MAXA AIR CONDITIONING

Chillers and Air/Water heat pumps with axial fans

User installer manual

Chiller
HWA1-A 02106÷04349

Reversible heat pump
HWA1-A/H 02109÷04345

08	11-2020	E.M.	A.R.	Changes of SEER values and HWA1-A chiller performance after unit revision for ErP 2021, updated heat pump refrigerant charges, modified coil treatments and KA accessory
07	08-2020	E.M.	A.R.	Fourth release
06	04-2020	A.R.	A.R.	Third release
05	10-2019	A.R.	A.R.	Second release
00	09-2018	A.R.	A.R.	First release
Rev	**Date**	**Author**	**Supervisor**	**Notes**
Catalogo / Catalogue / Katalog / Catalogue **MUI01110I8320-08**				Serie / Series / Serie / Serie / Série **HWA1-A 02106 ÷ 04349, HWA1-A/H 02109 ÷ 04345** **AIR/WATER CHILLERS AND 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

The manual of **HWA1-A/HWA1-H** units describes all the necessary information concerning the better use of the appliance under the operator's safety conditions meeting with the requirements listed in the 2006/42/CE Equipment Directive and following amendments.

1 PURPOSES AND CONTENTS OF THE MANUAL

This manual provides the basic information concerning the selection, installation, operation and maintenance of the **HWA1-A** and **HWA1-H** 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 the supplied manual for the installed unit.
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 by the user for future references. It has to be stored in a safe place, away from dusts and moisture. It has to be available and accessible to all users who shall consult it any time they are in doubt on how to operate the appliance.
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 appliances.

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 which should be respected by the operator in order to guarantee the correct and safe operation of the equipment.

2 SAFETY LAWS

The **HWA1-A/HWA1-H** units have been designed in accordance with the following directives and harmonised standards:

- EU Directives 2014/68/UE (PED), 2006/42/EC (MD), 2014/35/UE (LVD), 2014/30/EU, 2011/65/EU, 2012/19/EU,
- UNI EN 378-1, 378-2, EN 12735-1, EN 14276
- UNI EN ISO 12100, EN 60335-2-40, UNI EN ISO 13857,
- CEI EN 61000-6-3, IEC 61000-6-2.
- EN 50581

And the following directives, regulations and standards on ecodesign and energy labelling:

- Community directive 2009/125/EU and subsequent transposal
- Community directive 2010/30/EU and subsequent transposal
- EU Regulation no.2281/2016
- EU Regulation on.813/2013
- EN 14511-1:2018, EN 14511-2:2018, EN 14511-3:2018, EN 14511-4:2018
- EN 14825:2018

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 described in this manual.
- These units have recently 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 fluid to be used is exclusively water or a mixture of water and glycol in case of low water temperatures.
- 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 and specialist competent in the existing rules in the country in which the appliance will be installed.
- The appliance cannot be used by people with electrically controlled medical devices, such as pacemakers, since it can cause harmfulinterference.

4 GENERAL SAFETY GUIDELINES

Before beginning to operate on **HWA1-A/HWA1-H** 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 workplace health and safety laws, including **89/391/CEE**, **89/686/CEE, 2009/104/CE, 86/188/CEE 89/655/CEE,** and **77/576/CEE** should be respected by every employer and he must also oblige the employees 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 EQUIPMENTS

When operating and maintaining the **HWA1-A/HWA1-H** units, please use the following personal protective equipment.

		***Protective clothing: Service man or who operates on the plant systems should wear protective clothing that does not leave parts of the body uncovered, as during maintenance it is possible to come into contact with hot or sharp surfaces. Avoid clothes that can become entangled or drawn in by air flows.. In case of slippery floors, users have to wear safety shoes with non-slip soles.***
		***Gloves: Protection gloves should be used during maintenance or cleaning operations.***
		***Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.***

4.3 SAFETY SYMBOLS

The safety signs indicated on the unit which should be respected:

	***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:	Increasing 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/m³ 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
Color:	Colorless.
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) and carbonyl halides.
	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 any carcinogenic potential, 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 AVAILABLE SIZES, VERSIONS AND ACCESSORIES

The code of the HWA1-A unit is composed of:

- ✓ nr. 4 fixed digits, different depending on the number of mounted fans and on the type of unit (heat pump or chiller):
  - 2 fans – the digit 0127 stands for HWA1-A and the digit 0227 stands for HWA1-A/H.
  - 3 fans – the digit 0137 stands for HWA1-A and the digit 0237 stands for HWA1-A/H
  - 4 fans – the digit 0147 stands for HWA1-A and the digit 0247 stands for HWA1-A/H
  - 6 fans – the digit 0157 stands for HWA1-A and the digit 0257 stands for HWA1-A/H
- ✓ the symbol # as a separator
- ✓ nr. 13 variable digits (fields) that identify sizes, versions and accessories fitted in the factory
- ✓ nr. 1 fixed digit equal to 0, actually not used
- ✓ nr. 2 digits that identify customizations

0127#(RV)(PCF)(TA)(CI1)(TE)(KS)(KA)(EL)(EL2)(VF)(FAN)(SIL)(TR)(AC1)(AC2)(MC)

HWA1-A

FATHER CODE	**Variant type**			
0127	RV	PCF	TA	CI1
	Moto-condensing rooftop Chiller units	Heating/Cooling capacity	Water pipes configuration	Pump configuration
	00 Cooling only 54 Cooling only. – BT version	106 106 kW 120 120 kW 128 128 kW 140 140 kW 155 155 kW 177 177 kW 184 184 kW 209 209 kW 239 239 kW 258 258 kW 305 305 kW 349 349 kW	0 2 pipes 2 4 pipes – total recovery 3 Partial recovery (desuperheater circuit) 4 FC Free-Cooling	0 Heat exchanger connection 1 Standard-head pump 2 Standard-head double pump 3 High-head pump 4 High-head double pump

FATHER CODE	Variant type				
0127#(RV)(PCF)(TA)(CI1)	TE	KS	KA	EL	EL2
	Special tightening	Integrated tank kit	Antifreeze kit	Electrical variants	**Electrical variants 2**
	0 Standard tightening 1 Special mechanical tightening for glycol> 40% (*)	0 Without 2 With integrated technical accumulation (*)	0 Without antifreeze kit 1 Heat exchanger and electric pump resistance (if present) 2 Heat exchanger, electric pump and tank resistance (if present)	0 Without 1 Soft starter for HWA1-A 02106-04349	0 Without 1 Schuko plug (with magnetothermic breaker) 2 Interior lights for QE 3 Schuko plug (with magnetothermic breaker) and Interior lights for QE

FATHER CODE	**Variant type**					
0127#(RV)(PCF)(TA)(CI1)(TE)(KS)(KA)(EL)(EL2)	VF	FAN	SIL	TR	AC1	AC2
	Refrigeration variants	Fan	Silencing	Treatment	Accessory 1	Accessory 2
	0 Without 1 Taps on compressors' discharge and suction lines 2 Double relief valve 3 Taps on compressors' discharge and suction lines + Double reilef valve	0 DC/EC fan	0 Not silent 1 Super silent 2 Super silent(***) 4 Ductable version(***)	0 Coil Condenser without treatment 7 Coil with Aer treatment 7 o	0 None 9 "WG" version - Discharged unit	0 Without 2 magnetothermic breaker

(*)Not possible if CI1=0
(**) Not possible if RV=54
(***)Not possible if FAN=3

HWA1-A/H

MAIN CODE	Type of variant			
0227#	RV	PCF	TA	CI1
	Refrig-Rooftop-Condensing	Heating/cooling power	Water pipes configuration	Pump configuration
	09 /H reversible heat pump	109 109 kW 121 121 kW 142 142 kW 148 148 kW 160 160 kW 176 176 kW 199 199 kW 215 215 kW 237 237 kW 273 273 kW 304 304 kW 345 345 kW	0 2 pipes 3 Partial recovery (desuperheater circuit)	0 Exchanger connection 1 Standard head pump 2 Double standard head pump 3 High head pump 4 Double high head pump

MAIN CODE	**Type of variant**				
0127#(RV)(PCF)(TA)(CI1)	TE	KS	KA	EL	EL2
	Special seal	Integrated tank kit	Antifreeze kit	Electrical variants	Electrical variants 2
	0 None 1 Special mechanical seal for glycol >40% (*)				
		0 None 2 With integrated Technical storage tank (*)			
			0 Without antifreeze kit 1 H-exchanger resistance (and electric pump if present) 2 H-exchanger resistance, (electric pump and tank if present)		
				0 None 1 Soft starter for HWA1 02109-04345	
					0 None 1 Schuko plug (with circuit breaker) 2 Internal lights for EP 3 Schuko plug (with circuit breaker) and Internal lights for EP

MAIN CODE	Type of variant					
0127#(RV)(PCF)(TA)(CI1)(TE)(KS)(KA)(EL)(EL2)	VF	FAN	SIL	TR	AC1	AC2
	Refrigerant variants	Fan	Silencing	Treatment	Accessory 1	Accessory 2
	0 None 1 Valves on compressor delivery and intake lines 2 Double safety valve 3 Valves on delivery and intake lines + Double safety valve	0 DC/EC fan 3 Phase cut AC fan	0 Not silenced 1 Silenced 2 Super silenced (***) 4 Ducted version (***)	0 Coil without treatment 2 Coil with treatment Silver Line	0 None "WG" version 9 - Discharged unit	2 Circuit breaker switch

(*) Not possible if CI1=0
(***) Not possible if FAN=3

6 INSTALLATION

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

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

6.2 LIFTING AND HANDLING

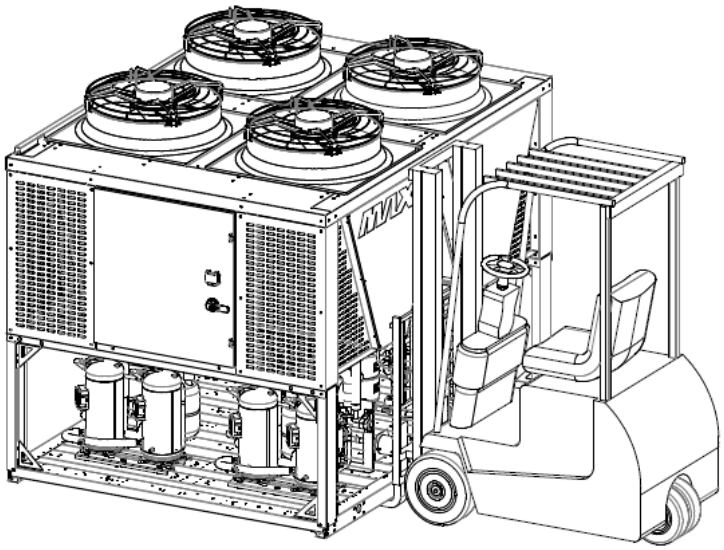
The handling must be performed by qualified personnel, properly equipped with appropriate tools to the weight and the encumbrance of the unit, in compliance with safety regulations of accident preventing.

	WARNING: The HWA1-A/HWA1-H 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, tightly close the panels with the fastening screws.

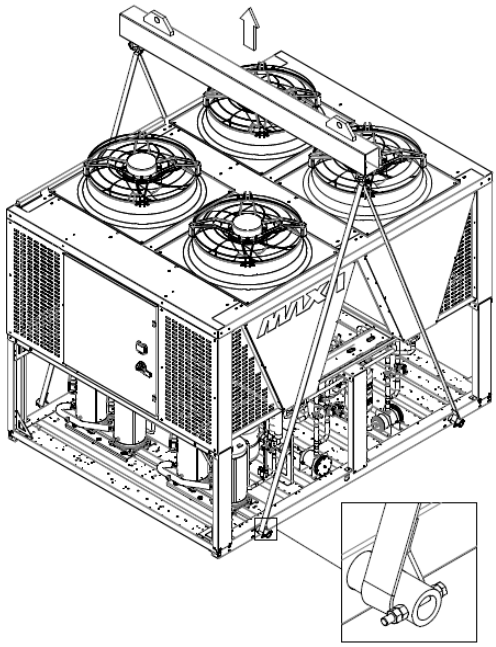
Hints:

1. Check the weight of the unit and the capacity of the lifting device.
2. Locate the critical points in the handling path (disconnected paths, ramps, stairs, doors).
3. Use protections to avoid damages to the unit.
4. Lifting brackets.
5. Lifting with sling-bar.
6. Lifting with spacer bar.
7. The center of gravity and the lifting point should be aligned.
8. Use all lifting brackets.
9. Bring the lifting straps into tension.
10. Bring gradually the lifting straps into tension and check their correct positioning.

11. Before beginning moving the unit make sure that it is in the state of stable equilibrium.



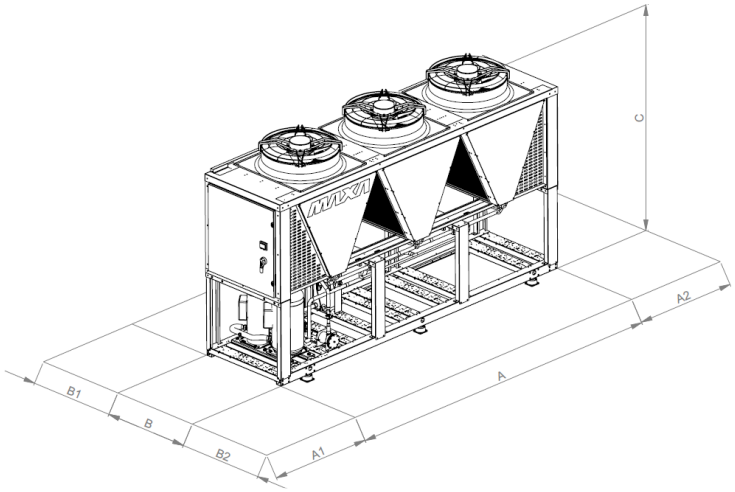
Lifting with a forklift

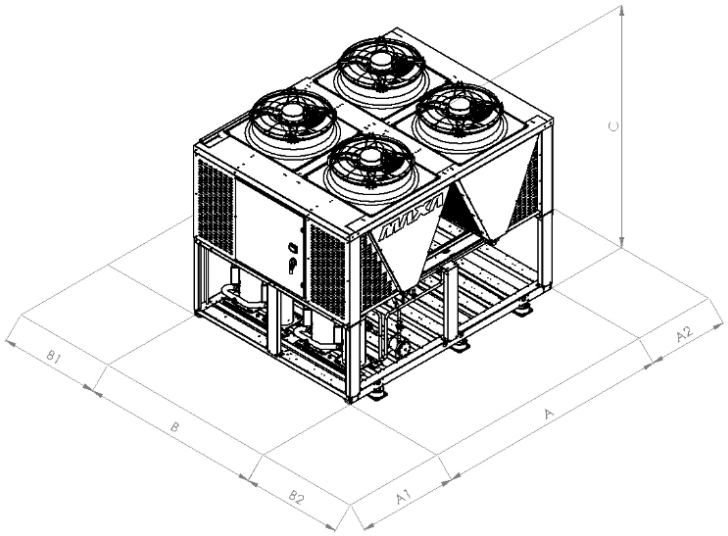


Lifting with lifting tubes, ropes and sling bar

6.3 LOCATION AND MINIMUM TECHNICAL CLEARANCES

The **HWA1-A** and **HWA1-H** models are all designed for outdoor installations; any covering over the unit or locating near trees (even if they partially cover the unit) should 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. Please always carry out an environmental impact assessment based on the power and sound pressure data provided in chapter 12 “Technical data” and the sound emission limits based on the unit’s installation area, with reference to Italian DPCM (Prime Minister’s Decree) of 14/11/1997. An assessment must also be made if the unit is installed close to workers, according to Italian Legislative Decree 81/2008 Art. 189 and subsequent amendments. n absolute care has to be taken to ensure adequate air volume to the condenser. The re-circulation of the discharged air should 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:





MODEL	A1 [mm]	A2 [mm]	B1 [mm]	B2 [mm]
HWA1-A 02106-04349	1000	800	1000	1000
HWA1-A/H 02109-04345	1000	800	1000	1000

Installation, maintenance and operation minimum technical clearances

6.4 DIMENSIONS

The dimensions of the standard and super silent (SSL) versions are reported in the below tables.

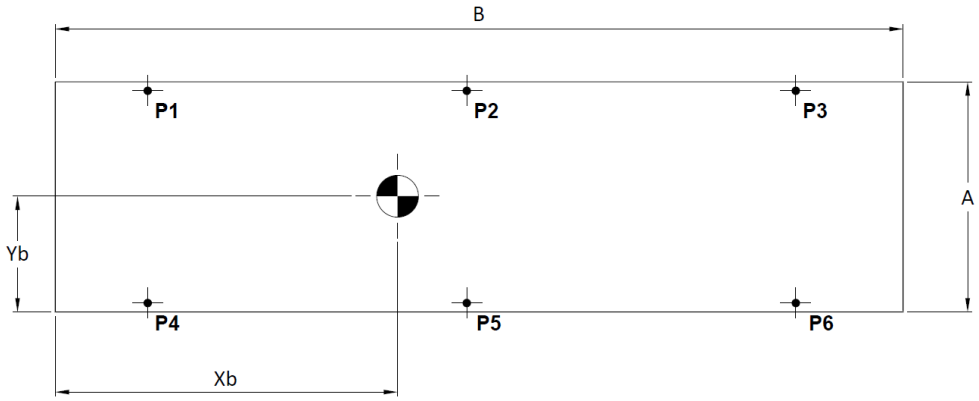
Model HWA1-A	Length A [mm]	With B [mm]	Height C [mm]	Height [mm] Versions "SSL" and "C"	Max Height Packing [mm]	Max Height Versions "SSL" or "C" Packing [mm]
02106	2860	1100	2350	2415	2430	2495
02120	2860	1100	2350	2415	2430	2495
02128	2860	1100	2350	2415	2430	2495
02140	4060	1100	2350	2415	2430	2495
04155	4060	1100	2350	2415	2430	2495
04177	4060	1100	2350	2415	2430	2495
04184	4060	1100	2350	2415	2430	2495
04209	2860	2200	2350	2415	2430	2495
04239	2860	2200	2350	2415	2430	2495
04258	2860	2200	2350	2415	2430	2495
04305	4060	2200	2350	2415	2430	2495
04349	4060	2200	2350	2415	2430	2495

Model HWA1-A/H	Length A [mm]	With B [mm]	Height C [mm]	Height [mm] Versions "SSL" and "C"	Max Height Packing [mm]	Max Height Versions "SSL" or "C" Packing [mm]
02109	2860	1100	2350	2415	2430	2495
02121	2860	1100	2350	2415	2430	2495
02142	4060	1100	2350	2415	2430	2495
02148	4060	1100	2350	2415	2430	2495
04160	4060	1100	2350	2415	2430	2495
04176	2860	2200	2350	2415	2430	2495
04199	2860	2200	2350	2415	2430	2495
04215	2860	2200	2350	2415	2430	2495
04237	2860	2200	2350	2415	2430	2495
04273	4060	2200	2350	2415	2430	2495
04304	4060	2200	2350	2415	2430	2495
04345	4060	2200	2350	2415	2430	2495

6.5 BARYCENTRE AND DAMPERS LOCATION

In the following tables, we report the position of the barycentre of each machine, with reference to the dimensions shown in the image.

It's important to distinguish between the standard version and the complete hydraulic circuit with double pump and tank version.



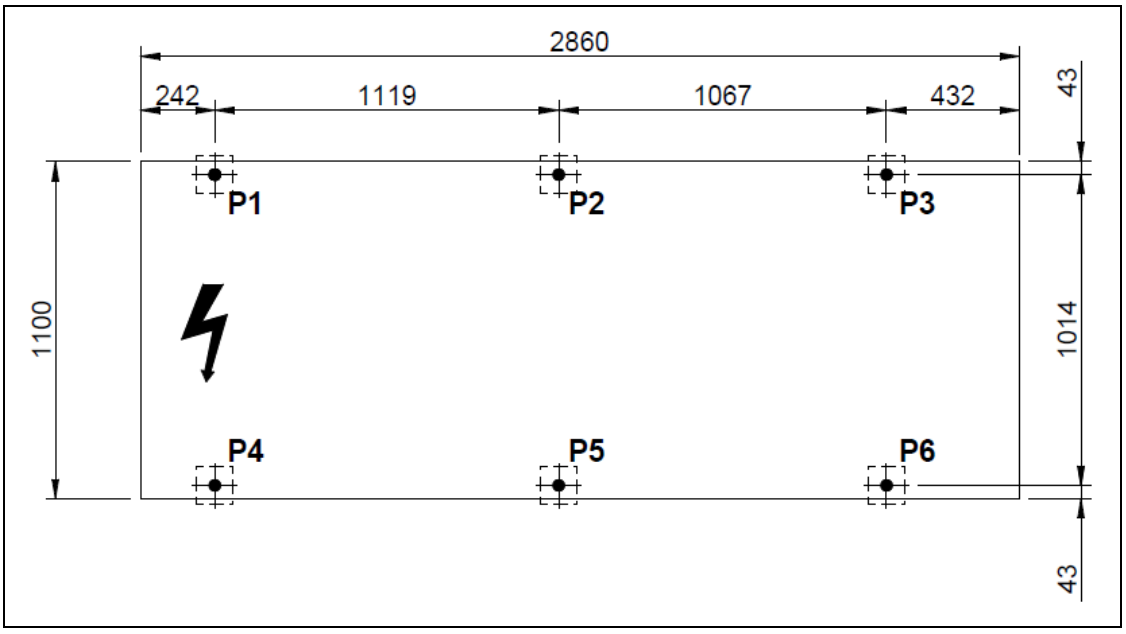
Model HWA1-A	Version	Shipping weight [kg]	Operating weight [kg]	A [mm]	B [mm]	X_b [mm]	Y_b [mm]
02106	Standard	1080	1090	1100	2860	1070	575
	/PDAP/SI	1310	1710			1418	587
02120	Standard	1080	1090	1100	2860	1069	576
	/PDAP/SI	1360	1760			1409	583
02128	Standard	1090	1100	1100	2860	1105	562
	/PDAP/SI	1360	1760			1422	577
02140	Standard	1510	1520	1100	4060	1617	555
	/PDAP/SI	1870	2590			2064	581
04155	Standard	1620	1630	1100	4060	1670	541
	/PDAP/SI	1920	2350			2046	516
04177	Standard	1620	1630	1100	4060	1667	531
	/PDAP/SI	1930	2360			2036	514
04184	Standard	1620	1630	1100	4060	1667	531
	/PDAP/SI	1930	2360			2036	514
04209	Standard	1950	1960	2200	2860	1128	1119
	/PDAP/SI	2230	2760			1391	1177

04239	Standard	1960	1970	2200	2860	1151	1118
	/PDAP/SI	2300	2840			1386	1168
04258	Standard	1960	1980	2200	2860	1148	1102
	/PDAP/SI	2310	2840			1402	1165
04305	Standard	2670	2690	2200	4060	1538	1096
	/PDAP/SI	3140	3870			1991	1203
04349	Standard	2850	2870	2200	4060	1465	1106
	/PDAP/SI	3400	4120			1949	1195

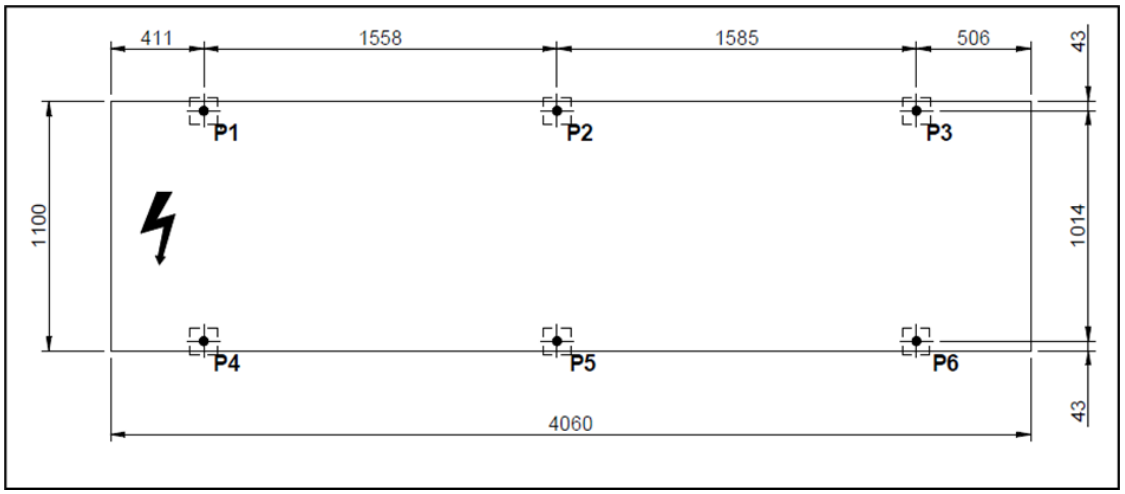
Model HWA1-A/H	Version	Shipping weight [kg]	Operating weight [kg]	A [mm]	B [mm]	Xb [mm]	Yb [mm]
02109	Standard	1180	1190	1100	2860	968	571
	/PDAP/SI	1410	1810			1386	584
02121	Standard	1210	1220	1100	2860	1090	529
	/PDAP/SI	1440	1840			1378	538
02142	Standard	1470	1480	1100	4060	1621	544
	/PDAP/SI	1770	2480			2101	582
02148	Standard	1530	1540	1100	4060	1641	544
	/PDAP/SI	1880	2600			2068	573
04160	Standard	1530	1540	1100	4060	1639	553
	/PDAP/SI	1890	2600			1701	566
04176	Standard	2030	2040	2200	2860	1203	1121
	/PDAP/SI	2380	2910			1324	1136
04199	Standard	2060	2070	2200	2860	1200	1046
	/PDAP/SI	2370	2900			1451	1171
04215	Standard	2100	2110	2200	2860	1185	1095
	/PDAP/SI	2440	2970			1426	1201
04237	Standard	2130	2140	2200	2860	1180	1105
	/PDAP/SI	2460	3000			1293	1120
04273	Standard	2680	2700	2200	4060	1694	1096
	/PDAP/SI	3190	3910			1812	1115
04304	Standard	2880	2900	2200	4060	1559	1138
	/PDAP/SI	3360	4090			1974	1233
04345	Standard	2900	2930	2200	4060	1605	1069
	/PDAP/SI	3450	4180			1776	1105

The ideal installation positions of the dampers for each type of machine are shown in the below images.

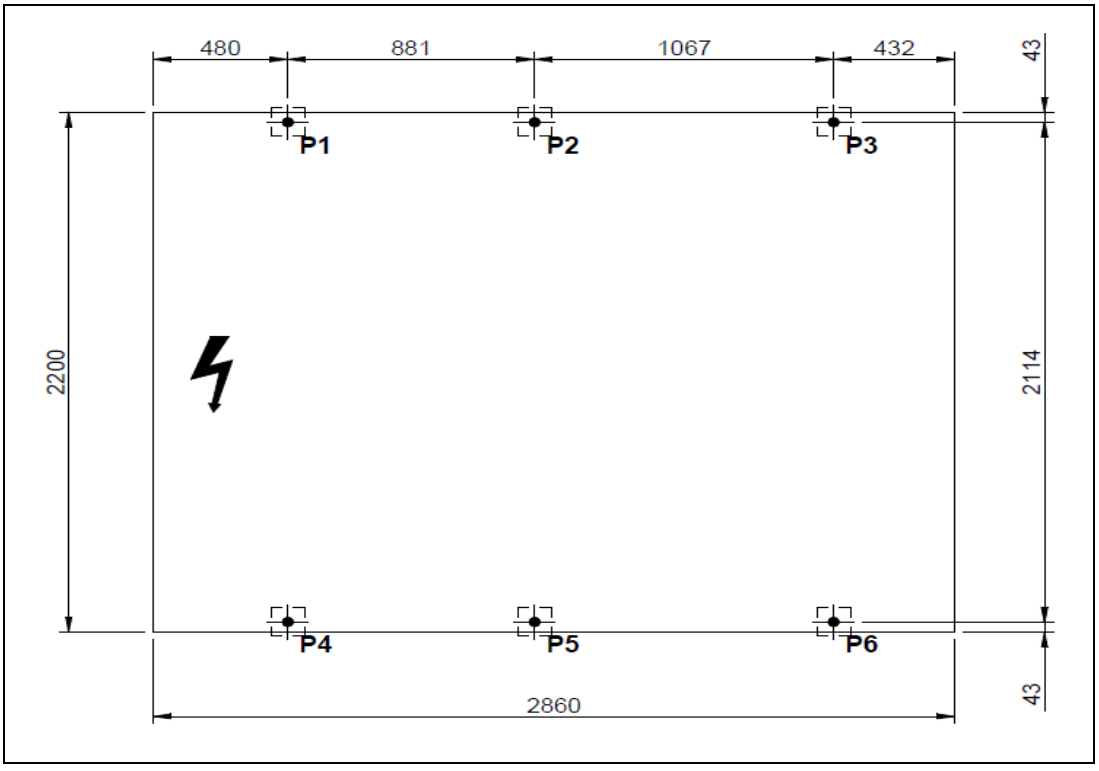
HWA1-A/H 2 fans: 02109, 02121



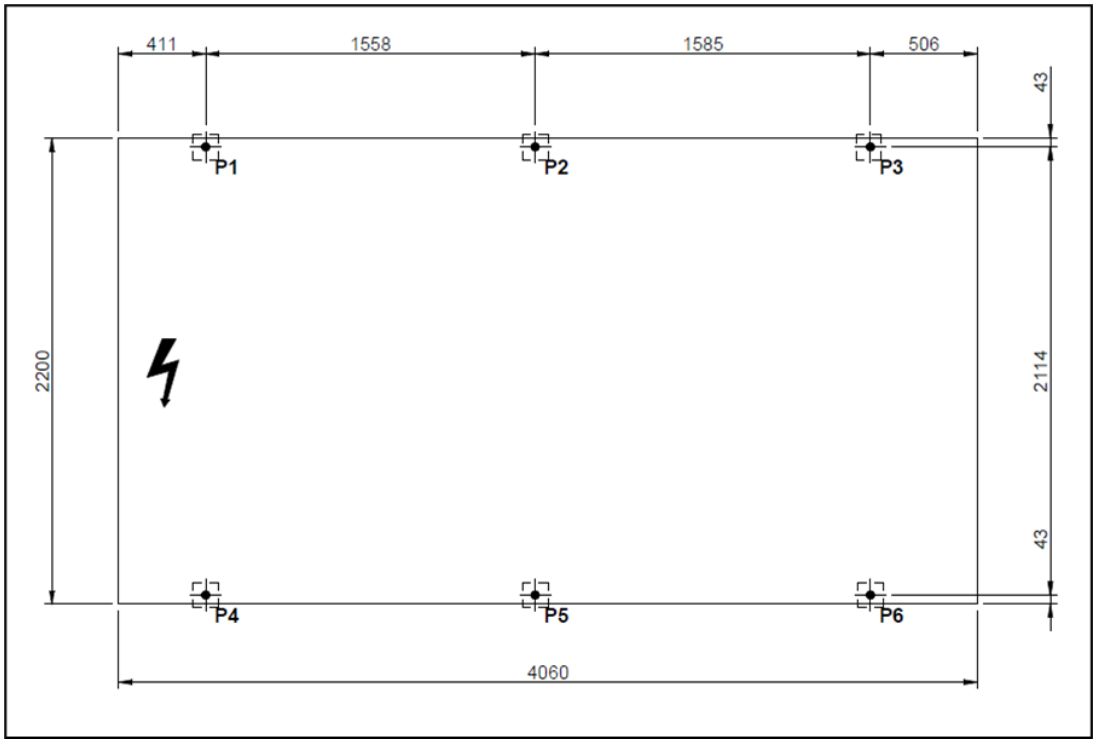
HWA1-A/H 3 fans: 02142, 02148, 02160



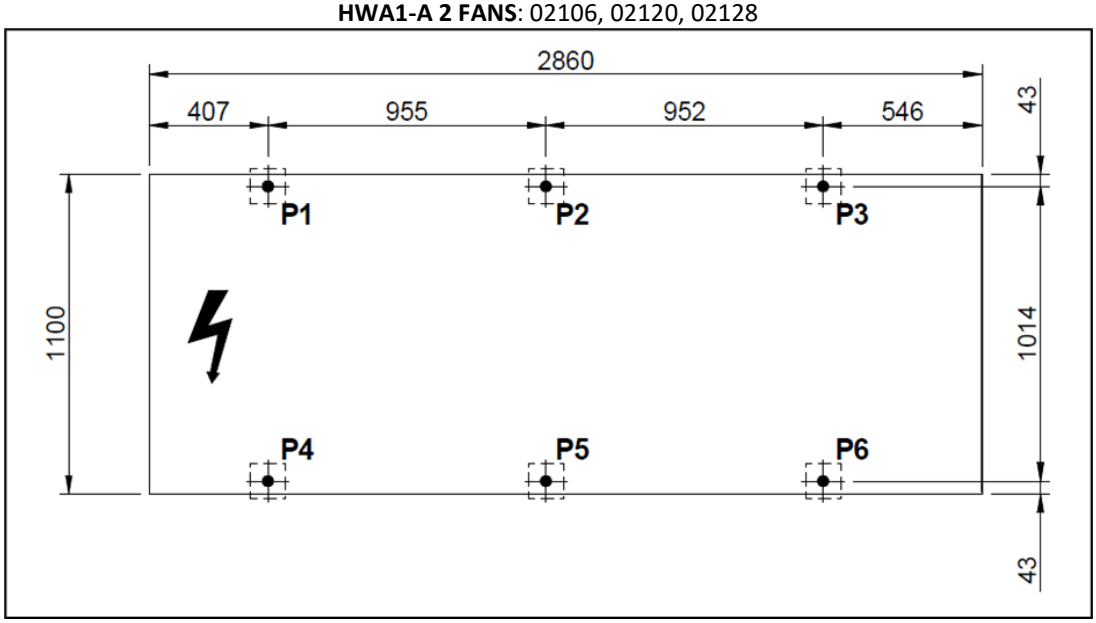
HWA1-A/H 4 fans: 04176, 04199, 04215, 04237



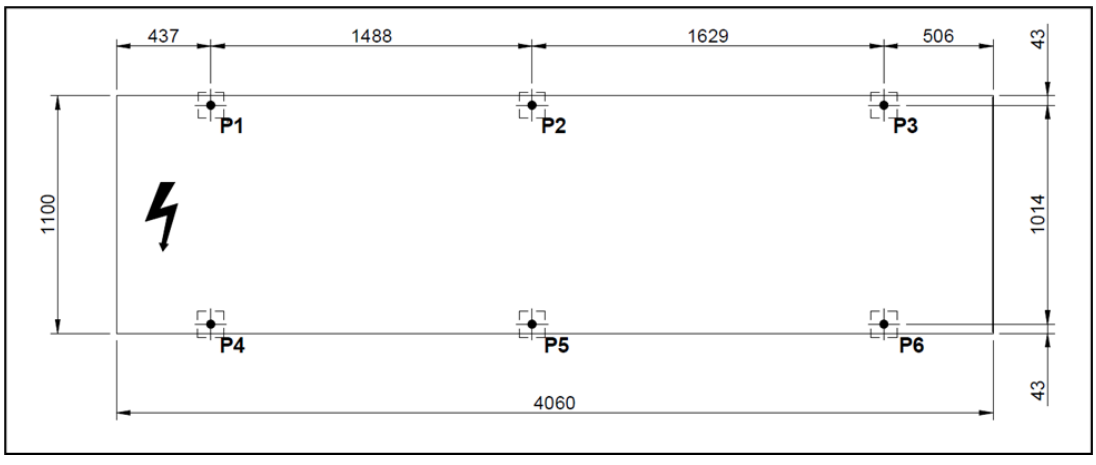
HWA1-A/H 6 FANS: 04273, 04304, 04345



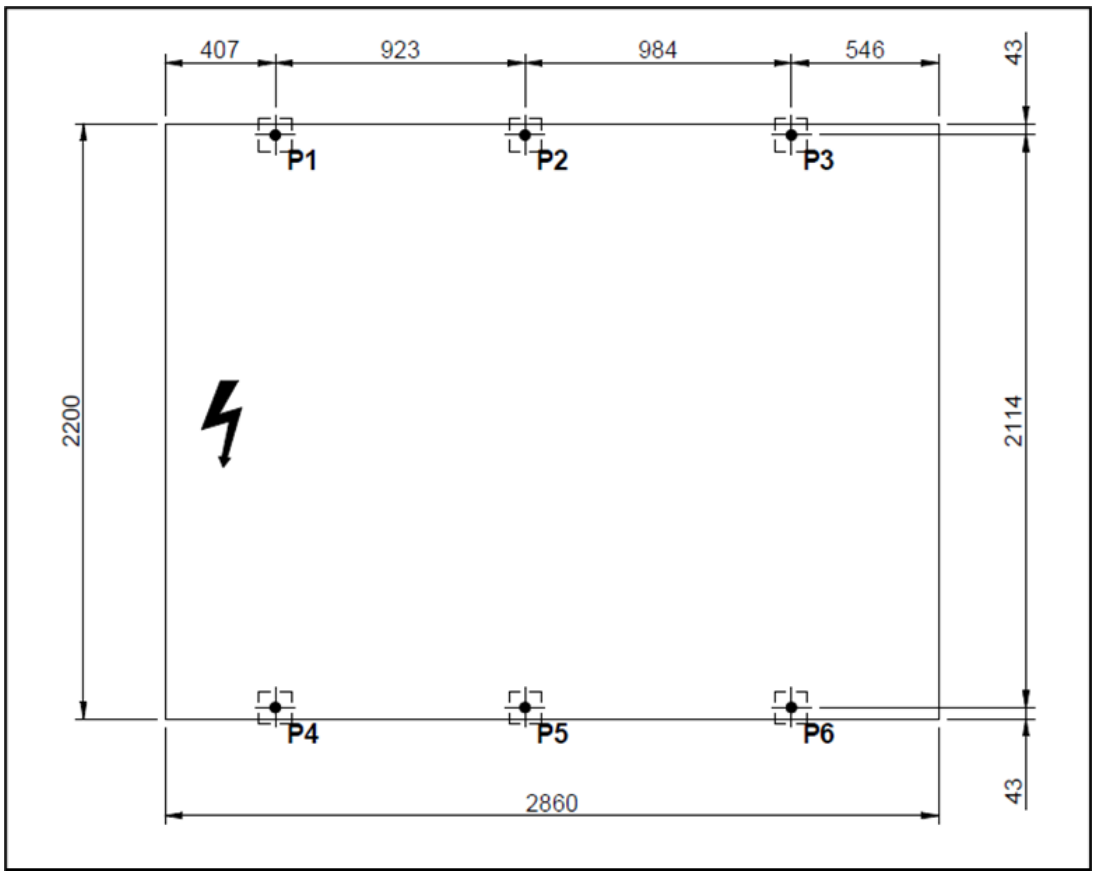
HWA1-A 2 FANS: 02106, 02120, 02128



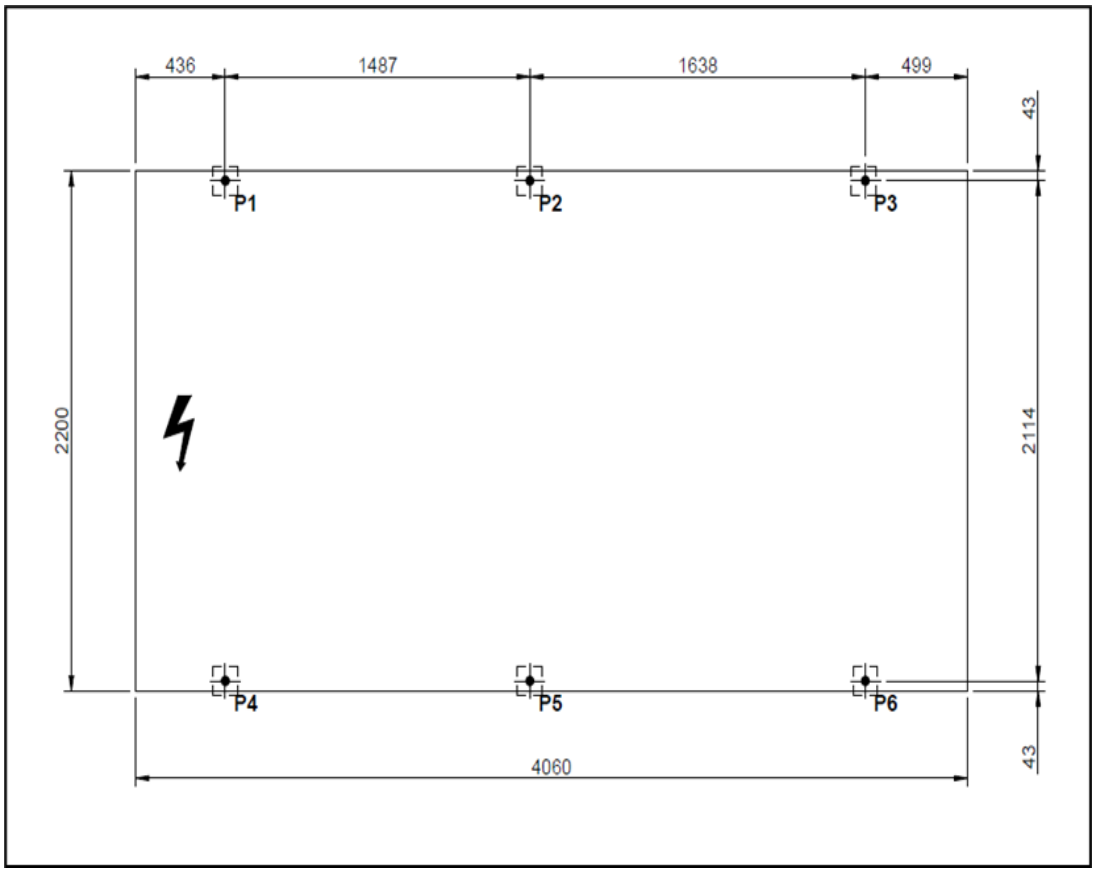
HWA1-A 3 fans: 02140, 04155, 04177, 04184



HWA1-A 4 fans: 04209, 04239, 04258



HWA1-A 6 fans: 04305, 04349



6.6 HYDRAULIC CONNECTIONS

The hydraulic connections have to be installed in accordance with national and/or local regulations; the pipes can be made up of steel. The pipes have to be accurately sized as a function on the nominal water flow of the unit and on the hydraulic pressure drops of the hydraulic circuit. All the hydraulic connections must be insulated with closed-cell material with a proper thickness. The chiller should be connected to piping using grooved joints. It's recommended to install in the hydraulic circuit the following components:

- Hole's thermometers for the hydraulic circuit's temperature measurement.
- Manual gate valves to intercept the unit from the hydraulic circuit.
- Y-shaped metallic filter (mounted on the return pipe from the plant circuit) with a metallic mesh not higher than 1mm.
- Loading group and discharge valve, where it's required.

	WARNING: Make sure that, when determining the pipe sizes you should exceed the maximum head loss on the plant side, please refer to the technical data given in the relative table.
	WARNING: An air vent valve should always be installed at high point of the system.
	WARNING: In the models of HWA1 series, the integrated expansion vessel is not included on the plant side. The real capacity of the plant circuit should be verified by the installer for providing an expansion tank with adequate volume.
	WARNING: The return pipe from the plant circuit should be in correspondence with the label: "WATER INLET", otherwise the evaporator may freeze.
	WARNING: It is required to install a metallic filter with mesh not larger than 1mm on the return pipe from the plant circuit with label "WATER INLET". The warranty will no longer be valid if the water flow switch is altered or changed or if the metallic filter is not installed. The filter should be kept clean, so make sure that is clean after the installation of unit, and then check it periodically.
	***All the units are standard supplied with a factory-mounted water flow switch. Should the water flow switch be altered, removed, or should the water filter not be installed on the unit, the warranty will no longer be valid. 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 a cartridge filter (washable, wrapped wire, etc.) of at least 1000 microns.
	Check the water hardness with which you charge and top up the plant circuit. For particularly hard water, it is necessary to utilize a water softener. For water treatment of the plant circuit, please refer to UNI 8065.
	Both for new installations and in case of replacement of a previously installed machine, the system must be washed in advance in order to prevent any residues from clogging the plate heat exchanger.
	Following the damage of the plate heat exchanger for: tampering with the flow switch, continuous manual restarts after alarm of the flow switch, lack of washing of the system or lack/tampering of the Y filter, the company reserves the right not to pass the replacement of the component as a guarantee.

6.6.1 Characteristics of water of the plant circuit

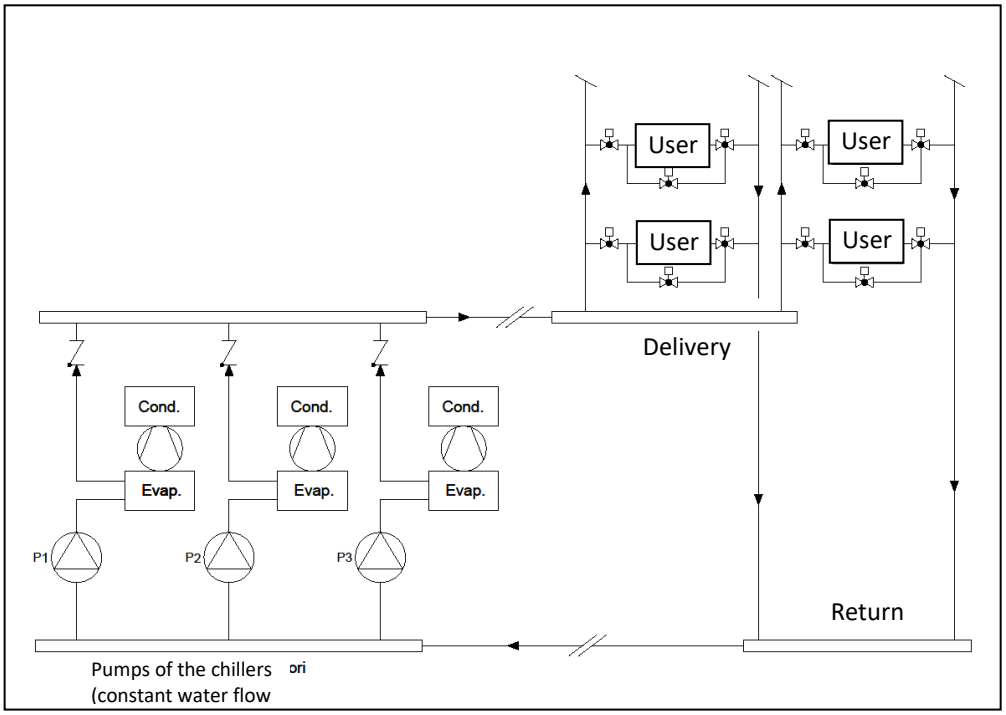
To ensure the correct operation of the unit, the water should be adequately filtred (see what is reported at the beginning of this paragraph) and that the amounts of dissolved substances should minimal. The maximum permitted values are given here below.

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 (PO_4)	< 2ppm
Manganese (Mn)	< 0,05 ppm
Iron (Fe)	< 0,3 ppm
Alkalinity (HCO_3)	70 – 300 ppm
Chloride ions (Cl-)	< 50 ppm
Sulfate ions (SO4)	< 50 ppm
Sulfide ion (S)	None
Ammonium ions (NH_4)	None
Silica (SiO_2)	< 30 ppm

6.6.2 Hydraulic circuit type

The hydraulic diagrams are presented below when the associated hydronic kit is mounted, we specify that the inlet filter accessory is MANDATORY and available upon request.

Coupled primary and secondary circuits —each chiller unit includes a pump

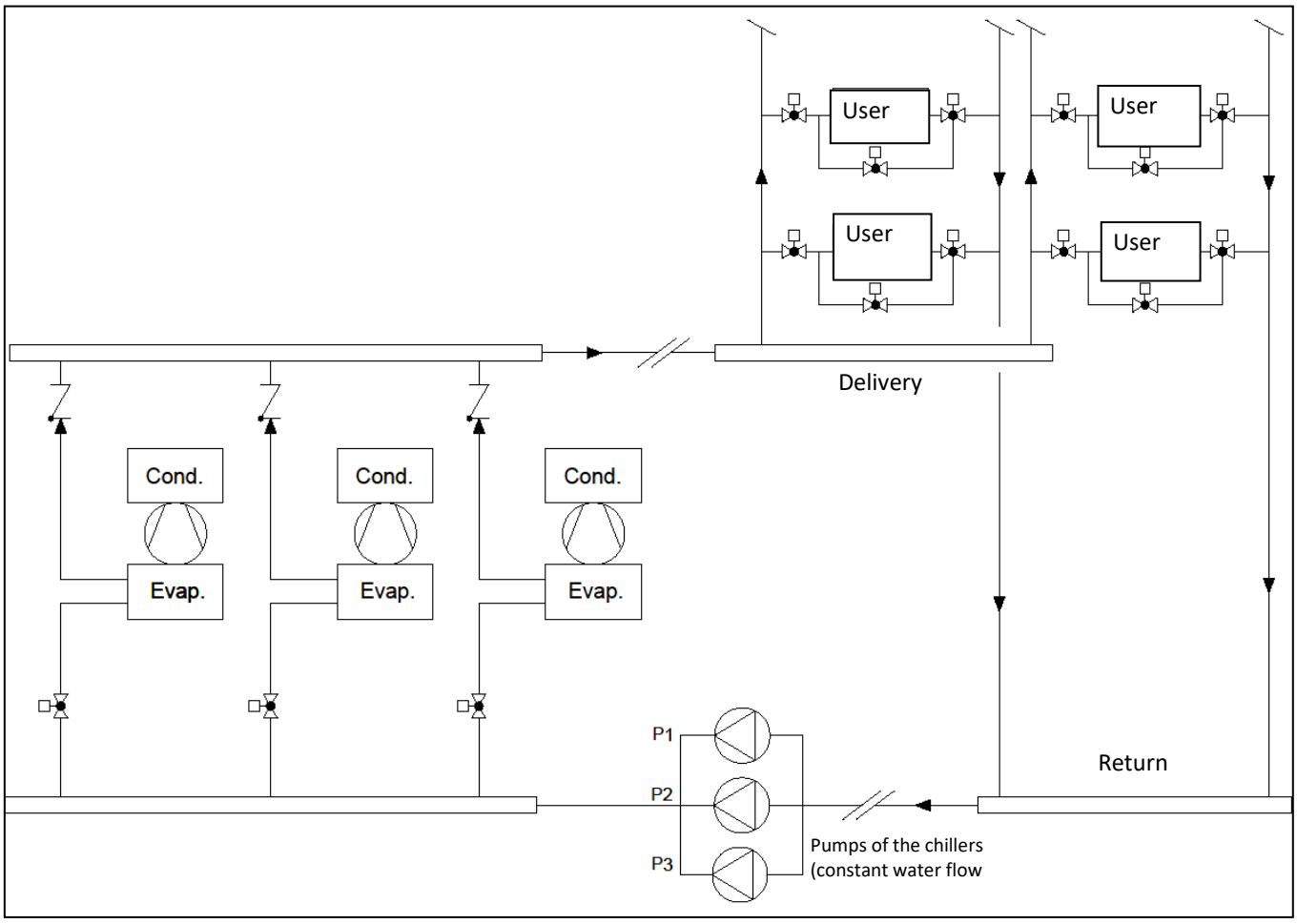


Since the primary and secondary circuits are not divided, the flow rate of the pumps must be dimensioned on the sum of the design flow rates of the whole terminals without regarding the contemporaneity.

The circulating water flow rate in the plant is constant independently of the working conditions.

The chillers must all always be kept working; stopping a chiller unit would cause closing the water flow temperature control.

Coupled primary and secondary circuits — common pumps for chiller units



Since the primary and secondary circuits are not divided, the flow rate of the pumps must be dimensioned on the sum of the design flow rates of the whole terminals without regarding the contemporaneity.

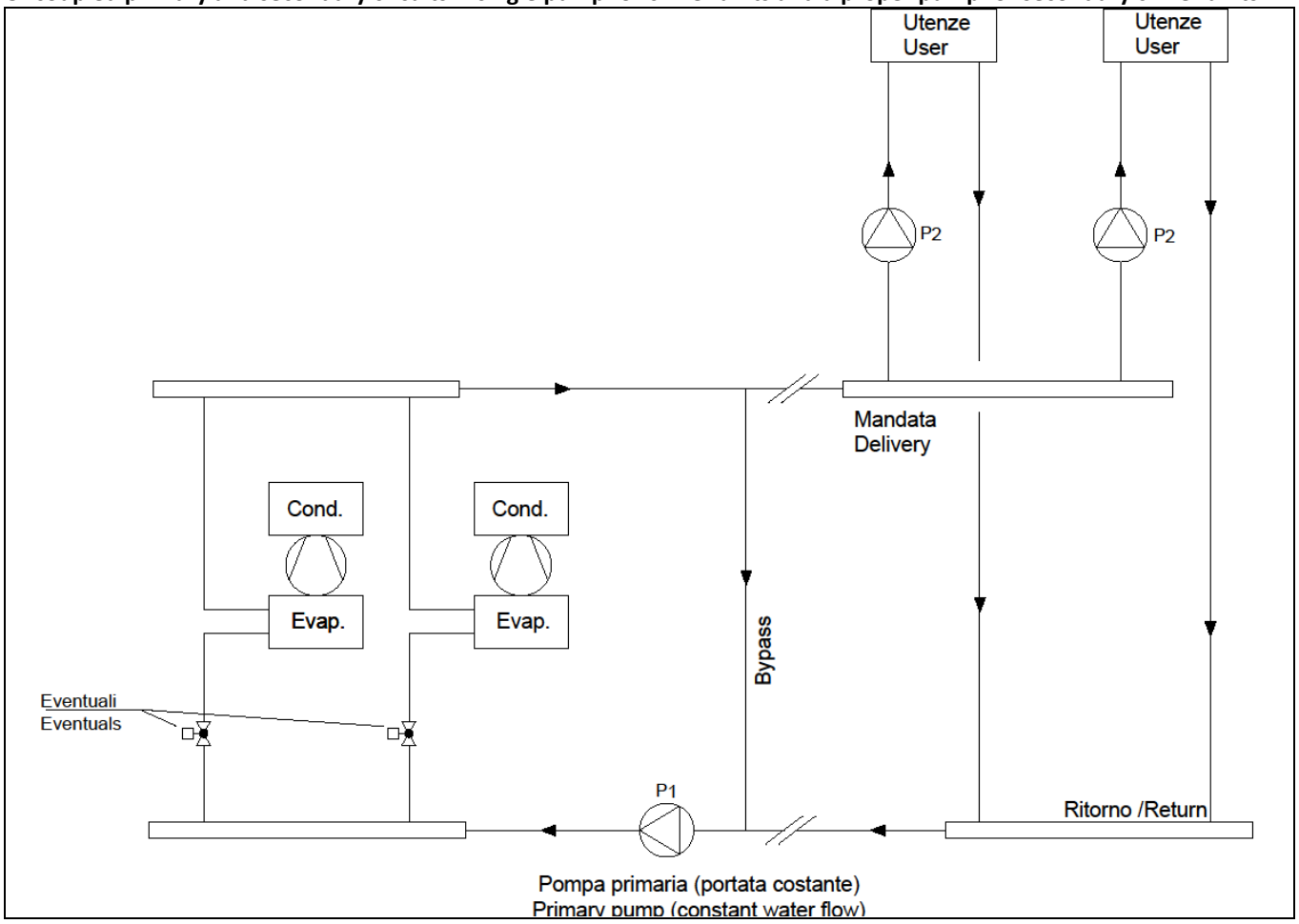
The water flow rate that circulates through each chiller unit is constant for any load condition.

The circulating water flow rate in the plant is constant independently of the working conditions.

Thanks to the use of dedicated common pumps, it is required to insert a single reserve pump for the chillers. The shut-off valves only come into operation in case of emergency in order to exclude a single unit.

The chiller units must all always be kept working; stopping a certain chiller unit would cause closing the water flow temperature control.

Uncoupled primary and secondary circuits— single pump for chiller units and a proper pump for secondary chiller units



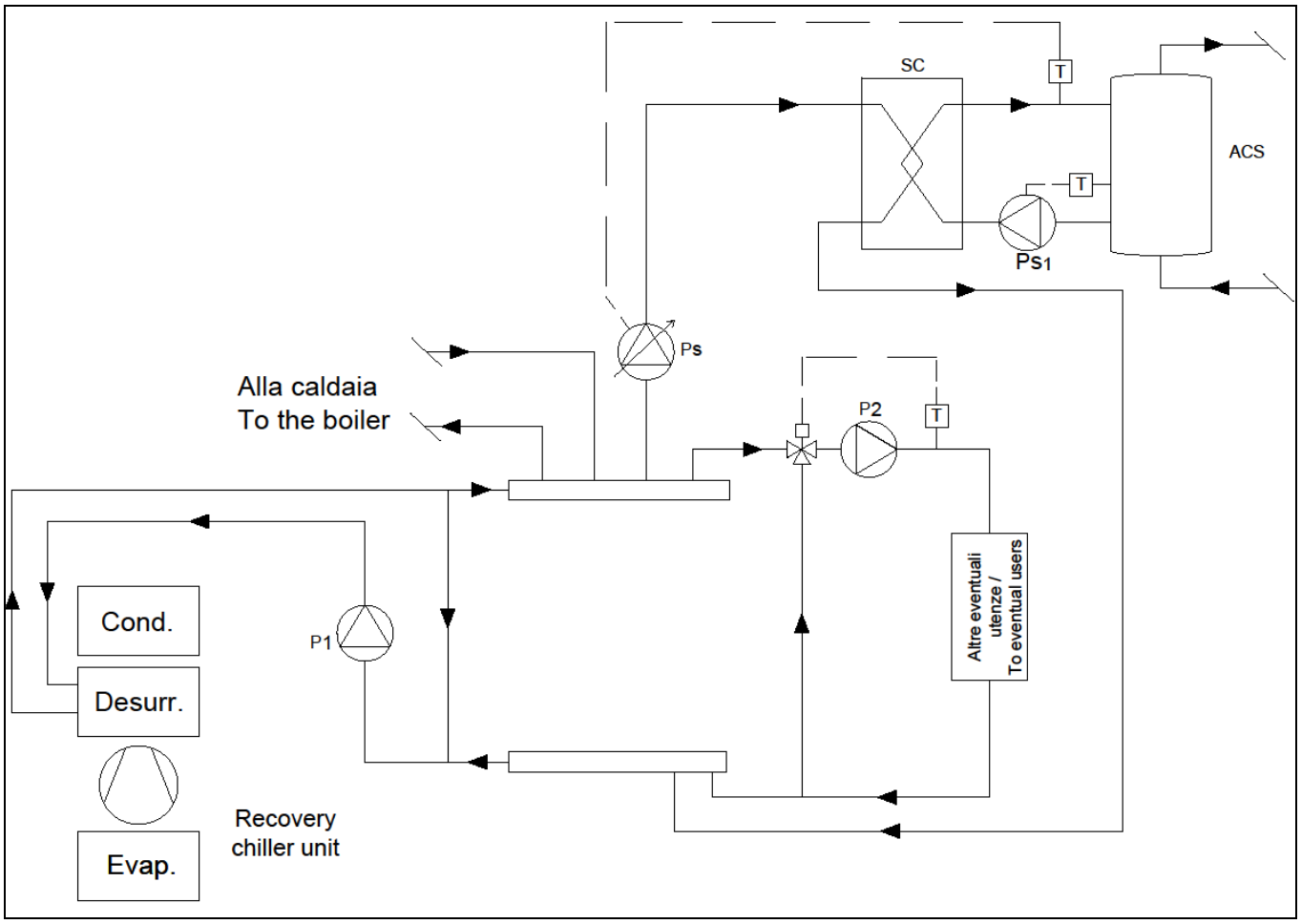
The diagram is suitable for the same refrigeration units also the flow rate can be constant or variable or the users.

The flow rate of the primary pump P1 must be greater than the sum of the flow rates of the pumps P2 at any condition: the water must flow from the delivery to the return in the by-pass section.

The flow rate that circulates through each chiller unit is constant for any load condition.

The chiller units must all always be kept working; stopping a certain chiller unit would cause closing the water flow temperature control.

Domestic hot water production with total or partial heat recovery chillers

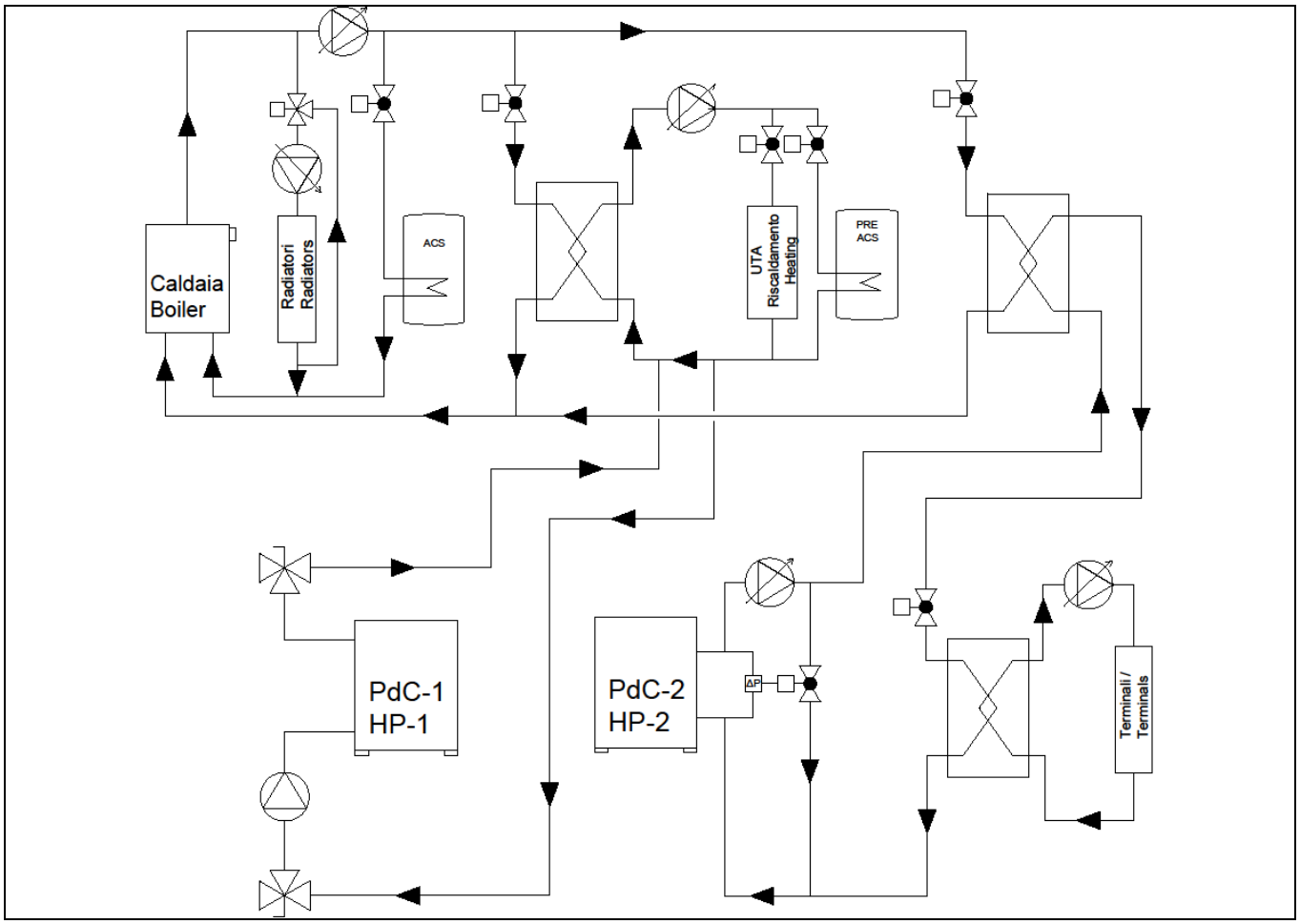


With the use of desuperheaters, it is possible to increase the temperature of the domestic hot water.

The SC heat exchanger prevents encrustations caused by the deposited scale on the heat exchanger of the refrigeration unit and must always be provided.

The P1 pump turns on and off based on the domestic hot water temperature in the storage tank, while the Ps pump is managed to keep the desired set-point value at the outlet of the SC exchanger.

Thermo-refrigerating unit for mixed air conditioning systems with primary air plus radiant panels or chilled beams — plant with chilling reversible heat pump units

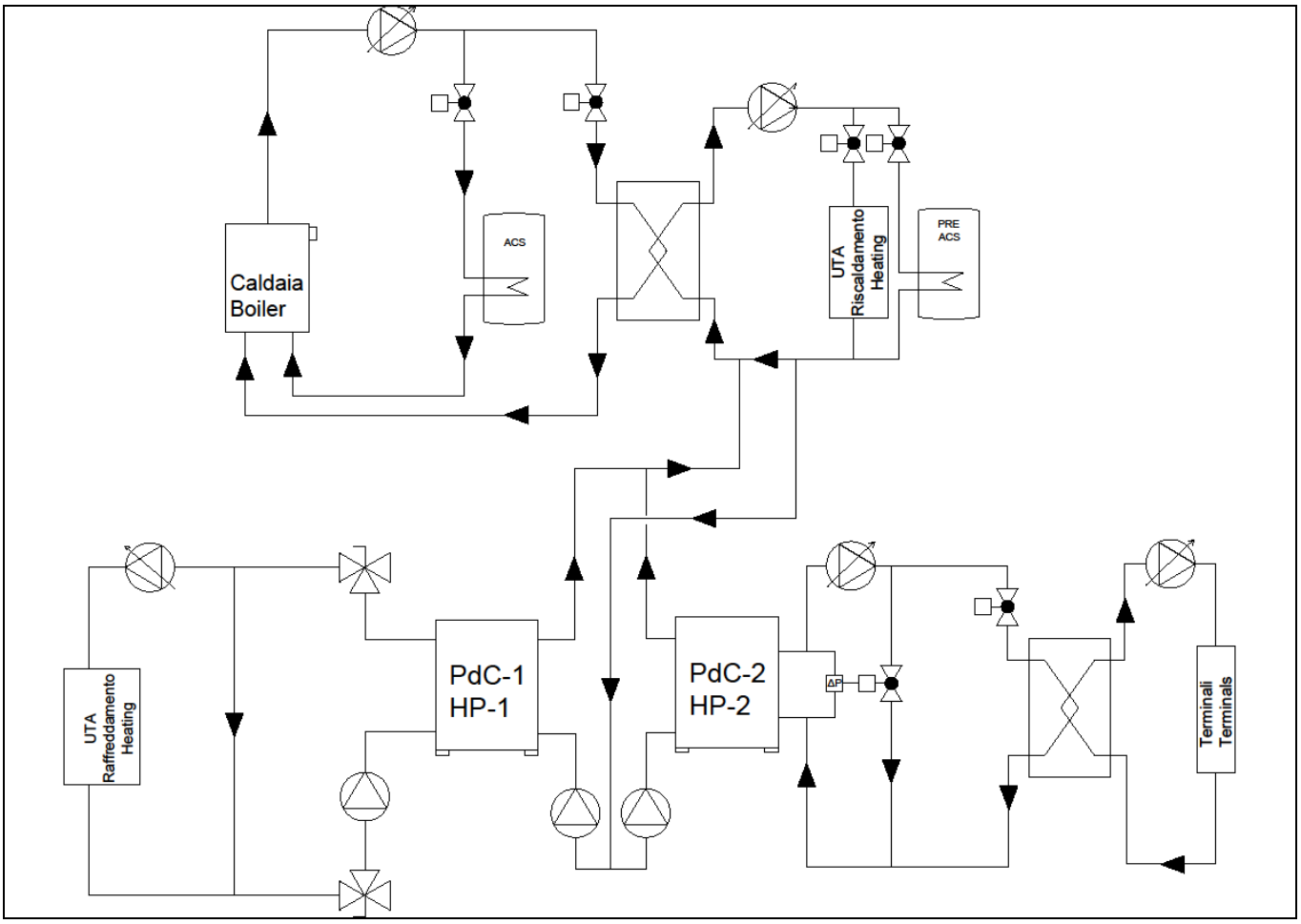


The heat generators feed the high temperature circuits of the heating and sanitary hot water production systems.

The PdC-1 (HP-1) group produces hot water that is introduced into the low temperature network that supplies the air treatment units (UTA) hot exchangers' and the preheating of the domestic hot water. If the efficiency of the heat pump is too low, therefore, the system is not sufficiently efficient, or in case of failure, the hot water will be produced entirely through the exchanger A that is supplied by the boilers.

The PdC-2 (HP-2) group also produces hot water at low temperature, which pass through the exchanger B and feeds C. As well, in case of lack convenience or in case of failures, the hot water will be produced by the exchanger B supplied by the boilers.

Thermo-refrigerating unit for mixed air conditioning systems with primary air plus radiant panels or chilled beams — plant with chiller reversible heat pump units



The heat generators work to integrate existing renewable sources and any post-heating elements if necessary.

The PdC-1 group works as a water-chiller producing water to feed the UTA cold batteries.

It is a good idea to equip the two chiller-heat pump units with radiators to feed the post-heating coils (if present) and to preheat the DHW.

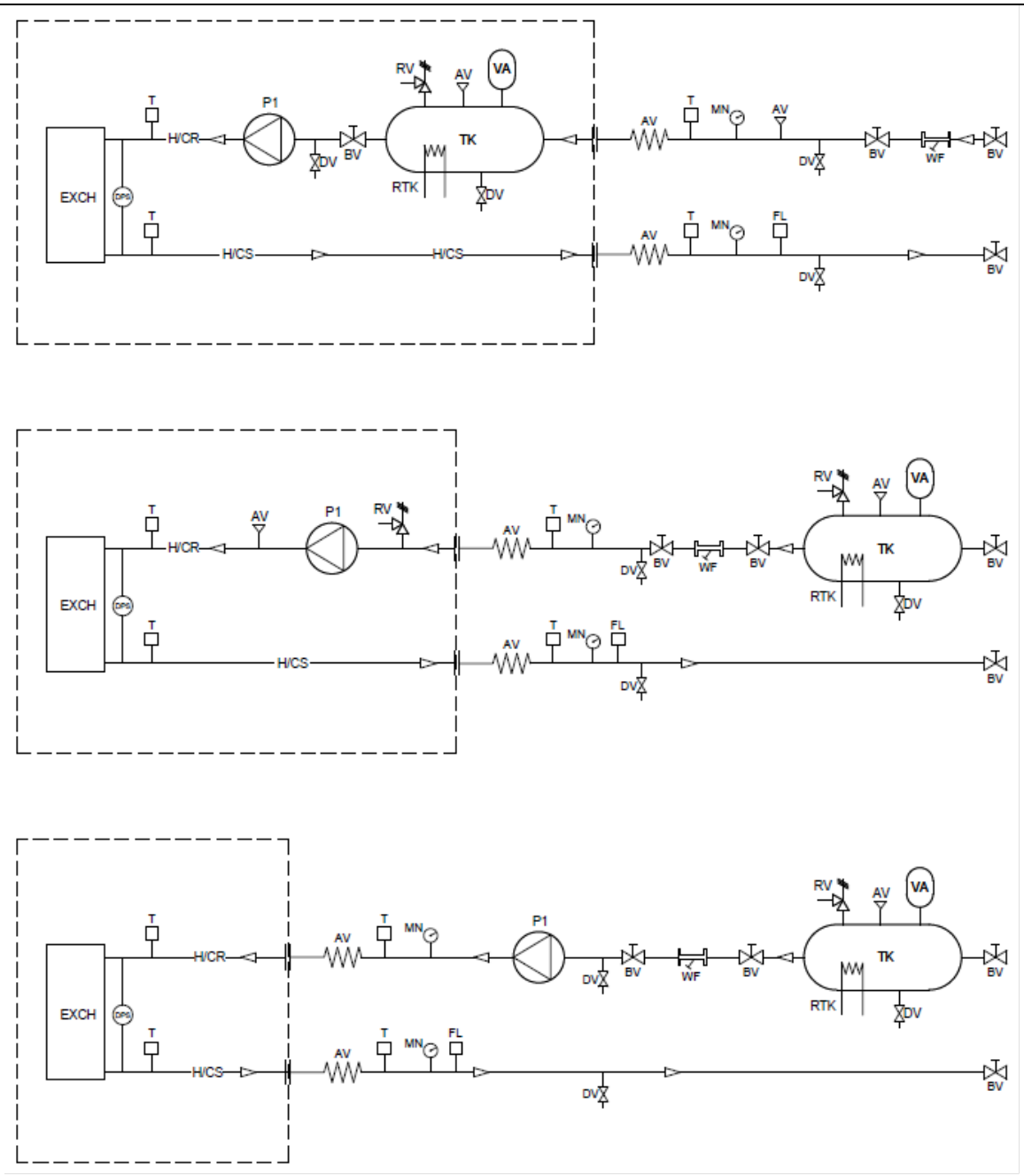
The PdC-2 group produces chilled water at a higher temperature with respect to the one of produced water by group 1; the water supplies the exchanger B. It is not possible to make a direct coupling between the group 2 and the terminals, as these provide the summer heat jump values lower than the minimum value (4°C) accepted by the chillers.

6.6.3 Handbook

For more information about some possible configurations, contact our offices and ask for the handbook, which collects a series of recommended drawings of plants that have been highlighted regarding the installation configuration of our high efficiency heat pumps. The "Handbook" shows also the symbiotic potential with some of our products present in the catalogue.

6.6.4 Hydraulic diagram inside the unit

Herein below the hydraulic diagrams for connection to the unit, are respectively for units equipped with PS/SI hydronic kit (pump and tank), units equipped with PS kit (single pump) and unit without hydronic kit.



EXCH	Plate heat exchanger	**TK**	Storage tank
DPS	Differential pressure switch	**AV**	Air vent valve
T	Temperature sensor	**VA**	Expansion vessel
P1	Pump	**MN**	Manometer
DV	Discharge valve	**FL**	Flow switch
BV	Shut-off valve	**WF**	Water filter
RV	Relief valve	**H/CR**	User's water inlet
RTK	Tank's electric heater	**H/CS**	User's water outlet
AB	Dampers		

In each unit equipped with a hydronic kit with tank (PS/SI, PSAP/SI, PD/SI, PDAP/SI configurations), the expansion vessel and safety valve are included. The expansion vessel is single or double depending on the size of the unit. The main features are indicated below:

· diaphragm resistant to peaks of 130°C;

· pre-charge pressure 2.5 bar;

· glycol percentage up to 100%;

· Maximum pressure 10 bar.

HWA1-A	02106	02120	02128	02140	04155	04177	04184	04209	04239	04258	04305	04349
Number of expansion vessels	1	1	1	2	1	1	1	1	1	1	2	2
Expansion vessel volume [l]	25											

HWA1-A /H	02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Number of expansion vessels	1	1	2	2	2	1	1	1	1	2	2	2
Expansion vessel volume [l]	25											

In each unit equipped with a hydronic kit without tank (PS, PSAP, PD, PDAP configurations), a safety valve with 6 bar opening pressure is included all the same.

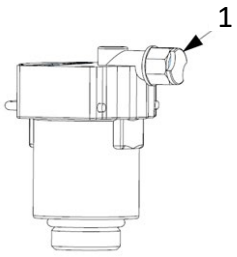
6.6.5 Drainage system

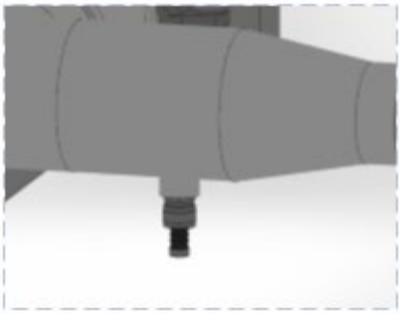
The **HWA1-A/HWA1-H** units all of them adopt drainage holes on the basement for the condensate draining which can leach from the pipes of hydraulic and refrigerant circuits, and to discharge the generated water during defrosting cycles.

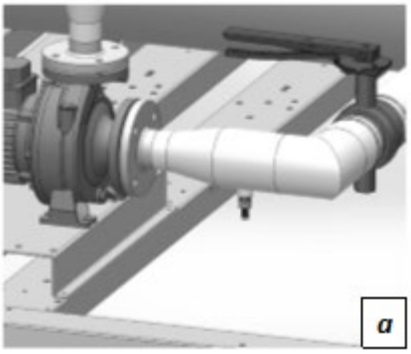
FOR THE HEAT PUMP UNITS, ESPECIALLY IN VERY COLD CLIMATE REGIONS, IT'S RECOMMENDED TO INSTALL ELEVATION SUPPORTS IN ORDER TO ALLOW ICE FORMATION UNDER THE UNIT WITHOUT DAMAGING IT BY FREEZING.

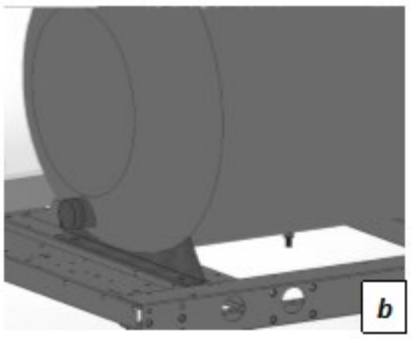
6.6.6 Plant circuit loading

	***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.

This valve has a different location depending on the hydronic kit:

· Hydronic kit with single/double pump — valve along the intake section of the pump (picture a);

· Hydronic kit with single/double pump + tank — valve under the tank (picture b).

6.6.7 Plant unlaoding

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).

6.6.8 Flow rate and minimum volume of water

The design flow rate must be in accordance with the values reported in the tables of chapter 11 TECHNICAL DATA and guaranteed with variable plant conditions. The previous chapter also reports the minimum water content, which should be respected in order to prevent the continuous compressors' switching on and off.

6.6.9 Risk of frost

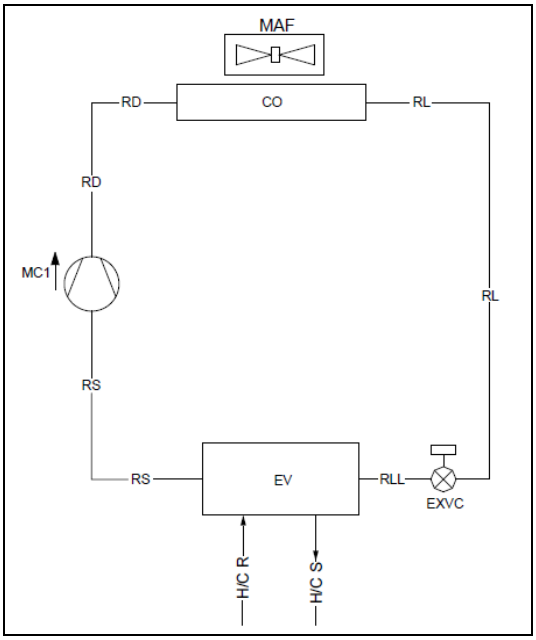
In case external temperatures close to 0°C, preventive measures should be taken to avoid freezing of the water in the plant circuit. It is possible to mix the water with glycol, use heating cables under the insulation in order to protect the pipes or discharge the water from the plant circuit in case of long stops.

If glycol is added, it is important to ensure that it is not corrosive and is compatible with the components of the hydraulic circuit. In the presence of glycol-water mixtures the performance of the units differs from those declared and must be reviewed using appropriate corrective factors depending on the amount of the added glycol. These coefficients are reported in the Technical Bulletin of the series in question.

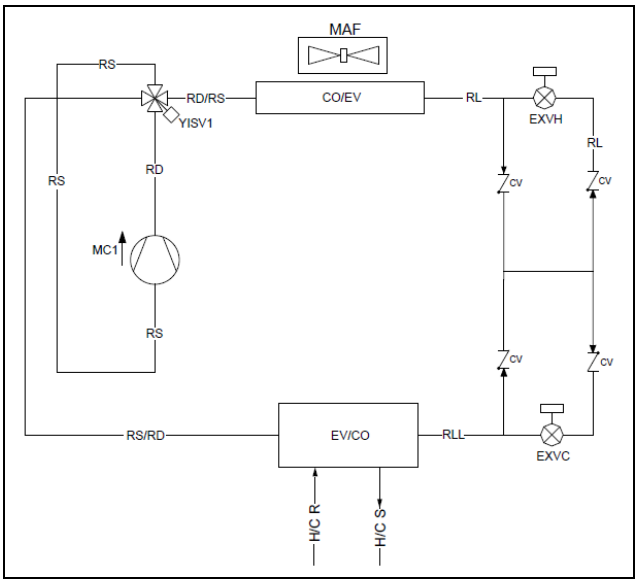
6.7 REFRIGERAT CIRCUITS

Herein below are reported the conceptual diagrams of chillers and heat pumps.

Refrigerant circuit of HWA1-A/H heat pump units



Refrigerant circuit of HWA1-A chiller units



MC1	Compressor	**EVXC**	Electronic expansion valve for chiller operation	**RD**	Discharge line
CO	CHILLER'S CONDENSER	**EVXH**	Electronic expansion valve for heat pump operation	**RL**	Liquid line
EV	CHILLER'S EVAPORATOR	**CV**	Non-return valve	**RLL**	Laminated liquid line
CO/EV	Condenser in chiller operation	**H/CR**	User's water inlet	**RS**	Suction line
EV/CO	Evaporator in chiller operation	**H/CS**	User's water outlet	**RS/RD**	Chiller operation suction line
YISV1	4-WAY reversing cycle valve	**MAF**	Axial fan motor	**RD/RS**	Chiller operation discharge line

6.8 ELECTRIC CONNECTIONS

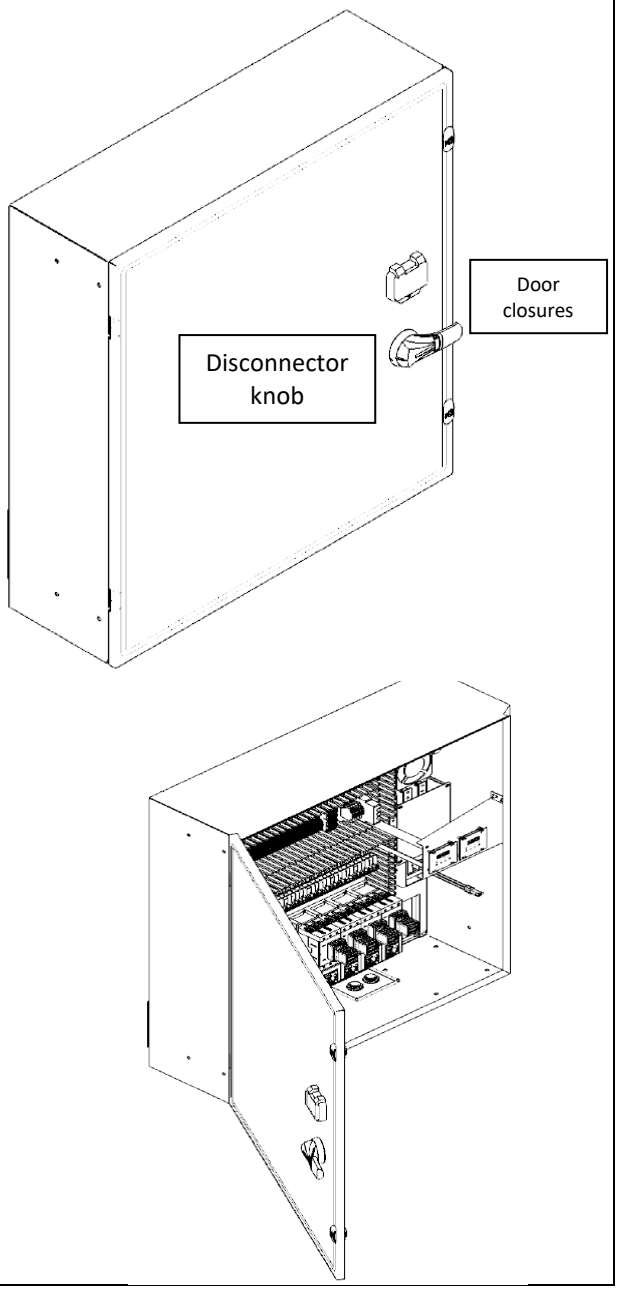
6.8.1 Access to electrical panel

The steps for getting access to the electrical panel are detailed below:

1. Turn the disconnector switch to break the voltage
2. Use a special key to unclock the door closures.

Remove the cover without taking off the fairlead support plate.

At the end of the work, close all the removed covers using the proper provided screws and with the gaskets (if provided).



6.8.2 Power supply terminal block

⚠	***Only qualified personnel can carry out the electrical wiring to the terminal block.***

The electrical connections must be carried out by qualified personnel. The connection terminal block can be accessed by opening the electrical panel door as indicated in the previous paragraph 6.9.1. The connections to the terminal block must be connected according to the following notes.

The following connections are standard. Further connections are reported the manual of the on-board controller (see “USER’S AND INSTALLER’S ALLOWED CONFIGURATIONS TABLES”), depending on the configurations adopted.

HWA1-A

TERMINAL	CONNECTION	TYPE
PE	Connect the grounding wire	Power supply input 3-Ph+PE, 400 Vac, 50Hz.
L1	Connect L1 phase cable coming from the mains	
L2	Connect L2 phase cable coming from the mains	
L3	Connect L3 phase cable coming from the mains	
XU-1.1	Modbus RTU+ signal connection for remote control panel	Communication Modbus RS RTU 485
XU-1.2	Modbus RTU- signal connection for remote control panel	
XU-2.1	RTU Modbus GND connection for remote control panel	
XU-4.1	Remote on/off input	Voltage-free digital input
XU-4.2		
XU-5.1	Plant remote sensor (TE IMP1)	Analog input
XU-5.2		
XU-6.1	Double set point (2 SP1)	Digital input
XU-6.2		
XU-8.1/8.2	Signal on compressor	Digital output
XU-9.1/9.2	Double set point signalization	
XU-10.1/10.2	Alarm signalization	
XU-11.1/11.2	Machine lock-out signalization	

HWA1-A/H

MORSETTO	COLLEGAMENTO	TIPO
PE	Connect to the grounding wire	Ingresso per alimentazione 3-Ph+PE, 400 Vac, 50Hz.
L1	Connect L1 phase cable coming from the mains	
L2	Connect L2 phase cable coming from the mains	
L3	Connect L3 phase cable coming from the mains	
XU-1.1	Modbus RTU+ signal connection for remote control panel	Communication Modbus RS RTU 485
XU-1.2	Modbus RTU- signal connection for remote control panel	
XU-2.1	RTU Modbus GND connection for remote control panel	
XU-2.2	Not connected	
XU-3.1	Input of summer/winter mode remote commutation (to activate the function see the relevant paragraph in the MCO manual), **only heat pump version**	Voltage-free digital input
XU-3.2		
XU-4.1	Remote on/off input (Closed = unit is ON / open = uniti s off)	
XU-4.2		
XU-5.1	Plant remote temperature sensor (TE IMP1)	Analog input
XU-5.2		
XU-6.1	Double set point (2 SP1)	Digital input
XU-6.2		
XU-7.1	Not connected	
XU-7.2		
XU-8.1/8.2	Internal use (HWA1-A/H unit)	Digital outputs
	Signal on compressor (HWA1-A unit)	
XU-9.1/9.2	Internal use (HWA1-A/H)	
	Double set point signalization (HWA1-A unit)	
XU-10.1/10.2	Season mode signalization (HWA1-A/H 02109, 02121 units)	
	Internal use (HWA1-A/H excepet the units 02109, 02121)	
	Alarm signalization (HWA1-A units)	
XU-11.1/11.2	Internal use (HWA1-A/H)	
	Signalization of lock-out of the machine (HWA1-A units)	
XU-12.1/12.2	Signalization of defrosting cycle (HWA1-A/H units)	
XU-13.1/13.2	Signalization of double set point (units: unità HWA1-A/H 02109, 02121)	Analog or digital input
	Season signalization (units: HWA1-A/H excluding 02109, 02121)	Analog input

7 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 make operating 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 turned 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 these seasonal operating modes 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.

7.1 POWERING-ON 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.

8 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 that are executed 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.

9 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: When the ambient temperature becomes lower than -20°C, if the unit equipped with water pump is turned off and disconnected from power supply even for short periods, in such case, it's necessary to discharge the plant circuit and the hydraulic circuit of the unit from the mixture of water and glycol. 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 13.4. 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.***

10 PERIODICAL CONTROLS AND MAINTENANCE

	***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 make 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 their nearest. 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 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.***
	***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:

Recommended routine control periods.

OPERATION	1 month	4 month	6 month	12 month
Loading of the water circuit and checking the preload pressure.	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 in the refrigerant circuit.	x			
Check if there is any 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 hydraulic connections.		x		
Check the tightening and the balancing of the fan blades.		x		
If the voltage is correct and phase imbalance (no load and with load).			x	
Check the correct electric absorption.			x	
Check the refrigerant charge and any leaks.			x	
Check the operating pressure, and superheat and sub-cooling.			x	
Check of the efficiency of circulation pump.			x	
Check for corrosion				x
Check panel fastening				x
Check the water quality (see Features of the circuit water chapter) and the concentration of			x	
Check the safety valve on the hydronic side			x	

ATTENTION: the unit is fitted with safety valves that limit the overpressure of the refrigerant circuit. These devices require specific inspection frequency, in order to check that they are intact and working properly. Each country in the European Union has established the inspection frequency; in Italy, for example, Decree no. 329 of 2004 set the following frequency:

- ***every 4 years operating check***
- ***every 10 years integrity check.***

It is recommended to check the inspection frequency set out by the relevant legislation if the unit is not installed in Italy.

10.1 CLEANING OF THE FINNED CONDENSER

It is important to follow the instructions below inorder to perform a proper cleaning:

a) Remove dirt from the surface. Deposits like leaves, fibers, etc. must be removed using a vacuum cleaner (use a brush or other soft accessory, be careful to avoid rubbing with metal or abrasive parts). In case of using compressed air, it is necessary to pay attention to keep the air flow always perpendicular to the surface of the condenser to avoid bending the aluminum fins. Be careful not to bend the fins with the nozzle of the compressed air lance.

b) Rinse with water. It is possible to use chemical substances (specific detergents for finned condensers). Rinse by do running the water inside each single passage of the fins, until they are perfectly clean. Be careful to direct the water jet perpendicular to the surface of the condenser for not to bend the aluminium fins. Avoid hitting the condenser with the water hose. It is recommended not to place your thumb on the end of the rubber pipe to obtain the desired pressure of water jet instead of using special nozzles that could hit the condenser and damage it.

10.1.1 Cleaning finned coils treated with the anti-corrosion method

The anti-corrosion treatment applied to the finned coils (available as an alternative to the standard coils) guarantees protection against aggressive atmospheres.

The cleaning frequency depends on the environmental conditions and is up to the common sense of the maintenance staff. When oxidising dust or grease particles are observed on the coil surface, cleaning is recommended. In general, in a slightly polluted atmosphere, it is recommended to carry out the cleaning procedures every three months.

Washing should be carried out preferably with hot water (40-60°C) and detergent with neutral pH, using a high pressure system. Rinse with plenty of cold water (50 l/m2).

- Cleaning procedure:
- disconnect the unit;
- rinse the coil if possible with hot pressurised water. Start from the inside and work from top to bottom, then proceed in the same way on the outside. Make sure the spray gun is kept perpendicular to the coil, therefore in line with the fins and at an adequate distance (20-25 cm) in order not to damage the latter.

	***ATTENZIONE: do not direct the spray gun directly towards the coil when the trigger is pressed but carry out this operation with the spray gun directed towards the ground. Move the spray gun towards the coil surface when the water is already flowing.***

- Apply the detergent, then use the low pressure mode (maximum 3 bar). The spray gun must always be kept perpendicular to the battery. Keep the spray gun about 15 cm away from the surface and move it at a speed of 1 m/s. Even in this phase, start from the inside of the coil, from top to bottom, and then repeat on the outside;
- rinse the coil in high pressure mode using only water. Start from the inside, from top to bottom, and repeat outside. Repeat this operation at least a couple of times until the foam stops coming out.

To clean the coil from the inside, a spray gun extension may be handy.

	***ATTENZIONE: during cleaning operations, avoid directing the spray gun towards the electrical components in the unit. The most critical point could be the coil near the main electrical panel.***

If the maintenance staff notices that the protective cover is missing on the edge of the fins, please contact the nearest service centre to reapply the cover and fully restore the corrosion protection.

10.2 EXTRAORDINARY MAINTENANCE

Any work of extraordinary maintenance must be carried out by authorized service center.

10.3 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.**

11 DISPOSAL PROCEDURE

Once the unit reaches the end of its life cycle and needs to be removed or replaced, the below operations should be respected,

- 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.

11.1 RESIDUAL RISKS

We point out the most common situations that could give rise to risks for persons or things. The manufacturer can not control what is illustrated above.

• If you smell burning, smoke, or other signs of serious anomalies, this could be a potentially dangerous situation of objects, persons or for the unit itself. Electrically isolate the unit (yellow-red disconnector switch) and contact the authorized service center to identify and resolve the problem causing the fault.

• The accidental contact with exchanger condensers, compressors, delivery pipes or other components can cause injuries and/or burns. To operate in the potentially dangerous area it is advisable to always have adequate clothing, including protective gloves.

• Maintenance and repair operations carried out by unqualified personnel can cause damage to objects, persons or the unit itself. Always contact a qualified service center.

• If failed to close the unit panels or to check the correct tightness of the panel fixing screws may cause damage to property, persons or the unit itself. Periodically check that all panels are properly closed and secured.

• In the event of a fire, the temperature of the refrigerant gas can reach values such as to increase the pressure above the safety value, causing possible projections of the refrigerant gas or explosions of the parts of the circuit that remain isolated from the closure of the taps. Do not stand near the relief valves and never leave the cooling plant taps closed.

• Handling operations, if not performed with all the necessary safety devices, can cause the unit to fall or overturnr. It is therefore recommended to handle it respecting the instructions given in this manual and on the packaging.

• If the unit is not installed correctly may result in water leakage, condensation build-up, refrigerant leakage, electric shock, fire, malfunction/damage to the unit. Therefore, check that the installation is carried out by suitably qualified personnel and that the instructions contained in this manual and the local regulations in force are followed.

• The installation of the unit in a place where there is a risk of flammable gas leakage and the consequent accumulation of these gases in the air surrounding the unit can cause an explosions and a fire to break out. Check the positioning of the unit carefully.

• The installation of the unit in a place that is not proper to support the weight and/or ensuring adequate anchorage may cause the machine to fall or turnover, which may cause damage to property, persons or the unit itself. Carefully check positioning and anchoring.

• With units easily accessible to children, unauthorized persons, animals, the occurrence of injuries, even serious ones is common. Install the unit in places that are accessible only to qualified personnel or provide protection against intrusions in the area of installation.

• In the presence of a connection line to the electrical network that is not complete and/or with cables that are not adequately sized and/or with inadequate protection devices may cause electric shocks, poisoning, damage to the unit or fire. Refer to the wiring diagram and this manual to perform the electrical connections, ensuring the use of a dedicated plant

Fixing incorrectly the cover of the electrical components makes easy the penetration of dust, water and in general of external agents which can consequently cause electric shocks, damages to the unit or fire. Make sure the cover is securely attached to the unit.

• The metallic masses of the unit, when electrified and not grounded properly, can cause electric shock or death by electrocution. Pay the utmost attention to the connection to the grounding system.

After removal of the guards, the contact with under-voltage parts inside the unit may cause electric shock, burns or death by electrocution. Before removing the guards, open and lock the general disconnector switch; it’is good way to mark with appropriate sign “works-in-progress”.

Coming in contact with parts that can be under electric voltage during the start-up of the unit may cause electric shock, burns or death by electrocution. When it is not needed to have voltage on the circuits, open the disconnector switch situated on the unit's connection line, lock it and equip it with the appropriate warning sign

• Coming in contact with the transmission or extraction of the fans this can cause injury. Before getting access to the unit or removing the protection grilles or the fans themselves, open the disconnecting switch located on the connection line of the unit, padlock it and attach on it the appropriate warning sign.

• The intervention of the relief valve and the consequent expulsion of the gas refrigerant can cause injuries and intoxication. Always wear adequate clothing, including safety glasses, in the case of operations in the dangerous area.

In the event of refrigerant gas leaks, refer to the "refrigerant safety data sheet" (4.4).

If the refrigerant comes into contact with open flame or heat sources, or heated compressed circuit gas, an explosion or fire may be happen. Be very careful not to place any heat source inside the hazardous area.

• In thr cases of defects in the pipes, in the connections or in the shut-off organs, leakages or water projections may happne which can cause damage to property or short circuits of the unit.

12 TECHNICAL DATA

12.1 COOLING ONLY VERSION "HWA1-A"

TECHNICAL CHARACTERISTICS		Unit	Model HWA1-A											
			02106	02120	02128	02140	04155	04177	04184	04209	04239	04258	04305	04349
Heating	Cooling capacity (1)	kW	105,0	118,7	129,5	139,3	155,0	175,9	182,4	207,9	238,1	256,6	304,8	347,7
	Total power input (1)	kW	33,5	38,3	44,2	44,3	49,9	56,7	62,9	67,1	76,8	88,5	98,3	112,2
	EER (1)	W/W	3,13	3,10	2,93	3,15	3,11	3,10	2,90	3,10	3,10	2,90	3,10	3,10
	Cooling capacity (2)	kW	138,8	154,9	163,7	184,9	204,4	229,7	238,8	277,3	314,3	332,8	405,3	458,3
	Total power input Potenza (2)	kW	35,73	40,82	46,8	47,5	52,9	60,85	67,76	71,58	81,9	94,63	105,2	121,1
	EER (2)	W/W	3,88	3,79	3,50	3,89	3,87	3,77	3,52	3,87	3,84	3,52	3,85	3,78
	SEER (3)	W/W	4,13	4,12	4,11	4,27	4,11	4,11	4,10	4,14	4,24	4,10	4,16	4,12
	IPLV (9)		4,99	5,09	4,71	5,02	5,13	5,13	4,95	4,99	4,94	4,37	4,92	5,05
	Cooling capacity (8)	kW	61,9	70,6	76,3	82,0	91,5	103,4	108,9	122,9	144,1	157,1	183,8	210,6
	Total power input (8)	kW	29,9	34,1	39,1	39,5	45,4	50,8	55,8	59,7	68,8	79,2	88,5	100,5
	EER (8)	W/W	2,07	2,07	1,95	2,08	2,02	2,04	1,95	2,06	2,09	1,98	2,08	2,10
	Water flow (1)	l/s	5,02	5,67	6,19	6,45	7,19	8,40	8,71	9,93	11,40	12,26	14,69	16,61
	Pressure drop on use-side heat exchanger (1)	kPa	17,48	20,72	16,14	27,84	21,08	16,69	19,11	24,81	34,23	35,42	31,97	28,82
Compressor	Type		SCROLL											
	Refrigerant oil type (type)		Emkarate RL 32 3MAF											
	Nr compressors	Nr	2	2	2	2	4	4	4	4	4	4	4	4
	Capacity steps Std	Nr	2	3	2	3	4	4	4	4	6	4	6	4
	Oily charge (Circuit 1)	l	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	6,3 + 4,44	3,25 + 3,25	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 6,3	6,3 + 6,3
	Oil charge (Circuit 2)	l	-	-	-	-	3,25 + 3,25	3,25 + 3,25	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 4,44	4,44 + 6,3	6,3 + 6,3
	Refrigerant	Nr	1	1	1	1	2	2	2	2	2	2	2	2

	circuits												
Refrigerant	Type		R410A										
	Refrigerant charge (Circuit 1) (4)	kg	10,5	10,5	10,5	15	13,0	13,0	13,0	13,0	13,5	13,5	19,5	20,0
	Refrigerant charge (Circuit 2) (4)	kg	-	-	-	-	10,5	10,5	10,5	13,0	13,5	13,5	19,5	20,5
	Quantity of CO_2 equivalent (4)	ton	21,9	21,9	21,9	31,3	49,1	49,1	49,1	54,3	56,4	56,4	81,4	84,6
	Design pressure (high/low)	bar	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4	40,5/4
Exterrnal zone fan motors	Fan motors type		AXIAL											
	Nr of fans	Nr	2	2	2	3	3	3	3	4	4	4	6	6
	Rated power (1)	kW	1,5	1,5	1,5	1,4	1,4	1,4	1,5	1,4	1,5	1,5	1,4	1,5
	Max power input	kW	3,8	3,8	3,8	5,7	5,7	5,7	5,7	7,6	7,6	7,6	11,4	11,4
	Max input current	A	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9
	Standard air flow	l/s	10614	10714	11143	14649	14467	15868	15892	20647	20471	22231	29279	33255
Internal heat exchanger	Internal Heat exchanger type		PHE - PLATE											
	Nr of internal H-exchangers	Nr	1	1	1	1	1	1	1	1	1	1	1	1
	Water content	l	6,87	6,87	9,90	7,88	9,30	11,40	11,40	11,40	15,50	22,10	22,10	22,10
Hydraulic circuit	Max pressure on water-side	bar	12	12	12	12	12	12	12	12	12	12	12	12
	Max pressure on hydronic kit side (relief valve calibration)	bar	6	6	6	6	6	6	6	6	6	6	6	6
	Water connections		2" 1/2	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	3"	3"	3"	3"	3"
	Minimum content of water plant (5)	l	427	535	535	699	409	533	533	533	669	669	874	874
Sound levels	Sound power (6)	dB (A)	86 std/ 85 SL/ 83 SSL	86 std/ 85 SL/ 83 SSL	87 std/ 86 SL/ 84 SSL	87 std/ 86 SL/ 84 SSL	87 std/ 86 SL/ 84 SSL	88 std/ 87 SL/ 85 SSL	88 std/ 87 SL/ 85 SSL	88 std/ 87 SL/ 85 SSL	88 std/ 87 SL/ 85 SSL	88 std/ 87 SL/ 85 SSL	88 std/ 87 SL/ 85 SSL	90 std/ 89 SL/ 87 SSL

	Sound pressure (7)	dB (A)	54 std/ 53 SL/ 51 SSL	54 std/ 53 SL/ 51 SSL	55 std/ 54 SL/ 52 SSL	54,9 std/ 53,9 SL/ 51,9 SSL	54,9 std/ 53,9 SL/ 51,9 SSL	55,9 std/ 54,9 SL/ 52,9 SSL	55,9 std/ 54,9 SL/ 52,9 SSL	55,9 std/ 54,9 SL/ 52,9 SSL	55,9 std/ 54,9 SL/ 52,9 SSL	55,9 std/ 54,9 SL/ 52,9 SSL	55,8 std/ 54,8 SL/ 52,8 SSL	57,8 std/ 56,8 SL/ 54,8 SSL
Electrical data	Power supply		400V/3P/50Hz											
	Pax power input (version without accessories)	kW	48,9	55,0	61,1	66,9	82,4	87,4	90,9	97,8	110,0	122,3	146,0	165,8
	Max current input (version without accessories)	A	83,0	93,4	103,8	113,5	139,9	148,3	154,3	166,0	186,8	207,6	247,8	281,4
	Max sart-up current (version without accessories)	A	285,6	332,3	342,7	358,1	279,9	350,9	356,9	368,6	425,7	446,5	492,4	526,0
	Max start-up current (with SS accessory version)	A	196,3	224,3	234,7	241,1	217,3	261,6	267,6	279,3	317,7	338,5	375,4	409,0
Dimensions and weights	A - Lenght	mm	2860	2860	2860	4060	4060	4060	4060	2860	2860	2860	4060	4060
	B - Width	mm	1100	1100	1100	1100	1100	1100	1100	2200	2200	2200	2200	2200
	C - Height	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Shipping net weight	kg	1080	1080	1090	1510	1620	1620	1620	1950	1960	1960	2670	2850
	Weight in operation	kg	1090	1090	1100	1520	1630	1630	1630	1960	1970	1980	2690	2870

Operating conditions:

(1) Internal heat-exchanger water temperature = 12/7 ° C, external exchanger air intake temperature 35°C

(2) Internal heat exchanger water temperature = 23/18°C, external heat-exchanger air intake temperature 35°C.

(3) Internal heat-exchanger water temperature reference = 12/7°C.

(4) The data are indicative and could be subject to change. For the correct data, always refer to the technical label on the unit.

(5) The calculated value of minimum water volume in the plant does not take in consideration the volume of the water contained in the internal heat-exchanger (evaporator). With low outdoor air temperature applications or low average loads required, the minimum water volume to the plant is obtained by making the double of the indicated value.

(6) Condizion (1); this value is determined on the basis of measurements taken in accordance with the UNI EN ISO 9614-2, in compliance with the requirements of Eurovent certification

(7) This value is calculated from the sound power level using ISO 3744: 2010, referred to 10 m distance from the unit.

(8) Cooling “BT version”: Outdoor air temperature 35°C, Internal heat exchanger water temperature = -3/-8°C. Fluid mixed with ethylene glycol at 35%.

N.B. The performance data are indicative and could be subject to change. In addition, the performances declared in (1), (2) and (8) refer to the instantaneous power according to UNI EN 14511. The declared data in (3) are determinated according to UNI EN 14825.

12.2 HEAT PUMP STANDARD VERSION

TECHNICAL CHARACTERISTICS		Unit	Model HWA1-A/H											
			02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
Cooling	Cooling capacity (1)	kW	102,8	113,1	131,8	137,9	148,1	165,3	186,9	208,3	224,8	259,6	289,1	324,6
	Total power input (1)	kW	33,8	38,9	41,3	44,4	49,8	52,6	59,4	67,2	77,5	80,6	92,9	111,9
	EER (1)	W/W	3,05	2,90	3,19	3,11	2,97	3,14	3,15	3,10	2,90	3,22	3,10	2,90
	Cooling capacity (2)	kW	139,0	150,6	177,0	187,8	202,4	223,6	252,0	282,0	301,1	351,2	387,5	433,8
	Total power input (2)	kW	36,5	42,7	44,1	47,7	53,0	55,7	63,8	71,6	83,2	87,0	100,5	121,8
	EER (2)	W/W	3,81	3,53	4,01	3,94	3,82	4,01	3,95	3,94	3,62	4,04	3,86	3,56
	SEER (5)	W/W	4,35	4,36	4,38	4,73	4,50	4,61	4,64	4,71	4,53	4,65	4,73	4,42
	Water flow (1)	l/s	4,92	5,41	6,31	6,61	7,09	7,90	8,94	9,97	10,76	12,42	13,81	15,53
	Pressure drop on use-side heat exchanger (1)	kPa	21,65	20,13	26,53	24,3	20,21	21,7	26,48	24,66	27,21	18,78	24,85	17,91
Heating	Heating capacity (3)	kW	112,6	125,1	147,8	154,1	166,2	187,6	207,3	223,0	245,9	285,8	316,1	356,1
	Total power input (3)	kW	27,6	30,9	36,6	37,7	41,4	46,0	50,7	54,8	61,1	69,2	78,3	88,5
	COP (3)	W/W	4,09	4,05	4,04	4,08	4,01	4,08	4,09	4,07	4,02	4,13	4,04	4,02
	Heating capacity (4)	kW	108,3	120,1	141,5	147,9	159,7	179,1	198,1	214,1	236,7	273,0	303,3	344,4
	Total power input (4)	kW	32,9	37,5	43,9	45,3	49,4	55,9	61,5	66,0	74,0	83,8	94,7	107,6
	COP (4)	W/W	3,30	3,20	3,22	3,26	3,23	3,21	3,22	3,24	3,20	3,26	3,20	3,20
	SCOP (6)	W/W	3,72	3,77	3,62	3,69	3,68	3,90	3,84	3,96	4,00	3,92	3,95	4,01
	Water flow (4)	l/s	5,20	5,78	6,80	6,96	7,68	8,62	9,54	10,29	11,38	13,13	14,59	16,57
	Pressure drop on use-side heat exchanger (4)	kPa	24,16	22,92	30,61	28,4	24,03	26,63	31,94	27,61	30,53	22,86	29,13	22,26
	Water heating energy efficiency 35°C/55°C	class	A+/A+	A+/A+	A+/A+	A+/A+	A+/A+	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+	A++/A+

Compressor	Type		SCROLL										
	Refrigerant oil (type)		Emkarate RL 32 3MAF										
	Number	Nr	2	2	2	2	2	4	4	4	4	4	4	4
	Capacity steps Std	Nr	2	3	2	3	3	4	6	4	6	5	5	5
	Oil charge (Circuit 1)	l	4,44+4,44	4,44+4,44	4,44+4,44	6,3 + 4,44	6,3 + 4,44	3,25+3,25	4,44+3,25	4,44+4,44	4,44+4,44	6,3 + 4,44	6,3 + 6,3	6,3 + 6,3
	Oil charge (Circuit 2)	l	-	-	-	-	-	3,25+3,25	4,44+3,25	4,44+4,44	4,44+4,44	4,44+4,44	4,44+4,44	4,44+4,44
	Refrigerant circuits	Nr	1	1	1	1	1	2	2	2	2	2	2	2
Refrigerant	Type		R410A											
	Refrigerant charge (Circuit 1) (7)	kg	28	32	34,5	42	42	22	22	30	30	43	47	54
	Refrigerant charge (Circuit 2) (7)	kg	-	-	-	-	-	22	22	30	30	36	34	34
	Quantity of CO_2 equivalent (7)	ton	58,5	66,8	72,0	87,7	87,7	91,9	91,9	125,3	125,3	165,0	169,1	183,7
	Design pressure (high/low)	bar	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5	40,5/2,5
External zone fan motors	Type		AXIAL											
	Number of fans	Nr	2	2	3	3	3	4	4	4	4	6	6	6
	Potenza nominale (1)	kW	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4	1,4
	Max power input	kW	3,80	3,80	5,70	5,70	5,70	7,60	7,60	7,60	7,60	11,40	11,40	11,40
	Max input current	A	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9	3,9
	Standard air flow	l/s	10021	9984	15109	15088	15045	20954	20888	20815	20738	31370	31264	31109
Internal heat exchanger	Internal heat exchanger type		PHE - PLATE											
	Number of internal heat exchanger	Nr	1	1	1	1	1	1	1	1	1	1	1	1
	Water content	l	6,87	6,87	7,88	7,88	8,89	11,40	11,40	11,40	15,50	15,50	22,10	22,10

Hydraulic circuit	Max pressure on water side	bar	12	12	12	12	12	12	12	12	12	12	12	12
	Max pressure on hydronic kit side (relief valve calibration)	bar	6	6	6	6	6	6	6	6	6	6	6	6
	Water connections		2" 1/2	2" 1/2	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	3"	3"	3"	3"
	Minimum content of water plant (8)	l	490	630	630	820	820	480	610	610	780	1020	1020	1290
Sound levels	Sound power (9)	dB (A)	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	88 std/ 87 SL/ 84 SSL	89 std/ 88 SL/ 85 SSL	89 std/ 88 SL/ 85 SSL	89 std/ 88 SL/ 85 SSL	90 std/ 89 SL/ 86 SSL	90 std/ 89 SL/ 86 SSL	91 std/ 90 SL/ 87 SSL	92 std/ 91 SL/ 88 SSL
	Sound pressure (10)	dB (A)	56 std/ 55 SL/ 52 SSL	56 std/ 55 SL/ 52 SSL	55,9 std/ 54,9 SL/ 51,9 SSL	55,9 std/ 54,9 SL/ 51,9 SSL	55,9 std/ 54,9 SL/ 51,9 SSL	56,9 std/ 55,9 SL/ 52,9 SSL	56,9 std/ 55,9 SL/ 52,9 SSL	56,9 std/ 55,9 SL/ 52,9 SSL	57,9 std/ 56,9 SL/ 53,9 SSL	57,9 std/ 56,9 SL/ 53,9 SSL	58,8 std/ 57,8 SL/ 54,8 SSL	59,8 std/ 58,8 SL/ 55,8 SSL
Electrical data	Power supply		400V/3P/50Hz											
	Max power input (version without accessories)	kW	48,9	55,0	63,1	66,9	73,0	87,9	92,8	97,8	110,0	123,8	139,8	160,1
	Max current input (version without accesories)	A	83,0	93,4	107,1	113,5	123,9	149,2	157,6	166,0	186,8	210,2	237,4	271,8
	Max sart-up current (version without accessories)	A	285,6	332,3	346,0	358,1	368,5	289,2	360,2	368,6	425,7	454,8	482,0	597,2
	Max start-up current (with SS accessory version)	A	196,3	224,3	238,0	241,1	251,5	226,6	270,9	279,3	317,7	337,8	365,0	441,2
Dimensions and weights	A - Lenght	mm	2860	2860	4060	4060	4060	2860	2860	2860	2860	4060	4060	4060
	B - Width	mm	1100	1100	1100	1100	1100	2200	2200	2200	2200	2200	2200	2200
	C - Height	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
	Shipping net weight	kg	1180	1210	1470	1530	1530	2030	2060	2100	2130	2680	2880	2900
	Weight in operation	kg	1190	1220	1480	1540	1540	2040	2070	2110	2140	2700	2900	2930

Operating conditions:

(1) Internal heat-exchanger water temperature = 12/7 ° C, external heat exchanger air intake temperature 35°C.

(2) Internal heat exchanger water temperature = 23/18°C, external heat-exchanger air intake temperature 35°C.

(3) Temperatura acqua scambiatore interno = 30/35°C, temperatura aria entrante allo scambiatore esterno = 7°C D.B./6°C W.B.

(4) Temperatura acqua scambiatore interno = 40/45°C, temperatura aria entrante allo scambiatore esterno = 7°C D.B./6°C W.B.

(5) Internal heat-exchanger water temperature reference = 12/7°C.

(6) Average climatic conditions; T_{biv}=-7°C, internal heat exchanger water temperature = 30/35°C.

(7) The data are indicative and could be subject to change. For the correct data, 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, hense the minimum water volume to the plant is two times the indicated value.

(9) Condition (1); this value is determined on the basis of measurements taken in accordance with the UNI EN ISO 9614-2, in compliance with the requirements of Eurovent certification.

(10) This value is calculated from the sound power level using ISO 3744: 2010, referred to 10 m distance from the unit.

N.B. The performance data are indicative and could be subject to change. In addition, the performances declared in (1), (2), (3) and () refer to the instantaneous power according to UNI EN 14511. The declared data in (5), (6) are determinated according to UNI EN 14825.

12.3 SOUND LEVELS

The sound levels are those of the units at full load and in normal test conditions, in heating mode for Heat pump versions. The value is determined on the basis of measurements made in accordance with the UNI EN ISO 9614-2 standard, respecting the Eurovent certification requirements, which provides a tolerance of 3dB(A) on the total sound power level (the only data item to be considered certified).

The sound pressure values are calculated from the sound power level using ISO 3744: 2010, both for standard machines and for those with installed SL and SSL accessories.

Model HWA1-A	Versions	Sound power level [LW(A)]	Sound pressure level at 1 m	Sound pressure level at 10 m
02106, 02120	Standard	86	67,6	54
	SL	85	66,6	53
	SSL	83	64,6	51
02128	Standard	87	68,6	55
	SL	86	67,6	54
	SSL	84	65,6	52
02140, 04155	Standard	87	68	54,9
	SL	86	67	53,9
	SSL	84	65	51,9
04177, 04184	Standard	88	69	55,9
	SL	87	68	55,9
	SSL	85	66	52,9
04209, 04239, 04258	Standard	88	68,9	55,9
	SL	87	67,9	54,9
	SSL	85	65,9	52,9
04305	Standard	88	68,3	55,8
	SL	87	67,3	54,8
	SSL	85	65,3	52,8
04349	Standard	90	70,3	57,8
	SL	89	69,3	56,8
	SSL	87	67,3	54,8

Model HWA1-A/H	Versions	Sound power level [LW(A)]	Sound pressure level at 1 m	Sound pressure level at 10 m
02109, 02121	Standard	88	69,6	56
	SL	87	68,6	55
	SSL	84	65,6	52
02142, 02148, 02160	Standard	88	69	55,9
	SL	87	68	54,9
	SSL	84	65	51,9
04176, 04199, 04215	Standard	89	69,9	56,9
	SL	88	68,9	55,9
	SSL	85	65,9	52,9
04237	Standard	90	70,9	57,9
	SL	89	69,9	56,9
	SSL	86	66,9	53,9
04273	Standard	90	90,3	57,8
	SL	89	69,3	56,8
	SSL	86	66,3	53,8
04304	Standard	91	71,3	58,8
	SL	90	70,3	57,8
	SSL	87	67,3	54,8
04345	Standard	92	72,3	59,8
	SL	91	71,3	58,8
	SSL	88	68,3	55,8

12.4 ELECTRICAL DATA OF THE UNITS AND AUXILIARY ELEMENTS

POWER SUPPLY OF THE UNIT	V/~/Hz	400/3+PE/50
ONBOARD CONTROLLER POWER SUPPLY	V/~/Hz	12/1/50
REMOTE CONTROLLER'S POWER SUPPLY	V/~/Hz	12/1/50
FAN MOTORS POWER SUPPLY	V/~/Hz	400/3/50

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

Greatness	Unit	Model HWA1-A											
		02106	02120	02128	02140	04155	04177	04184	04209	04239	04258	04305	04349
F.L.A. Input current input at the maximum allowable conditions													
F.L.A. Compressor 1	A	38,2	38,2	48,6	38,2	34,0	38,2	38,2	38,2	38,2	48,6	48,6	65,4
F.L.A. Compressor 2	A	38,2	48,6	48,6	65,4	34,0	38,2	38,2	38,2	48,6	48,6	65,4	65,4
F.L.A. Compressor 3	A	-	-	-	-	31	31,0	34,0	38,2	38,2	48,6	48,6	65,4
F.L.A. Compressor 4	A	-	-	-	-	31	31,0	34,0	38,2	48,6	48,6	65,4	65,4
F.L.A. Fan motors	A	6,6	6,6	6,6	9,9	9,9	9,9	9,9	13,2	13,2	13,2	19,8	19,8
L.R.A. Startup current (locked rotor)													
L.R.A. Compressor 1	A	240,8	240,8	287,5	240,8	174,0	240,8	240,8	240,8	240,8	287,5	287,5	310,0
L.R.A. Compressor 2	A	240,8	287,5	287,5	310,0	174,0	240,8	240,8	240,8	287,5	287,5	310,0	310,0
L.R.A. Compressor 3	A	-	-	-	-	140,0	140,0	174,0	240,8	240,8	287,5	287,5	310,0
L.R.A. Compressor 4	A	-	-	-	-	140,0	140,0	174,0	240,8	287,5	287,5	310,0	310,0
Whole unit													
Max power input	kW	48,9	55,0	61,1	66,9	82,4	87,4	90,9	97,8	110,0	122,3	146,0	165,8
Max current input	A	83,0	93,4	103,8	113,5	139,9	148,3	154,3	166,0	186,8	207,6	247,8	281,4
L.R.A.	A	285,6	332,3	342,7	358,1	279,9	350,9	356,9	368,6	425,7	446,5	492,4	526,0
F.L.A.	A	83,0	93,4	103,8	113,5	139,9	148,3	154,3	166,0	186,8	207,6	247,8	281,4
F.L.I.	kW	42,6	48,5	55,6	56,3	63,9	72,7	78,7	85,3	97,0	112,0	124,7	143,4

Greatness	Unit	Model HWA1-A/H											
		02109	02121	02142	02148	02160	04176	04199	04215	04237	04273	04304	04345
F.L.A. Input current input at the maximum allowable conditions													
F.L.A. Compressor 1	A	38,2	48,6	48,6	65,4	65,4	34,0	38,2	38,2	48,6	65,4	65,4	82,6
F.L.A. Compressor 2	A	38,2	38,2	48,6	38,2	48,6	34,0	34,0	38,2	38,2	48,6	65,4	82,6
F.L.A. Compressor 3	A	-	-	-	-	-	34,0	38,2	38,2	38,2	38,2	38,2	38,2
F.L.A. Compressor 4	A	-	-	-	-	-	34,0	34,0	38,2	48,6	38,2	48,6	48,6
F.L.A. Fan motors	A	6,6	6,6	9,9	9,9	9,9	13,2	13,2	13,2	13,2	19,8	19,8	19,8
L.R.A. Startup current (locked rotor)													
L.R.A. Compressor 1	A	240,8	287,5	287,5	310,0	310,0	174,0	240,8	240,8	287,5	310,0	310,0	408,0
L.R.A. Compressor 2	A	240,8	240,8	287,5	240,8	287,5	174,0	174,0	240,8	240,8	287,5	310,0	408,0
L.R.A. Compressor 3	A	-	-	-	-	-	174,0	240,8	240,8	240,8	240,8	240,8	240,8
L.R.A. Compressor 4	A	-	-	-	-	-	174,0	174,0	240,8	287,5	240,8	287,5	287,5
Whole unit													
Max input power	kW	48,9	55,0	63,1	66,9	73,0	87,9	92,8	97,8	110,0	123,8	139,8	160,1
Max input current	A	83,0	93,4	107,1	113,5	123,9	149,2	157,6	166,0	186,8	210,2	237,4	271,8
L.R.A.	A	285,6	332,3	346,0	358,1	368,5	289,2	360,2	368,6	425,7	454,8	482,0	597,2
F.L.A.	A	83,0	93,4	107,1	113,5	123,9	149,2	157,6	166,0	186,8	210,2	237,4	271,8
F.L.I.	kW	41,7	44,7	47,3	50,7	56,9	60,6	68,2	76,8	89,1	92,6	106,8	130,0

13 OPERATING LIMITS

13.1 EVAPORATOR WATER FLOW RATE

The nominal water flow rate is referred to a ΔT=5°C, between the evaporator's inlet and outlet temperatures. The allowed maximum water flow rate is that corresponding to ΔT=3°C. Higher values may produce too high pressure drops. The allowed minimum water flow rate is that 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).

The minimum flow rates have been calculated respecting the conditions (1) of the technical data tables for chillers and in the conditions (1) and (4) for heat pumps operating in cooling and heating mode respectively.

Model: HWA1-A	02106	02120	02128	02140	04155	04177
Cooling capacity of reference [kW]	105,0	118,7	129,5	139,3	155,0	175,9
Minimum water flow volume to be ensureb [l/s]	3,1	3,6	3,8	4,2	4,6	5,3

Model: HWA1-A	04184	04209	04239	04258	04305	04349
Cooling capacity of reference [kW]	182,4	207,9	238,1	256,6	304,8	347,7
Minimum water flow volume to be ensured [l/s]	5,5	6,2	7,1	7,7	9,1	10,4

Model: HWA1-A/H Heating mode	02109	02121	02142	02148	02160	04176
Cooling capacity of reference [kW]	108,3	120,1	141,5	147,9	159,7	179,1
Minimum water flow volume to be ensure [l/s]	3,2	3,6	4,2	4,4	4,8	5,3

Model: HWA1-A/H Heating mode	04199	04215	04237	04273	04304	04345
Cooling capacity of reference [kW]	198,1	214,1	236,7	273,0	303,3	344,4
Minimum water flow volume to be ensured [l/s]	5,9	6,4	7,1	8,2	9,1	10,3

Model: HWA1-A/H Cooling mode	02109	02121	02142	02148	02160	04176
Cooling capacity of reference [kW]	102,8	113,1	131,8	137,9	148,1	165,3
Minimum water flow volume to be ensured [l/s]	3,1	3,4	3,9	4,1	4,4	4,9

Model: HWA1-A/H Cooling mode	04199	04215	04237	04273	04304	04345
Cooling capacity of reference [kW]	186,9	208,3	224,8	259,6	289,1	324,6
Minimum water flow volume to be ensured [l/s]	5,6	6,2	6,7	7,8	8,6	9,7

As a first approach, in case of absence of other detection systems, the correct flow rate to ensure the best performance of the unit can be verified with maximum speed of the circulating pump, checking with the manometers the pressure difference between the return and the water delivery on the hydraulic connections installed outside of the unit and make sure that such value is equal to or lower than the available head pressure indicated on the curves given technical manual for the respective models, (if necessary, please change the settings of the circulator, see the control manual).

13.2 CHILLED WATER PRODUCTION (SUMMER OPERATION)

The minimum temperature that is allowed of the user exchanger outlet is 4°C: for lowest temperatures the BT version units which guarantees the operation of the outgoing water temperatures down to -8°C. In case of lower outdoor temperatures, please contact our company for the feasibility study and evaluation of changes to be made according to your needs. The maximum temperature that can be maintained at the outlet of the evaporator is 18°C. Higher temperatures (up to a maximum of 40°C) can anyway be tolerated during transition phases and in the start-up stages of the system.

13.3 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 which are not related to transition phases or start-up stages may cause system's failure with possible damages to compressor. 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 air temperature is higher than 5°C, even if the unit is still able to work up to the limit of -10°C (-20°C with CC accessory) with hot water production at 38°C.

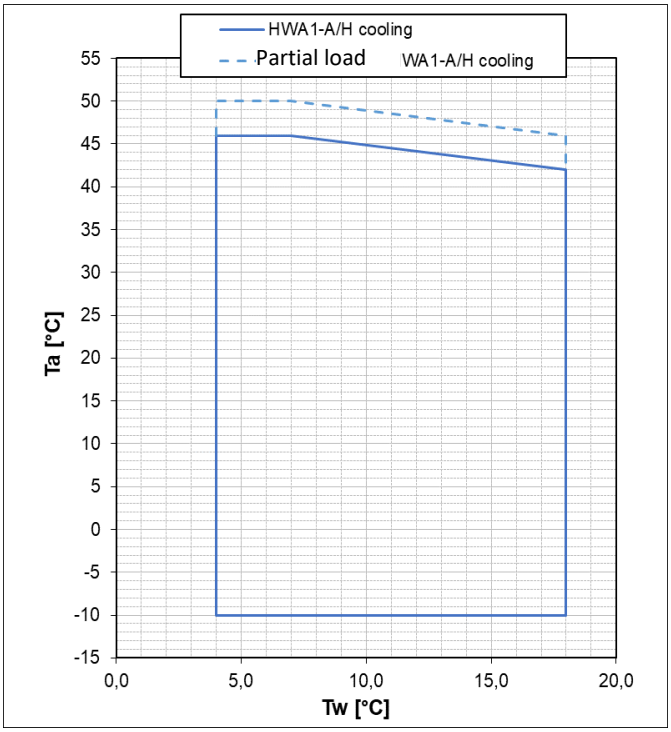
For higher temperatures than those pointed out, especially if have a concomitant with the reduction of the water flow rate, it may cause abnormalities to the normal operation of the unit, or the safety devices may act in critical situations.

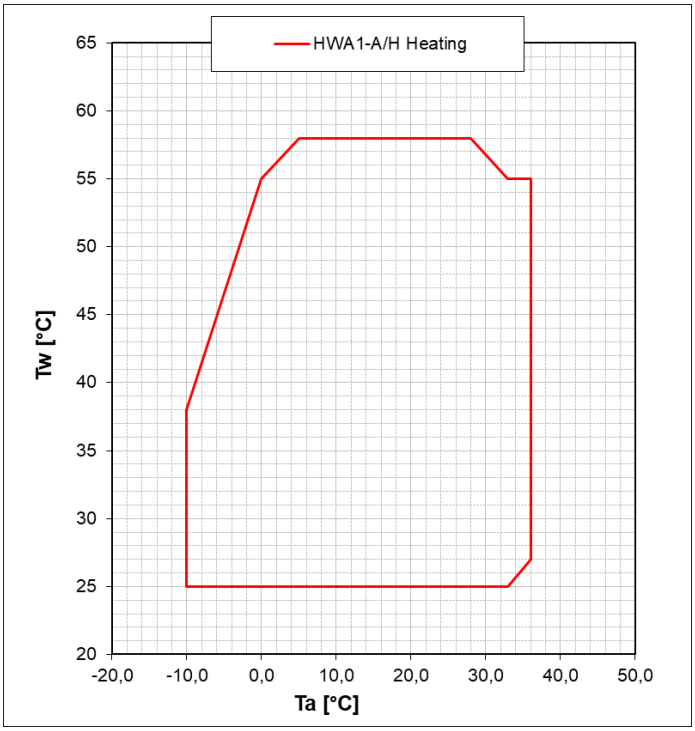
The maximum power consumption of the hrat pump will occur during the operation of the unit with outlet water temperature of 58°C and outdoor air temperature of 5°C.

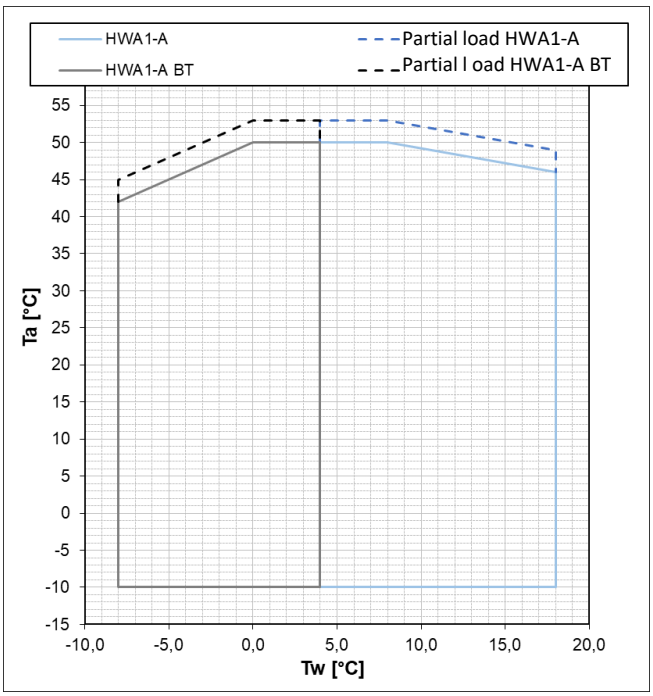
13.4 AMBIENT TEMPERATURE OPERATING LIMITS AND RECAPITULATIVE TABLE

The heat pump units are designed and manufactured to operate in summer mode regime, with the condensation control. For the cooling only versions the outside air temperature can reach up to 50°C. In heating mode, the allowed range of the outdoor temperature goes from -10°C(-20°C with CC accessory) to +36°C depending on the water outlet temperature as indicated in the below tables.

HWA1-A/H: Water chiller mode	
Ambient temperature	Minima -10°C (-20°C with CC accessory) Massima +46°C
Water outlet temperature	Minima +4°C (-20°C with CC accessory) Massima +18°C
HWA1-A/H: Heat pump mode	
Ambient temperature	Minima -10°C (-20°C with CC accessory) Massima +36°C
Water outlet temperature	Minima +25°C (-20°C with CC accessory) Massima +58°C
HWA1-A	
Ambient temperature (Standard version)	Minima -10°C (-20°C with CC accessory) Massima +50°C
Water outlet temperature (Standard version)	Minima +4°C (-20°C with CC accessory) Massima +18°C
Ambient temperature (BT version)	Minima -10°C (-20°C with CC accessory) Massima +50°C
Water outlet temperature (BT version)	Minima -8°C (-20°C with CC accessory) Massima +18°C


HWA1-A/H cooling
Partial load WA1-A/H cooling
Ta [°C]
Tw [°C]
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
0,0
5,0
10,0
15,0
20,0

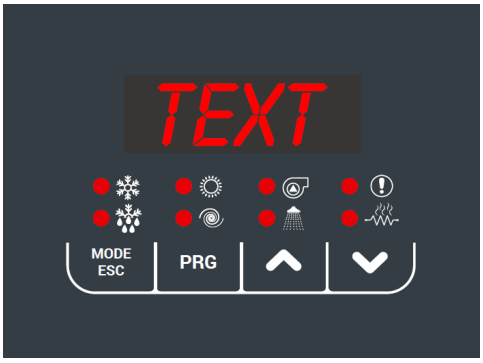

HWA1-A/H Heating
Tw [°C]
Ta [°C]
65
60
55
50
45
40
35
30
25
20
-20,0
-10,0
0,0
10,0
20,0
30,0
40,0
50,0


HWA1-A
HWA1-A BT
Partial load HWA1-A
Partial l oad HWA1-A BT
Ta [°C]
Tw [°C]
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-10,0
-5,0
0,0
5,0
10,0
15,0
20,0

14 USER – ONBOARD CONTROLLER INTERFACE

The unit is equipped with the display seen below having a transparent polycarbonate hinged door and its protection rating is IP67.

The interface consists of a variable text part and a series of icons identifying the operation of the unit as shown in the table below.



	Compressor LED	• ON if the compressor is active • OFF if the compressor is off • FLASHING if timings are in progress waiting for the start-up of compressor.
	DHW LED	• ON if DHW setpoint is achieved • OFF if DHW mode is not active • Flashing if DHW mode is in operation (DHW valve is active)
	Defrosting LED	• ON if defrosting mode is active • Flashing during defrost period counting.
	Antifreeze E-heater LED	• LED is ON if the antifreeze electric heater is active.
	Pump LED	• LED is ON if the pump is active.
	Alarm LED	• LED is ON if an alarm is active.
	Heating mode LED	• LED is ON if the unit is heating
	Cooling mode LED	• LED is ON if the unit is cooling

The buttons have specific features as shown below:

Terminal block XU	Description
MODE ESC	It is used to select the operating mode, and to reset the manual resetting alarms. Each time you press the Mode button, the operating mode changes as per the sequence below: OFF → COOL → OFF During the parameters' setting, this button can be used to revert BACK to the previous level.
PRG	It allows you to enter into the setting menu parameters and to adjust the summer set point value.
	UP button: In the setting mode, this button allows you to move up to a higher menu or to increase the value of a parameter when you are in the "edit" mode.
	DOWN button: In the setting mode, this button allows you to shift to a lower menu or to decrease the value of a parameter when you are in the "edit" mode.

In normal visualization, the display shows the water outlet temperature in tenths of degrees celsius or the alarm code if at least one is active. In the case of more than one active alarm the first one will be displayed, and the second will be shown once the first one is reset. In menu mode the display is a function of the position you are in.

14.1 MENU

The main functions of the menus are listed below, especially when there are some unambiguous functions. The main menu manages the following items

MENU	LABEL	LIVEL OF PASSWORD	OTHER CONDITIONS
Setpoint	Set	User	
Sensor	tP	Installer	---
Alarms	Err	User	Only in case of active alarms
Digital inputs	Id	Installer	---
Parameters	Par	Installer	---
Password	PSS	User	---
Operating hours	oHr	Installer	---
USB	USb	Installer	Only if the USB flash drive is presen

To enter the password menu you should introduce the relative password enable an access with a greater privilege. Once you exit completely from the menus, you lose the password privilege and needs to re-introduce it again.

14.2 SETPOINT MENU

You can display and change the various setpoint.

SETPOINT	DESCRIPTION	UNIT	DEFAULT	RANGE
Coo	First setpoint in summer	°C	7.0	25.0°C ÷ Co2
Hea	First setpoint in winter	°C	45.0	25.0°C ÷ 55.0°C
Co2	Second setpoint in summer	°C	18.0	Coo ÷ 25.0°C
He2	Second setpoint in winter	°C	35.0	25.0°C ÷ Hea

(*) If the domestic hot water function is enabled

14.3 ALATMS' MENU (Err)

In this menu shows only the active alarms. All active alarms can be displayed. If the unit is composed of multi-circuits, then the alarms are divided by circuit (the ALCx label gives access to the alarms of circuit number x).

15 TROUBLESHOOTING

PROBLEM	CAUSE	SOLUZIONE
THE UNIT DOES NOT START	Failure of power supply	- Check plant voltage - Check the protection devices upstream of the unit
	- The main switch into OFF position - Magnetothermic breaker on OFF position	- Place the switch to the ON posistion
	- Damaged electronic board - Damaged contactor - Faulty compressor	- Replace de damaged component
Poor heating/cooling capacity	- Insufficient amount of refrigerant - Palnt system not properly sized	- Check
NOISY COMPRESSOR	- Not adequately fixed - Wrong installation - Reversed pahses	- Check
COMPRESSOR DOES NOT RESTART BECAUSE OF PROTECTION DEVICES INTERVENTION	- Increase in discharge pressure - Low inlet pressure - Incorrect supply voltage - Incorrect wiring - Incorrect working conditions - Thermal protection intervention	- Check
	- Damaged pressure switch	- Replace
HIGH EXHAUST PRESSURE	- High outdoor air temperature - Plant return water temperature is high - Air in the hydraulic circuit - Excessive refrigerant gas charge	- Check
	- Low air flow rate - Low water flow rate	- Check the fan and pump operation
LOW EXHAUST PRESSURE	- Low outdoor air temperature - Low plant return water temperature - Residual humidity in the cooling circuit - Air in the hydraulic circuit - Insufficient refrigerant gas charge	- Check
HIGH SUCTION PRESSURE	- High outdoor air temperature - High plant return water temperature - Expansion valve remains too opened / damaged	- Check
LOW SUCTION PRESSURE	- Low outdoor air temperature - Low plant return water temperature - Expansion valve remains too closed / clogged/damaged - Dirty plate heat exchanger	- Check
	- Low air flow rate - Low water flow rate	- Check the fan and pump operation

16 IMPORTANT INFORMATION

IT IS FORBIDDEN

- ***To remove and/or tamper with any safety device.***
- ***To touch the appliance when barefoot or parts of the body are wet or damp.***
- ***To pull, remove or twist the electrical cables coming out from the unit.***
- ***If tampering with the safety devices, the warranty immediately expires.***
- ***To tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no whatsoever civilian or penal responsibility in case of unauthorized operations.***

WARNING:

- ***Before proceeding, you should read the user's-installer's manual accompanying the appliance.***
- ***All the operations described below must be carried out only by QUALIFIED PERSONNEL.***
- ***Any routine and/or not-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric power supply.***
- ***The equipment's supervisor and the service man have to receive suitable training for performing 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.***

ELECTRICAL CONNECTION:

- ***Ensure that the mains power supply specifications (voltage, phases and frequency) correspond to the voltage indicated on the data nameplate, the power supply of the auxiliary systems is derived from the main power through the transformer located inside the electrical panel of the unit.***
- ***The supply voltage's fluctuations should not exceed ±5% of the nominal value, and the imbalance between the 3 phases power should be of less than2%. Otherwise the guarantee will immediately expire.***
- ***Please refer to the wiring diagram, which shows how to make the electrical the electrical connections***
- ***Phase, neutral and ground connections should be respected, otherwise the unit will not operate.***
- ***It is needed to power on the unit at least 12 hours before the start-up.***
- ***The power supply cables (3-PH + PE) must be correctly sized according to the technical data of the system, and the environment where it is installed, using cables that comply with the regulations in force in the various countries.***
- ***It's mandatory to install an adequate protection and disconnection device "QF" of the electric power with delayed characteristic curve and with adequate capacity of breaking and differential protection. The capacity of the magneto-thermic circuit breaker must conform to the electric consumption of the system; (is the installer's responsibility).***

MAINTENANCE WORKS: Requirements before performing any electrical work on the control board:

- ***Turn off the unit from the on-board control panel ("OFF" displayed).***
- ***Put the switch "QF" general differential on OFF position.***
- ***Wait for 15 seconds before getting access to the electric board.***
- ***Check the ground connection before beginning any operation.***
- ***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.***
- ***Put the switch "QF" general differential on "OFF" position before performing any maintenance work on the unit.***

AFTER EACH MAINTENANCE OPERATION

- ***After approximately 10 minutes of operation, make sure the screws on the power terminal board are well tightened.***
- ***Check the correct operation of the unit.***

LIGHTNING RISCK: 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.
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.

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