19.1 SL

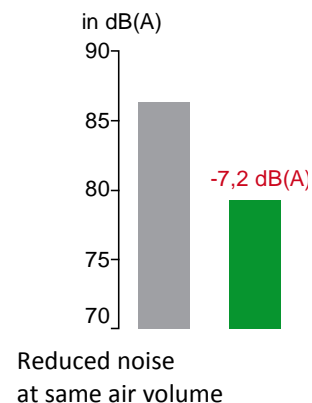
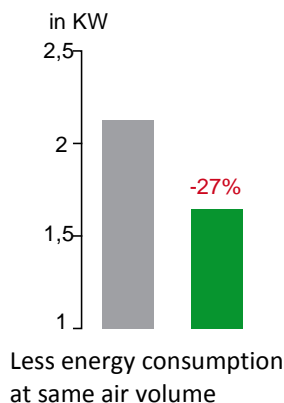
The silenced unit (with SL accessory) is provided with innovating thermo-acoustic shells on compressors. These shells allow a noise reduction up to 10% at specific compressor rotation frequencies. The special multi-layer structure generates a thermal insulation which reduces, at very low outside temperatures, the heat losses of 2% compared to a standard insulation.

19.2 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 7,2 dB(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



20 OPERATING LIMITS

20.1 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 $\Delta T=3^\circ\text{C}$. Higher values may produce too high pressure drops. The allowed minimum water flow rate is corresponding to $\Delta T=8^\circ\text{C}$. Insufficient values may produce too low evaporating temperatures 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.

We enclosed below a most accurate table showing the minimum flow rates that to ensure for the plate heat exchanger for a the proper operation of unit according to 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-HP		
	0125	0235	0250
Cooling capacity for reference [kW]	27,5	38,4	48,7
Minimum water flow rate that to ensure [L/s]	0,82	1,15	1,45

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.

20.2 COLD WATER TEMPERATURE (SUMMER OPERATION)

The allowed minimum temperature at the evaporator's outlet is 5°C; for more lower temperatures please contact us. In this case 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.

In all cases, the maximum electrical input occurs for the heat pump operating mode at a water outlet temperature of 55°C and with outdoor temperature of -10°C.

20.3 HOT WATER TEMPERATURE (WINTER OPERATION)

Once the system is working at the right temperature, the inlet hot water temperature should not to 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 have not to exceed 55°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 (-25°C for versions with injection).

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.

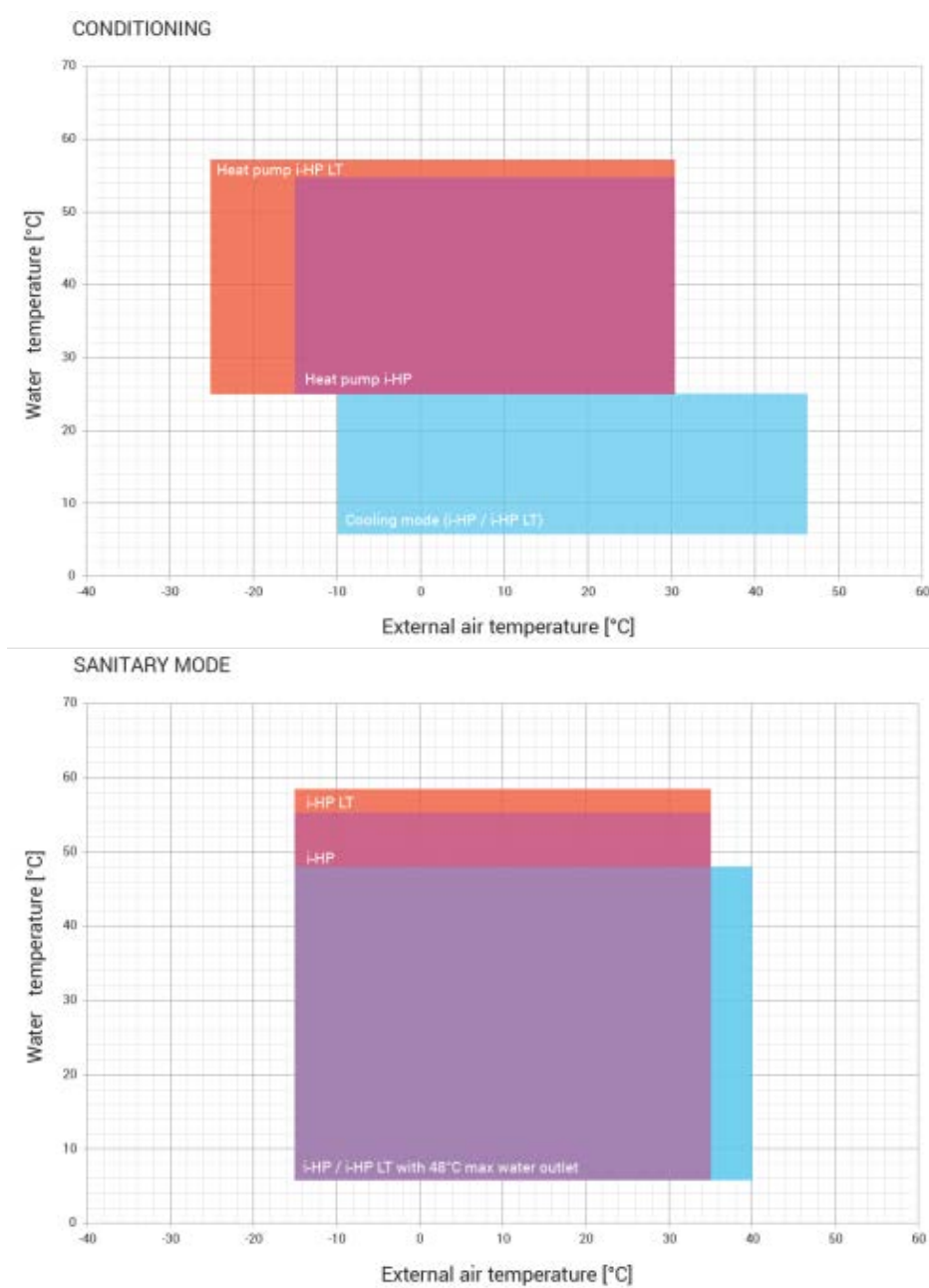
20.4 AMBIENT AIR TEMPERATURE

The units are designed and manufactured to operate, in summer operation, with the condensate control, with outdoor air temperatures ranging between -10°C and 46°C. While operating as a heat pump, the allowed range of the outdoor temperature goes from -15°C (-25°C for versions with injection) to 40°C as a function of 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 (versions of standard/injection)	Min. -15°C	Max. +30°C
Water outelt temperature (versions of standard/injection)	Min. +25°C	Max. +55°C/58°C
Heat pump mode for sanitary hot water		
Ambient temperature with maximum water temperature 48°C	Min. -15°C	Max. +40°C
Ambient temperature with maximum water temperature 55°C	Min. -15°C	Max. +35°C
Water outelt temperature (versions of standard/injection)	Min. +20°C	Max. +55°C/58°C

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



21 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

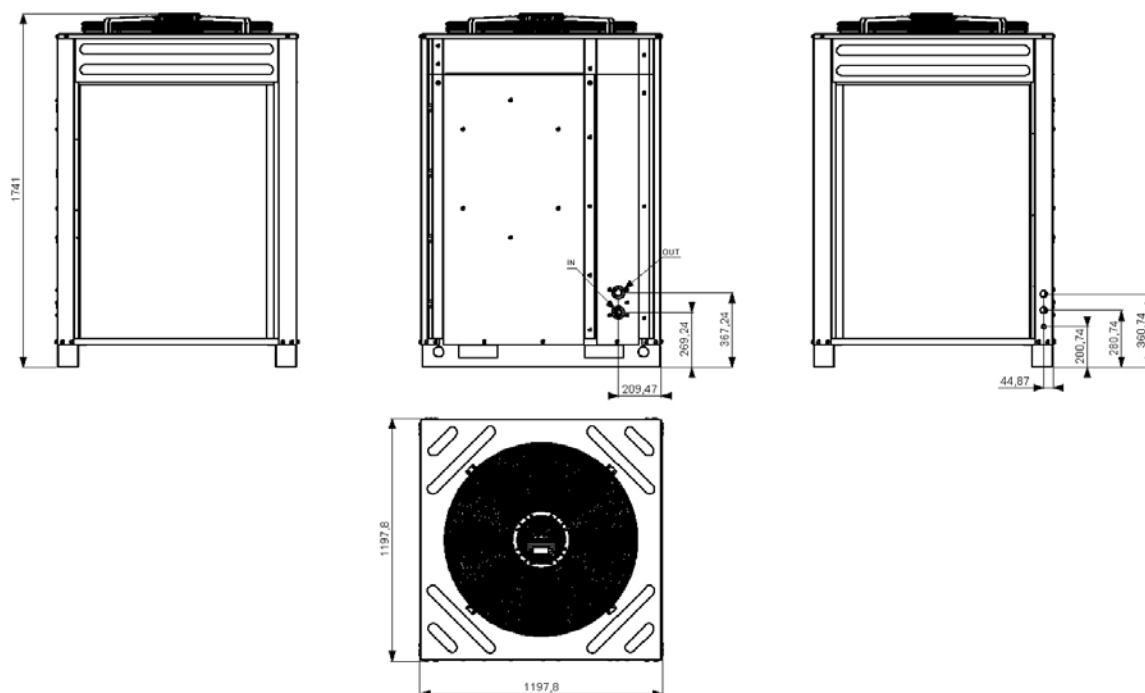
PDCF: Pressure drops correction factor.

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.

22 DIMENSIONS

22.1 MODELS N-I-HWAK/WP V2/V2+ 06

IN/OUT: 2" F



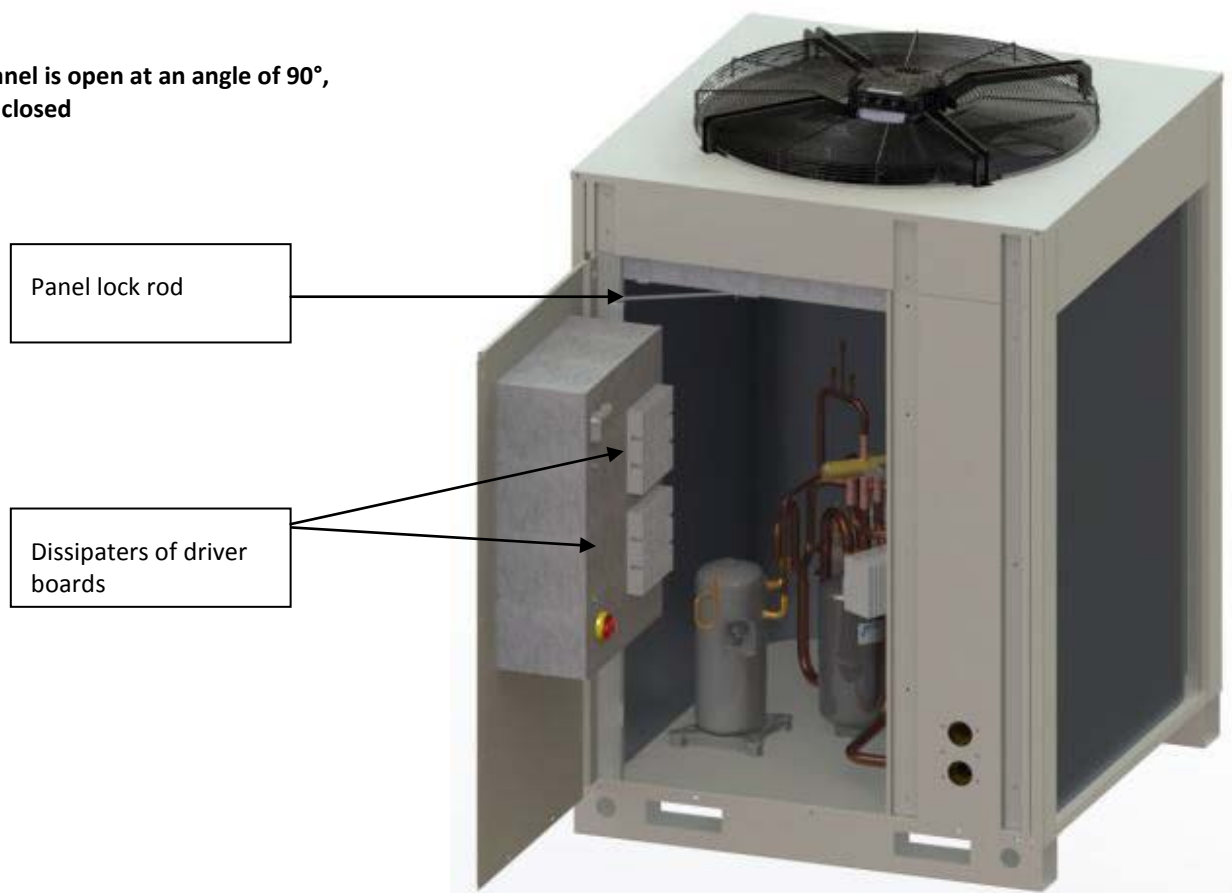
By inserting the optional element AxiTop the maximum height changes from 1741 mm to 1906 mm.

The maximum dimensions of the packaged unit with pallet are: height 2056 mm, while the plant is 1210*1210 mm.

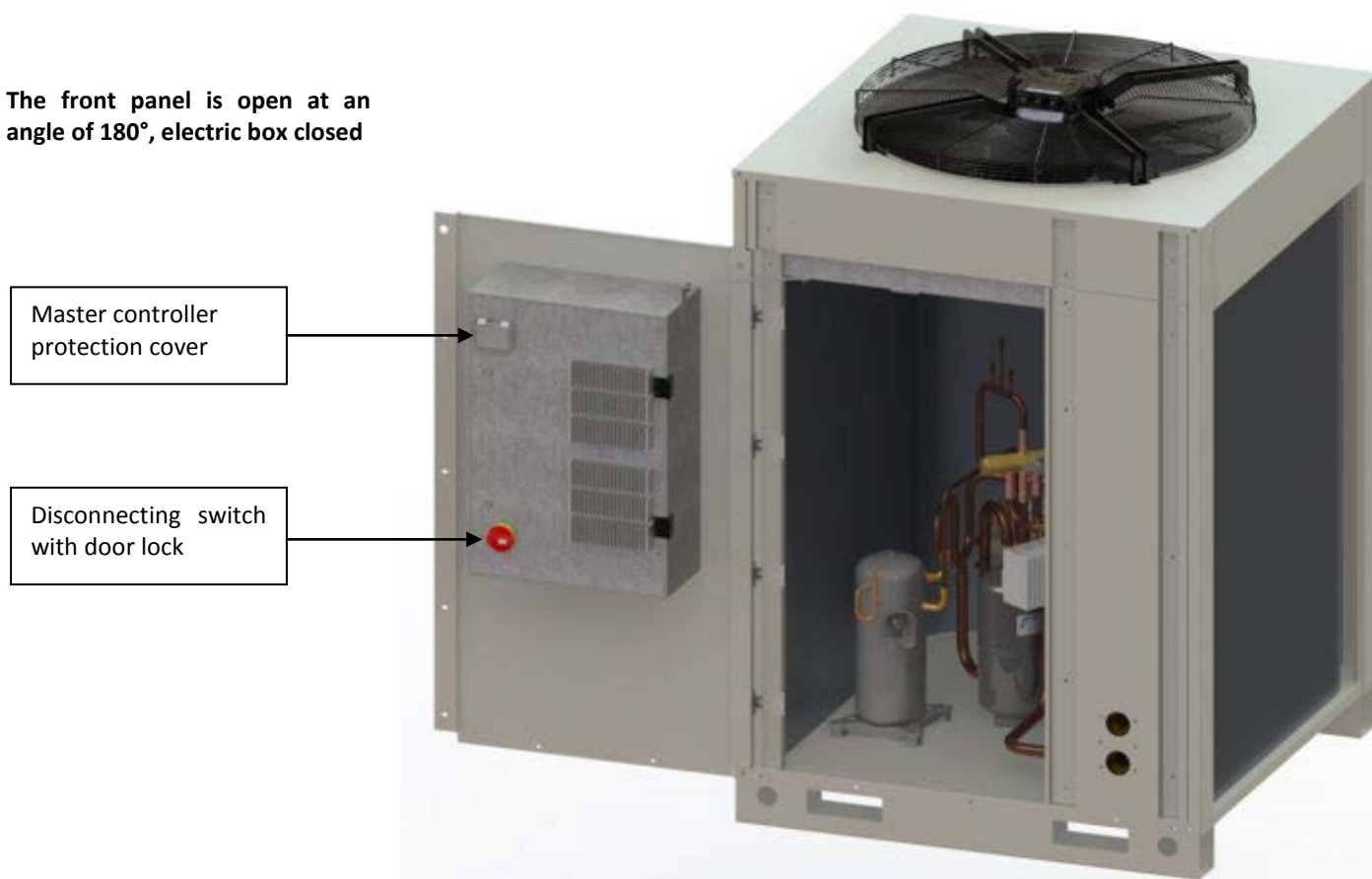
23 INTERNAL VIEWS

N.B. The number of components indicated 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 it's available.

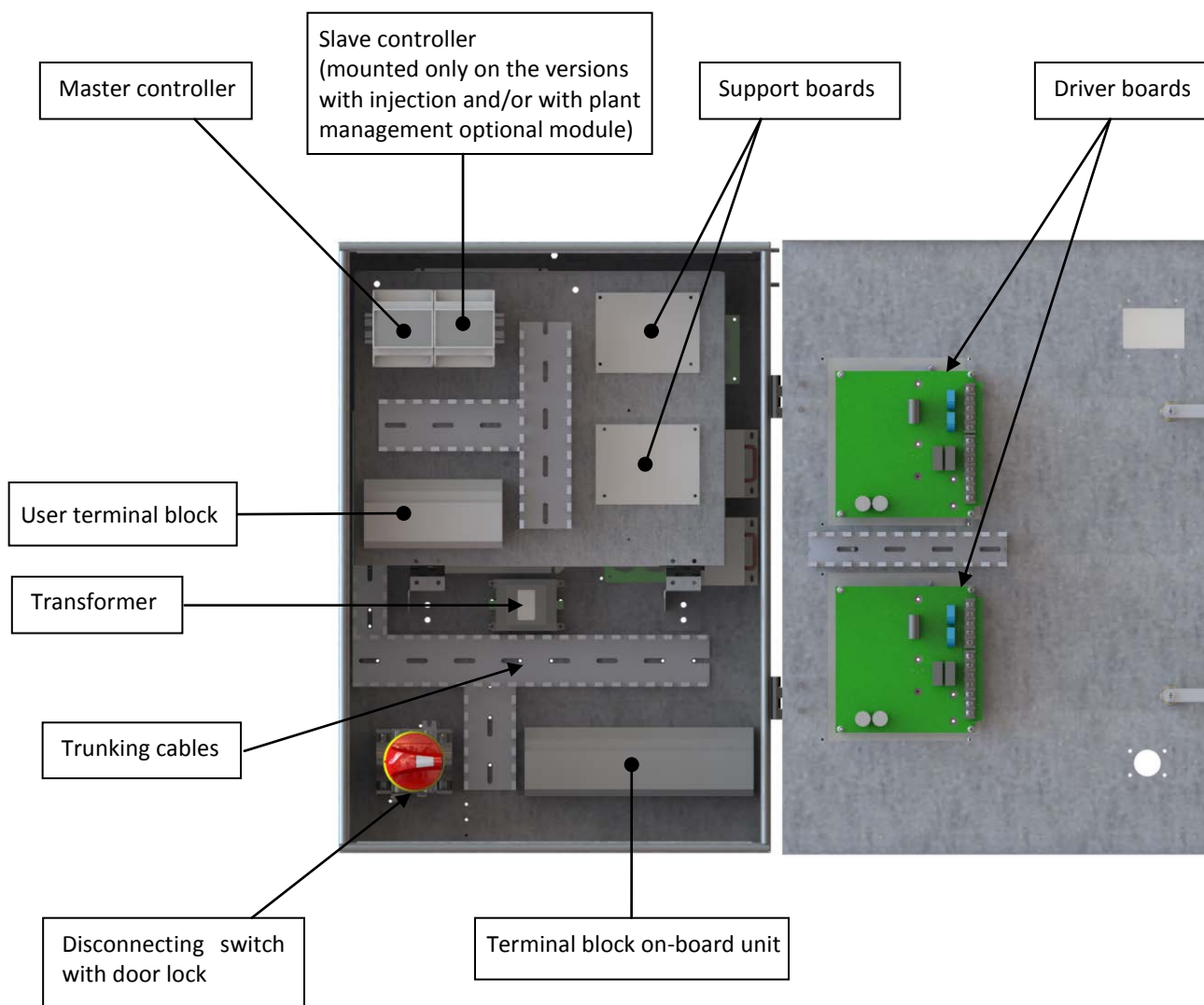
**The front panel is open at an angle of 90°,
 electric box closed**



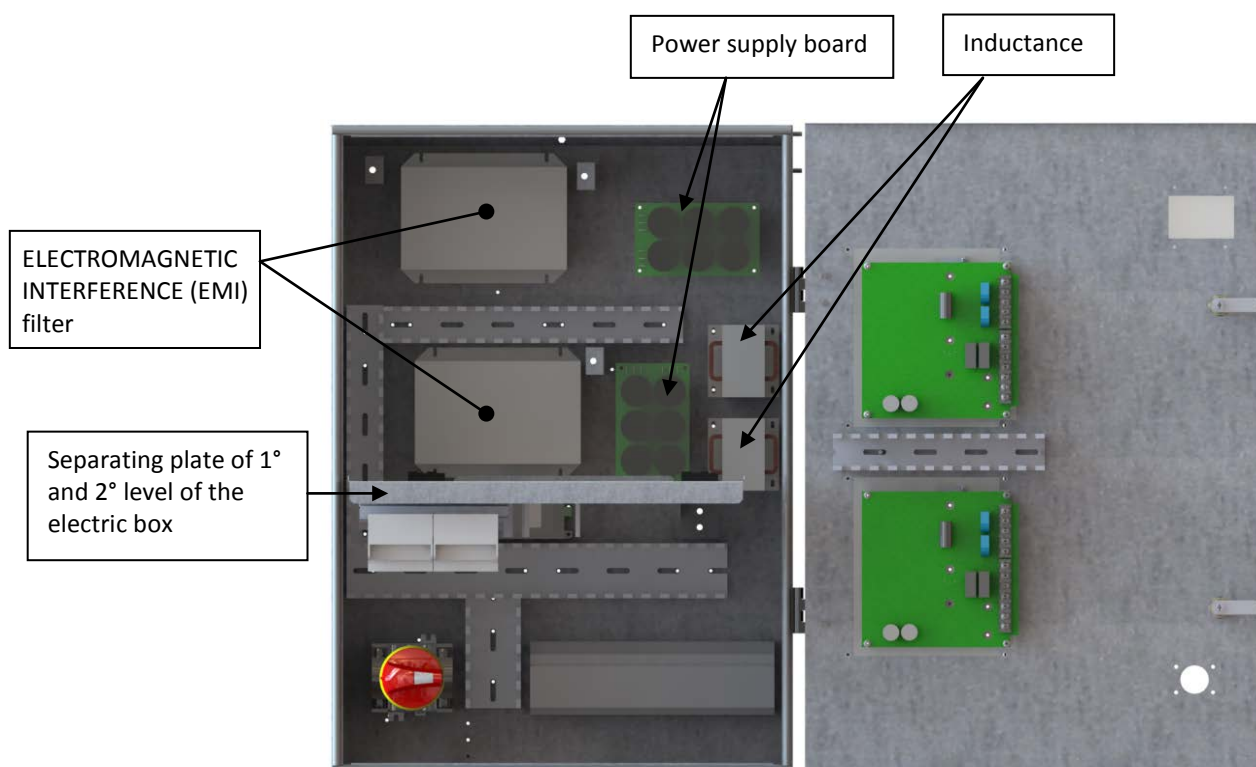
**The front panel is open at an
 angle of 180°, electric box closed**

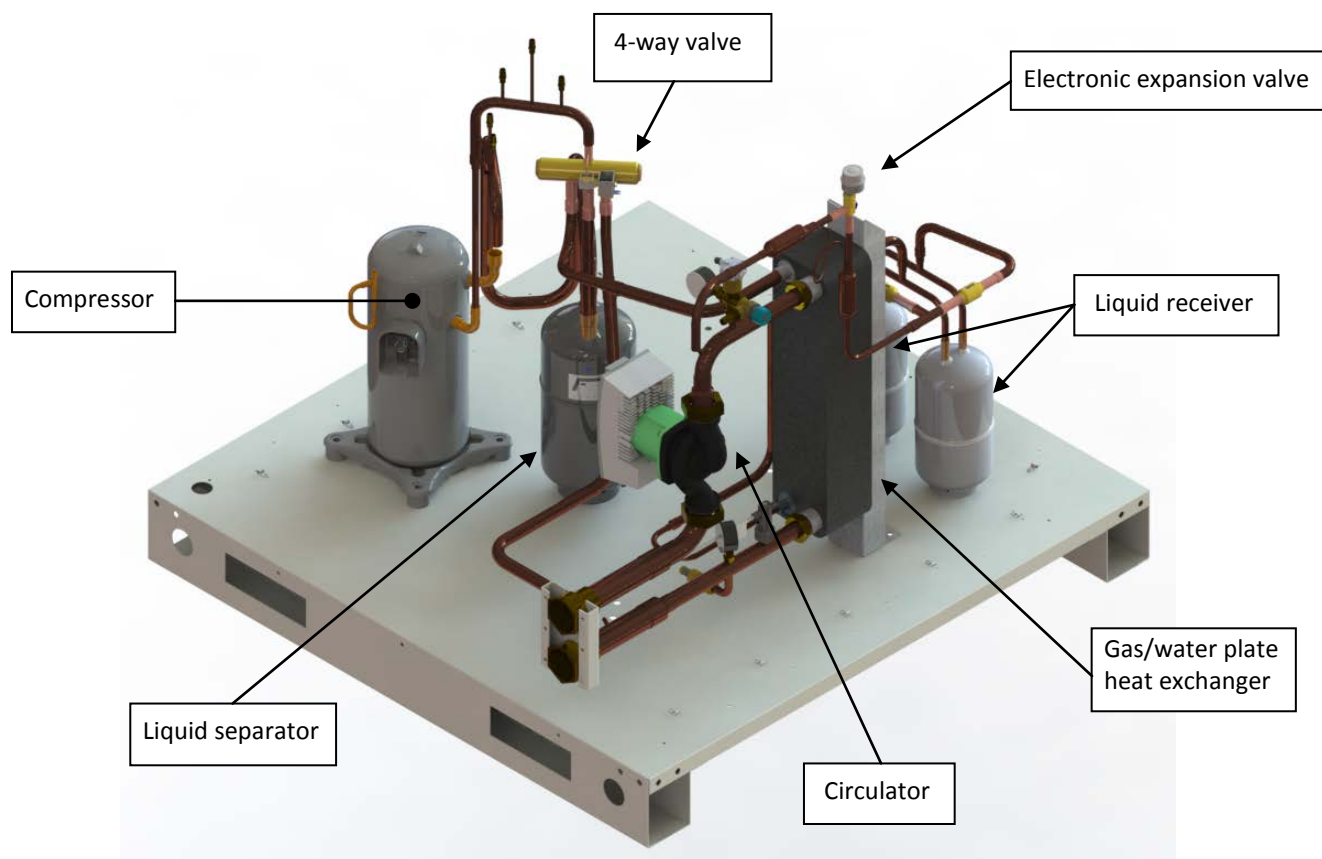
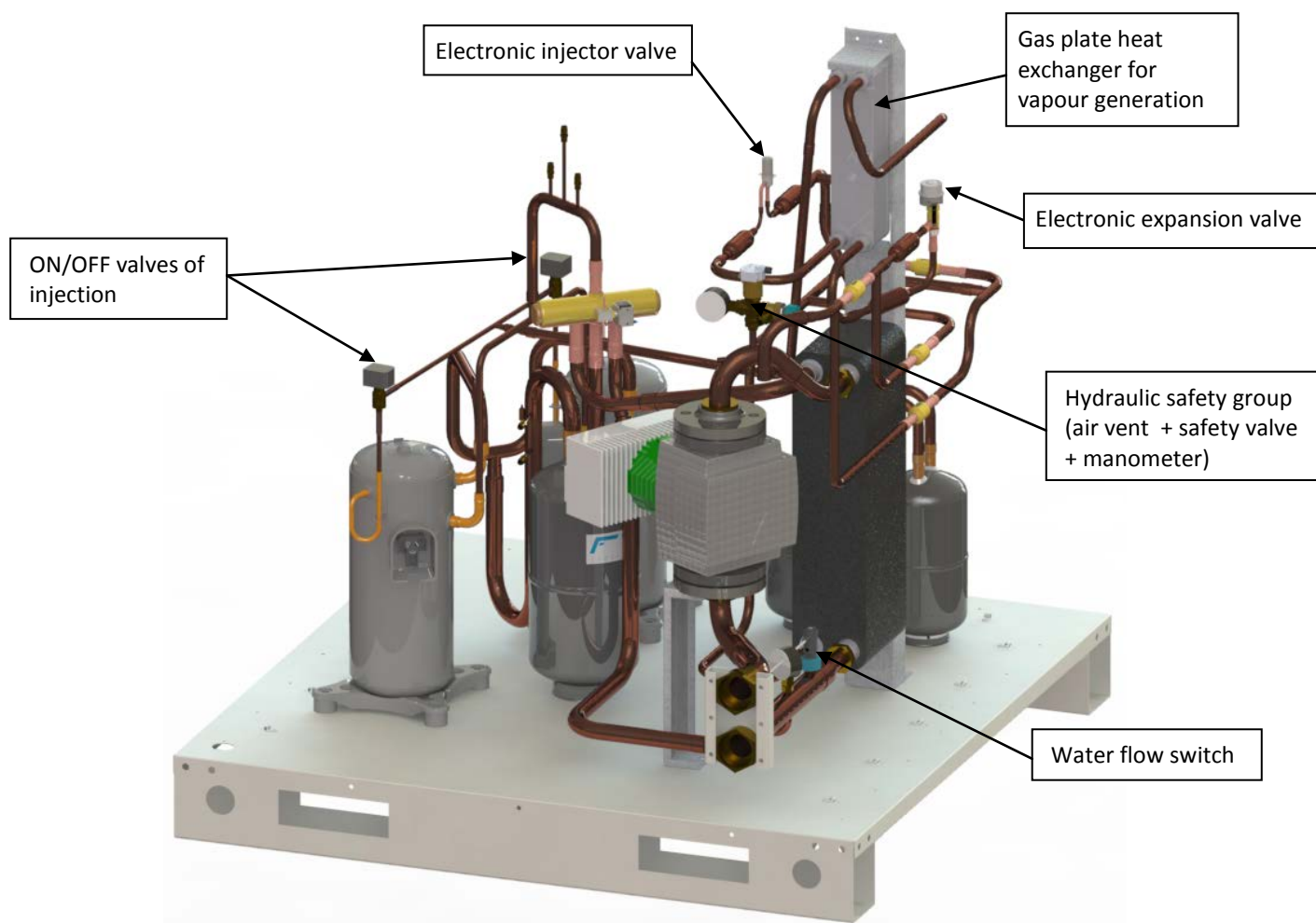


The electric box is open at the first level

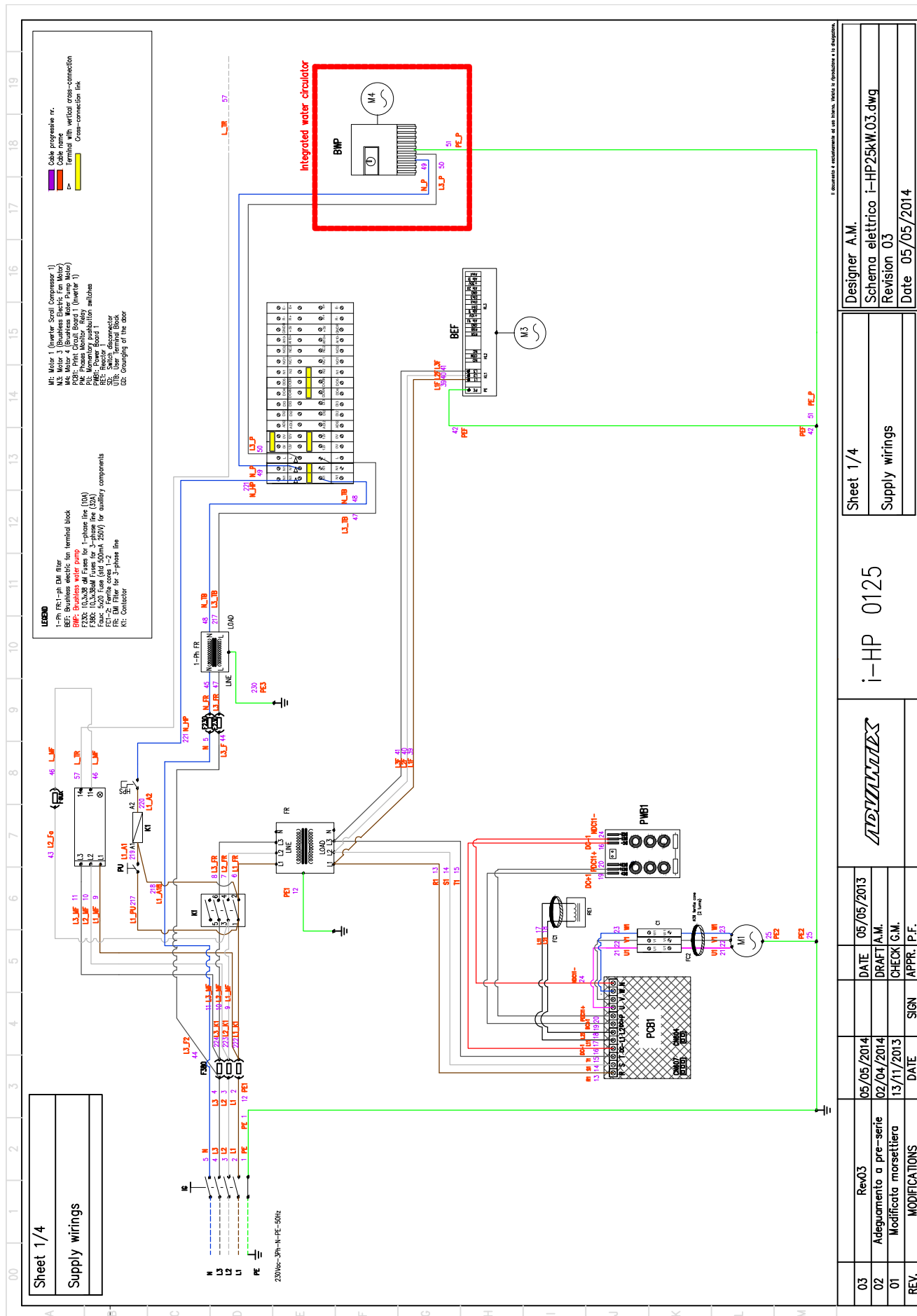


The electric box is open at the second level



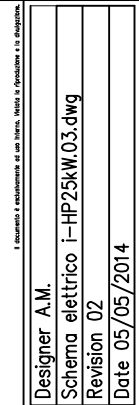
Internal views of the model i-HP 0125 with integrated circulator (in the models i-HP 0235 and 0250 with two compressors)

Internal views of the model i-HP 0250 LT with integrated circulator


24.1 MODEL i-HP 0125 (power supply)



Sheet 2/4

Control signal wirings (1)



Sheet 2/4

Control signal wirings (1)

i-HP 0125

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	DATE	05/05/2014	
	DRAFT	A.M.	
	CHECK	G.M.	
	APPR.	P.F.	

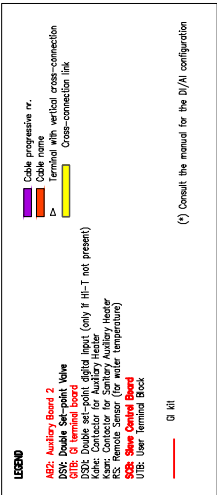
			SIG
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NS	13/11/2013		
tttiera	02/04/2014		
e-serie	05/05/2014		

03	Rev03	
02	Adeguamento a	
01	Modificata mors	
REV.	MODIFICATIO	

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Sheet 4/4

GI KIT



(*) Consult the manual for the DI/AI configuration

Il documento è esclusivamente ad uso interno. Vietata la riproduzione e la divulgazione.

Designer A.M.

Schema elettrico i-HP25kW.03.dwg

Revision 03

Date 05/05/2014

Sheet 4/4

GI KIT

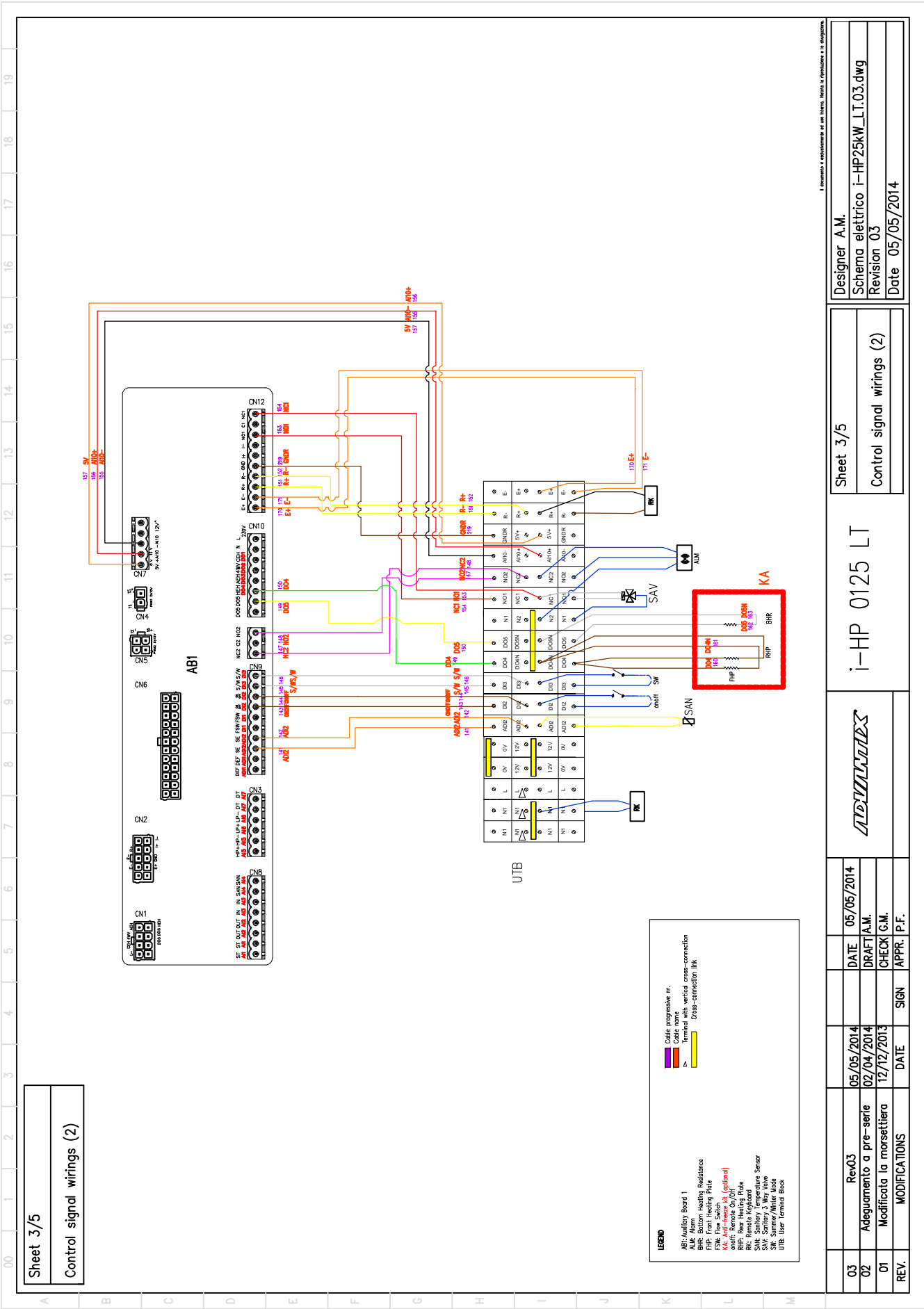
i-HP 0125

ХАЛГАД

03	Rev03	05/05/2014	DATE	05/05/2014
02	Adeguamento a pre-serie	02/04/2014	DRAFT	I.A.M.
01	Modificata maresettiera	13/11/2013	CHECK	G.M.
REV	MODIFICATIONS	DATE	SIGN	APPR. P.F.

[illegible]

24.7 MODEL i-HP-LT 0125 (control signals 2)



Designer A.M.
Schema elettrico i-HP25kW_L.T.03.dwg
Revision 03
Date 05/05/2014

Sheet 3/5
Control signal wirings (2)

i-HP 0125 LT

MAXA

05/05/2014	05/05/2014	DATE	05/05/2014
02/04/2014	02/04/2014	DRAFT A.M.	
12/12/2013	12/12/2013	CHECK G.M.	
MODIFICATIONS	DATE	SIGN	APPR. P.F.

Sheet 4/5

INJECTION

Sheet 4/5

INJECTION

Rev03

Adeguamento a pre-serie

Modificata la morsetteria

MODIFICATIONS

05/05/2014

02/04/2014

11/12/2013

DATE

05/05/2014

DRAFT/A.M.

CHECK G.M.

APPR. P.F.

DATE

SIGN

Rev03

Adeguamento a pre-serie

Modificata la morsetteria

MODIFICATIONS

05/05/2014

02/04/2014

11/12/2013

DATE

05/05/2014

DRAFT/A.M.

CHECK G.M.

APPR. P.F.

DATE

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DRAFT/A.M.

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APPR. P.F.

DATE

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APPR. P.F.

DATE

SIGN

05/05/2014

DRAFT/A.M.

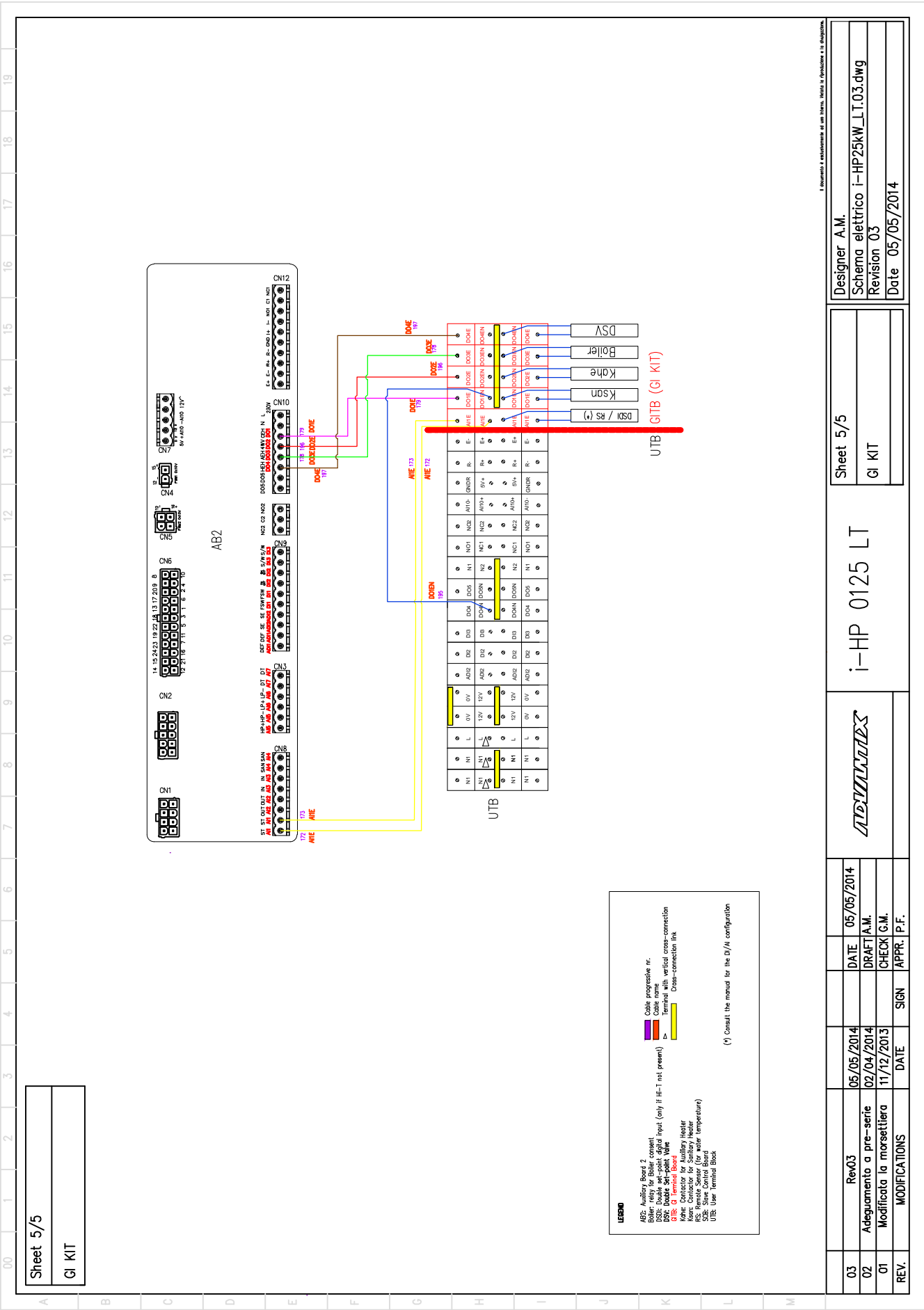
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APPR. P.F.

DATE

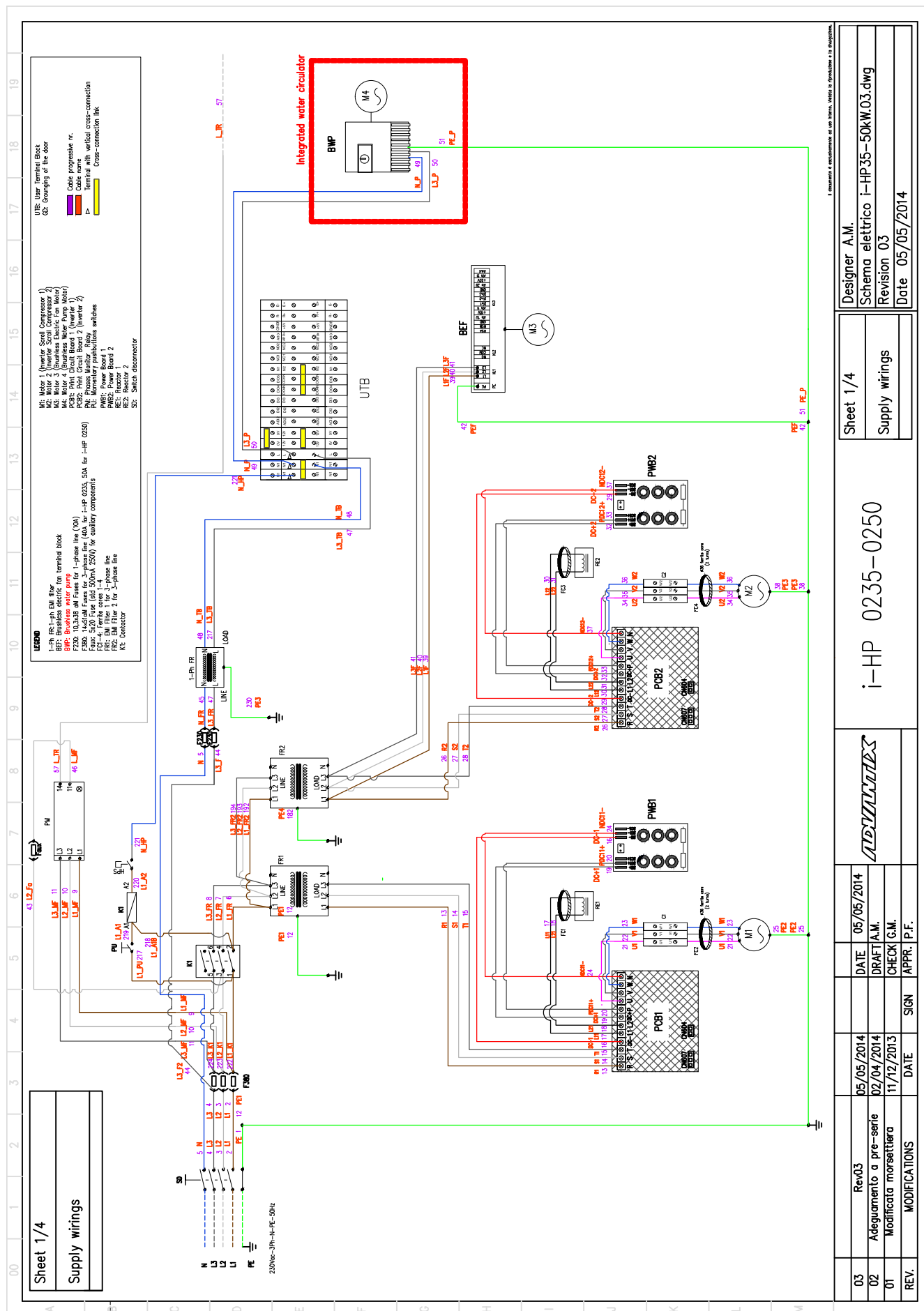
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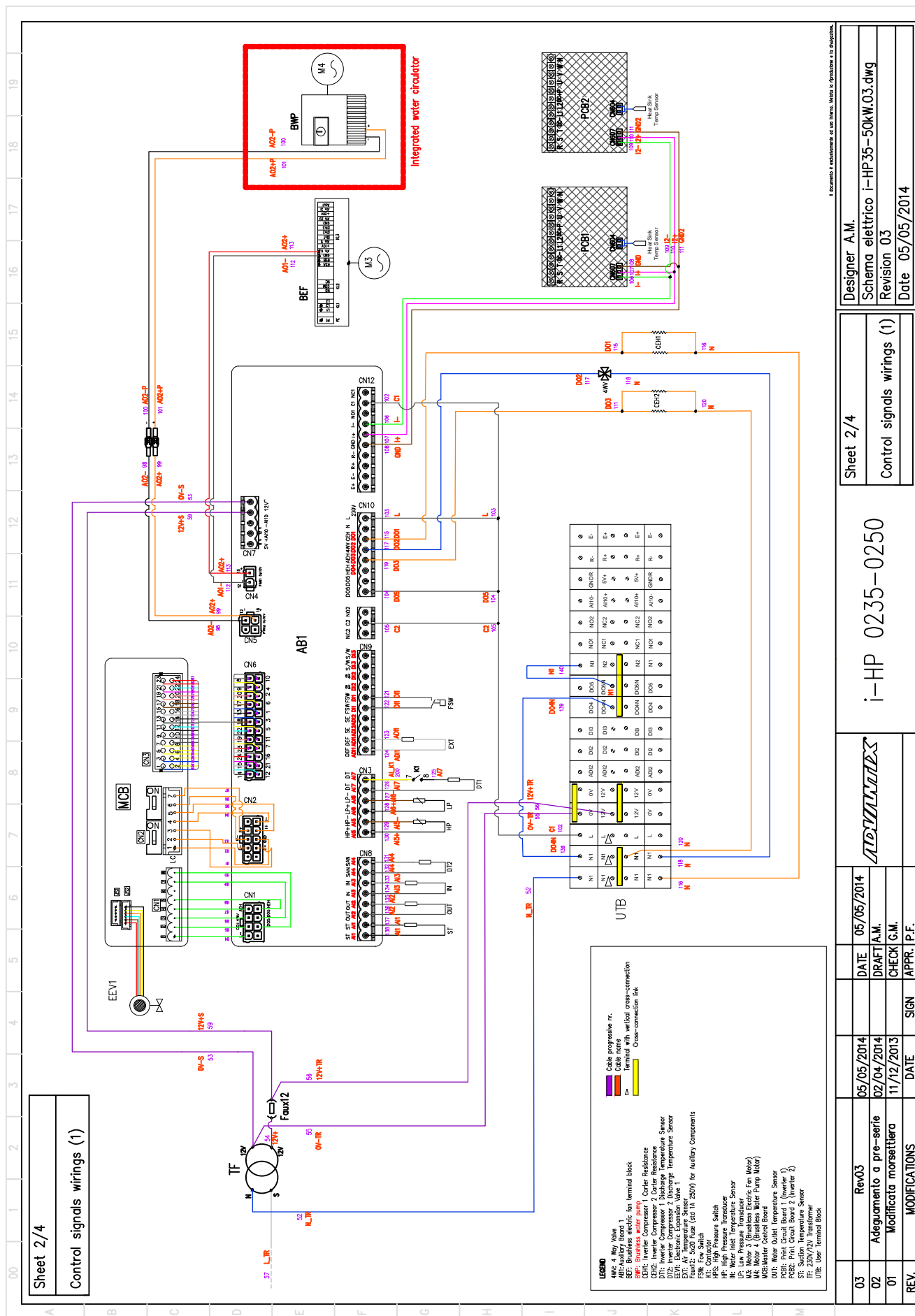
24.9 MODEL i-HP-LT 0125 (GI module control signals)



24.10

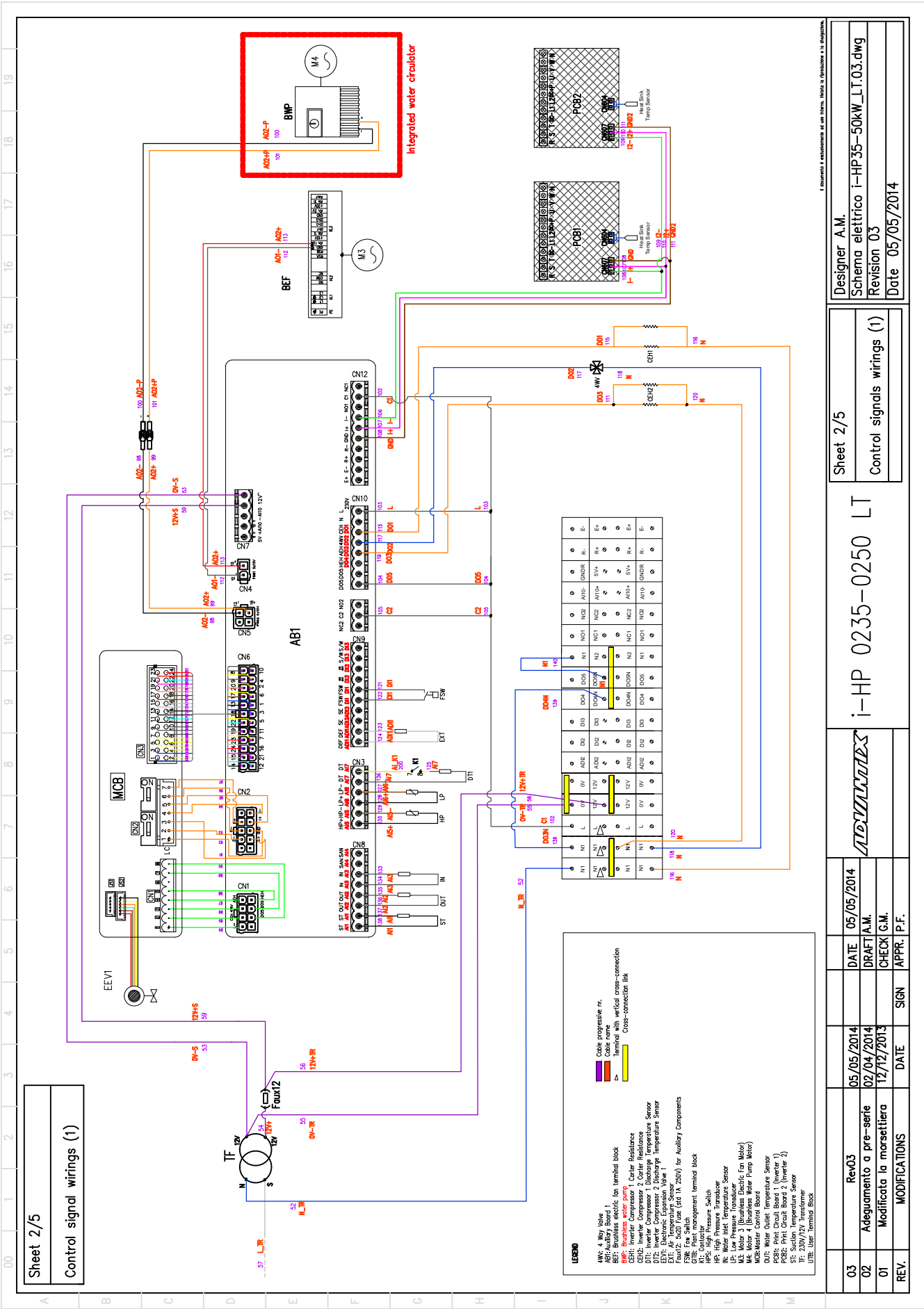
MODEL i-HP 0235-0250 (power supply)





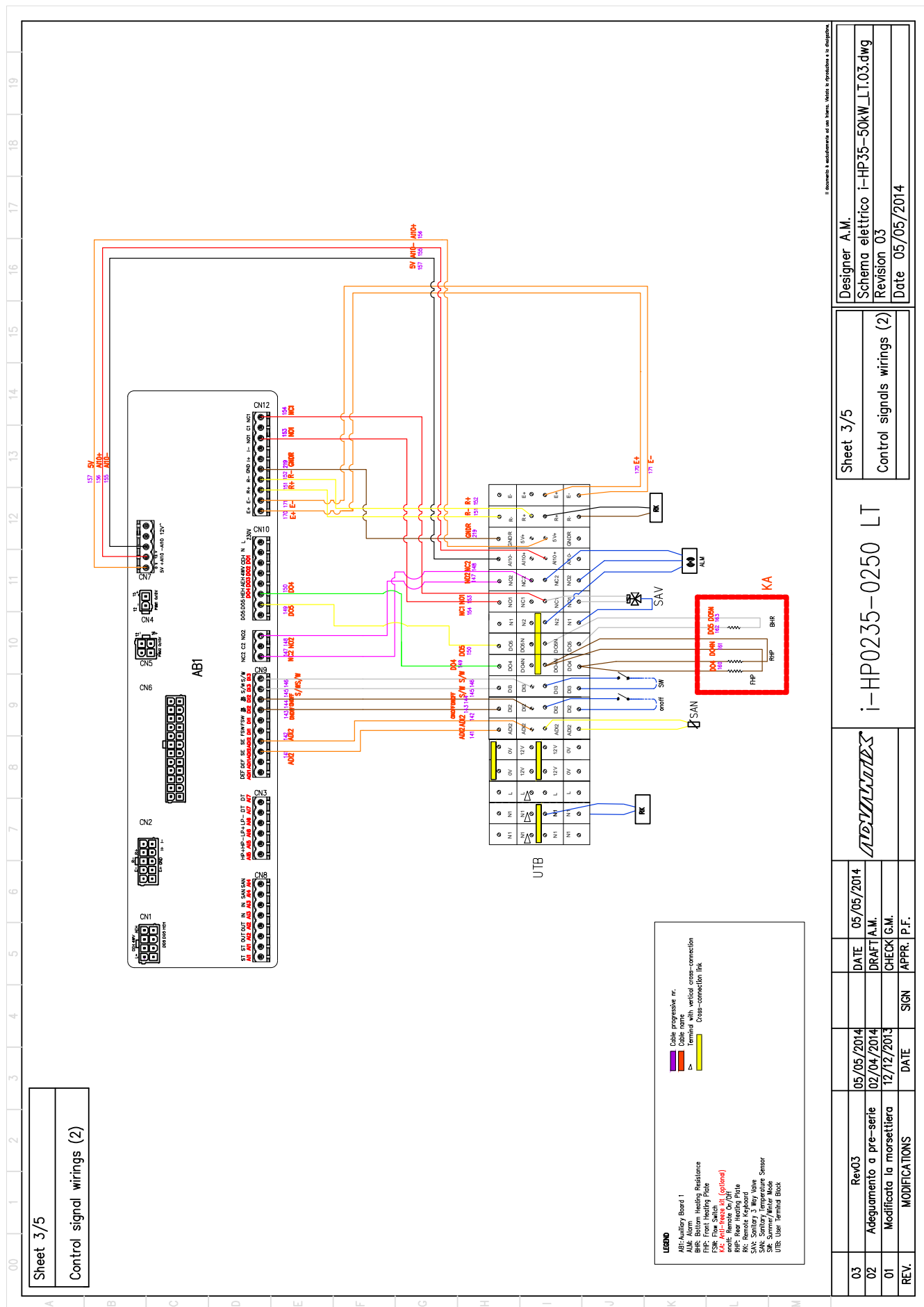
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24.15 MODEL i-HP-LT 0235-0250 (control signals 1)



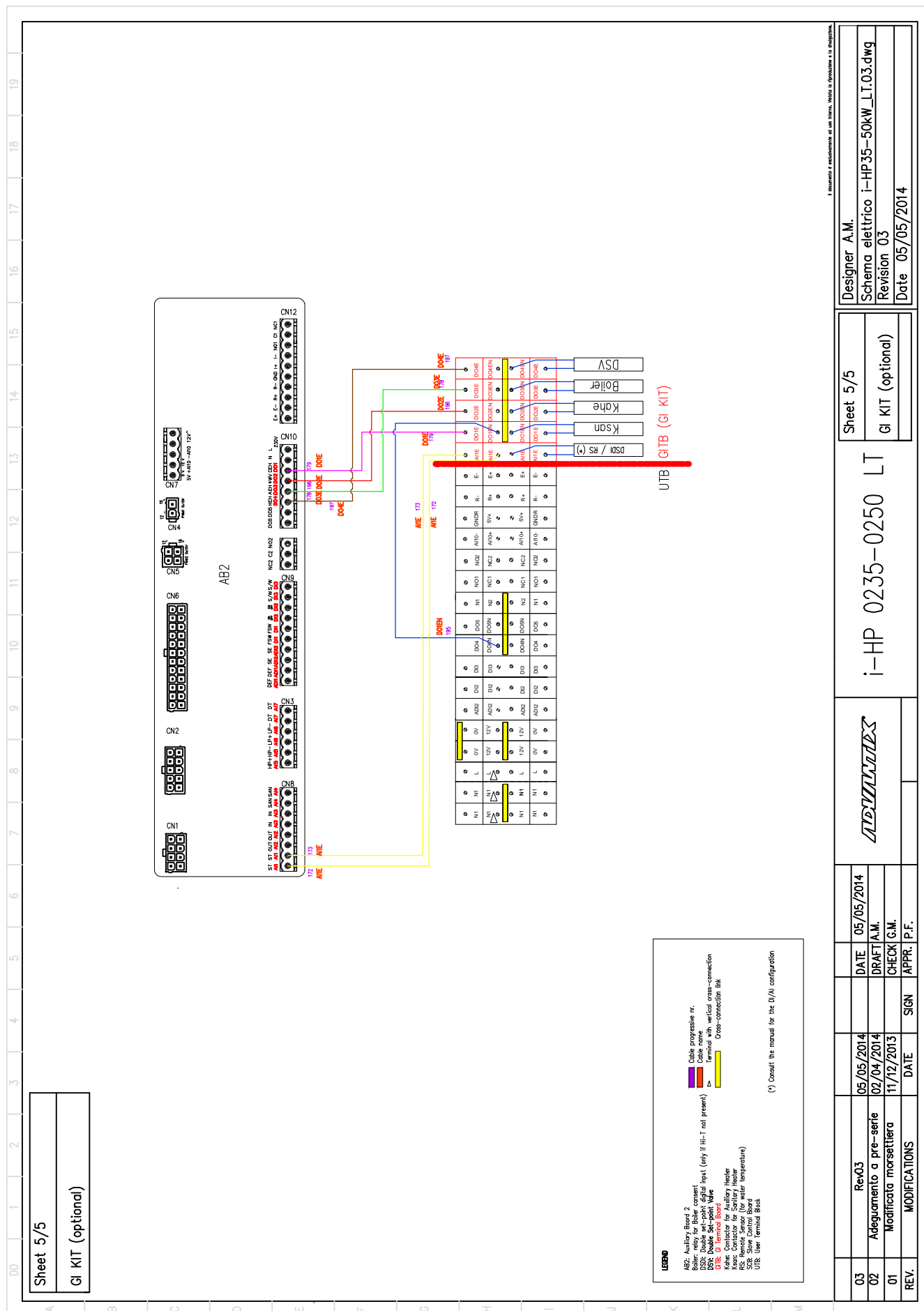
24.16

MODEL i-HP-LT 0235-0250 (control signals 2)



[illegible]

24.18



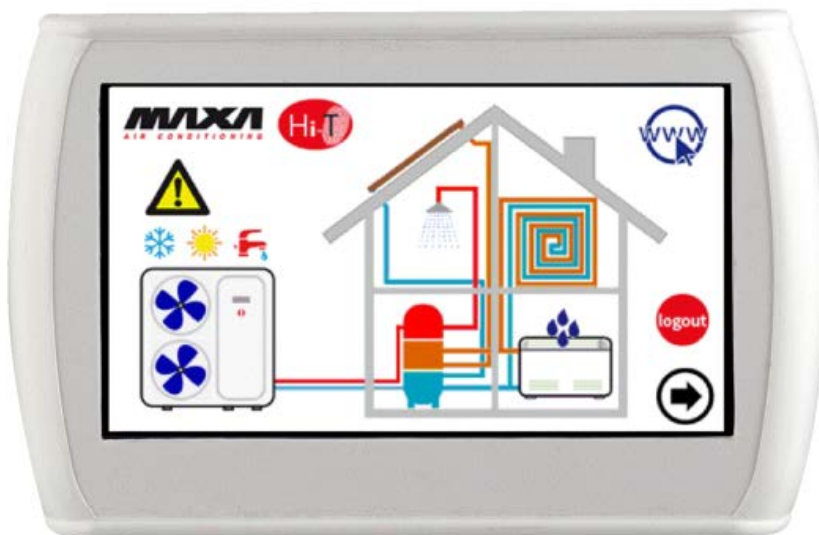
25 Hi-T REMOTE TOUCH-SCREEN CONTROL PANEL (OPTIONAL ACCESSORY)

The Hi-T is a touch screen remote control for centralized management of a chiller/heat pump and HNS system RS485 network. It can also be used for partial functions (ex. as a remote control panel for a single chiller/heat pump or for environment thermostat for manage some fan coils).

The network can consist of a maximum of 7 chillers in cascade and a maximum of 70 fan coil divided into 9 thermal zone.

It integrates humidity and temperature sensors for the environment thermohygrometer analysis and manage the double setpoint for the radiant floor panel that use a dehumidification system.

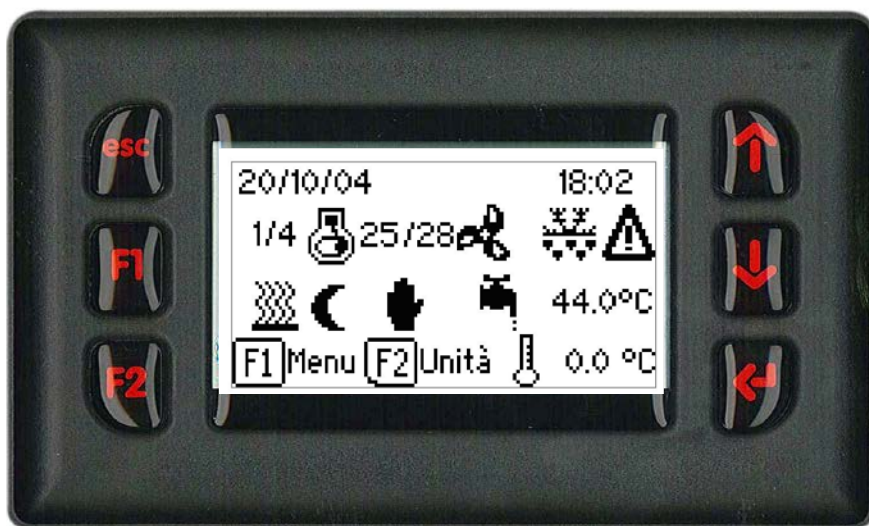
The intuitive interface simplifies the use of the control, all the functions are easily set through the use of synoptic.



For more informations, please see the manual of the Hi-T device.

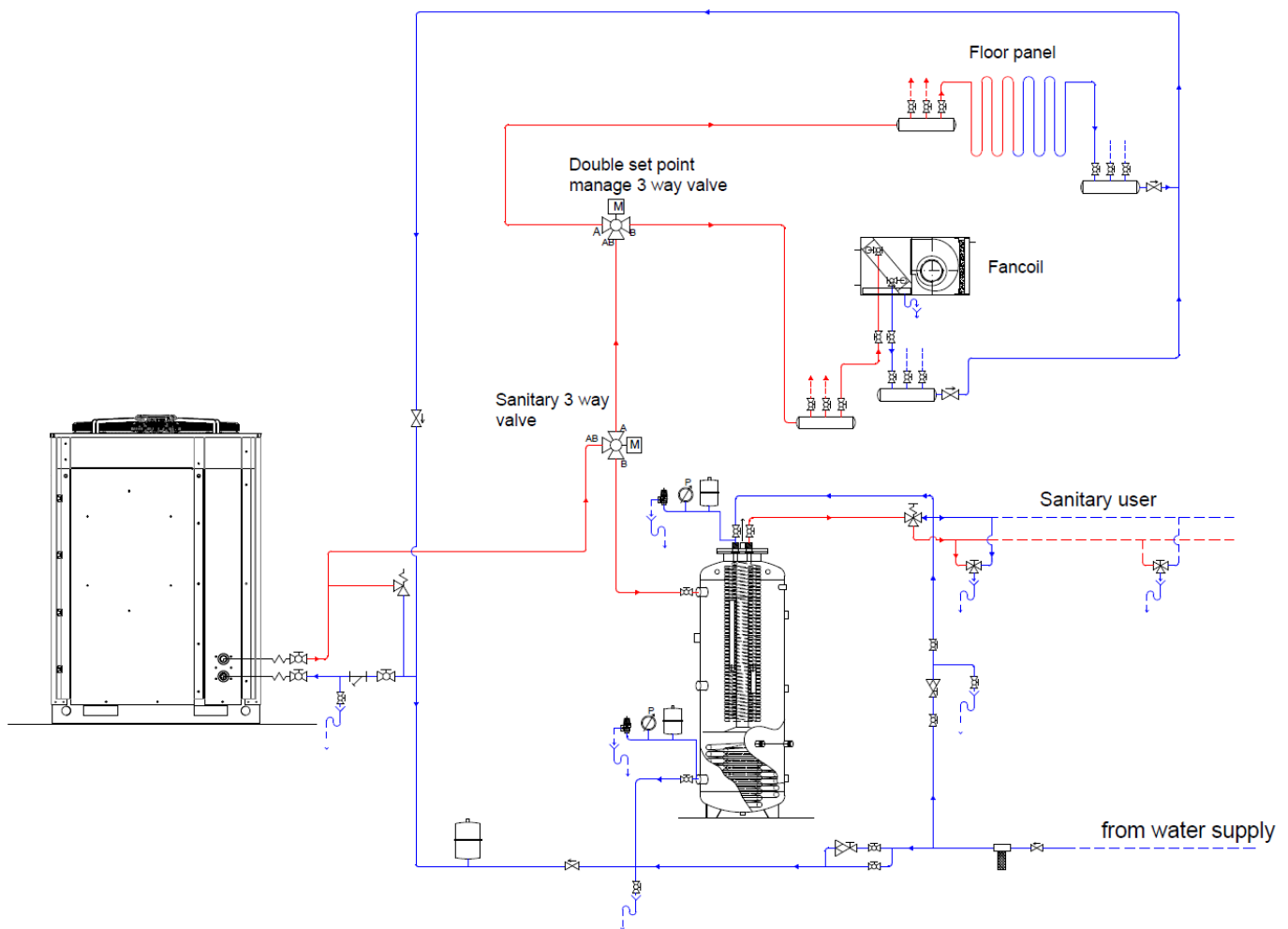
26 CRH REMOTE KEYBOARD (OPTIONAL ACCESSORY)

The CRH remote keyboard allows you to set the operating mode of the chiller and fan coils units connected to a RS485 network. The network can consist of up to 5 chillers in cascade and fan coils up to 70 units in 9 heating zones. The keyboard can be fitted onto the E503 built-in wall boxes.



For more informations, please see the manual of the CRH device.

27 HYDRAULIC DIAGRAM TYPE



28 HANDBOOK FOR CONFIGURATIONS OF INSTALLATION

If you need more information about the possible configurations, there is a handbook, that is a technical book containing a series of recommended drawings of plants that have been highlighted regarding the installation configuration of our high efficiency heat pumps. The "Handbook" aims also the task of showing the symbiotic potential with some of our items in the catalog.

You can contact our office for asking the handbook.

NOTES

Serial number



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The data indicated in this manual is purely indicative. The manufacturer reserves the right to modify the data whenever it is considered necessary.

