

CE

R407c

**MILXA**<sup>®</sup>  
AIR CONDITIONING



**INSTALLATION AND OPERATION MANUAL**

**HIGH EFFICIENCY AIR TO WATER HEAT PUMPS  
SCROLL COMPRESSORS  
WITH DOMESTIC HOT WATER PRODUCTION**



Series/Serie/Série	HWAR 06 +41	Emissione/Édition/Au- sgabel Issue	10.08
Catalogo/Catalogue/Katalog/Brochure	MUI011081520-00	Sostituisce/Superseedes Ersetzt/Remplace	-



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The HWAR manual, contains any information that is needed for a correct use of the equipment while safeguarding operator safety, according to what indicated from "Council Directive" 98/37/CE and following changes.

**AIM AND CONTENTS OF THIS MANUAL**

This manual provides basic information on the installation, operation and maintenance off the HWAR unit. It is addressed to machine operators and it enables them to use the equipment efficiently, even if they do not have any previous specific knowledge of it. This manual describes the characteristics of the equipment at the time it is being put on the market; therefore it may not capture later technological improvements introduced by MAXA as part of its constant endeavour to enhance the performance, ergonomics, safety and functionality of its products.

**HOW TO KEEP THIS MANUAL**

The manual must be always with the unit it refers to. It must be stored in a safe place, away from the dust and moisture. It must be accessible to all users who shall consult it any time they are in doubt on how to operate the equipment.

MAXA reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

MAXA is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

**GRAPHIC SYMBLS**



*Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment..*



*Indicates prohibited operations.*



*Indicates important information that the operator must follow in order to guarantee the correct operation of the equipment in complete safety*

## SAFETY LAWS

MAXA equipment and their component parts have been designed in compliance with the harmonised EC norms in force and other European and national norms as required by the Council Directive (98/37 and later amendments).

The equipment is also compliant with:

- Norms EN 292-1 e 292-2
- Norma EN 294
- Norms EN 378-1, 378-2, 378-3 e 378-4
- Norma EN 418
- Norma EN 953
- Norma EN 1050
- Norma EN 60204-1
- Norma EN 61000-6-2
- Norma EN 61000-6-4
- Community Directives 98/37/CE, 97/23/CE, 93/68/CEE, 89/336/CEE 73/23/CEE

## GENERAL SAFETY GUIDELINES

Before beginning to operate on HWAR units every user must be perfectly knowledgeable about the functions of the equipment and its controls and must have read and understood the information container in this manual.



**It's strictly forbidden to remove and/or tamper with any safety device.**



**Any routine or non-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric and pneumatic power source and after its pneumatic system has been discharged.**



**Do not put your hands or insert screwdrivers, spanners or other tools into moving parts of the equipment.**



**The equipment supervisor and the maintenance man must receive training suitable for the performance of their tasks in safety**



**Operators must know how to use personal protective devices and must know the accident-prevention guidelines contained in national and international laws and norms.**

### WORKERS' HEALTH AND SAFETY

The European Community has adopted a number of directives on workplace health and safety, which include directives **89/391/CEE**, **89/686/CEE**, **89/655/CEE**, **86/188/CEE** and **77/576/CEE**. Every employer shall implement such provisions and ensure that workers respect them:



**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 must be kept clean, tidy and free from objects that may hamper 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..**

### PERSONAL PROTECTIVE EQUIPMENT

When operating and maintaining the HWAR unit, use the following personal protective equipment.



**Protective clothing: Maintenance men and operators must wear protective clothing that complies with the basic safety requirements currently in force. In case of slippery floors users must wear safety shoes with non-slip soles.**



**Gloves: During maintenance or cleaning operation protection gloves must be used**



**Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.**

### SAFETY SIGNS

The equipment features the following safety signs, which must be complied with:



**General hazard**



**Electric shock hazard**

## TECHNICAL CHARACTERISTICS

*The high efficiency HWAR heat pump series have been especially designed for application with radiant floor heating systems or in those applications where it is necessary to have the highest maximum efficiency in heating mode. The units have been optimized for heating mode, they are able to produce water up to 60°C and they can operate down to -15°C ambient temperature. All models are supplied standard with reverse cycle valve for cold water production.*

### Frame

All HWAR units are made from hot-galvanised thick sheet metal, painted with polyurethane powder enamel at 180°C to ensure the best resistance against the atmospheric agents. The frame is self-supporting with removable panels. All screws and rivets for outdoor installations are in stainless steel. The colour of the units is RAL 7035.

### Refrigerant circuit

The refrigerant gas used in these units is R407C. The refrigerant circuit is made by using international primary brands components and according to ISO 97/23 concerning welding procedures. The refrigerant circuit includes:

sight glass, filter drier, double thermal expansion valves (one for cooling mode, one for heating mode) with external equalizer, 4 way reverse cycle valve, one way valves, liquid receiver, Schrader valves for maintenance and control, pressure safety device (according to PED regulation). Models starting from 10T are also supplied with an AISI316 stainless steel heat exchanger used as economizer and additional expansion valve for refrigerant vapour injection.

### Compressors

The compressors used are *high performance scroll type*, supplied with a special scroll design who enhance the efficiency of the refrigerant cycle at low ambient conditions. Units starting from model 10T, are also supplied with an additional heat exchanger used as economizer and a vapour injection system, used to enlarge the working range. The compressors are all supplied with crankcase heater and thermal overload protection by a klixon embedded in the motor winding. They are mounted in a separate chamber in order to be separated from the air stream. The crankcase heater is always powered when the compressor is in stand-by. The inspection is possible through the frontal panel of the unit that allow the maintenance of the compressors even if the unit is working.

### Source heat exchanger

The source heat exchangers are made of copper pipes and aluminium fins. The diameter of the copper pipes is 3/8" and the thickness of the aluminium fins is 0,1 mm. The tubes are mechanically expanded into the aluminium fins to improve the heat exchange factor. The geometry of these condensers guarantee a low air side pressure drop and then the use of low rotation (and low noise emission) fans. The source heat exchangers can be protected by a metallic filter to be installed on request.

### Fans

The fans are axial type with aluminium aerofoil blades. They are statically and dynamically balanced and supplied complete of the safety fan guard according to EN 60335. They are mounted on the unit frame by interposition of rubber vibration dampers. The electric motors are all at 6 poles (about 900 rpm). The motors are directly driven with an integrated thermal overload protection. The protection class of the motors is IP 54.

### User heat exchangers

The user heat exchangers are made of AISI 316 stainless steel braze-welded plates type. The use of these kind of heat exchangers allows a massive reduction of the refrigerant charge of the unit compared to the traditional shell-in-tube evaporators and also a reduction of the overall dimensions of the unit. The user heat exchangers are factory insulated with flexible close cell material and can be equipped with antifreeze heater (optional). Each heat exchanger is provided with a temperature sensor as antifreeze protection.

### Electric box

The electric box is made according to electromagnetic compatibility norms CEE 73/23 and 89/336. The accessibility to the board is possible after removing the front panel of the unit. The protection degree is IP55. In all HWAR units are installed, standard, the compressors sequence relay who disable the operation of the compressor in case the power supply phase sequence is not the correct one (scroll compressors in fact, can be damaged if they rotate reverse wise). The following components are also standard installed: main switch, magnetic-thermal switches (as a protection of pumps and fans), compressors fuses, control circuit automatic breakers, compressor contactors, fan contactors, pump contactors. The terminal board is supplied with voltage free contacts for remote ON-OFF , winter/summer change over and general alarm.

### Microprocessors

All HWAR units are supplied standard with microprocessor controls. The microprocessor controls the following functions: regulation of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence, alarm reset. The control panel is supplied with display showing all operational icons. The microprocessor is set for automatic defrost (in case of operation in severe ambient conditions) and for summer/winter/domestic hot water change over (SA versions only). Upon request any microprocessor can be connected to a BMS system for the remote control and management. The technical department is available to study, together with the customer, different solutions using MODBUS; LONWORKS; BACNET or TREND protocols.

**Control and protection devices**

All units are supplied with the following control and protection devices: Return user water temperature sensor, antifreeze protection sensor installed on the user outlet water temperature, return and supply domestic hot water sensors (SA versions only), high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, fans thermal overload protection, pressure transducer (used to optimize the defrost cycle and the fan speed depending on the ambient conditions), flow switch.

**OTHER VERSIONS****HWAR/SA UNIT WITH DOMESTIC HOT WATER PRODUCTION**

This version is suitable to produce domestic hot water: the unit is supplied with an additional heat exchanger used as condenser for the domestic hot water that, is independently from the operation mode of the unit. The activation of the additional heat exchanger is done automatically by the microprocessor control when the domestic hot water temperature measured by the sensor is lower than the required set point. *This unit allow the production of cold and hot water at the same time independently.* This version is supplied with return/supplied domestic hot water sensors and advanced control panel with specific software able to manage the operation priorities.

**HWAR / A1 HIGH EFFICIENCY HEAT PUMP WITH INTEGRATED HYDRAULIC KIT**

The HWAR heat pumps can be delivered as option, with a built in hydraulic kit that includes:

**Water tank** in different sizes (depending on the size of the unit), factory insulated with flexible close cell material and prepared for the installation of antifreeze kit (option). The water tank is installed on the hot water outlet water side to minimize the inevitable fluctuations in the water temperature due to the compressors starts and stops. The installation of the water tank on the hot water outlet water side keeps constant, for a period of time, the user water temperature when the compressors are Off, while this can not be obtained if the water tank is installed on the hot water inlet water side.

**Water pump**, centrifugal type, suitable for chilled water operation. The pump is directly controlled by the microprocessor that controls its correct operation. In the hydraulic circuit are also present the expansion vessel, the safety valve and the eventual manual valves with fittings.

**HWAR/SL LOW NOISE VERSION**

This version includes the complete acoustic insulation of the unit (compressor + heat exchangers vanes) with compressor jackets and insulating material made with high density media and the interposition of heavy bitumen layer.

**ACCESSORIES**

**SOUND ATTENUATION HOODS (mod. 06,08,10,10T,14,21 only)** These devices are installed on the units to minimize the sound level; they are made from hot-galvanised thick sheet metal, painted with polyurethane powder enamel at 180°C to ensure the best resistance against the atmospheric agents. The hoods are internally insulated with PU foam material, with the interposition of high density non toxic bitumen-free barrier. They are mounted on the unit by stainless steel screws.

**REMOTE CONTROL PANEL** It allows the remote control of all parameters of the unit.

**RUBBER VIBRATION DAMPERS** To be installed beneath the unit base and the ground to avoid the transmission of vibrations (and the noise) to the building.

**EVAPORATOR ANTIFREEZE HEATER** It is made by a "self-heating" electric cable mounted around the evaporator in order to avoid dangerous freezing of the water inside it. It is controlled by the microprocessor. It can be used in the units without hydraulic kit

**ANTIFREEZE KIT** It is made by a "self-heating" electric cable mounted around the evaporator and the water pipes plus an armoured electric heater fitted inside the water tank. This device is controlled by the microprocessor and it is used in the version A1 with integrated hydraulic kit..

**INTEGRATION ELECTRIC HEATER** To be installed in the water tank can be used to integrate the water in case the heat pump can not reach the set point due to very critical ambient conditions. The device can be installed in the water tank (A1 versions only) to integrate the user hot water temperature, or supplied separately to integrate the domestic hot water temperature circuit.



### UNIT DESCRIPTION

This chapter contains a general description of the main unit characteristics, together with those of its principal standard and optional components.

#### IDENTIFICATION

Unit identification

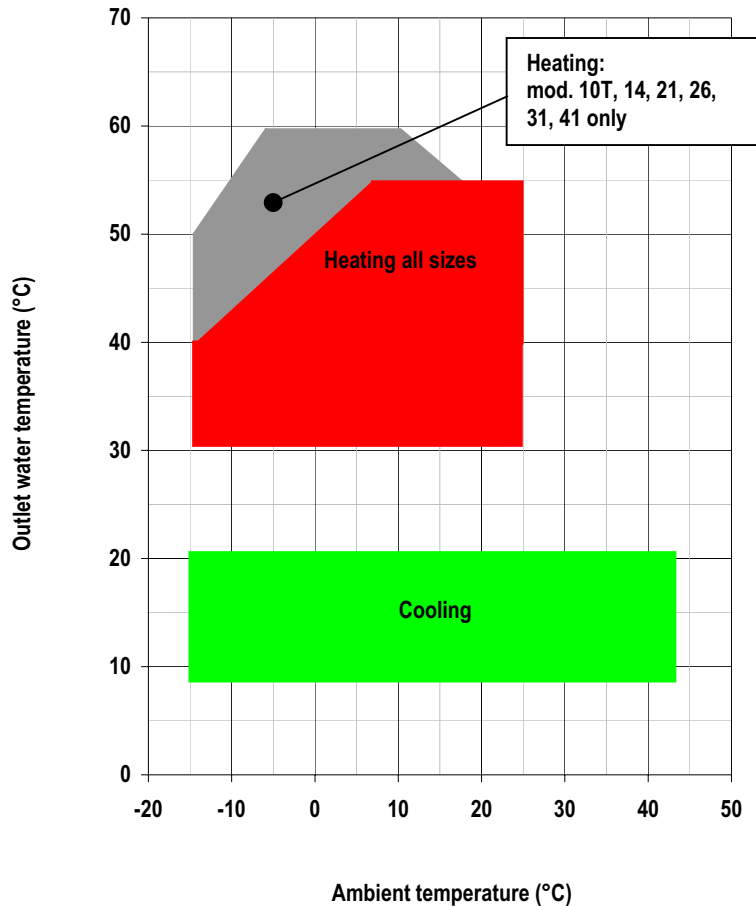
The unit can be identified through the plates attached on the frame and in the electrical box. This label contains the following information:

- Manufacturer's name
- Manufacturer's address
- Description of the series and type of unit
- Series number
- Year of construction
- Type and quantity of refrigerant liquid
- Max. Allowable pressure
- Pressure switch set point
- EC certification symbol
- Electrical characteristics
- Wiring diagram identification.

<b>CE</b>	
Manufactured by BV.ITA.40.02.1230	
Modello/Model	Matricola/Serial number
Modelli/Modèle	Matrikeln/Matricule
Tensioni-Fasi-Frequenza	Tensioni circuiti ausiliari
Voltage-Phases-Frequency	Auxiliary circuit voltage
Spannung-Phasen-Frequenz	Hilfstromkreisspannung
Tension-Phases-Fréquence	Tension circuits auxiliaires
	V
Corrente massima assorbita	Corrente massima di spunto
Max absorbed current	Max starting current
Maximale Stromaufnahme	Max Anlaufstrom
Courant maxi absorbée	Courant maxi de démarrage
A	A
Tipo di refrigerante	Carica refrigerante per circuito
Refrigerant type	Refrigerant charge per circuit
Kältemittel Typ	Kältemittelfüllung pro Kreislauf
Type de réfrigérant	Charge de réfrigérant chaque circuit
	kg
Taratura pressostato di alta	Press. massima circuito idraulico
High pressure switch setting	Max hydraulic circuit pressure
HD-Wächter Einstellung	Max. Druck im hydraul. Kreislauf
Pression maxi réfrigérant	Pression maxi circuit hydraulique
bar	bar
Gruppo del fluido frigorifero	Data di produzione
Group of the refrigerant fluid	Manufacturing date
Kältemittel Klasse	Herstellungsdatum
Groupe de fluide frigorifique	Date de fabrication

<b>CE</b>	
Manufactured by BV.ITA.40.02.1230	
DIRETTIVA 97/23/CE del 29 maggio 1997 (P.E.D.) cat I	
Modello/Model	<input type="text"/>
Modelli/Modèle	<input type="text"/>
Matricola/Serial number	<input type="text"/>
Matrikeln/Matricule	<input type="text"/>
Anno di costruzione	<input type="text"/>
Construction year	<input type="text"/>
Baujahr	<input type="text"/>
Année de fabrication	<input type="text"/>
PS Max.Press ammissibile	<input type="text"/> bar
Max Working press.Refrig side	
Max Betriebsdruck Kältemittelseite	<input type="text"/> bar
Press.max.de travail cûte refrigera...	

**OPERATION LIMITS**



**User heat exchanger water flow rate**

The nominal water flow rate given by MAXA is referred to a  $Dt$  of 5 °C. Maximum flow rate allowed is the one that presents a  $Dt$  of 3 °C: higher values may cause too high pressure drop. The minimum water flow rate allowed is the one presenting a  $Dt$  of 8 °C. Insufficient values cause too low evaporating temperatures with the action of safety devices which would stop the unit.

**User hot water temperature (winter operation)**

Once the system is on temperature, user hot water temperature at the user heat exchanger inlet does not have to be less than 30 °C: lower values could cause incorrect working operation of the compressor and compressor failure may occur. The maximum user water temperature can not exceed 60°C (sizes 10T,14,21,26,31,41) or 55°C (sizes 06,08,10); higher values may call the action of safety devices with unit stop.

**Cold water temperature (summer operation)**

The minimum temperature allowed at the evaporator outlet is 5 °C. To work below this limit, the unit should need some structural modifications. In this case contact our company. The maximum temperature allowed at the evaporator outlet is 15°C.

**Ambient air temperature**

The units are designed and manufactured to operate, In winter operation (heating mode ) from -15°C to 25°C. In cooling mode the units can operate with ambient air temperatures from 20 to 43°C.



**WARNING:** All units are supplied standard with evaporation / condensing pressure control. This device allows unit operation in heating mode over 15°C and in cooling mode under 20°C ambient temperature. The device modulates the airflow measured by a pressure transducer obtaining, in this way, correct operating parameters. This device can be used as well to reduce unit sound level emission in cooling mode when ambient temperature is decreasing (i.e. during night time). Fan speed control is factory pre-set. The values must never be modified.

**CORRECTION TABLES Operation with glycol**

Glycol percentage	Freezing point (°C)	CCF	IPCF	WFCF	PDCF
10	-3,2	0,985	1	1,02	1,08
20	-7,8	0,98	0,99	1,05	1,12
30	-14,1	0,97	0,98	1,09	1,22
40	-22,3	0,965	0,97	1,14	1,25
50	-33,8	0,955	0,965	1,2	1,33

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

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

**CORRECTION TABLES different DT**

Water temperature diff.(°C)	3	5	8
CCCP	0,99	1	1,02
IPCF	0,99	1	1,01

CCCP = Cooling capacity correction factor.      IPCF = Input power correction factor.

**CORRECTION TABLES Different Fouling factors**

Fouling factor	0,00005	0,0001	0,0002
CCCP	1	0,98	0,94
IPCF	1	0,98	0,95

CCCP = Cooling capacity correction factor.      IPCF = Input power correction factor.

**SOUND DATA**

HWAR/SL (LOW NOISE VERSION)											
Mod.	Octave bands (Hz)								Lw		Lp
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
06-08	80,9	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68,0	40,0
10-10T	80,9	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68,0	40,0
14	81,9	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69,0	41,0
21	86,9	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74,0	46,0
26	91,9	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79,0	51,0
31	91,9	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79,0	51,0
41	91,9	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79,0	51,0

HWAR/SL (LOW NOISE VERSION) WITH SUPPLY/RETURN SOUND ATTENUATION HOODS											
Mod.	Octave bands (Hz)								Lw		Lp
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
06-08	76,1	67,3	61,2	59,7	58,6	53,2	49,8	40,7	76,9	63,0	35,0
10-10T	76,1	67,3	61,2	59,7	58,6	53,2	49,8	40,7	76,9	63,0	35,0
14	77,1	68,3	62,2	60,7	59,6	54,2	50,8	41,7	77,9	64,0	36,0
21	82,1	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69,0	41,0



**WARNING:** The sound pressure level of the STANDARD VERSIONS without compressor jackets and compressor vane insulation is approx. 1,5 dB(A) higher than the equivalent low noise versions LS.

Lw: Sound power level according to ISO 3746.

Lp: Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 according to ISO 3746.

**SAFETY DEVICE SETTING**

Device		Set-point	Differential	Differential
Control thermostat (summer)	°C	20	2	...
Control thermostat (Domestic hot water)	°C	40	2	...
Control thermostat (winter)	°C	40	2	...
Anti-freeze thermostat	°C	4	6	MANUAL
Electric heater thermostat	°C	4	6	MANUAL
High pressure switch	Bar	28	7	MANUAL
Low pressure switch	Bar	0,7	1	MANUAL
Water safety valve (Optional)	Bar	6	...	...

**ELECTRIC DATA**

Power supply	V/~/Hz	230/1/50 (Sizes 06,08,10); 400 / 3+N / 50 (Sizes 10T,14,21,26,31,41)
Control board	V/~/Hz	24 / 1 / 50
Auxiliary circuit	V/~/Hz	230 / 1 / 50
Fans power supply	V/~/Hz	230/1/ 50

Electric data may change for updating. It is therefore necessary to refer always to the wiring diagram inside the units.



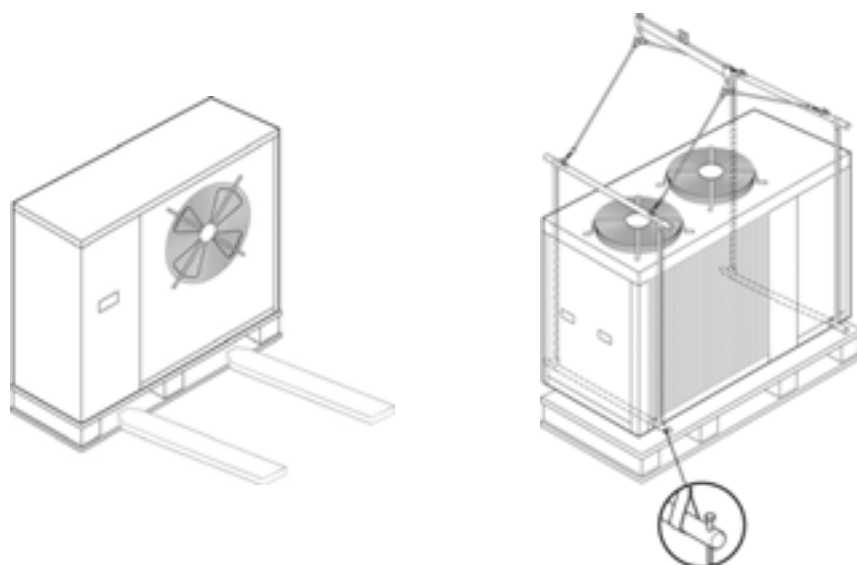
**WARNING: All this operation described in next chapters MUST BE DONE BY TRAINED PEOPLE ONLY. Before every operation of servicing on the unit, be sure that the electric supply is disconnected.**

**INSPECTION**

When installing or servicing the unit, it is necessary to strictly follow the rules reported on this manual, to conform to all the specifications of the labels on the unit, and to take any possible precautions of the case. 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 must be questioned to the carrier and recorded on the Delivery Note before it is signed. MAXA must be informed, within 8 days, of the extent of the damage. The Customer should prepare a written statement of any severe damage.

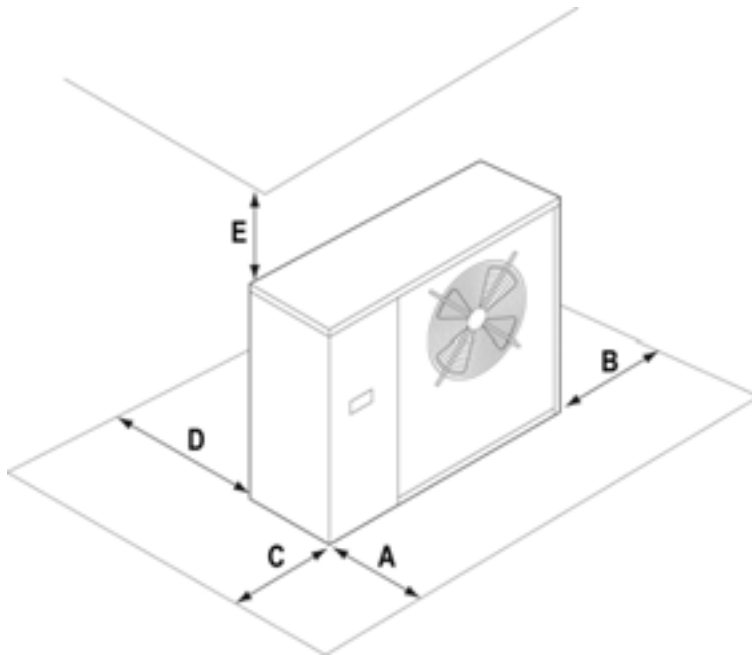
**LIFTING AND HANDLING**

When unloading the unit, it is highly recommended to avoid any sudden move in order to protect refrigerant circuit, copper tubes or any other unit component. Units can be lifted by using a forklift or, in alternative, using belts, being sure that the method of lifting does not damage the lateral panels and the cover. It is important to keep the unit horizontal at all time to avoid damages to the internal components.

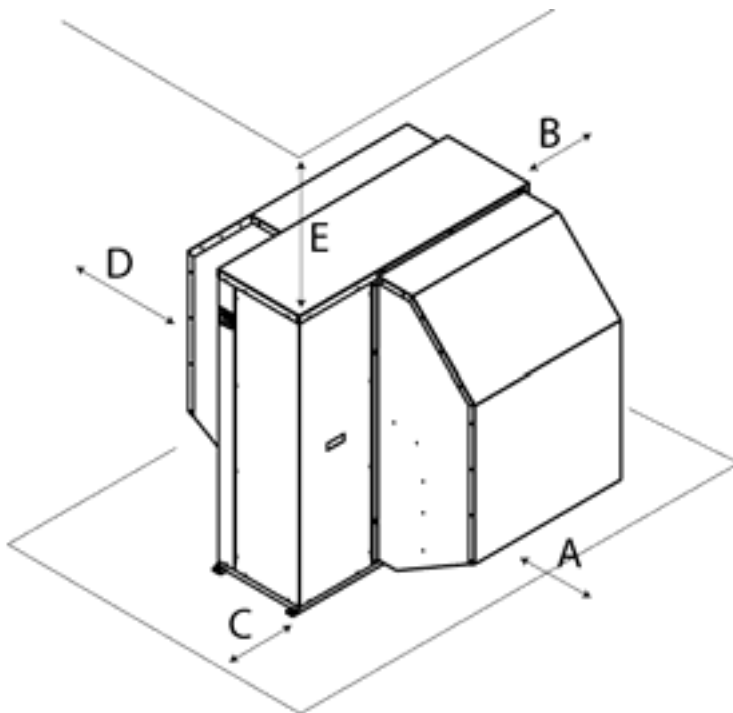


**LOCATION AND MINIMUM TECHNICAL CLEARANCES**

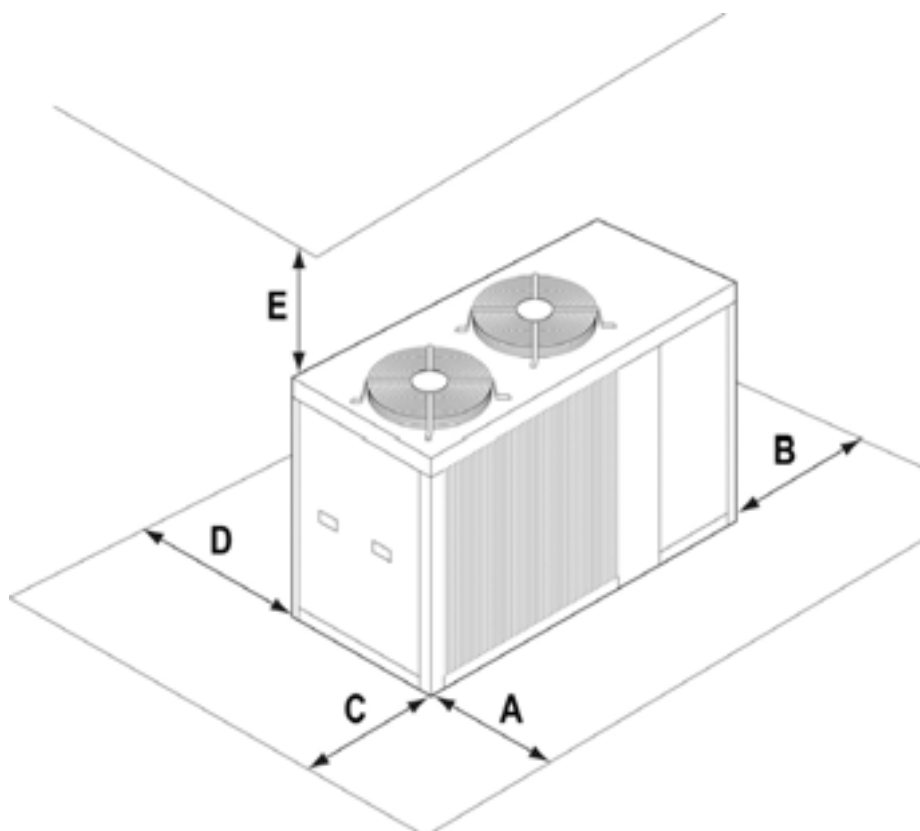
HWAR units are designed for external installation: any cover over the unit and location near trees (even if they partially cover the unit) must be avoided in order to prevent air by-pass. It is advisable to create a proper basement, with a size similar to unit foot-print. Unit vibration level is very low: it is advisable however, to fit a rigid rubber band between basement and unit base-frame. If it is the case, it is possible to install anti-vibration mounts (spring or rubber), to keep vibrations at a very low level. Absolute care must be taken to ensure adequate air volume to the condenser. Re-circulation of discharge air must 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:



MOD	A	B	C	D	E
06	800	500	500	500	500
08	800	500	500	500	500
10-10T	800	500	500	500	500
14	1000	500	500	500	500
21	1000	500	500	500	500



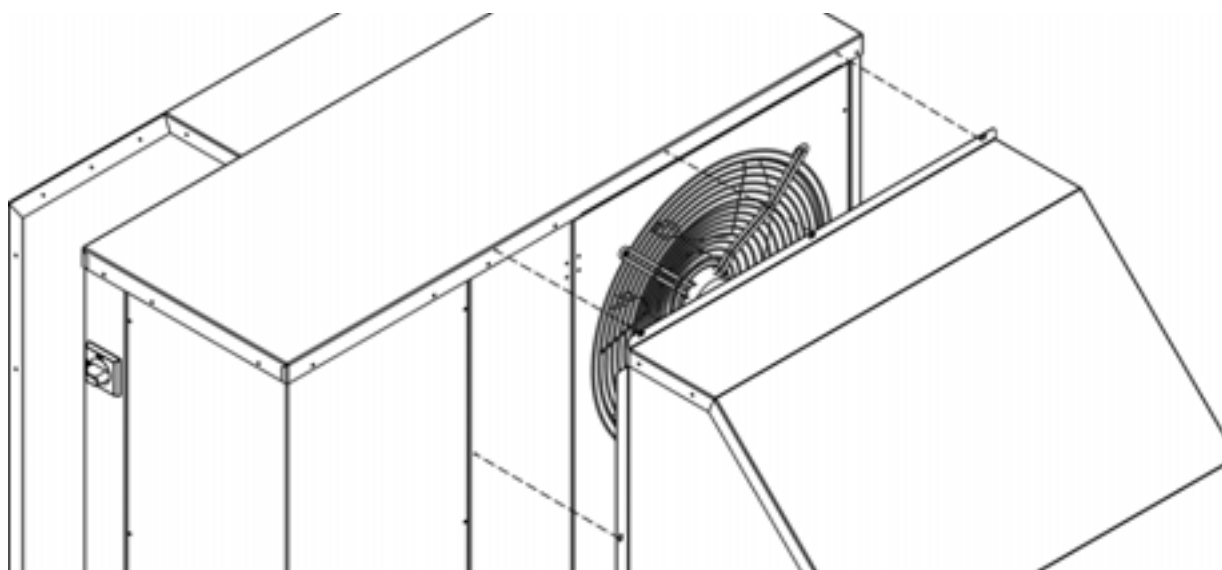
MOD	A	B	C	D	E
06	500	500	500	500	500
08	500	500	500	500	500
10-10T	500	500	500	500	500
14	500	500	500	500	500
21	500	500	500	500	500



MOD	A	B	C	D	E
26	1000	800	800	800	3000
31	1000	800	800	800	3000
41	1000	800	800	800	3000

### INSTALLATION OF THE HOODS

The sound attenuation hoods are supplied loose; they have to be mounted on the unit by Self-screwing screws M3,5 x 16 supplied in the installation kit.





**WARNING:** The equipment should be installed so that maintenance and/or repair services be possible. The warranty does not cover costs due to lifting apparatus and platforms or other lifting systems required by the warranty interventions.



**WARNING:** All the maintenance operation must be done by **TRAINED PEOPLE** only.



**WARNING:** Before any service operation on the unit, be sure that the electric supply is disconnected.



**WARNING:** Inside the unit some moving components are present. Be very careful when operating in their surroundings even if the electric supply is disconnected.



**WARNING:** The top shell and discharge line of compressor are usually at high temperature level. Be very careful when operating in their surroundings.

**WARNING:** Aluminium coil fins are very sharp and can cause serious wounds. Be very careful when operating in their surroundings



**WARNING:** After servicing operation close the unit with cover panels, fixing them with locking screws

### HYDRAULIC CONNECTIONS

Unit water pipe-work must be installed in accordance with national and local regulation, pipes can be made either in steel , galvanized steel or PVC. Pipes have to be designed depending on the nominal water flow and the hydraulic pressure drops of the system. All pipes must be insulated with closed-cell material of adequate thickness. The chillers have to be connected to the piping by using flexible joints. Piping should include:

- Temperature and pressure gauges for the ordinary maintenance or servicing operations.
- Shut-off manual valves to separate the unit from the hydraulic circuit.
- Metallic filters to be mounted on the inlet pipe with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.



**WARNING:** Unit water inlet must be in correspondence with the connection labelled: "USER WATER IN", otherwise the heat exchangers may freeze.

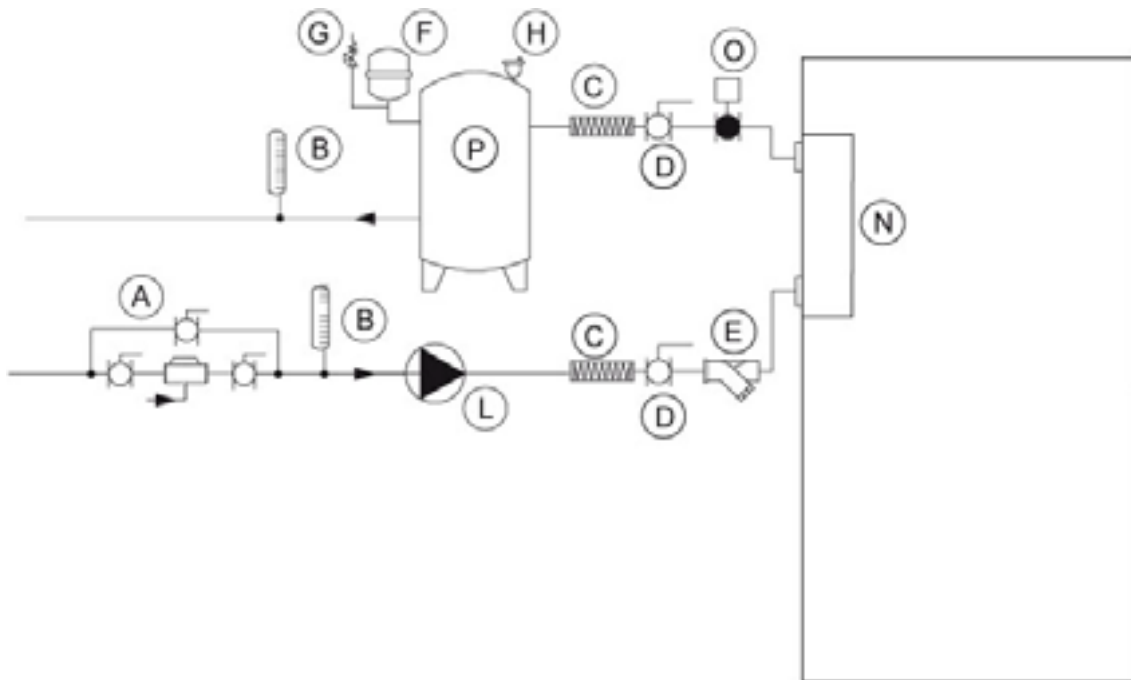


**WARNING:** It is compulsory to install on the USER WATER IN connection a metallic filter with a mesh not larger than 1 mm. The presence of the filter is to be considered mandatory, the warranty will no longer be valid if it is removed. The filter must be kept clean, so make sure it is clean after the unit has been installed, and then check it periodically.

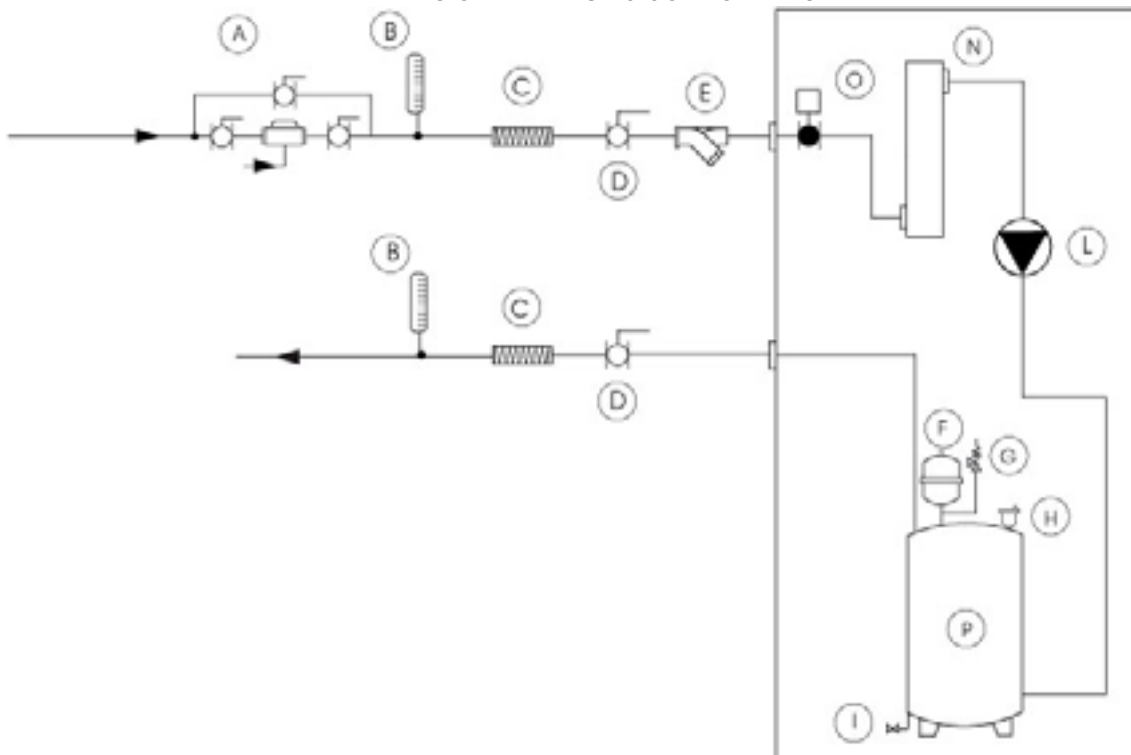


**WARNING:** All units are factory supplied with the flow switch ( it is factory installed in the "A" versions, supplied loose in the standard versions). The flow switch **MUST BE INSTALLED** on the water outlet connection (labelled USER WATER OUT); If the flow switch is altered, removed, or the water filter should not be present on the unit, the warranty will be invalidated. Please refer to the wiring diagram for flow switch electric connections.

**BASIC VERSION HYDRAULIC COMPONENTS**



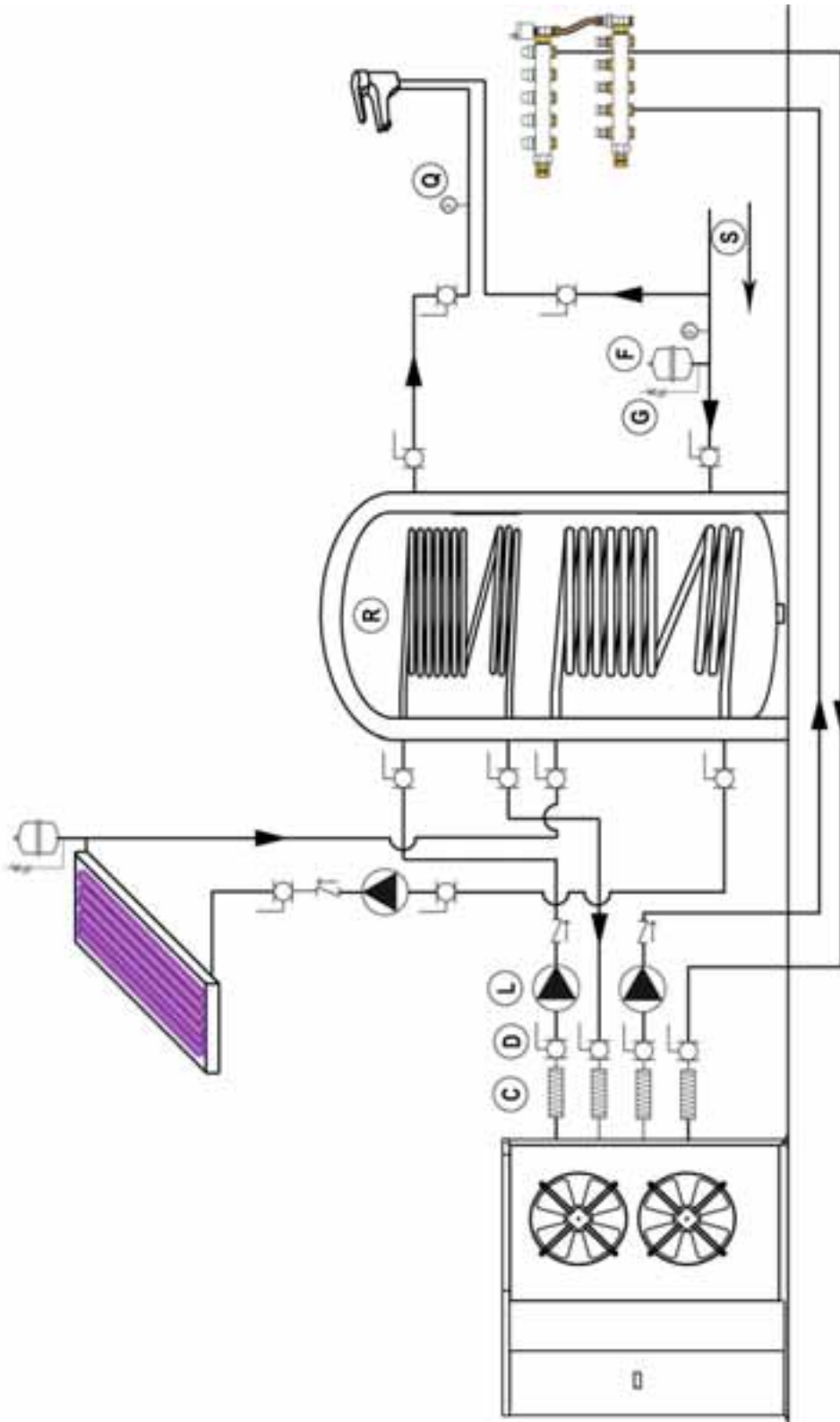
**“A” VERSION HYDRAULIC COMPONENTS**



A	System filling group	L	Water pump
B	Thermometer	M	One way valve
C	Flexible connection	N	Evaporator
D	Ball shut-off valve	O	Flow switch
E	Water strainer	P	User Water tank
F	Expansion vessel	Q	Water manometer
G	Safety valve	R	Domestic hot water accumulator
H	Vent valve	S	Domestic hot water feeding
I	Water tank Drainage valve		



**DOMESTIC HOT WATER HYDRAULIC CONNECTIONS (SA VERSIONS ONLY)**



## ELECTRICAL CONNECTIONS

It must be verified that electric supply is corresponding to the unit electric nominal data (tension, phases, frequency) reported on the label in the front panel of the unit. Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance to the norms in force. Power cable and line protection must be sized according to the specification reported on the form of the wiring diagram enclosed with the unit.



**WARNING:** The line voltage fluctuations can not be more than  $\pm 5\%$  of the nominal value, while the voltage unbalance between one phase and another can not exceed 2%. If those tolerances should not be respected, please contact our Company.



**WARNING:** Electric supply must be in the limits shown: in the opposite case warranty will terminate immediately. Before every operation on the electric section, be sure that the electric supply is disconnected.

**WARNING:** The Flow switch must be connected following the indication reported in the wiring diagram. Never bridge the flow switch connections in the terminal board. Guarantee will be invalidated if flow switch connections are altered or not properly made.



**WARNING:** The remote control panel is connected to the water chiller by 2 wires of 2,5 mm<sup>2</sup> section. Power supply cables must be separated by remote control wires. Maximum distance 50 metres.



**WARNING:** The remote control panel can not be installed in area in with strong vibrations, corrosive gases, excess of dirtiness or high humidity level. Leave free the area near the cooling openings.

## START UP


### Before start-up


- Check that all power cables are properly connected and all terminals are hardly fixed.
- The voltage at the phase R S T is the one shown in the unit labels.
- Check that there is not any refrigerant leakage.
- Check that crankcase heaters are powered correctly.
- Check that all water connections are properly installed and all indications on unit labels are observed.
- The system must be bleed off in order to eliminate any air.
- Before start up check that all the cover panel are re-located in the proper position and locked with fastening screws.



**WARNING:** Crankcase heaters must be powered at least 12 hours before start up by closing the main switch (heaters are automatically supplied when main switch is closed). The crankcase heaters are working properly if after some minutes the compressor crankcase temperature is about 10÷15°C higher than ambient temperature

### Start up and switch off

Push  for 5 seconds to run the unit in heating mode. Push the same key for 5 seconds to switch off.

Push  for 5 seconds to run the unit in cooling mode. Push the same key for 5 seconds to switch off.



**WARNING:** Never switch off the unit (for temporary stop), by opening the main switch: this component should be used only to disconnect the unit from power supply when the current is not passing through, i.e. when the unit is in OFF mode. Moreover, with no supply to crankcase heater, at the unit start up, compressor could be seriously damaged.



**WARNING:** Do not modify internal wiring of the unit otherwise warranty will terminate immediately.

**WARNING:** The summer/winter operation must be selected at the beginning of the related season. Frequent change over of the seasonal operation mode must be avoided in order to prevent severe damage to compressors.

### CONTROLS DURING UNIT OPERATION

- Check the fans rotation. If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation (only for units with three-phase fan motors).
- Check that water temperature at evaporator inlet is near to the set point of the control thermostat.
- For "A" version units (units with pumps and storage tank) if the motor driven pump should be noisy, slowly close discharge shut-off valve until normal working conditions are restored. This trouble may occur when system pressure drop is quite different from pump available pressure.

#### Refrigerant charge checking

- After few hours the unit is working, check that sight glass shows a green colour core: if the core is yellow moisture would be present in the circuit. In this case it is necessary circuit dehydration to be carried out by qualified people only. Check that at the sight glass there is no continuous vapour bubbles presence. In this case additional refrigerant charge could be required. It is however allowed the presence of few vapour bubbles.
- Few minutes after the start up, working on summer operating mode (cooling), check that condensing temperature, is approximately 15 °C higher than condenser inlet air temperature. Check moreover that evaporation temperature is about 5 °C lower than the evaporator outlet temperature.
- Check that refrigerant superheat on the evaporator is about 5-7 °C
- Check if refrigerant sub-cooling on the condenser is about 5-7 °C.

### MAINTENANCE AND PERIODIC CHECKS



**WARNING: All this operation described in this chapter MUST BE DONE BY TRAINED PEOPLE ONLY. Before every operation of servicing on the unit, be sure that the electric supply is disconnected. The top shell and discharge line of compressor are usually at high temperature level. Be very careful when operating in their surroundings. Aluminium coil fins are very sharp and can cause serious wounds. Be very careful when operating in their surroundings. After servicing operation close the unit with cover panels, fixing them with locking screws.**

It is a good rule to carry on periodic checks in order to verify the correct working of the unit.

- Check that safety and control devices work correctly as previously described (monthly).
- Check all the terminals on the electric board and on the compressor are properly fixed.
- Check and clean the sliding terminals of the contactors.
- Check refrigerant charge by sight glass; check leakages from compressor (monthly).
- Check water leakages in the hydraulic system (monthly).
- If the unit is to be expected to be stopped for a long period, unit hydraulic circuit should be emptied from all the tubes and heat exchanger. This operation is compulsory if, during seasonal stop, ambient temperature is expected to go down below the freezing point of employed mixture (typical seasonal operation).
- Check flow switch proper working, clean metallic filters on water piping (monthly).
- Check compressor crankcase heater proper supply and functioning (monthly).
- Clean finned coils metallic filters with compressed air in the opposite direction of the air flow. If filters should be fully clogged, clean them with a water jet (monthly).
- -Check mounting of fan blades and their balancing (every 4 months).
- Check the colour of the sight glass core (green=no moisture, yellow=moisture present): if it has a yellow colour, change the refrigerant filter (every 4 months).

### REFRIGERANT CIRCUIT REPAIR

In the case that refrigerant circuit should be discharged, all the refrigerant must be recovered with proper machines. The system must be charged with nitrogen, using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Any eventual leakage must be searched with a bubble leak finder. In case bubbles appear discharge the circuit before welding with proper alloys.



**WARNING: Never use oxygen instead of nitrogen: explosions may occur.**

### ENVIRONMENT PROTECTION

According to European norms dealing with the use of depleting stratospheric ozone substances, it is forbidden to release refrigerants fluids in the atmosphere. They must be redelivered to the seller or to proper gathering points at the end of their operating life. Refrigerant R407C is mentioned among controlled substances and for this reason it must 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.**

### UNIT OUT OF SERVICE

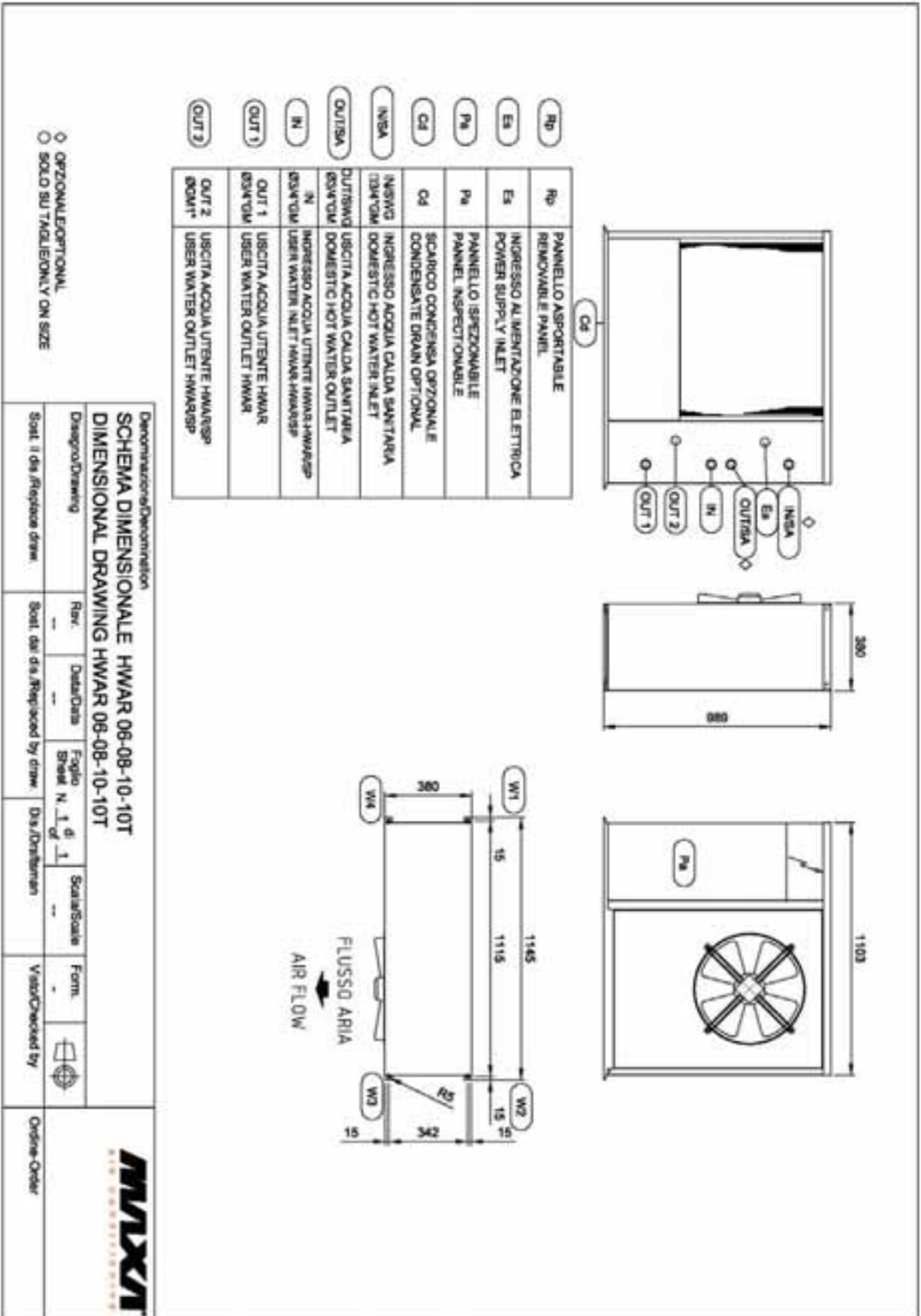
Once the unit is arrived at the end of its life and needs to be removed or replaced, the following operations are recommended:

- the unit refrigerant has to be recovered by trained people and sent to proper collecting centre;
- compressor lubricating oil has to be recovered and sent to proper collecting centre;
- the frame and various components, if not usable 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, reducing environmental impact.

### FAULT FINDING

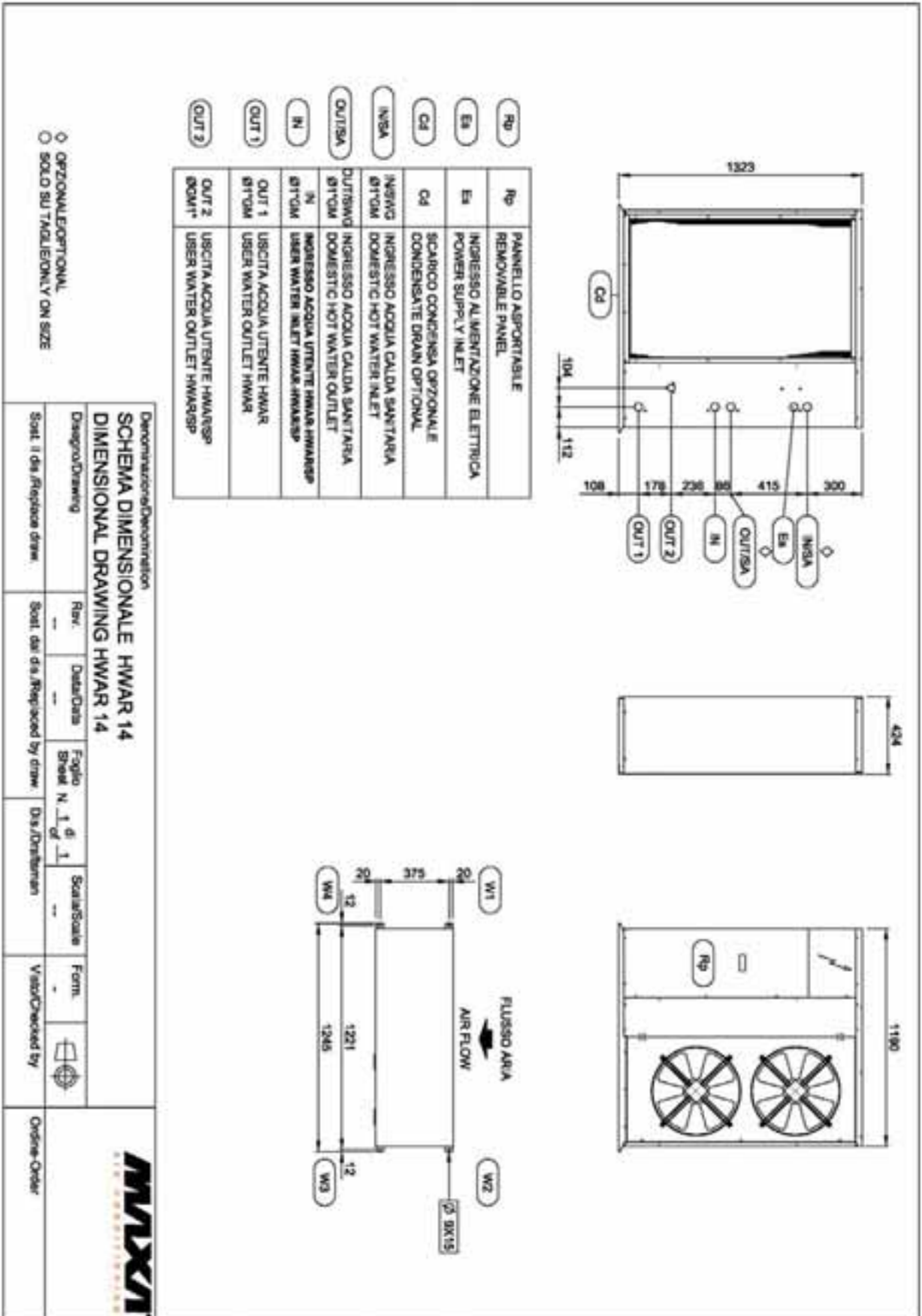
Cod	Meaning	Cause / Origin	Reset
P1	Pb1 probe alarm	Missing, faulty probe or resistance exceeding value	<b>Automatic</b> if the probe value recovers
P2	Pb2 probe alarm	Missing, faulty probe or resistance exceeding value	<b>Automatic</b> if the probe value recovers
P3	Pb3 probe alarm	Missing, faulty probe or resistance /current exceeding value	<b>Automatic</b> if the probe value recovers
P4	Pb4 probe alarm	Missing, faulty probe or resistance exceeding value	<b>Automatic</b> if the probe value recovers
A01	High pressure switch alarm	Digital input for high pressure activated	<b>Manual</b> after the alarm event expires, proceed with manual reset.
A02	Low pressure switch alarm	Digital input for low pressure activated	<b>Manual</b> after the alarm event expires, proceed with manual reset.

<b>Cod</b>	<b>Meaning</b>	<b>Cause / Origin</b>	<b>Reset</b>
<b>A07</b>	Anti freeze alarm	Digital input active anti freeze probe	<b>Manual</b> proceed with manual reset.
<b>A08</b>	Water flow alarm	Digital input active for AL06 duration.	<b>Automatic</b> It turns to manual after 3 events in 1 hour.
<b>A09</b>	Compressor 1 thermal protection alarm	Digital input active	<b>Manual</b> the event expires, then proceed with manual reset.
<b>A10</b>	Compressor 2 thermal protection alarm	Digital input active	<b>Manual</b> the event expires, then proceed with manual reset.
<b>A11</b>	Condenser fan thermal protection alarm	Digital input active	<b>Manual</b> the event expires, then proceed with manual reset.
<b>A12</b>	Defrost error alarm	Max defrost time	<b>Automatic</b> with next proper defrost cycle. Proceed with manual reset.
<b>A13</b>	Compressor 1 maintenance warning	Running hour > CO14	<b>Manual</b> Proceed with the hour reset procedure.
<b>A14</b>	Compressor 2 maintenance warning	Running hour > CO15	<b>Manual</b> Proceed with the hour reset procedure
<b>A15</b>	Water pump maintenance Warning	Running hour warning	<b>Manual</b> Proceed with the hour reset procedure
<b>rtC</b>	Clock alarm	Need to set the clock time	<b>Manual</b> Set the clock and then proceed with manual reset.
<b>rtF</b>	Clock alarm	Faulty clock control	<b>Manual</b> Proceed with manual reset, if nothing happens change the clock.
<b>EE</b>	EEPROM error alarm	Possible data losing	<b>Manual</b> Proceed with manual reset., if nothing happens the controller is locked, no regulation available.
<b>ACF1</b>	Configuration alarm	Heat pump configured without reversing valve	<b>Automatic</b> After parameter proper debug.
<b>ACF2</b>	Configuration alarm	without condensing probe control configuration	<b>Automatic</b> After parameter proper debug.
<b>ACF3</b>	Configuration alarm	Two digital inputs having the same function	<b>Automatic</b> After parameter proper debug.
<b>FErr</b>	Functioning alarm	Two digital inputs activated at the same time	<b>Manual</b> after the alarm event expires, proceed with manual reset.
<b>AFr</b>	Frequency alarm	The frequency of power supply is out of range	<b>Automatic</b> After the frequency becomes normal

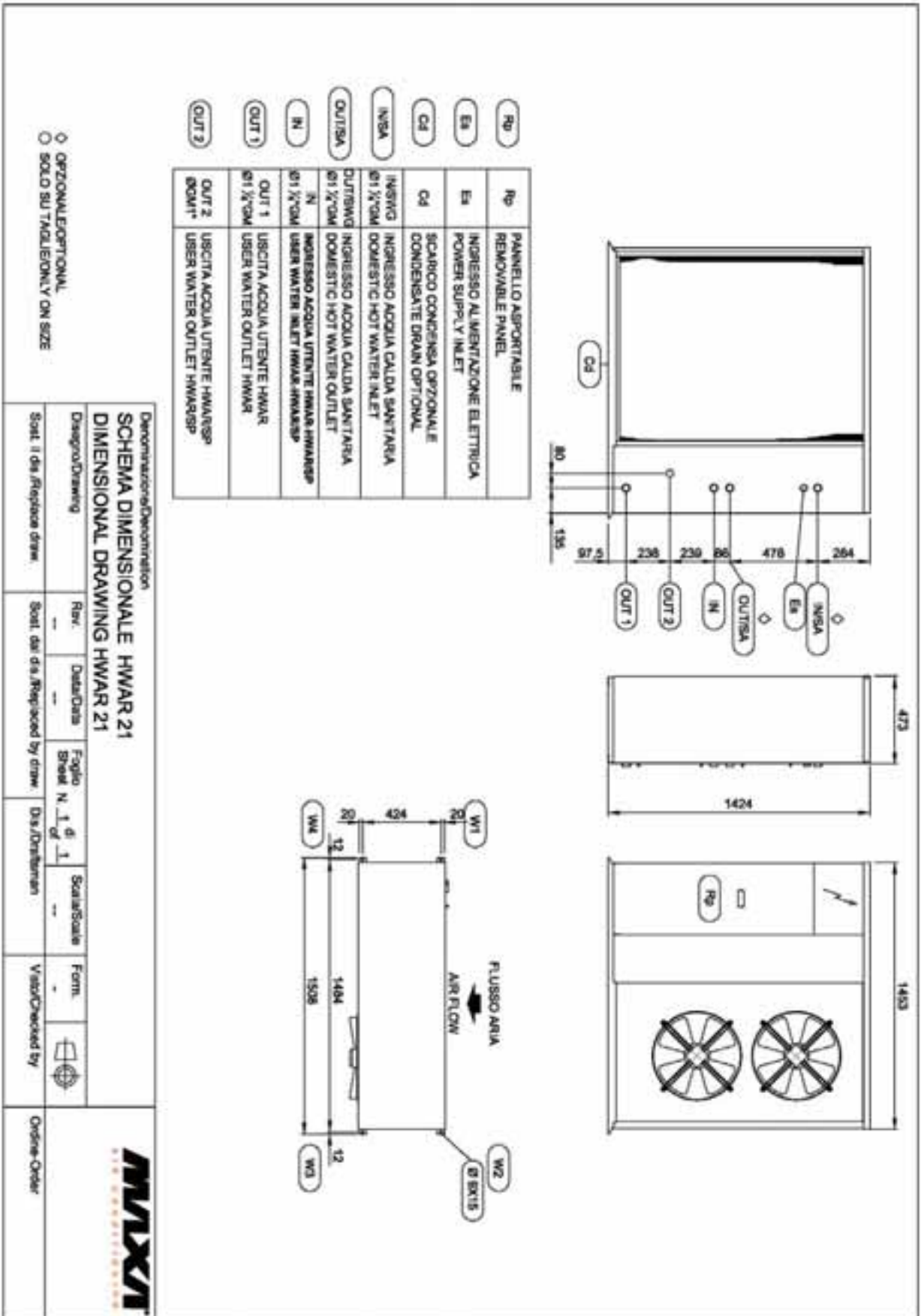


Denominazione/Denomination		HWAR 06-08-10-10T	
SCHEMA DIMENSIONALE		DIMENSIONAL DRAWING	
Disegno/Drawing		Riv.	---
Data/Date		Foglio Sheet N.	1 di 1
Scala/Scale		---	---
Form.		---	---
Disegnato/Drawn		Disegnato/Drawn	---
Verificato/Checked by		---	---

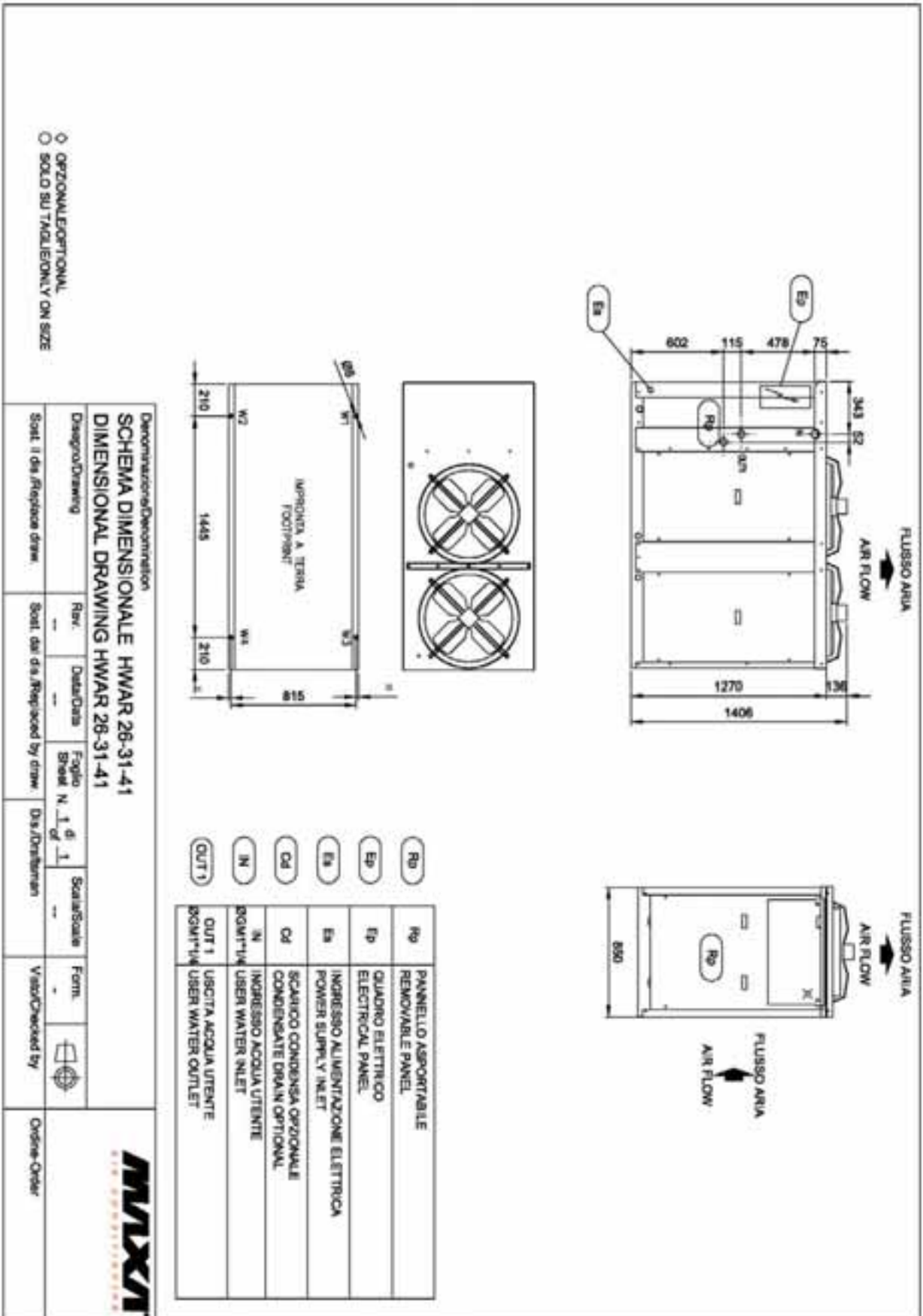
















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The data indicated in this manual is purely indicative. The manufacturer reserves the right to modify the data whenever it is considered necessary.

