



Inverter Heat pump

NEW

High energy efficiency with the **R410A**
Compact and silent Scroll compressors
Inverter technology
 High performance brazed-plate heat exchangers
 Self-adjusting **electronic control**



Cooling capacity: 40 to 80 kW
 Heating capacity: 45 to 90 kW



Cooling and heating



Hydraulic module



Heat recovery



USE

The **AQUACIAT^{GRAND INVERTER} IVDC series** packaged water chillers or heaters are medium-capacity units specifically designed for heating and air conditioning applications in Offices, Healthcare, Administrations, Shopping Centres and the Residential sector.

These standard packaged units are designed for outdoor installation and require no special protection against adverse weather conditions.

To operate in HEATING or COOLING mode, they use the outdoor air as the only external source; this permits the evacuation of heat in summer or the supply of thermal energy for heating in winter.

Connected to an underfloor heating or cooling system, fan coil units or an air handling unit, the reversible **AQUACIAT^{GRAND INVERTER} IVDC series** is an extremely easy way to heat and air condition buildings.

Each unit is delivered fully assembled, wired (control and power), charged with refrigerant and factory tested.

Simply make the necessary electrical and hydraulic connections, and your unit is ready to operate.

RANGE

AQUACIAT^{GRAND INVERTER} IVDC series

Reversible Air/Water modules with hydraulic system (circulation pump).



Inverter Heat pump

AQUACIAT GRAND INVERTER

DESCRIPTION

The **AQUACIAT^{GRAND INVERTER} IVDC series** is supplied as standard with the following components:

- air-source condenser with axial fan motor inverter and variable speed inverter,
- high efficiency brazed-plate heat exchangers,
- chilled water or hot water capacity control,
- control, automatic operation and startup box:
 - . Electrical supply: Three-phase 50 Hz - 400 V (+6%/-10%) + Earth
 - . Control circuit: Single-phase 50 Hz - 230 V

(transformers fitted on unit as standard),

- casing for outdoor installation.

■ Complies with European directives (CE):

- Machinery directive (98/37/EC)
- EMC directive (2004/108 EC)
- Pressure equipment directive (97/23/EC, category 2)
- Low voltage (2006/95/EC)

■ Compliance with standards

- EN 60204, EN 378-2 (NFC 15-100, France)



STANDARD AND OPTIONAL EQUIPMENT

| | IVDC |
|--|---------------|
| Power supply: 400 V, 3-Phase, 50 Hz, without neutral, with transformer | Std |
| Coil protection screen | Std |
| Resilient mounts | Std |
| Main disconnect switch | Std |
| Water flow regulator | Std |
| Phase monitor (reversal, loss, over- and undervoltage) | Std |
| Soft start | Std |
| Variable-speed condenser fan | Std |
| Connection frame/duct (XTRAFAN) | O |
| Sleeve + connection duct/duct (XTRAFAN) | O |
| 800 micron water filter | Std |
| All-season operation (-20°C) | Std |
| Remote control | O |
| Additional voltage-free contacts board | O |
| LONWORKS Protocol | O |
| MULTICONNECT multiple unit management | O |
| Partial heat recovery - desuperheater | O |
| Frost protection | O |
| BLYGOLD coated coil | O |
| Polyurethane coated coil fins | O |
| Hydraulic control kit (manifold, control & shut-off valve) | O |
| Hydraulic hoses | O |
| Double pump | O / 200 ➔ 300 |
| 15 kW electric auxiliary heater kit | O ➔ 150 |
| 15 - 30 - 45 - 60 kW electric auxiliary heater module kit | O / 200 ➔ 300 |
| External auxiliary heating management (4-stage) | O |

Std: Supplied as standard

O: Option

Note: Some technical options not listed above may be added on special request (please contact us).



Inverter Heat pump

TECHNICAL DATA - REVERSIBLE HEAT PUMPS



| IVDC | | 150 V | 200 V | 300 V |
|---|------------------------|--|-----------|-----------|
| Cooling capacity ① | kW | 36.9 | 47.4 | Underway |
| Power input | kW | 13.7 | 18 | |
| Energy efficiency rating (EER) ② | | 2.69 | 2.63 | |
| Seasonal energy efficiency rating (ESEER) | | 3.97 | 3.87 | |
| Lw/Lp ③ (HP high performance version) | dB(A) | 78.5/46.5 | 75.9/43.9 | |
| Lw/Lp ③ (high temperature [HT] version) | dB(A) | 86.3/54.3 | 86.3/54.3 | |
| Heating output ① | kW | 41.1 | 53.5 | |
| Absorbed power | kW | 13.8 | 16.7 | |
| COP/COP performances ② | | 2.98 | 3.20 | |
| Compressor | | Inverter hermetic SCROLL | | |
| Start-up mode | | Direct using Soft Starter | | |
| Number | | 1 | | |
| Power control | % | Variable from 33 to 100% | | |
| Refrigerant oil type | | Polyester POE 160 SZ | | |
| Oil capacity | l | 3 | 3.3 | 6.7 |
| No. of refrigerant circuits | | 1 | | |
| Refrigerant (GWP) | kW eq. CO ₂ | R410A (1720) | | |
| Refrigerant load | kg | 12 | 17 | Underway |
| Electrical supply | ph/Hz/V | Three-phase 50 Hz 400 V (+6%/-10%) + Earth | | |
| Machine protection rating | | IP 44 | | |
| Control circuit voltage | ph/Hz/V | Single-phase 50 Hz 230 V (+6%/-10%) - transformer fitted | | |
| Evaporator | | Brazen plate exchanger(s) | | |
| Water capacity | l | 3.11 | 7.71 | 8.6 |
| Chilled water outlet temp. (min./max.) | °C | -10 / +15 | | |
| Hot water outlet temp. (min./max.) | °C | +30 / +55 | | |
| Minimum water flow rate | m ³ /h | 5.1 | 6.9 | 10.4 |
| Maximum water flow rate | m ³ /h | 13.1 | 17.6 | 24.5 |
| Water connections | ∅ | 1" 1/2 M | 2" M | 2" M |
| Max. pressure, water end | bar | IVDC 4 bar | | |
| Air-cooled condenser | | Finned heat exchanger | | |
| Fan ∅ | mm | 800 | | |
| HP High Performance Version- No. x motor capacity | no. x kW | 1 x 1.143 | 1 x 1.066 | 1 x 2.153 |
| HP High Performance Version - Air flow rate | m ³ /h | 15,500 | 16,100 | 24,000 |
| HP High Performance Version - Rotational speed | rpm | 690 | 690 | 1049 |
| HT High Temperature Version- No. x motor capacity | no. x kW | 1 x 2.443 | 1 x 2.443 | 1 x 2.553 |
| HT High Temperature Version - Air flow rate | m ³ /h | 23,000 | 23,500 | 26,000 |
| HT High Temperature version - Rotational speed | rpm | 985 | 985 | 1110 |
| Min. water volume (IVDC) | l | 74 | 96 | 144 |
| Expansion vessel C | l | 6 | 12 | 12 |
| Maximum capacity of system in litres ④ | max. water 36°C ⑤ | 550 | | 1100 |
| Pure water | max. water 46°C ⑤ | 325 | | 650 |
| Maximum capacity of system in litres ④ | max. water 36°C ⑤ | 390 | | 780 |
| Glycol/water mix | max. water 46°C ⑤ | 230 | | 460 |
| Standard pump | Qty. | 45 | 40 | 41 |
| Height (excluding mounts) | mm | 1423 | 1773 | 1773 |
| Length (IVDC) | mm | 1995 | | |
| Depth | mm | 1055 | | |
| Weight (empty) | kg | 450 | 620 | 750 |
| Storage temperature | °C | +50°C | | |

① HP High Performance version capacities based on:

a/ COOLING: +12°C/+7°C and condenser air inlet temperature of +35°C at nominal air flow

b/ HEATING: hot water outlet at +45°C and external air at +7°C DB, 86% RH (EN 14511 and EUROVENT conditions)

② Gross EER/COP values

③ Overall sound power level (Lw) overall sound pressure level (Lp) measured at 10 metres in a free field, as per ISO 3744

④ System capacity depending on expansion vessel fitted on unit

⑤ Water temperatures given are those which can be reached when the machine is off

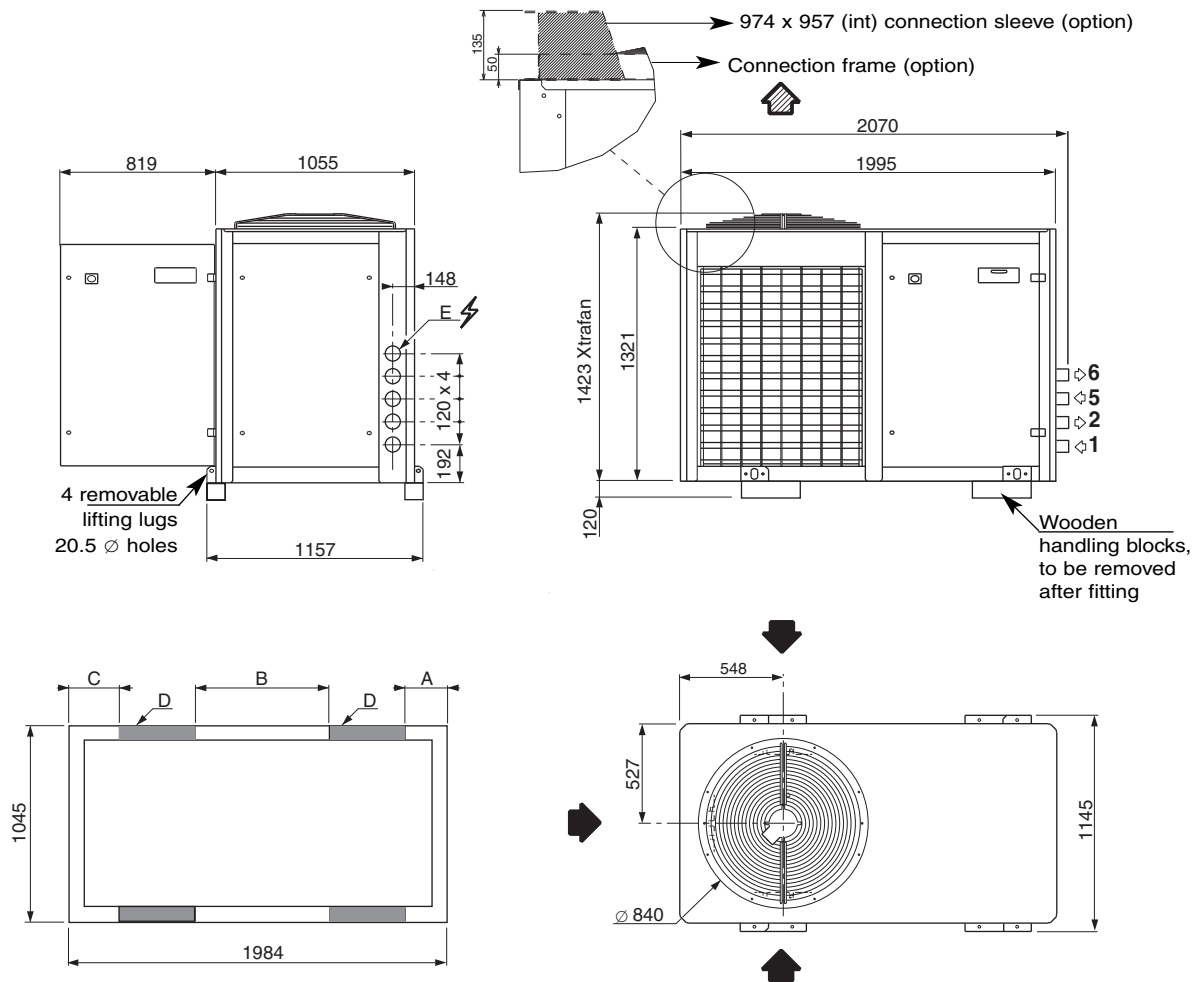


Inverter Heat pump

AQUACIAT GRAND INVERTER

DIMENSIONS

AQUACIAT^{GRAND INVERTER} IVDC model 150



Outdoor air discharge

Outdoor air intake

- 5: G 1/2" male hot water inlet
- 6: G 1/2" male hot water outlet
- 1: G 1 1/2" male chilled water inlet
- 2: G 1 1/2" male chilled water outlet
- E: Electrical supply (Ø 80)

Leave a space of 1 metre around the unit for maintenance

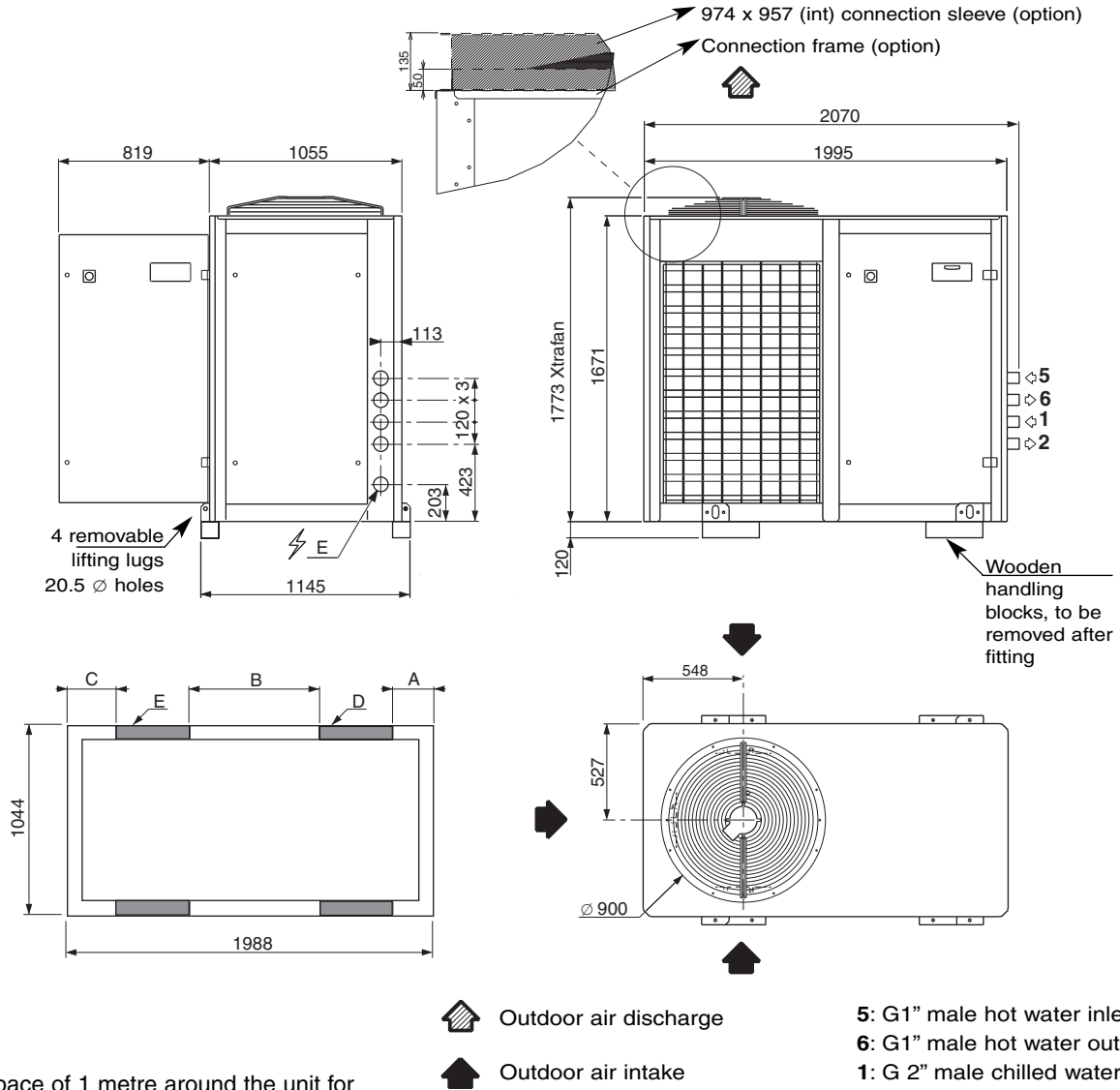
| AQUACIAT ^{GRAND INVERTER} | | Position of mounts | | | Anti-vibration mounts | Weight (kg) | |
|------------------------------------|-----|--------------------|------|-----|-----------------------|-------------|--------------|
| | | A | B | C | D | empty | in operation |
| IVDC | 150 | 300 | 1147 | 300 | P25 50 x 120 | 450 | 454 |



Inverter Heat pump

DIMENSIONS

AQUACIAT^{GRAND INVERTER} IVDC models 200 to 300



Leave a space of 1 metre around the unit for maintenance

| AQUACIAT ^{GRAND INVERTER} | | Position of mounts | | | Anti-vibration mounts | | Weight (kg) | |
|------------------------------------|-----|--------------------|------|-----|-----------------------|--------------|-------------|--------------|
| | | A | B | C | D | E | empty | in operation |
| IVDC | 200 | 100 | 1188 | 350 | P25 50 x 200 | P25 50 x 150 | 620 | 625 |
| | 300 | 100 | 1088 | 400 | P25 50 x 200 | P25 50 x 200 | 750 | 755 |

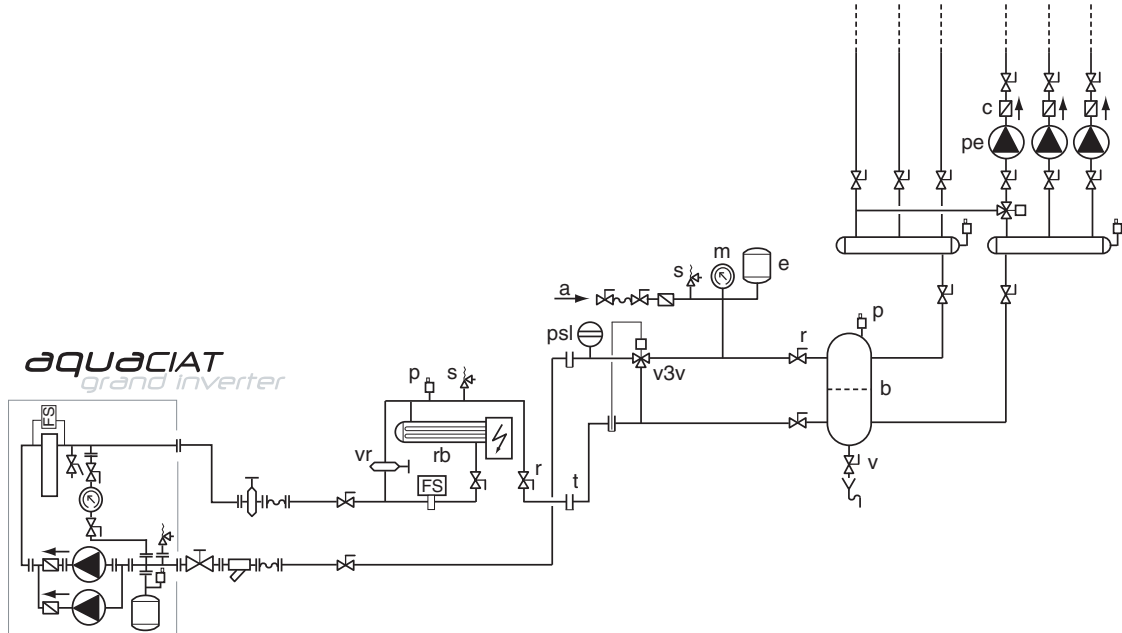


Inverter Heat pump

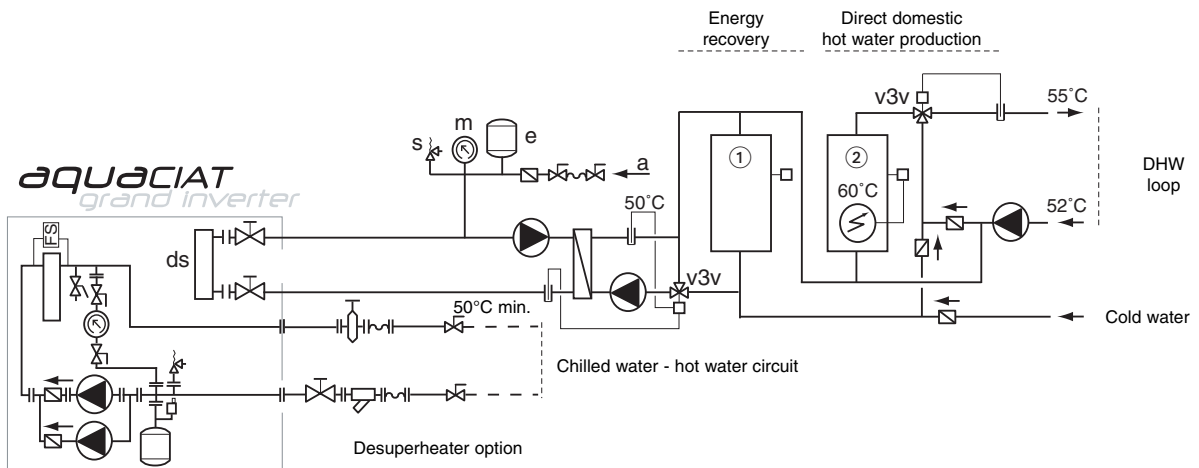
AQUACIAT GRAND INVERTER

EXAMPLES OF HYDRAULIC CONNECTION DIAGRAMS

Chilled water - hot water hydraulic circuit



Hot water circuit during partial recovery (desuperheater)



Aquaciat^{GRAND INVERTER}: air-to-water reversible unit
 psl : zero pump water pressure switch
 3wv : three-way valve
 2wv : two-way valve
 e : expansion vessel
 v : retaining valve
 g : gauge
 a : water top-up
 b : mixer tank
 sv : shut-off valve

cv : control valve
 s : safety valve
 cp : circulation pump
 t : temperature sensor pocket
 rb : backup heater
 FS : water flow regulator
 ds : desuperheater
 sv : solenoid valve

General comments:

p : air vents at pipe high points d : drain nozzles at pipe low points

N.B.: these circuit diagrams are provided for information only and must not be construed as detailed execution diagrams.

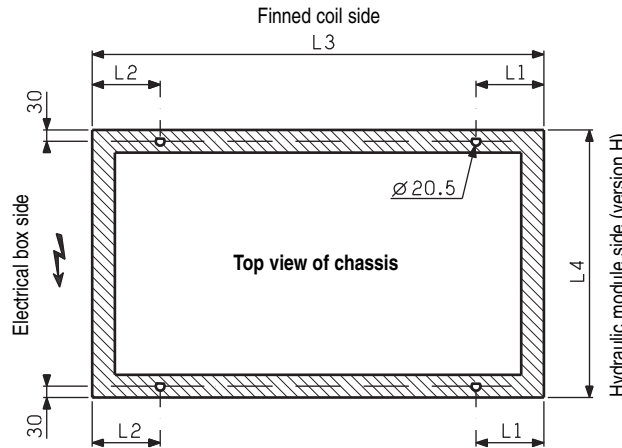


Inverter Heat pump

FIXING OF FRAMES TO GROUND

AQUACIAT^{GRAND INVERTER} IVDC

The chassis may be affixed to the ground. (mounts with bolts NOT supplied by CIAT). (The hardness is defined by the unit's weight and centre of gravity).



| | 150 V | 200 V | 300 V |
|----|-------|-------|-------|
| L1 | 316 | | |
| L2 | 316 | | |
| L3 | 1984 | 1987 | |
| L4 | 1045 | 1044 | |

AQUACIAT^{GRAND INVERTER}

Installation recommendations

Water quality criteria to be respected

Important: it is essential that an 800 micron water filter be placed on the unit's water inlet during installation.

The quality of the water used has a direct impact on the correct operation of the unit and its service life. This is particularly true if the water used clogs or corrodes components or promotes the growth of algae or microorganisms.

The water must be tested to determine whether it is suitable for the unit and whether chemical treatment will suffice to make it of acceptable quality and if a water softening/demineralising system should be installed.

The results of the analysis must confirm whether the site's water is compatible with the various materials used on the CIAT unit's circuit:

- 99.9% copper tubes brazed with copper and silver,
- threaded bronze couplings or flat steel flanges, depending on the unit model,
- plate heat exchangers and connections made of AISI 316/ DIN 1.4401 stainless steel brazed with copper and silver.

N.B.: The guarantee shall be void if these instructions are not followed.

Lifting and handling

The utmost safety precautions must be taken when lifting and handling the unit.

Always follow the lifting diagram on the unit and in the installation, operation, commissioning and maintenance manual.

Before attempting to lift the unit, make sure the path leading to its intended location is free from obstacles.

Always keep the unit vertical when moving it. Never tip it or lie it on its side.

Choosing a location for the unit

The standard version of the AQUACIAT^{GRAND INVERTER} is designed for outdoor installation.

Precautions should be taken to protect it from freezing temperatures.

Special attention should be paid to ensure sufficient free space (including at the top) to allow maintenance.

The unit must be placed on a perfectly level, fireproof surface strong enough to support it once charged.

Noise pollution from auxiliary equipment such as pumps should be studied thoroughly.

Potential noise transmission routes should be studied, with assistance from an acoustical engineer if necessary, before installing the unit.

Flexible couplings must be placed over pipes (available as options).

Reversible units installed in areas of snowfall or heavy frost should be raised approx. 300 mm off the floor or ground.

On reversible units, the steam and defrosted water must be properly evacuated during defrosting cycles.

Installation in a machine room

Installation in a machine room, if required, gives rise to special technical precautions, such as:

- the draining of defrosted water, including during periods of very low outdoor temperatures,
- the management of water vapour created at the fan discharge during defrosting
- ground which can support the weight of the unit and which must be perfectly watertight and capable of collecting and draining the defrosted water, including during freezing periods,
- the weight of an air discharge sleeve must not be supported by the roof of the unit, under any circumstances.

According to the regulations in force where the installation is taking place, installation within a machine room may have to comply with certain ventilation rules for fresh air to ensure there is no risk of discomfort or any hazard in the event of a refrigerant leak.



Inverter Heat pump

AQUACIAT GRAND INVERTER

■ Assembly of separately supplied accessories:

A number of optional accessories may be delivered separately and installed on the unit at its location.

Always follow the instructions in the installation, operation, commissioning and maintenance manual

■ Electrical connections:

Always follow the instructions in the installation, operation, commissioning and maintenance manual.

All information concerning electrical connections is stated on the wiring diagrams provided with the unit. Always follow this information.

Electrical connections must be made in accordance with best current practices and applicable standards and regulations.

Electrical connections to be made on site:

- . unit's electrical supply,
- . outdoor operation authorisation (optional)
- . information feedback (option)

It should be noted that the unit's electrical system is not protected against lightning strikes.

Therefore components to protect against transient voltage surges must be installed on the system and inside the electrical supply unit.

■ Pipe connections:

Always follow the instructions in the installation, operation, commissioning and maintenance manual.

All pipes must be correctly aligned and slope toward the system's drain valve.

Pipes must be installed to allow sufficient access to the panels and fitted with heat insulation.

Pipe mountings and clamps must be separate to avoid vibrations and placing pressure on the unit.

Water shut-off and control valves must be fitted when the unit is installed.

- Pipe connections to be made on site:

- . system water supply with pressure-reducing valve,
- . evaporator, condenser and drain,
- The following are a few examples of accessories essential to any hydraulic system and which must also be installed:
 - . thermostatically controlled valve on the condenser water outlet to regulate the flow of cooling water (heat pump in HEATING mode).
 - . water expansion vessel,
 - . drain nozzles at pipe low points,
 - . exchanger shut-off valves equipped with filters,
 - . air vents at pipe high points,
 - . check the system's water capacity (install a buffer water tank if necessary),
 - . flexible couplings on exchanger inlets and outlets,
 - . manual water flow rate control valves,
 - . thermometers on each water inlet and outlet to allow all the necessary checks during start-up and maintenance.

N.B.:

- Pressure in the water circuits below 4 bar.
- Place the expansion vessel before the pump.
- Do not place any valves on the expansion vessel.
- Make sure the water circulation pumps are placed directly at the exchanger inlets.
- Make sure the pressure of the water drawn in by the circulation pumps is greater than or equal to the required minimum NPSH, particularly if the water circuits are open.
- Test the water quality in accordance with the relevant technical requirements.
- Take the necessary precautions to protect the unit and hydraulic system from freezing temperatures (eg. allow for the possibility of draining the unit). If glycol is added to prevent freezing, check its type and concentration before commissioning.
- Before making any final hydraulic connections, flush the pipes with clean water to remove any debris.

■ Commissioning

AQUACIAT^{GRAND INVERTER} units must be commissioned by CIAT or a CIAT-approved contractor.

IMPORTANT: Following commissioning and every time the compressor has been switched off for a prolonged period (except during operating cycles), the unit must be switched on for **12 hours** before start-up to ensure the compressor oil is correctly preheated.

Always follow the instructions in the installation, operation, commissioning and maintenance manual.

Partial list of precommissioning checks:

- Correct positioning of unit,
- Power supply protections,
- Phases and direction of rotation,
- Wiring connections on unit,
- Direction of water flow in unit,
- Cleanliness of water circuit,
- Adjusting water flow rate to specified value,
- Pressure in the refrigeration circuit,
- Direction of rotation of compressors,
- Water pressure drops and flow rates,
- Operating readings.

■ Maintenance operations

Specific preventive maintenance operations must be regularly carried out on the unit by CIAT-approved firms.

The operating parameters are read and noted on a "CHECK LIST" form to be returned to CIAT.

It is essential to comply with the Instructions, Installation, Operation, Commissioning and Maintenance Manual.

You must take out a maintenance contract with a CIAT-approved refrigeration equipment specialist. Such a contract is required even during the warranty period.



Inverter Heat pump

CONNECT CONTROL

USER-FRIENDLY INTERFACE CONSOLE

- Multilingual LCD display (2 lines of 20 characters)
- Display of pressure and temperature values- Management of the pumps
- Communication

Voltage-free contacts available:

- Inputs:*
- Control of automatic operation
 - Selection of setpoints 1/2
 - Selection of heating/cooling

- Outputs:*
- Fault signalling contact

RS-485 OUTPUT AS STANDARD

- Open Modbus / Jbus protocol (standard)**
- LonWorks protocol (option)**

RELAY BOARD (OPTION)

Available outputs:

- Water flow fault
- Anti-freeze fault
- Pump fault
- Fan fault
- High and low pressure fault
- Compressor safety fault
- Discharge temperature fault
- Compressor running status

REMOTE-CONTROL UNIT (OPTION)

- Operation and design same as display console**

MULTICONNECT MULTI-UNIT MANAGEMENT (OPTION)

Main functions available:

- Management of up to 8 units on a single water loop
- Management in COOLING mode (chilled water unit) or in HEATING mode (heat pump)
- Management of the chilled water or hot water network pumps
- Centralised management of a backup unit
- Unit bypass
- System time programming
- Energy storage mode management
- Fault management on each unit
- Unit runtime balancing
- Integrated Modbus GTC link for obtaining information on unit operation and faults



150 to 300

This document is non-contractual. As part of its policy of continual product improvement, CIAT reserves the right to make any technical modification it feels appropriate without prior notification.

Head office

Avenue Jean Falconnier - B.P. 14
 01350 - Culoz - France
 Tel.: +33 (0)4 79 42 42 42 - Fax: +33 (0)4 79 42 42 10
 info@ciat.fr - www.ciat.com



Tel.: +33 (0)4 79 42 42 90 - Fax: +33 (0)4 79 42 42 13

CIAT Service

CERTIFIED ISO 9001
QUALITY SYSTEM



Compagnie Industrielle d'Applications Thermiques - S.A. with a registered capital of 26 728 480 € - R.C.S. Bourg-en-Bresse B 545 620 114