AQUACIAT LD ILD

Water chillers
Heat pump

Unit with protection grille option

Compact and silent

Scroll compressors
High-efficiency brazed plate heat exchangers
All-aluminium micro-channel condenser
Self-adjusting electronic control

Cooling capacity, LD: 40 to 156 kW
Cooling capacity, ILD: 38 to 148 kW
Heating capacity, ILD: 42 to 150 kW

Cooling only | **Cooling and heating** | **Hydraulic module** | **Heat recovery** | HFC R410A

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

USE

The latest generation of **AQUACIAT** heat pumps and water chillers are the perfect solution for all heating and cooling applications in the Office, Healthcare, Industry, Administration, Shopping Centres and Collective Housing markets.

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

AQUACIAT is optimised to use ozone-friendly HFC R410A refrigerant.

This range guarantees compliance with the most demanding requirements for increased seasonal energy efficiency (SEER, SEPR and SCOP) and CO2 reduction to comply with the various applicable European directives and regulations.

RANGE

- **AQUACIAT LD series**

Cooling only version.

- **AQUACIAT ILD series**

Reversible heat pump version.

These two versions are optimised to meet the most demanding technical and economic requirements, whilst complying with the new Ecodesign regulations.

DESCRIPTION

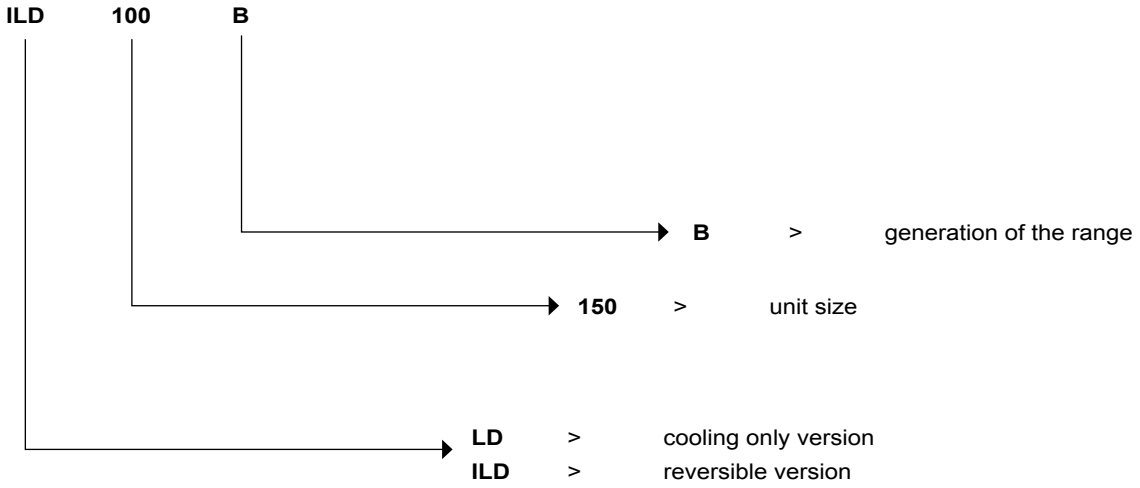
AQUACIAT units are packaged machines supplied as standard with the following components:

- Hermetic SCROLL compressors
- Brazed-plate condenser or evaporator water type heat exchanger
- Air-cooled exchanger with axial fan motor assembly
  - all-aluminium micro-channel coil, cooling only version
  - copper tube coil with aluminium fins, reversible heat pump version
- Electrical power and remote control cabinet:
  - 400 V-3ph-50 Hz (+/-10 %) mains power supply + earth
  - transformer fitted as standard on the machine for supplying the remote control circuit with 24 V
- Connect Touch electronic control module
- Casing for outdoor installation

The entire AQUACIAT range complies with the following EC directives and standards:

- Machinery Directive 2006/42/EC
- Electromagnetic compatibility directive 2014/30/EC
- EMC immunity and emissions EN 61800-3 'C3'
- Low Voltage Directive 2014/35/EU
- RoHS 2011/65/EU
- Pressure Equipment Directive (PED) 2014/68/EU
- Machinery directive EN 60-204 -1
- Refrigeration systems and heat pumps EN 378-2
- Commission Regulations (EU) No. 813/2013 (AQUACIAT ILD) and No. 2016/2281 (AQUACIAT LD) implementing directive 2009/125/EC setting the ecodesign requirements

DESCRIPTION



CONFIGURATION

LD-ILD	Standard
LD-ILD, XLN option	Standard Xtra Low Noise

DESCRIPTION OF THE MAIN COMPONENTS

Compressors
- Hermetic SCROLL type
- Electronic motor overheating protection
- Crankcase heater
- Mounted on anti-vibration mounts

Water type heat exchanger
- Brazed-plate exchanger
- Condenser or evaporator mode exchanger on the reversible heat pump version
- Plate patterns optimised for high efficiency
- 19-mm armaflex thermal insulation
- Frost protection with heater

Air-cooled exchanger
- Air-cooled exchanger:
  - all-aluminium micro-channel coil, cooling only version
  - copper tube coil with aluminium fins, reversible heat pump version
- Condenser or evaporator mode exchanger on the reversible heat pump version
- propeller fans with composite blades offering an optimised profile, fixed speed as standard or variable speed as an option
- motors – IP 54, class F

Refrigerant accessories
- Dehumidifier filters
- Hygroscopic sight glasses
- Electronic expansion valves
- Service valves on the liquid line
- 4-way cycle inversion valves in cooling/heating mode on the reversible heat pump version

Regulation and safety instruments
- High and low pressure sensors
- Relief valves on the refrigerant circuit
- Water temperature control sensors
- Evaporator antifreeze protection sensor
- Factory-fitted evaporator water flow controller

Electrical cabinet
- Electrical cabinet with IP 44 protection rating
- A connection point without neutral
- Front-mounted main safety switch with handle
- Control circuit transformer
- 24 V control circuit
- Fan and compressor motor circuit breaker
- Fan and compressor motor contactors
- Connect Touch microprocessor-controlled electronic control module
- Wire numbering
- Marking of the main electrical components

Casing
Frame made from RAL7035 light grey & RAL 7024 graphite grey painted panels.

Connect Touch control module
- User interface with 4.3-inch touch screen
- Intuitive, user-friendly navigation using icons
- Clear text display of information available in 6 languages (F-GB-D-E-I-NL)

The electronic control module performs the following main functions:
- Regulation of the water temperature (at the return or at the outlet)
- Regulation of the water temperature based on the outdoor temperature (water law)
- Regulation for low temperature energy storage
- Second setpoint management
- Complete management of compressors with start-up sequence, timer and operating time balancing
- Self-regulating and proactive functions with adjustment of the control to counter parameter drift
- Optimised defrosting with free defrost function to optimise performance at partial load and the SCOP
- In-series staged power control system on the compressors according to the thermal requirements
- Management of compressor short-cycle protection
- Frost protection (exchanger heaters)
- Phase reversal protection
- Management of occupied/unoccupied modes (according to the time schedule)
- Compressor and pump runtime balancing
- Management of the machine operation limit according to outdoor temperature
- Sound level reduction device (night mode according to the user programme) with limitation of compressor capacity and fan speed
- Diagnostics of fault and operating statuses
- Management of a fault memory allowing a log of the last 50 incidents to be accessed, with operating readings taken when the fault occurs
- Master/slave management of the two machines in parallel with operating time balancing and automatic changeover if a fault occurs on one machine
- Weekly and hourly time schedule for the machine, including 16 periods of absence
- Pump standby based on demand (energy saving)
- Calculation of the water flow rate and operating pressure (hydraulic module version)
- Electronic adjustment of the water pump speed and water flow rate (variable-speed pump option)
- Display of all machine parameters (3 access levels, User/Maintenance/Factory, password-protected): temperature, setpoints, pressures, water flow rate (hydraulic version), runtime.

Remote management

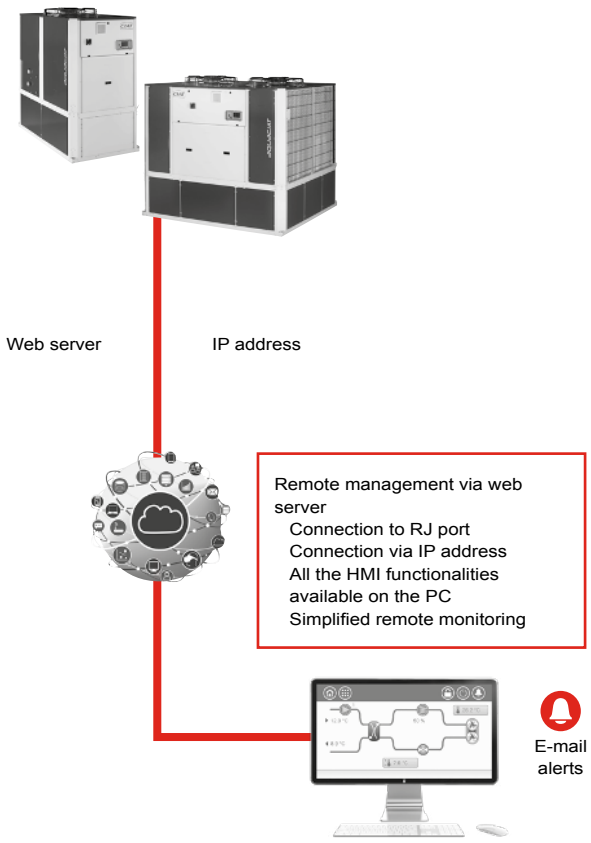
Connect Touch is equipped as standard with an RS485 port and an ETHERNET (IP) connection, offering a range of options for remote management, monitoring and diagnostics.

Using the integrated Webserver, a simple internet connection uses the unit's IP address to access the Connect Touch interface on the PC, facilitating everyday management tasks and maintenance operations.

A range of communication protocols are available: MODBUS/JBUS RTU (RS485) or TC/IP as standard, LONWORKS – BACNET IP as an option, enabling most CMS/BMS to be integrated.

Several contacts are available as standard, enabling the machine to be controlled remotely by wired link:
- Automatic operation control: when this contact is open, the machine stops
- Heating/cooling operating mode selection
- Setpoint 1/setpoint 2 selector: when this contact is closed, a second cooling setpoint is activated (energy storage or unoccupied mode, for example)
- Power limitation: closing the contact concerned allows the power or refrigerating consumption of the machine to be limited by stopping one or more compressors (this limit can be set with a parameter)
- Fault reporting: this contact indicates the presence of a major fault which has caused one or both refrigerant circuits to stop
- Operational status reporting indicates that the unit is in production mode.
- Activation control for partial energy recovery using the desuperheater
- Switch control for the customer pump, external to the machine (on/off).
- 0-10V output available for control of a variable flow pump (unit without hydraulic module)

Contacts available as an option:
- Setpoint adjustable via 4-20 mA signal: this input is used to adjust the setpoint in COOLING mode
- On/off control for a boiler
- 4-stage on/off management for additional heaters.



Maintenance

Connect Touch has two maintenance reminder functions as standard, making users aware of the need to regularly perform maintenance operations and to guarantee the service life and performance of the unit. These two functions can be activated independently.

A reminder message appears on the unit's HMI screen, and stays there until it is acknowledged by the maintenance operator. The information and alert relating to these functions are available on the communication bus to be used on the CMS/BMS.

- the scheduled maintenance reminder: when activated, this function enables the period between two maintenance inspections to be set. This period may be set by the operator in either days, months or operating hours, depending on the application.
- The compulsory F-GAS sealing test maintenance reminder: when activated, this function, which is the default factory setting, enables the period between two sealing tests to be selected, according to the refrigerant charge, in compliance with the F-GAS regulations

CIATM2M, the CIAT supervision solution

CIATM2M is a remote supervision solution dedicated to monitoring and controlling several CIAT machines in real time.

Advantages

- Access to the operating trend curves for analysis
- Improved energy performance
- Improved availability rate for the machines

Features

CIATM2M will send data in real time to the supervision website, www.ciatm2m.com.

The machine operating data can be accessed from any PC, smartphone or tablet.

Any event can configured to trigger a mail alert.

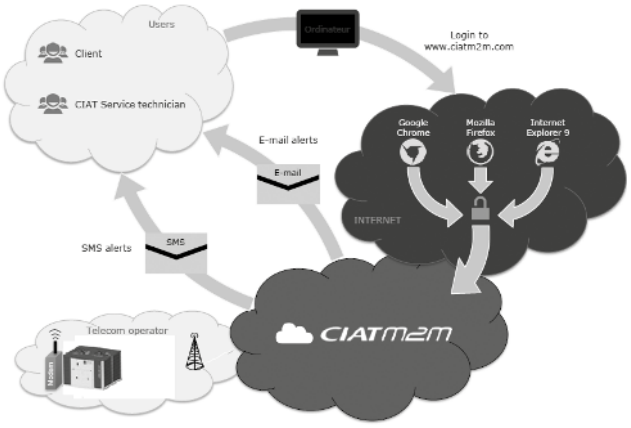
Parameters monitored:
- Overview
- Control panel for the controllers
- Events
- Temperature curves

Monthly and annual reports are available to analyse:
- The performance and operation of the machine
  Example: operating curves and time, number of compressor start-ups, events, preventive maintenance actions to be performed, etc.

Incidents such as a drift in the measurements on a temperature sensor, incorrectly set control parameters, or even incorrect settings between one compressor stage and the other are immediately detected, and the corrective actions put in place.

Equipment

This kit can be used on both machines which are already in use (existing inventory), and on new machines which do not have sufficient space in their electrical cabinets.
- 1 transportable cabinet
- 1 wall-mounted antenna

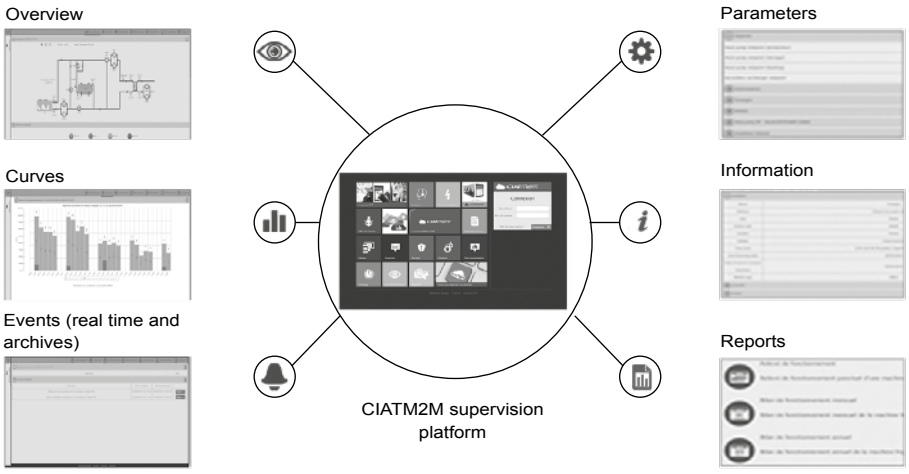


CIATM2M kit contents

- 1 GPRS / 3G modem
- 1 SIM card
- One 24 VDC power supply
- 1 power protection device
- 1 GSM antenna
- Rail mounting
- Enclosed casing to protect the equipment during transport
- Packing box for cable routing (bus, power supply, Ethernet)

Compatibility

Up to three machines per CIATM2M kit



AVAILABLE OPTIONS

Options	Description	Advantages	LD	ILD
Corrosion protection, traditional coils	Fins made of pre-treated aluminium (polyurethane and epoxy)	Improved corrosion resistance, recommended for moderate marine and urban environments	NO	•
Medium-temperature brine solution	Low temperature chilled water production down to 0°C with ethylene glycol and propylene glycol.	Covers specific applications such as ice storage and industrial processes	•	•
Low-temperature brine solution	Low temperature chilled water production down to -15°C with ethylene glycol and -12°C with propylene glycol.	Covers specific applications such as ice storage and industrial processes	•	•
XtraFan	Unit equipped with specifics variable-speed fans : XtraFans (See specific chapter for maximum available static pressure according to size), each fan equipped with a connection flange & sleeves allowing the connection to the ducting system.	Ducted fan discharge, optimised temperature control, based on the operating conditions and system characteristics	•	•
Xtra Low Noise	Acoustic compressor enclosure and low-speed fans	Noise emission reduction at reduced fan speed	•	•
Protection grilles	Metallic protection grilles	Coil protection against possible impact	•	•
Soft Starter	Electronic starter on each compressor	Reduces start-up current	•	•
All year round cooling operation down to -20°C	Fanspeed control via frequency converter	Stable unit operation when the outdoor air temperature is between 0°C and -20°C	•	•
Hydronic module frost protection	Electric heater on the hydraulic module	Hydraulic module frost protection at low outside temperatures down to -20°C	•	•
Exchanger & hydraulic module frost protection	Electric heater on the water exchanger hydraulic module and optional expansion vessel & water buffer tank	Water exchanger and hydraulic module frost protection between 0°C and -20°C outside air temperature	• with buffer tank option	• with buffer tank option
Partial heat recovery	Unit equipped with one desuperheater on each refrigerant circuit.	Production of free high-temperature hot-water simultaneously with chilled water production (or hot water for Heat pump)	•	•
Master/slave operation	Unit equipped with supplementary water outlet temperature sensor kit to be field-installed allowing master/slave operation of two units connected in parallel	Optimised operation of two units connected in parallel operation with operating time equalisation	•	•
HP single-pump hydraulic module	Evaporator hydraulic module equipped with high-pressure fixed-speed pump, drain valve, air vent and pressure sensors. For more details, refer to the dedicated chapter (expansion vessel not included). Option with built-in safety hydraulic components available.)	Quick and easy installation (plug & play)	• (Low-temperature brine solution only)	•
HP dual-pump hydraulic module	Dual high-pressure water pump, water filter, electronic water flow control, pressure sensors. For more details, refer to the dedicated chapter (expansion vessel not included; option with built-in safety hydraulic components available)	Quick and easy installation (plug & play)	• (Low-temperature brine solution only)	•
HP evap. variable-speed single-pump	Single high-pressure water pump with variable speed drive (VSD), water filter, electronic water flow control, pressure transducers. Multiple possibilities of water flow control. For more details, refer to the dedicated chapter (expansion vessel not included; option with built-in hydraulic safety components available)	Quick and easy installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved system reliability	•	•
HP variable-speed dual pump.	Dual high-pressure water pump with variable speed drive (VSD), pressure transducers. Multiple possibilities of water flow control. For more details, refer to the dedicated chapter (expansion vessel not included; option with built-in hydraulic safety components available)	Quick and easy installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved system reliability	•	•
Lon gateway	Bi-directional communication board complying with Lon Talk protocol	Connects the unit by communication bus to a building management system	•	•

• ALL MODELS
(*) Standard equipment on ILD version
Refer to the selection tool to find out which options are not compatible.

Options	Description	Advantages	LD	ILD
Bacnet over IP	Two-directional high-speed communication using BACnet protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a BMS. Allows access to multiple unit parameters	•	•
External boiler management	Control board factory-installed on the unit to control a boiler	Extended remote control capabilities to a boiler on/off command. Facilitates control of a basic heating system	NO	•
Management of electric heaters	Control board factory-installed on the unit with additional inputs/ outputs in order to manage up to 4 external heating stages (electric heaters, etc.)	Expands the remote control capacities to include a maximum of four electric heaters. Facilitates control of a basic heating system	NO	•
Compliance with Russian regulations	EAC certification	Compliance with Russian regulations	•	•
LP single-pump hydraulic module	Single low-pressure water pump, water filter, electronic water flow control, pressure sensors. For more details, refer to the dedicated chapter (expansion vessel not included; option with built-in hydraulic safety components available)	Quick and easy installation (plug & play)	NO	•
LP dual-pump hydraulic module	Dual low-pressure water pump, water filter, electronic water flow control, pressure transducers. For more details, refer to the dedicated chapter (expansion vessel not included; option with built-in hydraulic safety components available)	Quick and easy installation (plug & play)	NO	•
Protect2 anti-corrosion protection	Coating which uses a conversion process to alter the aluminium surface into a coating which forms an integral part of the coil. Complete immersion in a bath to ensure 100% coverage. No heat transfer variation, salt spray resistance test for 4000 hours (ASTM B117)	Protect2 Improved corrosion resistance of the MCHE coils by 2, recommended for use in moderately corrosive environments	•	NO
MCHE anti-corosion protection Protect4	Extremely durable and flexible epoxy polymer coating applied on micro channel coils by electro coating process, final UV protective topcoat. Minimal heat transfer variation, tested 6000 hours constant neutral salt spray per ASTM B117, superior impact resistance per ASTM D2794	Protect4 Improved corrosion resistance of the MCHE coils by 4, recommended for use in corrosive environments	•	NO
Evaporator screw connection sleeves (kit)	Evaporator inlet/outlet screw connection sleeves	Allows unit connection to a screw connector	•	•
Reinforced ECM filtration for fan VFD	Fan variable frequency drive compliance to IEC 61800-3 C1 class	Allows unit installation in domestic residential environment by reducing electromagnetic interferences	• with variable speed fans	• with variable speed fans
Reinforced ECM filtration for pump VFD	Pump variable frequency drive compliance to IEC 61800-3 C1 class	Allows unit installation in domestic residential environment by reducing electromagnetic interferences	• With variable speed pump	• With variable speed pump
Expansion vessel	6 bar expansion vessel integrated in the hydraulic module (requires hydraulic module option)	Easy and fast installation (plug & play), & protection of closed water systems from excessive pressure	• with pump option	• with pump option
M2M supervision (accessory)	Monitoring solution which allows customers to track and monitor their equipment remotely in real time	Real-time expert technical support to improve equipment availability and reports at customer hand to monitor and optimize operating equipment.	•	•
Water buffer tank module	Integrate water buffer tank	Avoid short cycle on compressors and ensure a stable water in the loop	•	•
Water buffer tank module with extra heater	Integrates a water buffer tank module with a 16/31/45 kW extra heater	The tank avoids short cycles on the compressors and ensures the water in the loop is stable. The extra heater provides additional or backup heating in heating mode.	NO	150-300
Anti-vibration mounts	Elastomer anti-vibration mounts to be placed under the unit (material classified B2 fire class according to DIN 4102).	Isolate the unit from the building, avoid transmission of vibration and associate noise to the building. Must be associated with a flexible connection on water side	•	•
Exchangers flexibles connection (kit)	Flexible connections on the exchanger water side	Easy to install. Limits the transmission of vibrations to the water network	•	•
Exchangers water filter (kit)	Water filter	Eliminate dust in the water network	• without pump option	• without pump option
Setpoint adjustable by 4-20 mA signal	Connections to allow a 4-20 mA signal input	Simplified energy management, enabling the setpoint to be set by a 4-20 mA external signal	•	•
Free cooling drycooler management	Control and connections of an Opera or Vextra free cooling drycooler equipped with the FC control box option	Easy system management, control capabilities extended to a drycooler used in free cooling mode	•	NO

• ALL MODELS
Refer to the selection tool to find out which options are not compatible.

AVAILABLE OPTIONS

Options	Description	Advantages	LD	ILD
Evap. single pump power/ control circuit	Unit equipped with an electrical power and control circuit for one pump evaporator side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	• (Low-temperature brine solution and HP pump only)	•
Evap. dual pumps power/ control circuit	Unit equipped with an electrical power and control circuit for two pumps evaporator side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	• (Low-temperature brine solution and HP pump only)	•
Variable speed single pump power/control circuit	Unit equipped with an electrical power and control circuit for variable speed single pump	Quick and easy installation: the control of variable-speed pumps is built into the control unit	•	NO
Variable speed dual-pump power/control circuit	Unit equipped with an electrical power and control circuit for variable speed dual pump	Quick and easy installation: the control of variable-speed pumps is built into the control unit	•	NO
Desuperheater flexible connection (kit)	Flexible connections on the desuperheater water side	Easy to install. Limits the transmission of vibrations to the water network	•	•

• ALL MODELS
Refer to the selection tool to find out which options are not compatible.

SEASONAL PERFORMANCE, COOLING MODE

Most central air conditioning systems installed in the tertiary sector in Europe use water chillers to provide refrigeration.

Analyses of installed systems show that the heat load varies from season to season and that a water chiller operates at reduced capacity for the majority of the time.

The efficiency under partial load is therefore essential when choosing a water chiller. It is with this in mind that the new AQUACIAT range was designed. In particular, the entire range uses R410A refrigerant which, thanks to its thermodynamic performance, makes it possible to obtain much higher seasonal efficiency ratings.

The (**S**easonal **E**nergy **E**fficiency **R**atio) (**SEER**) measures the seasonal energy efficiency of liquid chillers **for comfort applications** by calculating the ratio between the annual cooling demand of the building and the chiller's annual energy demand. It takes into account the energy efficiency for each outdoor temperature weighted by the number of hours observed for each of these temperatures, using actual climate data. The **SEER** is a new way of measuring the energy efficiency of liquid chillers for **comfort applications** over an entire year. The new indicator provides a more realistic overview of the cooling system's energy efficiency and its actual impact on the environment. (Ecodesign regulation 2016/2281).

As the compressors are connected in parallel on the refrigerating circuit, the AQUACIAT easily and efficiently adjusts the cooling capacity to the system's needs. The self-adjusting Connect Touch control anticipates variations in load and starts only the number of compressors needed. This ensures optimum operation of the compressors and guarantees energy efficiency for the majority of the system's life.

As an option, the AQUACIAT can be equipped with variable speed fan motors. This technology enables the machine's part-load performance to be improved, along with its seasonal performance (SEER and SEPR).

The **S**easonal **E**nergy **P**erformance **R**atio (**SEPR**) measures the seasonal energy efficiency of liquid chillers for process applications by calculating the ratio between the annual process cooling demand and the chiller's annual energy demand. It takes into account the energy efficiency at each outdoor temperature for the average European climate weighted by the number of hours observed for each of these temperatures.

The **SEPR** is a new way of measuring the energy efficiency of liquid chillers for **process applications** over an entire year. The new indicator provides a more realistic overview of the cooling system's energy efficiency and its actual impact on the environment (Ecodesign regulation 2015/1095).

SEASONAL PERFORMANCE, HEATING MODE

The European "Ecodesign" directive takes into account the product's environmental impact throughout its life cycle. It defines the mandatory energy efficiency requirements for water chillers and heat pumps.

Products that do not meet the energy efficiency requirements set by the new directive will gradually be phased out of the market, forcing manufacturers to develop and offer more efficient products.

Like the SEER relating to water chillers, the new seasonal coefficient of performance (SCOP) resulting from this new European directive is used to evaluate the energy efficiency of heat pumps. Until now, only the COP has been used to measure energy efficiency in heating mode.

The COP was exclusively calculated using a single measuring point, and only took into account operation at full load, which did not represent the efficiency of the heat pump over an entire heating season.

The purpose of the SCOP is to characterise the seasonal efficiency of the heat pump by taking into account the full-load and part-load performances established for several outdoor temperature values. The SCOP is the ratio between the building's annual heating demand and the annual electricity consumption of the heating system. It is measured in accordance with the EN14825 standard based on an average reference climate that takes into account several reference temperatures between -10°C and +16°C

■ Primary energy evaluation

In order to compare the energy efficiency of products using different energy sources, the Ecodesign directive introduced a new seasonal energy efficiency calculation known as Ƞs (Greek letter eta followed by the letter "s" for seasonal) and expressed as a percentage. For heat pumps, the SCOP (final energy) value is transposed to Ƞs (primary energy) by taking into account a conversion coefficient of 2.5 which corresponds to the average efficiency of the electrical production and various corrections for the responsiveness of the regulation system (i = 3 for air-to-water heat pumps).

$$\eta s\ (\%) = \frac{(SCOP(kW/kW)\times 100)}{2{,}5} - \sum i \text{ corrections}$$

The minimum seasonal efficiency requirements to be met by low temperature heat pumps, set by the standard, are as follows:

ηs = 125%, which is a minimum SCOP of 3.20 valid from September 2017.

AQUACIAT ILD complies with the Ecodesign regulation 813/2013.

HYDRAULIC MODULE

The "ALL-IN-ONE" solution

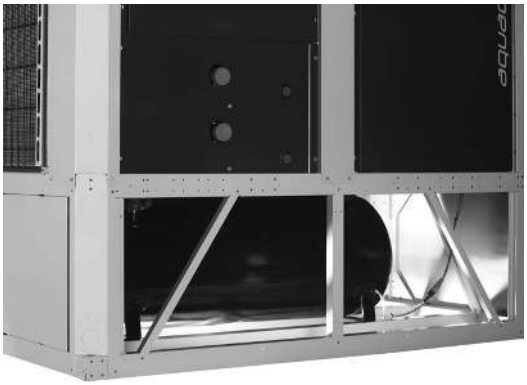
The PLUG & COOL solution offered by AQUACIAT

The hydraulic module contains all the water circuit components needed for the system to operate correctly:

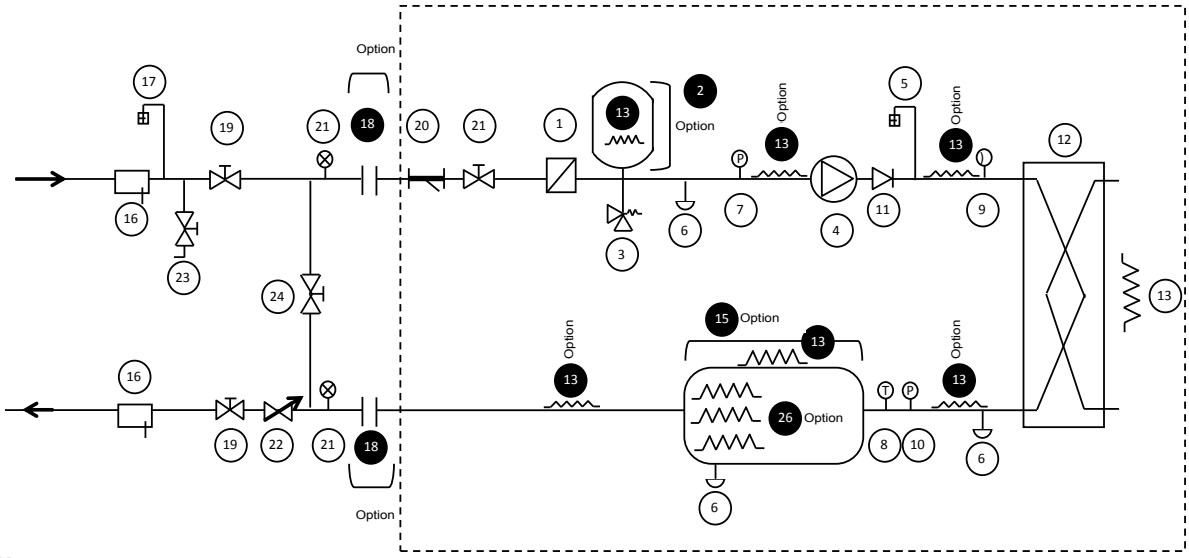
- Buffer tank with 19-mm insulation, 250-litre capacity (option).
- Expansion vessel (option):
  - 12 litres, 18 litres or 35 litres, depending on the model (see table of technical characteristics)
- Wide choice of pumps:
  - Single or dual pumps with operating time balancing and backup.
  - Low-pressure pumps (ILD only).
  - High-pressure pumps.
  - Fixed-speed or variable-speed pumps.
- Water temperature and pressure sensors.
- Water filter
- Relief valve
- Drain circuit
- Air bleed valve
- Antifreeze protection (optional)

The components in the hydraulic system are carefully selected and factory assembled and tested to make the installation of the units simple and economical.

This ensures conditioning times, implementation times and space requirements are kept to a minimum.



AQUACIAT hydraulic module diagram



Key

Components of the unit and hydraulic module

1 Screen filter (particle size of 1.2 mm)
2 Expansion vessel
3 Relief valve
4 Circulating pump (single or dual)
5 Air vent
6 Water drain tap
7 Pressure sensor

Notes:

- Provides information on the pump inlet pressure 8 Temperature sensor
- Provides information on the water type heat exchanger outlet temperature 9 Temperature sensor
- Provides information on the water type heat exchanger inlet temperature 10 Pressure sensor
- Provides information on the water type heat exchanger outlet pressure 11 Check valve (for dual pumps)

12 Plate heat exchanger
13 Heater or heat trace cable for frost protection
14 Water type heat exchanger flow rate sensor
15 Water buffer tank module

● Option

Installation components

16 Pocket
17 Air vent
18 Flexible connection
19 Shut-off valve
20 800 µm screen filter (Option - mandatory in the case of a unit without hydraulic module/included on version with hydraulic module)
21 Pressure gauge
22 Water flow control valve

Note: not required if hydraulic module with variable speed pump

23 Charging valve
24 Bypass valve for frost protection (if shut-off valves (item 19) are closed during winter)

---- Hydraulic module (unit with hydraulic module option)

26 Extra heaters in tank (option). The option includes a vent on the tank + a WTOT temperature sensor at the tank outlet.

Notes:

- The system must be protected against freezing.
- The unit's hydraulic module and the water heat exchanger may be protected (factory-fitted option) against freezing using electric heaters and heat trace cables (13)
- The pressure sensors are fitted on connections without Schraeder. Depressurise and drain the system before any work.

VARIABLE FLOW PUMP

Description

The AQUACIAT may be equipped with one or two variable-speed pumps which save you energy by adjusting the electrical consumption of one pump to the actual requirements of a hydraulic system, in particular for oversized installations.

Simple to use

The "variable-speed pump" is fully integrated on the machine, with full protection, and, as it is installed outdoors, there is no need for any work in the machine room.

The assembly is factory-fitted and pre-set on the unit; it is therefore quick to install and reduces the cost of work, in particular because there is no water flow control valve on the unit's outlet.

The ability to adjust the water flow to your requirements means that the pump pressure can be adapted precisely to the actual pressure drop on the system when it is started up on-site.

Operating principle

- Full load operating

  A regulator, with a direct display of the flow rate and pressure on the Connect Touch screen, enables one pump (pump A in the example below) to be adapted, by lowering its pressure P1 to the requirements of system P2, to obtain the optimal water flow rate setpoint. Electricity bills relating to the pump's consumption are reduced proportionately; this means you will see a return on investment (ROI) in only a few years, compared with the same fixed speed pump equipped with a simple flow control valve.

- Operating at partial load

  There are three operating modes for part load:

  - **Fixed speed**

    The control ensures the pump continuously runs at a constant speed, based on the capacity of the compressor(s). When the compressors are powered off, the Connect Touch "standby" function manages the electrical power consumed by the pump by reducing its speed to the minimum.

    This provides energy savings of around 33%

  - **Variable flow rate: Constant regulation of the pressure difference**

    The control continuously acts on the pump speed to ensure a constant pressure difference. This solution is suitable for installations with two-way valves. This control mode is used to ensure a uniform supply in each hydraulic circuit to make sure that each terminal unit operates at a satisfactory pressure

  - **Variable flow rate: Constant regulation of the temperature difference**

    The regulation maintains a constant temperature difference whatever the load rate of the unit by reducing the flow rate to the minimum acceptable limit. This control mode is suitable for most comfort applications.

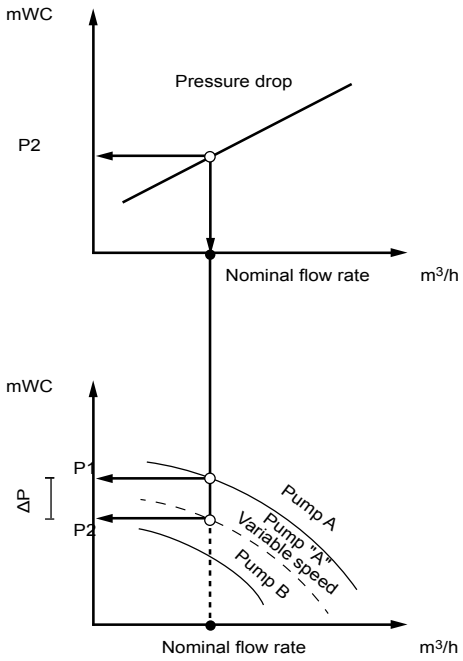
    This provides energy savings of around 66% for the pump in each of these last two operating modes

SOFT START

A SOFT START function prevents any current peaks when the pump is started up to protect the electrical system, thereby limiting the building's electricity use at peak times and preventing any hammering in the pipework.

STANDBY function

Lowering the speed when the compressors are on standby reduces the water flow rate to ensure the water loop is perfectly homogenised and the control temperature sensors are well irrigated. This reduces the pump's electricity consumption by around 80% during standby periods, which represents a significant proportion of the machine's normal operating time, in particular for air conditioning applications.



16, 31, 45 kW EXTRA HEATER MODULE (ILD 150 TO 300)

General description

On sizes 150 to 300, the CIAT extra heater module is a simple and economic way of providing safe additional heating on a water loop in heating mode, particularly in heat pump mode when outdoor temperatures are very low.

This additional heating is especially designed for heating by heat pump, for the hotel and collective housing sectors, for example, or for some tertiary sector applications.

Specially designed for reversible AquaCiat ILD 150 to 300 versions, the extra heater module is available as a fully-fitted, factory-tested option.

It is built into the casing of the reversible unit, for which it also provides the power input from a single power terminal strip, whilst ensuring aesthetic unity on-site.

It is fully managed by the heat pump when operating in HEATING mode.

Technical characteristics

Electrical data

Rated electrical power	16 kW	31 kW	45 kW
kW power stages	8+8	8+8+15	15+15+15
Power supply	3-ph 50Hz 400V + Earth		
MAX rated current *	23.2 A	44.9 A	65.1 A
Control circuit voltage	1-ph~50 Hz 24 V + Earth		
Number of stages possible	2	3	3
MAX temperature setpoint	+60°C		
MAX service pressure	4 bar		

***Warning**: The current shown in the table above is to be added to the maximum nominal current of the ILD-extra heater module. This value is essential for calculating the sizing of the power supply cable for the assembly.

Composition of the extra heater module

Factory fitted with self-regulating frost protection, the extra heater module is supplied within a single-unit housing similar to that of the reversible unit, which allows it to be installed and used outside during adverse weather conditions.

Depending on the user's requirements, it is available with 3 electrical power ratings: 16 kW, 31 kW or 45 kW.

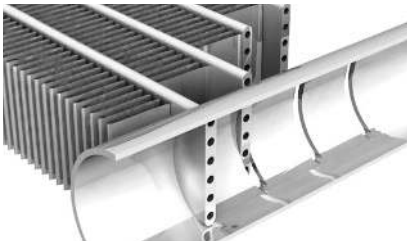
Equipment supplied as standard:

- Safety switch, connection strip
- Switches, thermal-magnetic circuit breakers
- Electric heater(s)
- Safety valve, automatic bleed device
- Electric frost protection with thermostat
- painted casing for outdoor installation
- Water pipe thermal insulation

Environmental responsibility

The AQUACIAT contributes to sustainable development via an environmentally responsible approach, aimed at balancing ecological and economic concerns. This enables it to meet the requirements of future European thermal regulations and to protect our environment for future generations.

The highly efficient performance it offers enables energy consumption to be greatly reduced, thereby reducing the unit's carbon footprint throughout its service life.



This performance is the result of the high quality components used, which have all been rigorously selected:

- Latest-generation Scroll compressors
- Highly efficient R410A refrigerant, which has a low environmental impact: zero ODP (Ozone Depletion Potential), low GWP (Global Warming Potential)
- MCHE micro-channel type coils for the cooling only version:
  - Energy efficiency increased by 10% compared to a conventional coil
  - 40% reduction in the refrigerant charge.
  - Reduction in the unit weight, reducing the environmental impact during transportation
  - Simplified end-of-life recycling thanks to the all-aluminium construction
- Asymmetrical brazed plate heat exchangers (BPHE)
  - Reduction in the refrigerant charge compared with a tubular heat exchanger solution
  - The asymmetrical technology enables a reduction in pressure drops on the water side, and an associated drop in electricity consumption.

AQUACIAT		150	180	200	240	260	300	360	390	450	520	600
Refrigerant load	kg	4,7	5,3	5,9	6,7	6,2	7,3	10,7	10,8	11,4	13	14,8
Environmental impact	tCO_2eq	9,8	11,1	12,3	14	12,9	15,2	22,3	22,6	23,8	27,2	31

Only 20% of a unit's impact on the ozone layer comes from the refrigerant (direct effect), with 80% coming from the CO_2 released into the atmosphere when the electricity required to power the unit is produced (indirect effect). With AQUACIAT, it's a win-win situation: its low refrigerant charge minimises the risk of emissions, and its low energy consumption limits its indirect impact.

The choice of technology used in the AQUACIAT range means that the TEWI, which covers the unit's environmental impact (both direct and indirect) throughout its service life, is greatly reduced.

Integration into the most demanding environments

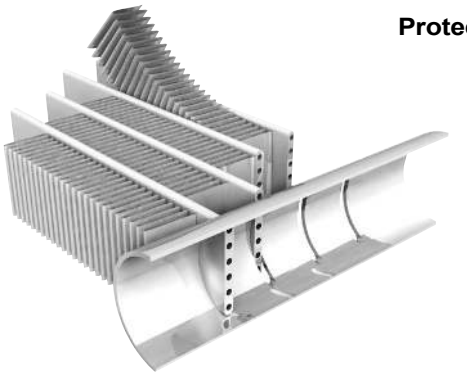
The AQUACIAT has standard or optional equipment which enables it to be integrated into any one of a diverse range of environments.

In the micro-channel (MCHE) coil, the rate of corrosion is less than in a conventional coil with copper tube and aluminium fins. Indeed, its all-aluminium design limits the galvanic couples in the coil, thereby providing increased corrosion resistance

- The Protect2 anti-corrosion post-treatment option doubles its resistance to corrosion. This treatment is applied by immersing the coil, ensuring complete protection as the aluminium surface undergoes a chemical change.

  This treatment is recommended for moderately corrosive environments

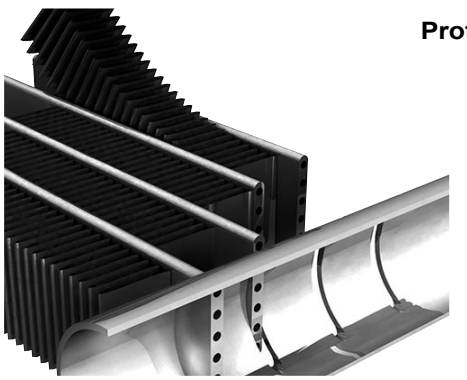
Protect2



- The Protect4 anti-corrosion post-treatment option provides a fourfold increase in resistance to corrosion. An e-coating process is used to electro-coat the coil in polymer epoxy, and then a top layer of anti-UV protection is applied.

  This treatment is recommended for highly corrosive industrial and marine environments

Protect4



TECHNICAL CHARACTERISTICS - COOLING ONLY

AQUACIAT LD				150	180	200	240	260	300	360	390	450	520	600
Cooling														
Standard unit Full load performances*	CA1	Nominal capacity	kW	39,6	44	51,2	58,1	67,2	78,9	86,7	97,1	114	135	156
		EER	kW/kW	2,87	2,76	2,67	2,66	2,72	2,70	2,73	2,73	2,67	2,70	2,65
		Eurovent class		C	C	D	D	C	C	C	C	D	C	D
	CA2	Nominal capacity	kW	53,0	58,9	68,5	80,9	84,7	98,3	114	126	151	171	194
		EER	kW/kW	3,44	3,32	3,12	3,31	2,97	3,06	3,18	3,09	3,10	2,99	3,01
Standard unit Seasonal energy efficiency**		**SEER $_{12/7°C}$ Comfort low temp.**	**kWh/kWh**	**3,86**	**3,97**	**4,03**	**3,92**	**3,79**	**3,85**	**4,16**	**4,16**	**4,07**	**3,93**	**4,17**
		ηs cool $_{12/7°C}$	**%**	**152**	**156**	**158**	**154**	**149**	**151**	**164**	**163**	**160**	**154**	**164**
		SEPR $_{12/7°C}$ Process high temp.	**kWh/kWh**	**5,27**	**5,31**	**5,26**	**5,09**	**4,92**	**5,16**	**4,95**	**5,12**	**5,51**	**4,90**	**5,32**
Unit with low-temperature brine solution option Seasonal energy efficiency**		**SEPR $_{-2/-8°C}$ Process medium temp.**	**kWh/kWh**	**2,88**	**3,21**	**2,91**	**3,09**	**3,04**	**2,75**	**2,97**	**3,12**	**3,10**	**3,07**	**3,02**
Part Load integrated values		IPLV.SI	kW/kW	4,510	4,680	4,780	4,560	4,250	4,380	5,540	4,530	4,530	4,280	4,620
Sound levels														
Standard unit														
Sound power(1)			dB(A)	80	81	81	81	87	87	84	84	84	90	90
Sound pressure at 10 m(2)			dB(A)	49	49	49	49	55	55	52	52	52	58	58
Unit + Xtra Low Noise option														
Sound power(1)			dB(A)	79	80	80	80	80	80	83	83	83	83	83
Sound pressure at 10 m(2)			dB(A)	48	48	48	48	48	48	51	51	51	51	51
Dimensions														
Length			mm	1090	1090	1090	1090	1090	1090	2270	2270	2270	2270	2270
Width			mm	2109	2109	2109	2109	2109	2109	2123	2123	2123	2123	2123
Height			mm	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330
Height with Buffer Tank Module			mm	1930	1930	1930	1930	1930	1930	1930	1930	1930	1930	1930
Operating weight with micro-channel coils(3)														
Standard unit			kg	422	430	436	449	445	463	753	762	771	829	854
Unit + High pressure single pump option			kg	463	472	478	491	487	505	820	829	842	903	928
Unit + High pressure dual pump option			kg	489	498	504	517	513	531	865	874	891	940	965
Unit + high pressure single pump + Water buffer tank module option			kg	859	868	874	887	883	901	1253	1262	1275	1336	1361
Unit + high pressure dual-pump + Water buffer tank module option			kg	885	894	900	913	909	927	1298	1307	1324	1373	1398
Compressors				Hermetic Scroll 48.3 r/s										
Circuit A			Qty	2	2	2	2	2	2	3	3	3	2	2
Circuit B			Qty	-	-	-	-	-	-	-	-	-	2	2
No. of power stages			Qty	2	2	2	2	2	2	3	3	3	4	4
Refrigerant with micro-channel coils(3)			R410A											
Circuit A			kg	4,7	5,3	5,9	6,7	6,2	7,3	10,7	10,8	11,4	6,5	7,4
			tCO_2e	9,8	11,1	12,3	14,0	12,9	15,2	22,3	22,6	23,8	13,6	15,5
Circuit B			kg	-	-	-	-	-	-	-	-	-	6,5	7,4
			tCO_2e	-	-	-	-	-	-	-	-	-	13,6	15,5

* In accordance with standard EN14511-3:2013.

** In accordance with standard EN14825:2016, average climate

CA1 Cooling mode conditions: evaporator water inlet/outlet temperature 12 °C/7 °C, outdoor air temperature 35 °C, evaporator fouling factor 0 m^2. k/W

CA2 Cooling mode conditions: evaporator water inlet/outlet temperature 23 °C/18 °C, outdoor air temperature 35 °C, evaporator fouling factor 0 m^2. k/W

ηs cool $_{12/7°C}$ & SEER $_{12/7°C}$ **Values in bold comply with Ecodesign Regulation (EU) No. 2016/2281 for Comfort application**

SEPR $_{12/7°C}$ **Values in bold comply with Ecodesign Regulation (EU) No. 2016/2281 for Process application**

SEPR $_{-2/-8°C}$ **Values in bold comply with Ecodesign Regulation (EU) No. 2015/1095 for Process application**

IPLV.SI Calculated as per AHRI standard 551-591 (SI).

\- Not applicable

(1) in dB ref=10^{-12} W, 'A' weighted. Declared dual-number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3 dB(A)). Measured in accordance with ISO 9614-1.

(2) In dB ref 20 µPa, 'A' weighted. Declared dual-number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3 dB(A)). For information, calculated from the sound power level Lw(A).

(3) Values are guidelines only. Refer to the unit name plate.

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

Eurovent certified values

TECHNICAL CHARACTERISTICS - COOLING ONLY

AQUACIAT LD		150	180	200	240	260	300	360	390	450	520	600
Oil charge		POE SZ160 (EMKARATE RL 32-3MAF).										
Circuit A	l	5,8	7,2	7,2	7,2	7	7	10,8	10,5	10,5	7	7
Circuit B	l	-	-	-	-	-	-	-	-	-	7	7
Control system		Connect Touch Control										
Minimum capacity	%	50	50	50	50	50	50	33	33	33	25	25
Air heat exchanger		All-aluminium micro-channel coil										
Fans - Standard unit												
Quantity		1	1	1	1	1	1	2	2	2	2	2
Maximum total air flow	l/s	4111	4111	4111	4167	5500	5583	8056	8056	8222	11000	11167
Maximum rotation speed	r/s	12	12	12	12	16	16	12	12	12	16	16
Water heat exchanger		Direct expansion, plate heat exchanger										
Water volume	l	2,6	3	3,3	4	4,8	5,6	8,7	9,9	11,3	12,4	14,7
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Hydraulic module (option)												
Single or dual pump (as selected)		Pump, victaulic screen filter, relief valve, vent valves (water and air), pressure sensors										
Expansion vessel volume (option)	l	12	12	12	12	12	12	35	35	35	35	35
Expansion vessel pressure(4)	bar	1	1	1	1	1	1	1,5	1,5	1,5	1,5	1,5
Max. water-side operating pressure with hydraulic module	kPa	400	400	400	400	400	400	400	400	400	400	400
Water buffer tank module (option)												
Single or dual pump (as selected)		Pump, victaulic screen filter, relief valve, vent valves (water and air), pressure sensors										
Water volume	l	250	250	250	250	250	250	250	250	250	250	250
Expansion vessel volume (option)	l	18	18	18	18	18	18	35	35	35	35	35
Expansion vessel pressure(4)	bar	1	1	1	1	1	1	1,5	1,5	1,5	1,5	1,5
Max. water-side operating pressure with hydraulic module	kPa	400	400	400	400	400	400	400	400	400	400	400
Water connections with or without hydraulic module		Victaulic										
Connections	inch	2	2	2	2	2	2	2	2	2	2	2
External diameter	mm	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3
Casing paint		Colour code RAL 7035 and RAL 7024										

(4) Upon delivery, the standard preinflation of the vessels is not necessarily at the optimum value for the installation. In order to enable free variation of the water volume, adjust the inflation pressure to a pressure close to that corresponding to the static head of the installation. Fill the installation with water (bleeding out any air) at a pressure 10 to 20 kPa higher than that of the vessel.

TECHNICAL CHARACTERISTICS - REVERSIBLE HEAT PUMP

AQUACIAT ILD				150	180	200	240	260	300	302	360	390	450	520	600
Heating															
Standard unit Full load performances*	HA1	Nominal capacity	kW	42·3	46,4	53,2	61,2	68,0	77,6	81,7	92,2	100	116	135	155
		COP	kW/kW	3,69	3,69	3,76	3,72	3,64	3,46	3,78	3,80	3,76	3,68	3,61	3,47
	HA2	Nominal capacity	kW	41,5	46,3	51,7	59,3	65,9	75,0	78,9	89,5	97,4	112	130	150
		COP	kW/kW	3,05	3,02	3,01	3,01	2,98	2,85	3,11	3,05	3,06	3,00	2,94	2,86
Standard unit Seasonal energy efficiency**	HA1	**$SCOP_{30/35°C}$**	**kW/kW**	**3,32**	**3,39**	**3,53**	**3,40**	**3,40**	**3,28**	**3,51**	**3,50**	**3,57**	**3,54**	**3,44**	**3,42**
		$\eta s\ heat_{30/35°C}$	**%**	**130**	**133**	**138**	**133**	**133**	**128**	**137**	**137**	**140**	**139**	**135**	**134**
		P_{rated}	kW	35,5	31,6	36,3	43,8	50,1	55,7	56,8	81,5	72,3	84,2	99,4	111
		Energy labelling		A+	A+	A+	A+	A+	A+	A+	-	-	-	-	-
Cooling															
Standard unit Full load performances*	CA1	Nominal capacity	kW	37,7	43,1	49,4	58,0	63,1	70,2	77,0	84,9	95,1	112,4	130,5	148,2
		EER	kW/kW	2,80	2,66	2,61	2,72	2,66	2,43	2,75	2,66	2,66	2,65	2,73	2,54
		Eurovent class		C	D	D	C	D	E	C	D	D	D	C	D
	CA2	Nominal capacity	kW	47,1	53,9	62,7	70,7	78,2	88,5	96,5	106,9	116,6	141,9	161,6	185,2
		EER	kW/kW	3,23	3,11	3,04	3,08	3,04	2,81	3,14	3,09	3,05	3,05	3,12	2,88
Standard unit Seasonal energy efficiency**		SEER $_{12/7°C}$ Comfort low temp.	kWh/kWh	3,64	3,67	3,70	3,53	3,49	3,37	3,83	3,70	3,76	4,00	3,65	3,62
		SEPR $_{12/7°C}$ Process high temp.	kWh/kWh	4,92	4,95	4,74	4,53	4,44	4,72	5,16	4,67	4,62	5,15	4,59	4,95
Unit with low-temperature brine solution option Seasonal energy efficiency**		SEPR $_{-2/-8°C}$ Process medium temp.	kWh/kWh	2,58	2,58	2,61	2,96	2,98	2,86	2,70	2,86	3,04	2,94	2,80	2,68
Part Load integrated values		IPLV.SI	kW/kW	4,464	4,447	4,409	4,127	4,102	4,033	4,475	4,314	4,378	4,795	4,246	4,295
Sound levels															
Standard unit															
Sound power(1)			dB(A)	80	81	81	86	87	87	84	84	84	84	90	90
Sound pressure at 10 m(2)			dB(A)	49	49	49	55	55	55	52	52	52	52	58	58
Unit + Xtra Low Noise option															
Sound power(1)			dB(A)	79	80	80	80	80	80	83	83	83	83	83	83
Sound pressure at 10 m(2)			dB(A)	48	48	48	48	48	48	51	51	51	51	51	51
Dimensions															
Length			mm	1090	1090	1090	1090	1090	1090	2270	2270	2270	2270	2270	2270
Width			mm	2109	2109	2109	2109	2109	2109	2123	2123	2123	2123	2123	2123
Height			mm	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330	1330
Height with Buffer Tank Module			mm	1930	1930	1930	1930	1930	1930	1930	1930	1930	1930	1930	1930
Operating weight(3)															
Standard unit			kg	497	506	543	549	559	564	777	896	905	979	1053	1057
Unit + High pressure single pump option			kg	539	548	585	591	601	606	844	963	972	1050	1127	1131
Unit + High pressure dual pump option			kg	565	574	611	617	627	632	889	1008	1017	1098	1164	1168
Unit + high pressure single pump + Water buffer tank module option			kg	935	943	981	986	996	1001	1276	1395	1404	1482	1560	1563
Unit + high pressure dual-pump + Water buffer tank module option			kg	961	969	1006	1012	1022	1027	1321	1440	1449	1531	1597	1600

* In accordance with standard EN14511-3:2013.

** In accordance with standard EN14825:2016, average climate conditions.

HA1 Conditions in heating mode: water type heat exchanger water outlet/inlet temperature 30 °C/35 °C, outside air temperature tdb/twb = 7 °C db/6 °C wb, evaporator fouling factor 0 m^2. k/W

HA2 Conditions in heating mode: water type heat exchanger water outlet/inlet temperature 40 °C/45 °C, outside air temperature tdb/twb = 7 °C db/6 °C wb, evaporator fouling factor 0 m^2. k/W

CA1 Cooling mode conditions: evaporator water inlet/outlet temperature 12 °C/7 °C, outdoor air temperature 35 °C, evaporator fouling factor 0 m^2. k/W

CA2 Cooling mode conditions: evaporator water inlet/outlet temperature 23 °C/18 °C, outdoor air temperature 35 °C, evaporator fouling factor 0 m^2. k/W

$\eta s\ heat_{30/35°C}$ & $SCOP_{30/35°C}$ Values in bold comply with Ecodesign Regulation (EU) No. 813/2013 for heating application

SEER $_{12/7°C}$ & SEPR $_{12/7°C}$ Values calculated according to EN14825:2016

SEPR $_{-2/-8°C}$ Values calculated according to EN14825:2016

IPLV.SI Calculated as per AHRI standard 551-591 (SI).

(1) in dB ref=10^{-12} W, 'A' weighted. Declared dual-number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1 and certified by EUROVENT

(2) In dB ref 20 µPa, 'A' weighted. Declared dual-number noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Value calculated from the sound power level Lw(A).

(3) Weights given as a guide. Refer to the unit name plate.

EUROVENT CERTIFIED PERFORMANCE www.eurovent-certification.com

Eurovent certified values

TECHNICAL CHARACTERISTICS - REVERSIBLE HEAT PUMP

AQUACIAT ILD		150	180	200	240	260	300	302	360	390	450	520	600
Operating weight(3)													
Unit + high pressure single pump option + Water buffer tank module with extra heaters (16 kW)	kg	1018	1026	1064	1069	1079	1084						
Unit + high pressure dual pump option + Water buffer tank module with extra heaters (16 kW)	kg	1044	1052	1089	1095	1105	1110						
Unit + high pressure single pump option + Water buffer tank module with extra heaters (31 kW and 45 kW)	kg	1022	1030	1068	1073	1083	1088						
Unit + high pressure dual pump option + Water buffer tank module with extra heaters (31 kW and 45 kW)	kg	1048	1056	1093	1099	1109	1114						
Compressors		Hermetic Scroll 48.3 r/s											
Circuit A	Qty	2	2	2	2	2	2	2	3	3	3	2	2
Circuit B	Qty	-	-	-	-	-	-	-	-	-	-	2	2
No. of power stages	Qty	2	2	2	2	2	2	2	3	3	3	4	4
Refrigerant (3)		R-410A											
Circuit A	kg	12.5	13,5	16,5	17,5	18	16,5	21,5	27,5	28,5	33	19	18,5
	tCO_2e	26.1	28,2	34,5	36,5	37,6	34,5	44,9	57,4	59,5	68,9	39,7	38,6
Circuit B	kg	-	-	-	-	-	-	-	-	-	-	19	18,5
	tCO_2e	-	-	-	-	-	-	-	-	-	-	39,7	38,6
Oil charge		POE SZ160 (EMKARATE RL 32-3MAF).											
Circuit A	l	5.8	7,2	7,2	7,2	7,0	7,0	7,2	7,0	7,0	7,0	7,0	7,0
Circuit B	l	-	-	-	-	-	-	-	-	-	-	7,0	7,0
Power control		Connect Touch Control											
Minimum capacity	%	50	50	50	50	50	50	50	33	33	33	25	25
Air heat exchanger		Grooved copper tube and aluminium fins											
Fans													
Quantity	1	1	1	1	1	1	1	2	2	2	2	2	2
Maximum total air flow	l/s	3694	3694	3889	5278	5278	5278	7778	7389	7389	7778	10556	10556
Maximum rotation speed	r/s	12	12	12	16	16	16	12	12	12	12	16	16
Water heat exchanger		Direct expansion, plate heat exchanger											
Water volume	l	2.6	3	4	4,8	4,8	5,6	8,7	8,7	9,9	11,3	12,4	14,7
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Hydraulic module (option)													
Single or dual pump (as selected)		Pump, victaulic screen filter, relief valve, vent valves (water and air), pressure sensors											
Expansion vessel volume (option)	l	12	12	12	12	12	12	12	35	35	35	35	35
Expansion vessel pressure(4)	bar	1	1	1	1	1	1	1	1,5	1,5	1,5	1,5	1,5
Max. water-side operating pressure with hydraulic module	kPa	400	400	400	400	400	400	400	400	400	400	400	400
Water buffer tank module (option)													
Single or dual pump (as selected)		Pump, victaulic screen filter, relief valve, vent valves (water and air), pressure sensors											
Water volume	l	250	250	250	250	250	250	250	250	250	250	250	250
Expansion vessel volume (option)	l	18	18	18	18	18	18	18	35	35	35	35	35
Expansion vessel pressure(4)	bar	1	1	1	1	1	1	1	1,5	1,5	1,5	1,5	1,5
Max. water-side operating pressure with hydraulic module	kPa	400	400	400	400	400	400	400	400	400	400	400	400
Water buffer tank module with extra heaters (option)													
Single or dual pump (as selected)		Pump, victaulic screen filter, relief valve, vent valves (water and air), pressure sensors, vent at the top of the tank											
16 kW extra heaters in the tank	kW	2 x 8 kW	2 x 8 kW	2 x 8 kW	2 x 8 kW	2 x 8 kW	2 x 8 kW						
31 kW extra heaters in the tank	kW	2 x 8 kW + 1 x 15 kW	2 x 8 kW + 1 x 15 kW	2 x 8 kW + 1 x 15 kW	2 x 8 kW + 1 x 15 kW	2 x 8 kW + 1 x 15 kW	2 x 8 kW + 1 x 15 kW						
45 kW extra heaters in the tank	kW	3 x 15 kW	3 x 15 kW	3 x 15 kW	3 x 15 kW	3 x 15 kW	2 x 8 kW						
Water connections with or without hydraulic module		Victaulic											
Connections	inch	2	2	2	2	2	2	2	2	2	2	2	2
External diameter	mm	60.3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3	60,3
Casing paint		Colour code RAL 7035 and RAL 7024											

(3) Weights given as a guide. Refer to the unit name plate.
(4) Upon delivery, the standard preinflation of the vessels is not necessarily at the optimum value for the installation. In order to enable free variation of the water volume, adjust the inflation pressure to a pressure close to that corresponding to the static head of the installation. Fill the installation with water (bleeding out any air) at a pressure 10 to 20 kPa higher than that of the vessel.

ELECTRICAL DATA

LD / ILD Standard unit (without hydraulic module)		150	180	200	240	260	300	302	360	390	450	520	600
Power circuit													
Nominal voltage	V-ph-Hz	400-3-50											
Voltage range	V	360-440											
Control circuit supply		24 V, via internal transformer											
Rated unit current draw(3)													
Circuit A&B	A	25,6	29	33	36	42,4	52,8	53,4	55,4	61,7	77,3	84,8	105,6
Maximum unit power input(2)													
Circuit A&B	kW	19,5	22,3	24,5	27,9	31,2	35,8	35,6	42,3	45,6	52,5	62,4	71,6
Unit power factor at maximum capacity(2)		0,83	0,81	0,81	0,83	0,81	0,78	0,78	0,83	0,81	0,79	0,81	0,78
Unit max. operating current (Un-10%)(5)													
Circuit A&B	A	38	49,2	51,4	58,4	74,8	79,6	80,2	89	110,3	117,5	149,6	159,2
Maximum current draw (Un)(4)													
Circuit A&B - Standard unit	A	34,8	44,8	46,8	52,8	67	73	73,6	80,6	98,6	107,6	134	146
Maximum start-up current, standard unit (Un)(1)													
Circuit A&B	A	113,8	134,8	142,8	145,8	176	213	213,6	173,6	207,6	247,6	243	286
Maximum start-up current, unit with soft start (Un)(1)													
Circuit A&B	A	74,7	86,5	93,8	96,2	114,4	139,8	139,8	130,4	155,4	181,4	186,4	215,4

(1) Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + fan current(s) + locked rotor current of the largest compressor).
(2) Power input, at the unit's permanent operating limits (indication given on the unit's name plate).
(3) Standardised EUROVENT conditions, water type heat exchanger input/output = 12°C/7°C, outdoor air temperature = 35°C.
(4) Maximum unit current at 400V, during non-permanent operation (indication given on the unit's name plate)
(5) Maximum unit current at 360V, during non-permanent operation

Short circuit current withstand capability (TN system(1))

AQUACIAT LD / ILD		150	180	200	240	260	300	302	360	390	450	520	600
Value without upstream protection													
Short time assigned current (1s) - Icw	kA eff	3,36	3,36	3,36	3,36	3,36	3,36	3,36	5,62	5,62	5,62	5,62	5,62
Allowable peak assigned current - Ipk	kA pk	20	20	20	20	20	15	15	20	20	15	20	15
Value with upstream protection													
Conditional short circuit assigned current Icc	kA eff	40	40	40	40	40	40	40	40	40	40	30	30
Associated Schneider circuit breaker - Compact type range(2)		NS100H	NS100H	NS100H	NS100H	NS100H	NS100H	NS100H	NS100H	NS160H	NS160H	NS250H	NS250H

(1) Type of system earthing
(2) If another current limiting protection device is used, its time-current trip and I^2t thermal stress characteristics must be at least equivalent to those of the recommended Schneider circuit breaker.
The short-circuit withstand values given above were determined for the TN system.

PARTIAL RECOVERY WITH DESUPERHEATER

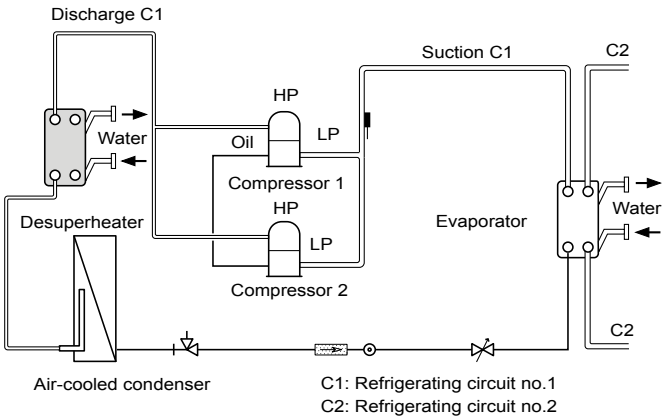
The AQUACIAT range may be equipped as an option with an energy recovery function using a desuperheater

Heat from gases released by the compressors is recovered directly by a type of heat exchanger called a desuperheater located on the unit to produce free, additional hot water.

This optional configuration requires assembly in our factories and is by order only

Refrigerant circuit schematic diagram

This refrigeration diagram illustrates a unit with a desuperheater on each refrigerating circuit. For heat recovery to be possible, the unit must be operating. For the same cooling capacity, the desuperheater provides a source of free hot water and lowers the unit's electrical power consumption.



Hydraulic connections: configuration and precautions

The hydraulic supply for each desuperheater is delivered in parallel. In order to ensure that the unit can start and operate under the correct conditions, the desuperheater circuit water loop must be as short as possible and be able to increase quickly in temperature. The minimum desuperheater water inlet temperature must be 25°C. It may require the use of a three-way valve with its controller and a sensor controlling the minimum water inlet temperature.

Note:
The water loop for the desuperheater circuit must include an expansion vessel and a valve. Special attention should be paid when selecting the expansion vessel as the recovery water circuit can reach 120°C if the pump is turned off or if no hot water is consumed.

Operating limits

Operating mode		COOLING		HEATING	
Desuperheater		**Minimum**	**Maximum**	**Minimum**	**Maximum**
Water inlet temperature at start-up	°C	25	60	25	60
Water outlet temperature during operation	°C	30	65	30	65
Air heat exchanger		**Minimum**	**Maximum**	**Minimum**	**Maximum**
Outdoor air temperature during operation	°C	-10*	46	-10	48

* With winter operation option

PARTIAL RECOVERY WITH DESUPERHEATER

Technical characteristics

LD partial heat recovery mode		150	180	200	240	260	300	360	390	450	520	600
Standard unit	kg	436	445	454	470	468	490	785	796	827	867	899
Unit + High pressure single pump option	kg	478	486	496	512	510	532	852	863	898	941	973
Unit + High pressure dual pump option	kg	504	512	522	537	536	558	897	908	947	978	1010
Unit + high pressure single pump + Water buffer tank module option	kg	874	882	892	908	906	928	1285	1296	1331	1374	1406
Unit + high pressure dual pump + Water buffer tank module option	kg	900	908	918	933	932	954	1330	1341	1380	1411	1443
Refrigerant with MCHE coils		R410A										
Circuit A	kg	4,7	5,3	5,9	6,7	6,2	7,3	10,7	10,8	11,4	6,5	7,4
Circuit B	kg	-	-	-	-	-	-	-	-	-	6,5	7,4
Air heat exchanger		"Micro Channel Heat Exchanger" (Micro-Channel) coils made entirely from aluminium										
Desuperheater on circuits A and B		Plate heat exchanger										
Water volume	l	0,549	0,549	0,549	0,549	0,732	0,732	0,976	0,976	0,976	0,732	0,732
Water volume	l	-	-	-	-	-	-	-	-	-	0,732	0,732
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Water connections		Cylindrical male gas thread										
Connections	inch	1	1	1	1	1	1	1	1	1	1	1
External diameter	mm	42	42	42	42	42	42	42	42	42	42	42

ILD partial heat recovery mode		150	180	200	240	260	300	302	360	390	450	520	600
Standard unit	kg	506	515	552	558	569	574	787	907	916	990	1068	1072
Unit + High pressure single pump option	kg	548	557	594	600	611	616	854	974	983	1061	1142	1146
Unit + High pressure dual pump option	kg	574	583	620	626	637	642	899	1019	1028	1109	1179	1183
Unit + high pressure single pump + Water buffer tank module option	kg	944	952	990	995	1006	1011	1286	1406	1415	1493	1575	1578
Unit + high pressure dual pump + Water buffer tank module option	kg	970	978	1015	1021	1032	1037	1331	1451	1460	1542	1612	1615
Refrigerant with copper tube coils/aluminium fins(1)		R410A											
Circuit A	kg	12,5	13,5	16,5	17,5	18	16,5	21,5	27,5	28,5	33	19	18,5
Circuit B	kg	-	-	-	-	-	-	-	-	-	-	19	18,5
Air heat exchanger		Grooved copper tube and aluminium fins											
Desuperheater on circuits A and B		Plate heat exchanger											
Water volume	l	0,549	0,549	0,549	0,732	0,732	0,732	0,732	0,976	0,976	0,976	0,732	0,732
Water volume	l	-	-	-	-	-	-	-	-	-	-	0,732	0,732
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Water connections		Cylindrical male gas thread											
Connections	inch	1	1	1	1	1	1	1	1	1	1	1	1
External diameter	mm	42	42	42	42	42	42	42	42	42	42	42	42

(1) Weights given as a guide.

PARTIAL RECOVERY WITH DESUPERHEATER

Performance

■ Heating capacity recovered by the desuperheaters

LD water chiller

LD 150 - 600	Water inlet temperature on desuperheater, °C								
	45			50			55		
	Qhr	q	Δp	Qhr	q	Δp	Qhr	q	Δp
	kW	l/s	kPa	kW	l/s	kPa	kW	l/s	kPa
150	12,9	0,31	6,1	10,9	0,26	4,4	9,0	0,21	3,1
180	16,5	0,40	9,5	14,3	0,34	7,4	12,0	0,29	5,2
200	18,1	0,43	11,7	15,4	0,37	8,5	12,8	0,31	6,1
240	19,3	0,46	12,9	16,6	0,40	9,8	13,7	0,33	6,9
260	24,3	0,58	11,8	21,0	0,50	9,2	17,5	0,42	6,5
300	28,6	0,68	16,3	24,4	0,58	12,1	20,6	0,49	8,8
360	30,5	0,73	11,4	25,8	0,62	8,2	21,5	0,51	5,8
390	36,4	0,87	16,0	31,9	0,76	12,4	27,0	0,64	8,9
450	43,1	1,03	22,6	37,4	0,89	17,2	31,6	0,75	12,3
520(1)	47,1	1,12	11,3	39,7	0,95	8,3	33,0	0,79	5,9
600(1)	54,0	1,29	15,0	45,6	1,09	10,7	38,3	0,92	7,8

Application data

Water type heat exchanger inlet/outlet temperature: 12/7 °C
Outdoor air temperature: 35°C
Water inlet/outlet difference on desuperheater: 10 K
Evaporator fluid: chilled water
Fouling level coefficient: 0.18 x 10-4 m².K/W

ILD heat pumps

ILD 150 - 600/Cooling Mode	Water inlet temperature on desuperheater, °C								
	45			50			55		
	Qhr	q	Δp	Qhr	q	Δp	Qhr	q	Δp
	kW	l/s	kPa	kW	l/s	kPa	kW	l/s	kPa
150	10,9	0,26	4,4	9,1	0,22	3,1	7,1	0,18	2,1
180	14,4	0,34	7,5	12,2	0,29	5,4	10,0	0,24	3,7
200	17,2	0,41	10,5	14,7	0,35	7,8	12,3	0,29	5,6
240	17,4	0,44	6,6	15,1	0,36	4,6	12,3	0,29	3,0
260	21,4	0,51	9,3	17,9	0,43	6,7	14,7	0,35	4,8
300	26,8	0,64	14,7	22,5	0,54	10,4	18,8	0,45	7,5
302	23,9	0,57	12,1	21,2	0,51	7,8	16,3	0,39	5,8
360	28,1	0,67	9,9	23,9	0,57	7,1	19,7	0,47	5,1
390	33,9	0,81	14,0	28,3	0,68	10,1	23,7	0,57	7,2
450	37,7	0,90	17,5	31,7	0,76	12,4	26,5	0,63	8,9
520(1)	42,9	1,03	9,4	35,5	0,85	6,7	29,1	0,7	4,5
600(1)	52,3	1,25	14,1	44,2	1,06	10,1	36,9	0,88	7,1

Application data

Water type heat exchanger inlet/outlet temperature: 12/7 °C
Outdoor air temperature: 35°C
Water inlet/outlet difference on desuperheater: 10 K
Evaporator fluid: chilled water
Fouling level coefficient: 0.18 x 10-4 m².K/W

ILD 150 - 600/Heating Mode	Water inlet temperature on desuperheater, °C								
	45			50			55		
	Qhr	q	Δp	Qhr	q	Δp	Qhr	q	Δp
	kW	l/s	kPa	kW	l/s	kPa	kW	l/s	kPa
150	10,1	0,24	3,8	8,3	0,20	2,7	6,8	0,16	1,8
180	11,1	0,27	4,6	9,3	0,22	3,3	7,7	0,18	2,3
200	14,0	0,33	7,1	11,8	0,28	5,2	9,9	0,24	3,6
240	14,3	0,34	4,4	11,8	0,28	3,0	9,4	0,22	2,0
260	17,1	0,41	6,3	14,4	0,34	4,5	11,9	0,28	3,1
300	19,1	0,46	7,8	16,0	0,38	5,6	13,2	0,32	3,9
302	17,5	0,42	6,6	14,6	0,35	4,8	11,7	0,28	3,2
360	21,4	0,51	6,0	17,7	0,42	4,1	14,7	0,35	2,8
390	20,6	0,49	5,1	16,5	0,39	3,4	12,7	0,30	2,0
450	23,0	0,55	6,9	18,5	0,44	4,7	14,5	0,35	3,0
520(1)	32,0	0,77	5,5	26,7	0,64	3,8	21,6	0,52	2,6
600(1)	37,5	0,90	7,3	31,2	0,75	5,4	25,4	0,61	3,7

Application data

Water type heat exchanger inlet/outlet temperature: 40/45 °C
Outdoor air temperature: 7°C
Water inlet/outlet difference on desuperheater: 10 K
Evaporator fluid: chilled water
Fouling level coefficient: 0.18 x 10-4 m².K/W

Qhr Total heating capacity reclaimed at the desuperheater(s), kW
q Total water flow rate on the desuperheater loop, l/s
Δp Water pressure drop per desuperheater (kPa)
(1) Sizes 520 and 600 are fitted with 2 desuperheaters, one per circuit.

XTRA FAN OPERATING PRESSURE VENTILATION

The AQUACIAT range can be equipped as an option with the XTRAFAN operating pressure ventilation.

Features

The XTRAFAN offers a wide range of functions, making a whole host of flexible installation conditions possible, such as:

- The option of installation in a confined space, for example on a terrace surrounded by walls, where only an air supply with static pressure of between 100 and 200 pascals within a duct enables use without recirculation or mixing of air at the condenser intake,
- Installation in an urban area in which noise is a particular issue, where operation is only possible by adapting a sound trap to the supply air,
- A self-adjusting variable speed function which allows "all-season" cooling, fully secured for industrial processes, including during harsh winter conditions with an external temperature of -20°C,
- The freedom to precisely adjust the ventilation speed on-site to what is "strictly necessary" to obtain the optimum air supply pressure, or the maximum acceptable noise level for the site on which the unit is located,
- An improvement in the energy efficiency and electrical consumption of the unit, in direct proportion to the load required by the installation

The performances (cooling capacity, heating capacity, power input, energy efficiency) depend on the rotation speed of the fans, and therefore on the required operating pressure in the duct.

The sound level at the duct outlet and the level radiated around the machine depends on the operating pressure.

Precautions for installation

On-site installation of a packaged reversible air-to-water unit requires some safety measures to be taken, particularly if it is installed in a machine room. For example, the evacuation of condensates specific to these units, including at very low outdoor temperatures.

During defrosting cycles, reversible units are liable to discharge a large amount of water onto the ground, which must be drained, as well as steam from the fan discharge which can damage the air discharge ducts. The ground supporting the unit must be perfectly watertight and capable of collecting and draining the defrosted water, including during freezing periods. It is recommended that the unit is raised by approximately 300 mm.

If an air discharge duct is installed on site, its weight must not be supported by the roof of the unit. Each fan must be connected independently

Aquaciat cooling only

Duct pressure drop	Fan rotation speed (rps)	Power input variation	Cooling capacity variation
LD 150-240/LD 360-450			
0	12	0,943	1,019
50	13,33	0,962	1,012
100	14,66	0,98	1,006
130	15,46	0,99	1,003
160	16,26	1	1
200	17,31	1,012	0,998
240	18,36	1,023	0,996
LD 260-300/LD 520-600			
0	15,83	0,929	1,018
50	16,81	0,944	1,016
100	17,78	0,964	1,014
130	18,36	0,978	1,011
160	18,36	1	1
180	18,36	1,019	0,991

Aquaciat reversible

Duct pressure drop	Fan rotation speed (rps)	Power input variation	Heating or cooling capacity variation (*)
Cooling mode			
ILD 150-200/ILD 302-450			
0	12	0,943	1,019
50	13,33	0,962	1,012
100	14,66	0,980	1,006
130	15,46	0,990	1,003
160	16,26	1,000	1,000
200	17,31	1,012	0,998
240	18,36	1,023	0,996
ILD 240-300/ILD 520-600			
0	15,83	0,929	1,018
50	16,81	0,944	1,016
100	17,78	0,964	1,014
130	18,36	0,978	1,011
160	18,36	1,000	1,000
180	18,36	1,019	0,991
Heating mode			
ILD 150-200/ILD 302-450			
0	18,36	0,990	1,016
50	18,36	0,990	1,012
100	18,36	0,990	1,009
130	18,36	1,000	1,005
160	18,36	1,000	1,000
200	18,36	1,000	0,994
240	18,36	1,010	0,981
ILD 240-300/ILD 520-600			
0	18,36	1,000	1,026
50	18,36	1,000	1,02
100	18,36	1,000	1,011
130	18,36	1,000	1,007
160	18,36	1,000	1,000
180	18,36	1,001	0,993

(*) Cooling mode cooling capacity
Heating mode heating capacity

INTELLIGENTLY-DESIGNED ACOUSTICS

To comply with the various restrictions on integration, the AQUACIAT has two sound finish levels enabling it to be easily integrated into a number of zones without causing disruption to users or their neighbours.

Basic version

The distinguishing feature of the AQUACIAT range is its rigorous design incorporating "noiseless" assembly techniques to reduce vibrations and sources of noise:

- New generation scroll compressors with a continuous scrolling motion to lessen vibrations
- Compressor structure separated from the unit by anti-vibration mounts
- Pipes separated from the unit structure
- Fans made from a synthetic material, with aerodynamic blades offering an optimised profile. Optimised coil-fan combination, the result of many hours of study of the thermal and acoustic properties in our Research and Innovation Centre, to ensure a linear flow of air without turbulence, to limit noise to an acceptable acoustic spectrum.
- The Connect Touch controller automatically adjusts the fan air flow rate according to the outdoor air temperature and the unit's load rate which enables the sound level to be significantly reduced, particularly at night, mid-season, morning and evening, which totals more than 75% of the time the unit is used

Xtra Low Noise option

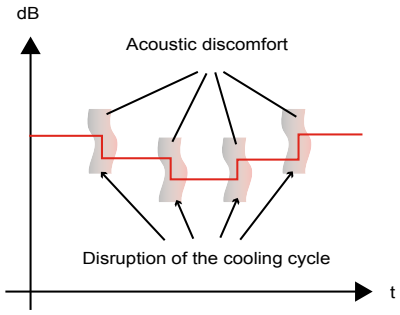
In this version, the compressors are housed in jackets and the fan rotation speed is reduced whilst ensuring the output and thermal performance remain optimised.

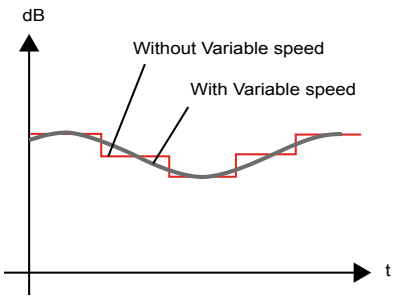
Night mode

The AQUACIAT has a Night Mode enabling the sound level to be limited at night or when the building is unoccupied (according to the user programming) by controlling the output and the fan rotation speed.

Acoustic signature

As important as the sound power level, the acoustic signature reflects the noise disturbance generated by the unit.





The AQUACIAT can be equipped as an option with a variable speed motor, enabling the fan to start gradually (all-season operation).

It avoids the increases in noise linked to the on/off sequences, thereby improving the unit's acoustic signature.

Similarly, the installation of a variable-speed pump enables the sound level of the pump function to be reduced by adjusting the pump speed to what is strictly necessary. The soft start improves the signature and reduces nuisance noise.

With all these benefits and its two acoustic finish levels (Standard and Xtra Low Noise), the AQUACIAT can be integrated into any site, ensuring any constraints in terms of the sound environment can be met.

SOUND LEVELS

LD standard version

■ Sound power level ref 10^{-12} W ± 3 dB (Lw)

At nominal EN 14511-3: 2013 operating conditions – Cooling mode

AQUACIAT LD	SOUND POWER LEVEL SPECTRUM (dB)						Overall power level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	77	79	79	75	72	67	80
180	77	79	79	76	73	67	81
200	77	79	79	76	72	68	81
240	77	79	79	76	74	69	81
260	81	84	84	83	77	73	87
300	81	84	85	83	77	71	87
360	80	82	82	79	76	71	84
390	80	82	82	79	76	74	84
450	80	82	82	79	77	71	84
520	84	87	87	86	80	76	90
600	84	87	88	86	80	74	90

■ Sound pressure levels ref $2x10^{-5}$ Pa ± 3 dB (Lp)

Measurement conditions: free field, 10 metres from machine, 1.50 metres above floor level, directivity 2

AQUACIAT LD	SOUND PRESSURE SPECTRUM (dB)						Overall pressure level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	45	47	47	43	40	36	49
180	45	47	47	44	41	36	49
200	45	47	47	44	41	36	49
240	45	47	47	44	42	37	49
260	50	52	53	51	45	41	55
300	50	52	53	51	46	39	55
360	48	50	50	47	44	39	52
390	48	50	50	47	44	42	52
450	48	50	50	47	45	40	52
520	53	55	56	54	48	44	58
600	53	55	56	54	48	42	58

NB: Sound pressure levels depend on the installation conditions of each system. As such, the levels listed here are given for information only. Only the sound power levels are comparable and certified.

SOUND LEVELS

LD Standard, XTRA LOW NOISE version

■ Sound power level ref 10^{-12} W ±3 dB (Lw)

At nominal EN 14511-3: 2013 operating conditions – Cooling mode

AQUACIAT LD	SOUND POWER LEVEL SPECTRUM (dB)						Overall power level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	77	79	78	75	70	63	79
180	77	79	79	75	70	63	80
200	77	79	79	75	70	63	80
240	77	79	78	75	70	64	80
260	77	79	79	75	71	66	80
300	77	79	79	75	71	64	80
360	80	82	81	78	73	66	83
390	80	82	82	78	73	68	83
450	80	82	82	78	74	67	83
520	80	82	82	78	74	69	83
600	80	82	82	78	74	67	83

■ Sound pressure levels ref $2x10^{-5}$ Pa ±3 dB (Lp)

Measurement conditions: free field, 10 metres from machine, 1.50 metres above floor level, directivity 2

AQUACIAT LD	SOUND PRESSURE SPECTRUM (dB)						Overall pressure level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	45	47	47	43	38	31	48
180	45	47	47	43	38	31	48
200	45	47	47	43	38	31	48
240	45	47	47	43	39	32	48
260	45	47	47	43	39	35	48
300	45	47	47	43	39	33	48
360	48	50	50	46	41	34	51
390	48	50	50	46	41	37	51
450	48	50	50	46	42	35	51
520	48	50	50	46	42	37	51
600	48	50	50	46	42	36	51

NB: Sound pressure levels depend on the installation conditions of each system. As such, the levels listed here are given for information only. Only the sound power levels are comparable and certified.

SOUND LEVELS

ILD, Standard version

■ Sound power level ref 10^{-12} W ± 3 dB (Lw)

At nominal EN 14511-3: 2013 operating conditions – Cooling mode

AQUACIAT LD	SOUND POWER LEVEL SPECTRUM (dB)						Overall power level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	77	79	79	75	72	67	80
180	77	79	79	76	73	67	81
200	77	79	79	76	72	68	81
240	81	84	84	83	77	71	86
260	81	84	84	83	77	73	87
300	81	84	85	83	77	71	87
302	80	82	82	78	76	70	84
360	80	82	82	79	76	71	84
390	80	82	82	79	76	74	84
450	80	82	82	79	77	71	84
520	84	87	87	86	80	76	90
600	84	87	88	86	80	74	90

■ Sound pressure levels ref $2x10^{-5}$ Pa ± 3 dB (Lp)

Measurement conditions: free field, 10 metres from machine, 1.50 metres above floor level, directivity 2

AQUACIAT LD	SOUND PRESSURE SPECTRUM (dB)						Overall pressure level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	45	47	47	43	40	36	49
180	45	47	47	44	41	36	49
200	45	47	47	44	41	36	49
240	50	52	53	51	45	39	55
260	50	52	53	51	45	41	55
300	50	52	53	51	46	39	55
302	45	50	50	47	44	38	52
360	48	50	50	47	44	39	52
390	48	50	50	47	44	42	52
450	48	50	50	47	45	40	52
520	53	55	56	54	48	44	58
600	53	55	56	54	48	42	58

NB: Sound pressure levels depend on the installation conditions of each system. As such, the levels listed here are given for information only. Only the sound power levels are comparable and certified.

SOUND LEVELS

ILD Standard, XTRA LOW NOISE version

■ Sound power level ref 10^{-12} W ±3 dB (Lw)

At nominal EN 14511-3: 2013 operating conditions – Cooling mode

AQUACIAT ILD	SOUND POWER LEVEL SPECTRUM (dB)						Overall power level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	77	79	78	75	70	63	79
180	77	79	79	75	70	63	80
200	77	79	79	75	70	63	80
240	77	79	78	75	70	64	80
260	77	79	79	75	71	66	80
300	77	79	79	75	71	64	80
302	80	82	82	78	73	65	83
360	80	82	81	78	73	66	83
390	80	82	82	78	73	68	83
450	80	82	82	78	74	67	83
520	80	82	82	78	74	69	83
600	80	82	82	78	74	67	83

■ Sound pressure levels ref $2x10^{-5}$ Pa ±3 dB (Lp)

Measurement conditions: free field, 10 metres from machine, 1.50 metres above floor level, directivity 2

AQUACIAT ILD	SOUND PRESSURE SPECTRUM (dB)						Overall pressure level dB(A)
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	
150	45	47	47	43	38	31	48
180	45	47	47	43	38	31	48
200	45	47	47	43	38	31	48
240	45	47	47	43	39	32	48
260	45	47	47	43	39	35	48
300	45	47	47	43	39	33	48
302	48	50	50	46	41	34	51
360	48	50	50	46	41	34	51
390	48	50	50	46	41	37	51
450	48	50	50	46	42	35	51
520	48	50	50	46	42	37	51
600	48	50	50	46	42	36	51

NB: Sound pressure levels depend on the installation conditions of each system. As such, the levels listed here are given for information only. Only the sound power levels are comparable and certified.

SYSTEM WATER VOLUME - EVAPORATOR WATER FLOW RATE

The Connect Touch controller is equipped with anticipation logic making it highly flexible in adjusting operation to parameter drift, particularly on hydraulic systems with low water volumes. By adjusting compressor running times, it prevents short-cycle protection cycles from starting and, in most cases, eliminates the need for a buffer tank.

NOTE: The minimum volumes of chilled water are calculated for EUROVENT rated conditions:

Cooling mode, LD version
- Chilled water temperature = 12 °C/7 °C
- Condenser air inlet temperature = 35 °C

Heating mode, ILD version
- Hot water temperature = 40 °C/45 °C
- Outdoor air temperature = 7 °C

This value is applicable for most air conditioning applications (unit with fan coil units)

Note: For installations running with a low volume of water (unit with air handling unit) or for industrial processes, the buffer tank is essential.

Minimum system water volume and water type heat exchanger flow rate

AQUACIAT LD		150	180	200	240	260	300	360	390	450	520	600
Minimum system water volume, air conditioning application (litres)		121	140	164	182	207	243	181	205	240	204	240
Minimum system water volume, industrial process application (litres)		304	351	410	454	518	608	452	513	601	510	601
Min/max water type heat exchanger flow rate without hydraulic module(1) (l/s)		0.9 / 3	0.9 / 3.4	0.9 / 4.2	0.9 / 5	1 / 5	1.2 / 5.5	1.3 / 6.8	1.5 / 7.7	1.7 / 8.5	2 / 10.6	2.3 / 11.2
Water type heat exchanger maximum flow rate Dual pump (l/s) (2)	Low pressure (3)	2,9	3,2	3,7	4,1	4,1	4,4	5,1	6,3	6,5	7,9	8,2
	High pressure (3)	3,4	3,8	4,4	5	5	5,2	6,2	6,5	8	8,7	8,9

(1) Maximum flow rate for a pressure drop of 100 kPa in the water exchanger
(2) Maximum flow rate for an available pressure of 20 kPa (unit with low-pressure pumps) or 50 kPa (high pressure).
(3) Maximum flow rate with single pump 2 to 4% higher, depending on the size.

NOTE: For the Buffer Tank Module option, the volume of the tank must be taken into account: 250 litres

AQUACIAT ILD		150	180	200	240	260	300	302	360	390	450	520	600
Minimum system water volume, air conditioning application (litres)		202	234	274	303	346	405	405	301	342	400	340	401
Minimum system water volume, industrial process application (litres)		304	351	410	454	518	608	608	452	513	601	510	601
Min/max water type heat exchanger flow rate without hydraulic module(1) (l/s)		0.9 / 3	0.9 / 3.4	0.9 / 4.2	0.9 / 5	1 / 5	1.2 / 5.5	1.2 / 6.8	1.3 / 6.8	1.5 / 7.7	1.7 / 8.5	2 / 10.6	2.3 / 11.2
Water type heat exchanger maximum flow rate Dual pump (l/s) (2)	Low pressure (3)	2,9	3,2	3,7	4,1	4,1	4,4	5,1	5,1	6,3	6,5	7,9	8,2
	High pressure (3)	3,4	3,8	4,4	5	5	5,2	6,2	6,2	6,5	8	8,7	8,9

(1) Maximum flow rate for a pressure drop of 100 kPa in the water exchanger
(2) Maximum flow rate for an available pressure of 20 kPa (unit with low-pressure pumps) or 50 kPa (high pressure).
(3) Maximum flow rate with single pump 2 to 4% higher, depending on the size.

NOTE: For the Buffer Tank Module option, the volume of the tank must be taken into account: 250 litres

OPERATING RANGE

AQUACIAT devices have a broad field of application, enabling them to meet a range of heating and cooling requirements in the most varied of climates.

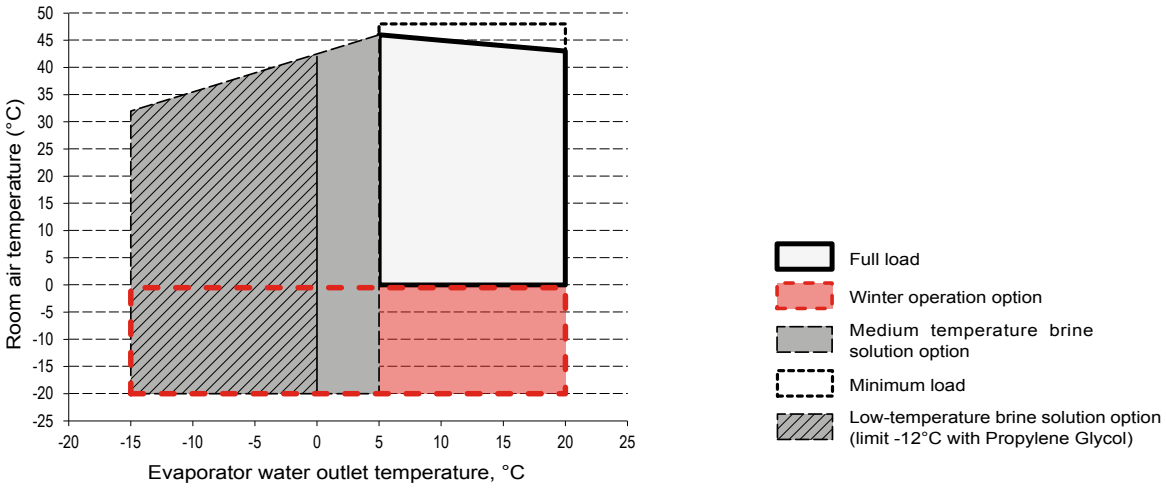
Multi-application: air conditioning, heating, industrial processes

The AQUACIAT can be used for all traditional air conditioning and heating applications in sectors as varied as shared residential, hotels, shopping centres and offices.

■ Operating limits of the LD water chiller

Multi-climate: -20°C to +48°C

The AQUACIAT is equipped as standard with all the management devices and algorithms to enable all-season operation down to temperatures of 0 °C, with the option of extending this to -20 °C if the variable speed fan option is selected.

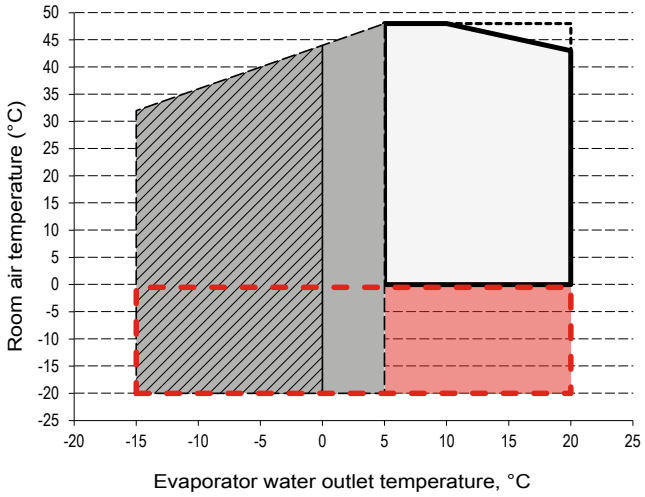


■ Operating limits of the ILD heat pump

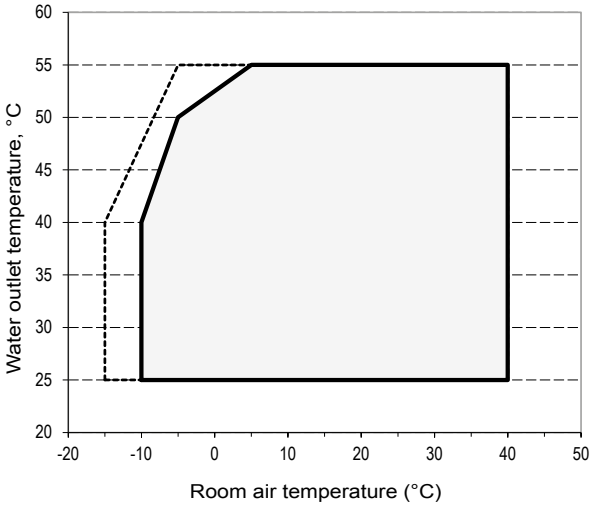
Multi-climate

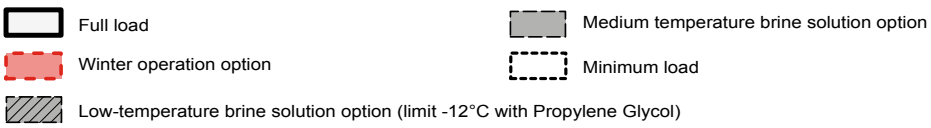
The design of the AQUACIAT makes it suitable for the majority of heating and air conditioning applications, regardless of the climate. Water heated to +40 °C is guaranteed, even for outdoor temperatures of -10 °C

Cooling mode from -20 °C to +48 °C



Heating mode from -15 °C to +40 °C



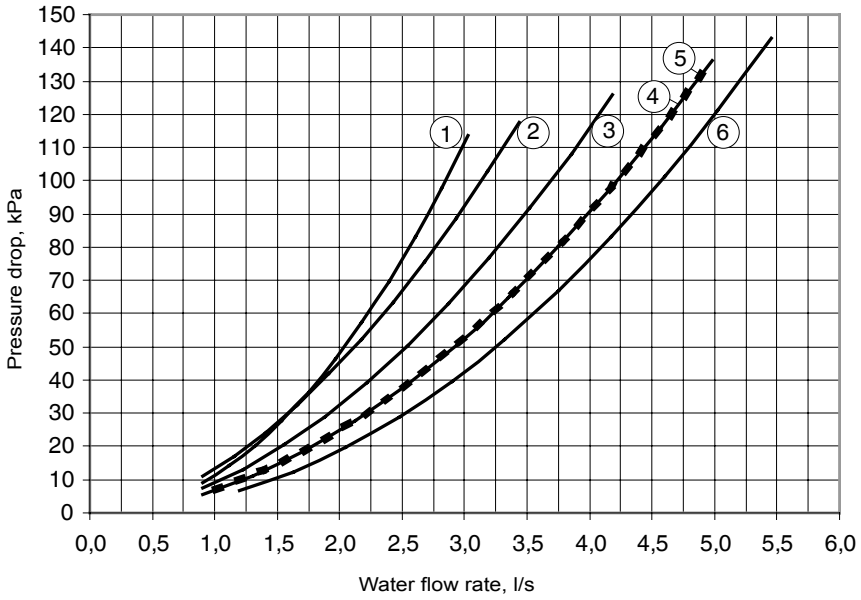


HYDRAULIC SPECIFICATIONS

■ Water pressure drop in the evaporator

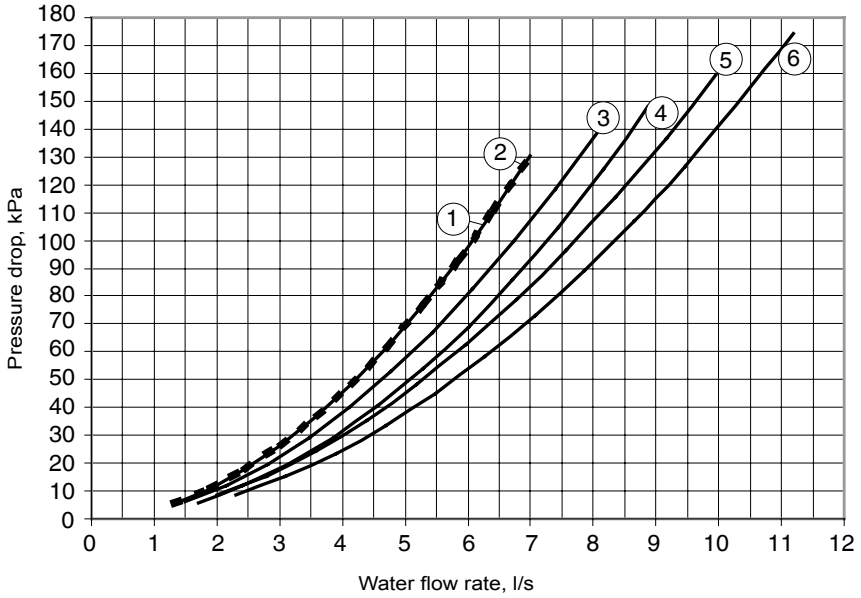
Data applicable for pure water at 20°C

LD/ILD sizes 150-300



B	LD/ILD 150	E	LD/ILD 240
C	LD/ILD 180	F	LD/ILD 260
D	LD/ILD 200	G	LD/ILD 300

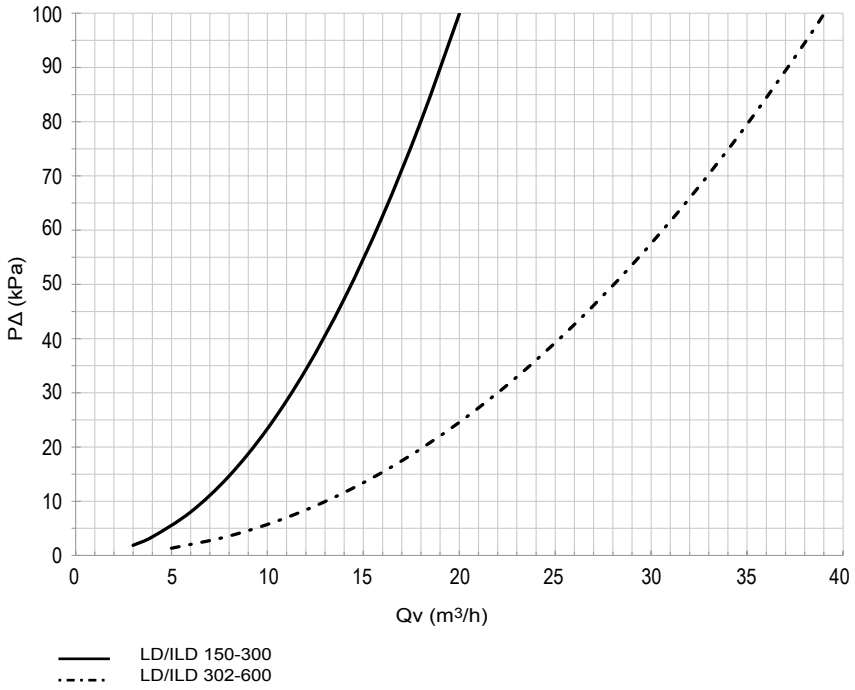
LD/ILD sizes 302-600



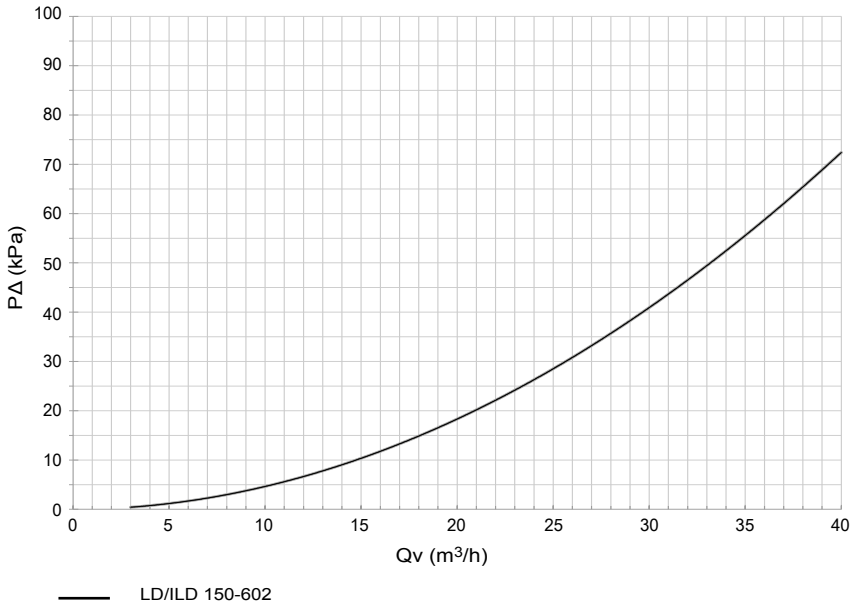
B	ILD 302	E	LD/ILD 450
C	LD/ILD 360	F	LD/ILD 520
D	LD/ILD 390	G	LD/ILD 600

HYDRAULIC SPECIFICATIONS

■ Water pressure drop in the filter



■ Water pressure drop in the buffer tank



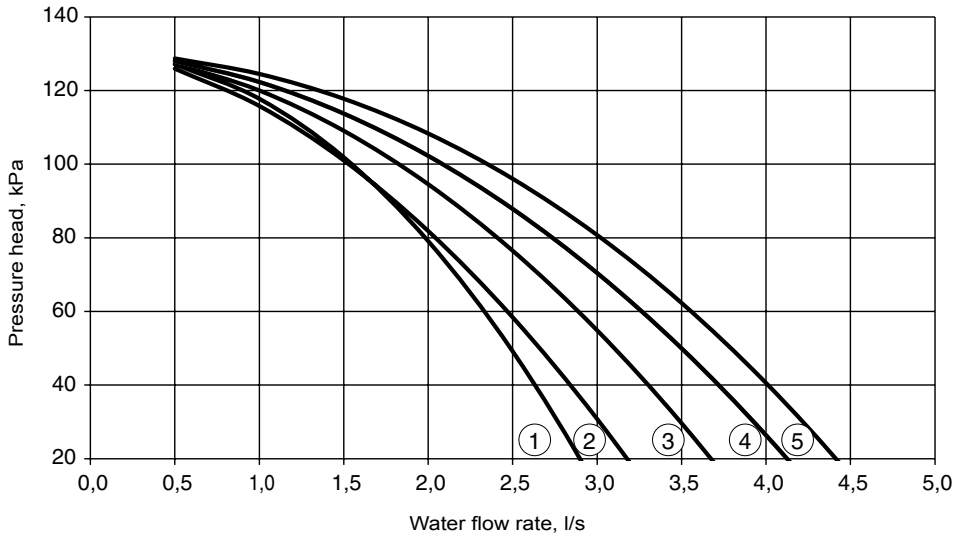
HYDRAULIC SPECIFICATIONS

■ Available static system pressure

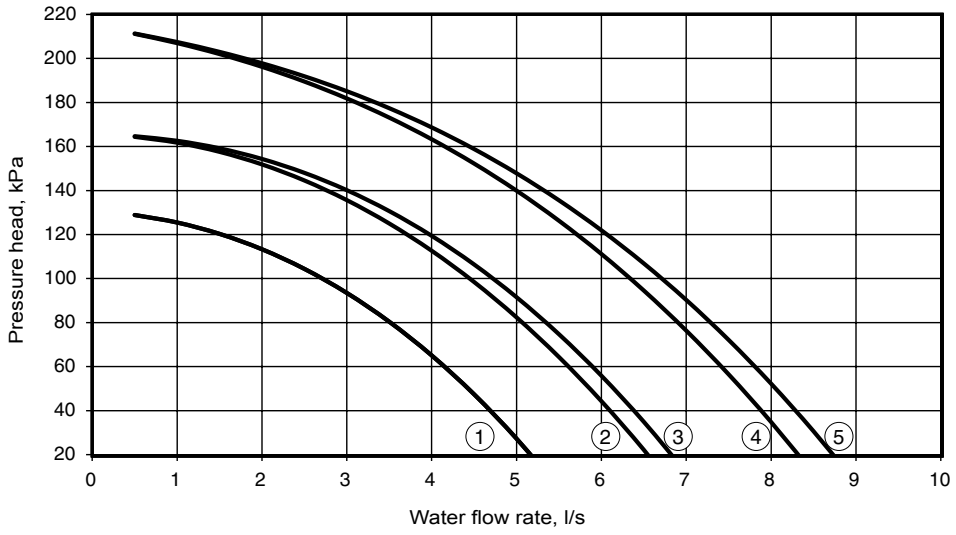
Units with hydraulic module (fixed-speed pump or variable-speed pump at 50 Hz)

Data applicable for:
- Pure water at 20 °C
- Refer to the section "Evaporator water flow rate" for the minimum and maximum water flow rate values
- If brine is used, the maximum water flow rate is reduced.

Low pressure pumps



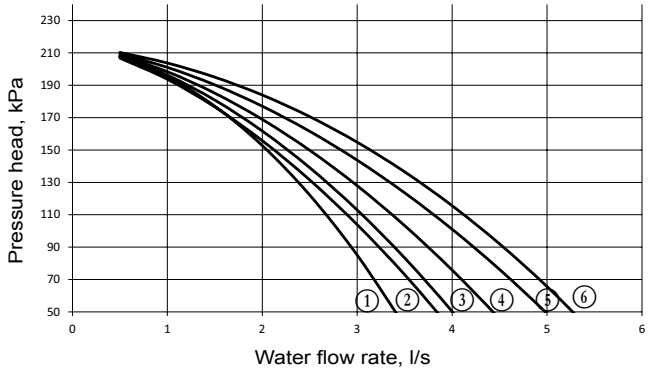
B ILD 150
C ILD 180
D ILD 200
E ILD 240 & 260
F ILD 300



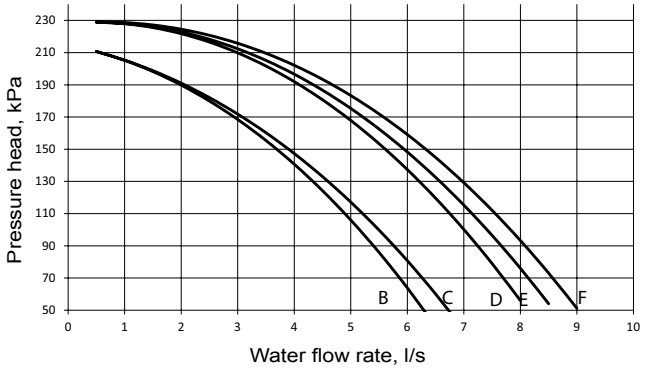
B ILD 302 & 360
C ILD 390
D ILD 450
E ILD 520
F ILD 600

HYDRAULIC SPECIFICATIONS

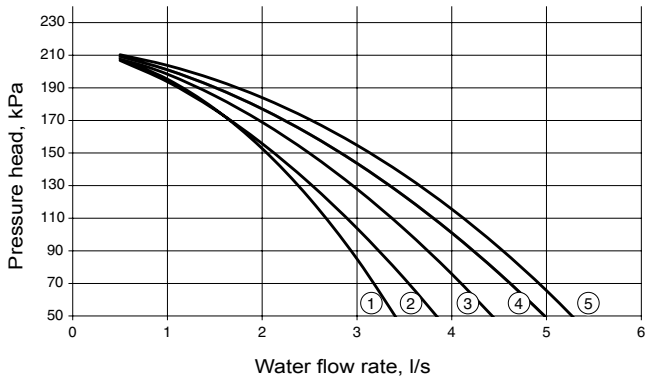
High pressure pumps



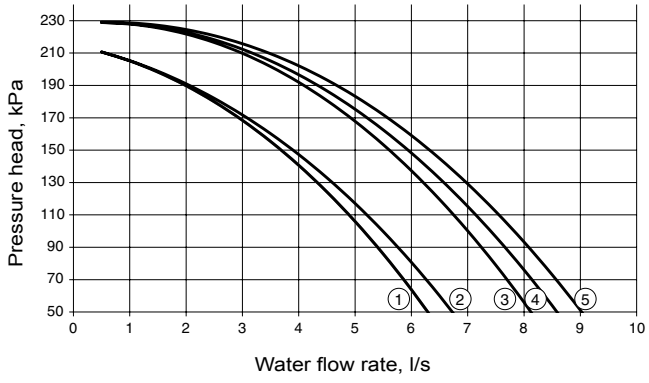
B	LD 150	E	LD 240
C	LD 180	F	LD 260
D	LD 200	G	LD 300



B	LD 360	E	LD 520
C	LD 390	F	LD 600
D	LD 450		



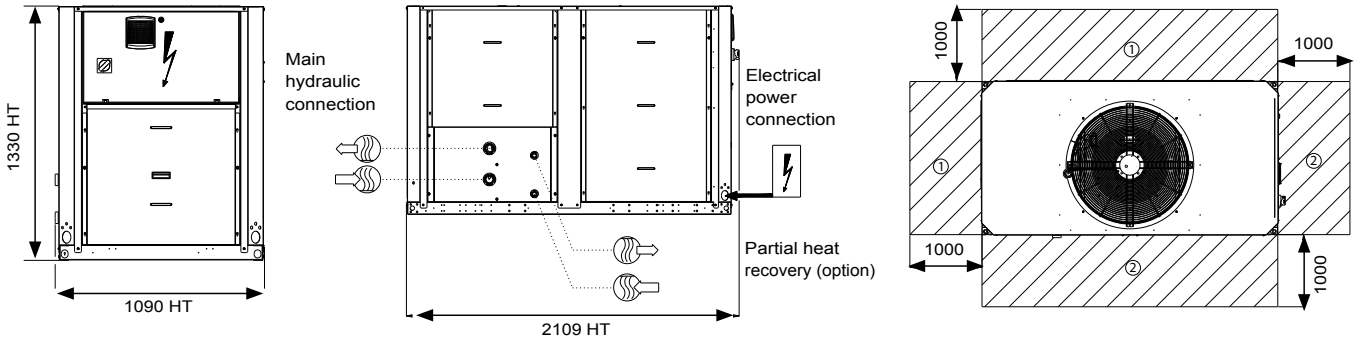
B	ILD 150	E	ILD 240 & 260
C	ILD 180	F	ILD 300
D	ILD 200		



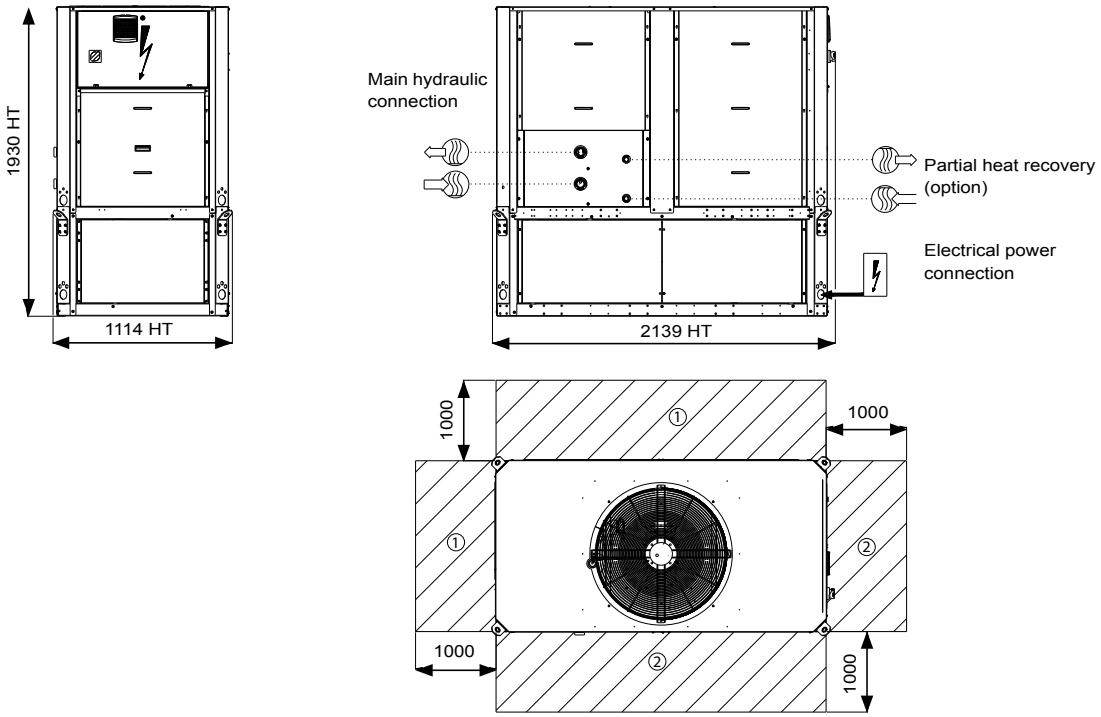
B	ILD 302 & 360	E	ILD 520
C	ILD 390	F	ILD 600
D	ILD 450		

DIMENSIONS

AQUACIAT LD-ILD 150 to 300 Without buffer tank



AQUACIAT LD-ILD 150 to 300 With buffer tank



Key
All dimensions in mm

1. Clearance required for maintenance and air flow
2. Clearance recommended for coil removal
- Water inlet
- Water outlet
- Air outlet, do not obstruct
- Electrical cabinet

NOTES:

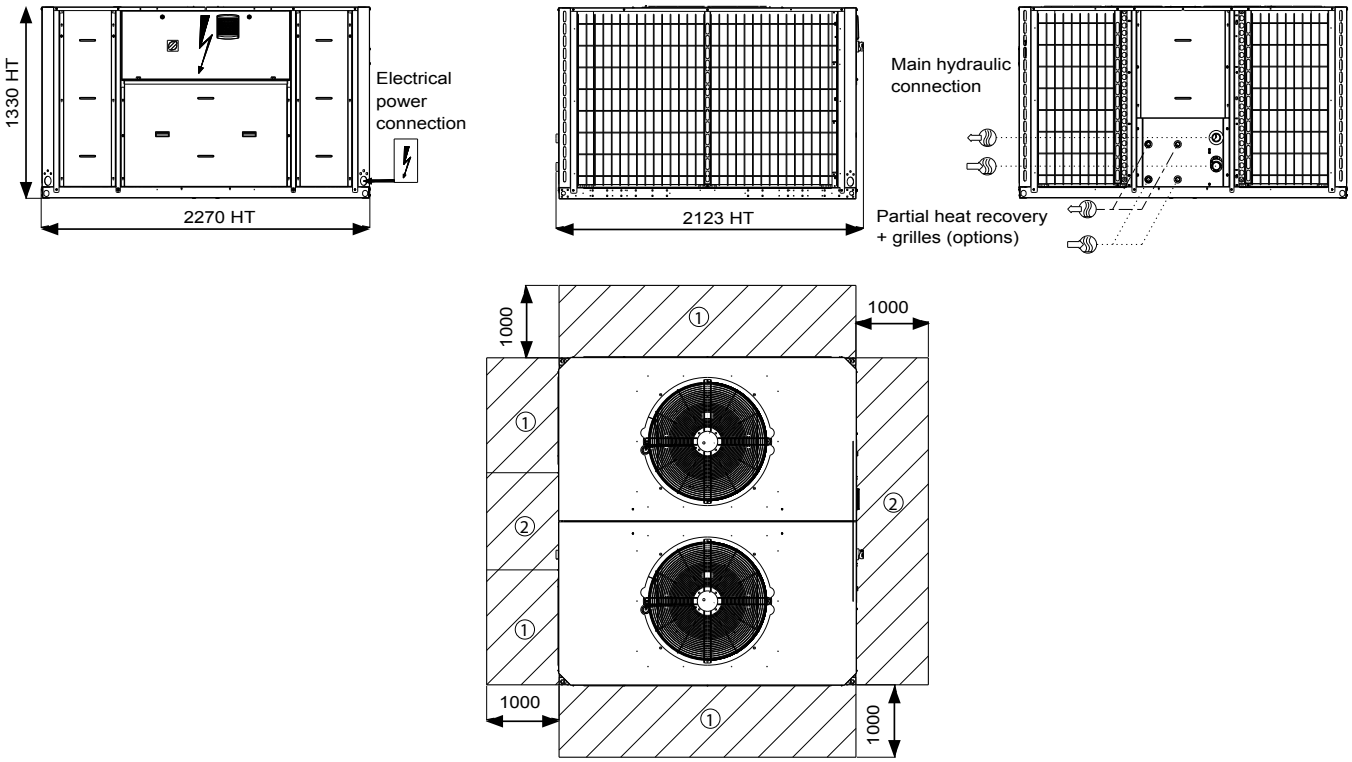
Non-contractual drawings.

When designing a system, refer to the certified dimensional drawings provided with the unit or available on request.

Please refer to the certified dimensional drawings for the positioning of the fixing points, weight distribution points and centre of gravity coordinates.

DIMENSIONS

AQUACIAT LD-ILD 302 to 600 Without buffer tank



Key
All dimensions in mm

1. Clearance required for maintenance and air flow
2. Clearance recommended for coil removal
- Water inlet
- Water outlet
- Air outlet, do not obstruct
- Electrical cabinet

NOTES:

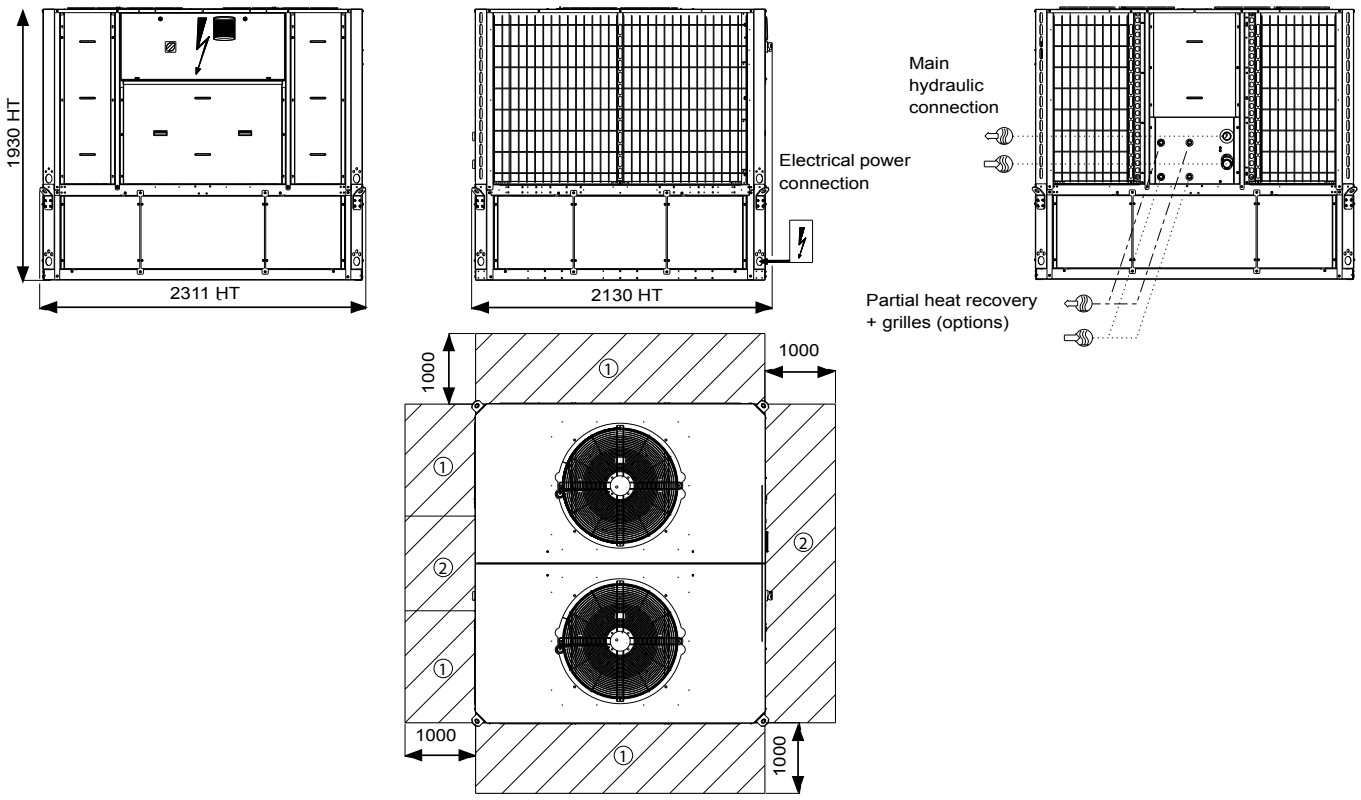
Non-contractual drawings.

When designing a system, refer to the certified dimensional drawings provided with the unit or available on request.

Please refer to the certified dimensional drawings for the positioning of the fixing points, weight distribution points and centre of gravity coordinates.

DIMENSIONS

AQUACIAT LD-ILD 302 to 600 With buffer tank



Key
All dimensions in mm

1. Clearance required for maintenance and air flow
2. Clearance recommended for coil removal
- Water inlet
- Water outlet
- Air outlet, do not obstruct
- Electrical cabinet

NOTES:

Non-contractual drawings.

When designing a system, refer to the certified dimensional drawings provided with the unit or available on request.

Please refer to the certified dimensional drawings for the positioning of the fixing points, weight distribution points and centre of gravity coordinates.

INSTALLATION RECOMMENDATIONS

Water quality criteria to be respected

WARNING: 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 and compliant operation of the machine and its service life. This is particularly true if the water used clogs or corrodes components or promotes the growth of algae or micro-organisms. The water must be tested to determine whether it is suitable for the unit. It is also tested to determine whether chemical treatment is necessary and will suffice to make it of acceptable quality. This analysis should confirm whether or not the various machine components are compatible with the water they come into contact with on-site.

WARNING: failure to follow these instructions will result in the immediate voiding of the unit's warranty.

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 instruction 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

AQUACIAT units are designed for outdoor installation. Precautions should be taken to protect them 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 when ready for operation. 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. It is strongly recommended that flexible couplings are placed over pipes and anti-vibration mounts are fitted underneath the unit (equipment available as an option) to reduce vibrations, and the noise this causes, as much as possible.

Fitting accessories supplied separately

A number of optional accessories may be delivered separately and installed on the unit on site.

You must follow the instructions in the manual.

Electrical connections

You must follow the instructions in the manual. All information concerning electrical connections is stated on the wiring diagrams provided with the unit. Always follow this information to the letter.

Electrical connections must be made in accordance with best current practices and applicable standards and regulations. Electrical cable connections to be made on-site:

- Electrical power supply to unit
- Contacts available as standard enabling the machine to be controlled remotely (optional)

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

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

Pipe connections

You must follow the instructions in the manual. All pipes must be correctly aligned and slope toward the system's drain valve. Pipes must be installed and connected to allow sufficient access to the panels and fitted with heat insulation.

Pipe fixings and brackets must be separate to avoid vibrations and ensure no pressure is placed on the unit. Water flow shut-off and control valves must be fitted when the unit is installed.

Pipe connections to be made on site:

- Water supply with pressure-reducing valve
- Evaporator, condenser and drain
- Accessories essential to any hydraulic circuit must also be installed, such as:
- 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 tank if necessary)
- Flexible couplings on exchanger inlets and outlets

WARNING:

- Pressure in the water circuits below 4 bar for units equipped with the hydraulic module
- 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 (e.g. allow for the possibility of draining the unit). If glycol is added to prevent freezing, check its type and concentration before system start-up.
- Before making any final hydraulic connections, flush the pipes with clean water to remove any debris in the network

INSTALLATION RECOMMENDATIONS

System start-up

System start-up for these machines must be performed by CIAT or a CIAT-authorised firm.

You must follow the instructions in the manual.

List of system start-up checks (non-exhaustive):
- Correct positioning of the unit
- Power supply protections
- Phases and direction of rotation
- Wiring connections on the unit
- Direction of water flow in the unit
- Cleanliness of the water circuit
- Water flow rate at the specified value
- Pressure in the refrigerant circuit
- Direction of rotation of the compressors
- Water pressure drops and flow rates
- Operating readings

Maintenance operations

Specific preventive maintenance operations are required at regular intervals and should be performed by CIAT-approved contractors.

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

To do this, you must refer to and comply with the instruction 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.

CONTROL SYSTEM

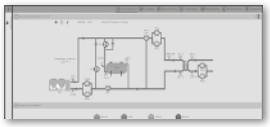
USER-FRIENDLY INTERFACE CONSOLE

- User-friendly 4.3-inch touch screen.
- Information displayed in a choice of languages.
- Temperature and pressure readings.
- Operating and fault status diagnostics.
- Master/slave control of two machines in parallel.
- Fault memory management.
- Pump management.
- Time schedule.
- IP Web server.
- Programmable maintenance.
- Preventive maintenance.
- FGAS maintenance.
- E-mail alerts.

REMOTE M2M MACHINE SUPERVISION

Two years of Full Serenity with:

- Monitoring of machine operation (operation overviews and curves, alarm logs).
- E-mail alerts for alarms (optional SMS alerts).
- Remote update of the M2M.
- Access to a log of machine operation data.
- Remote advice for using M2M.
- System start-up and operating readings.



PRODUCT FUNCTIONALITY

Via dry contact

Customer CMS COMMUNICATION

Via BUS communication

POTENTIAL-FREE (DRY) CONTACTS AVAILABLE AS STANDARD

Inputs:

- Automatic operation control
- Heating/cooling mode selection
- Selection of setpoints 1 / 2
- Power limitation

Outputs:

- General fault reporting
- Circuit fault reporting
- User fault display
- 0-10V output available for control of a variable flow pump (unit without hydraulic module)

Additional inputs available as options:

- Setpoint adjustment by 4-20 mA signal

Additional outputs available as options:

- On/off control for a boiler
- 4-stage on/off management for additional heaters

AVAILABLE OUTPUTS

- MODBUS-JBUS RTU (RS485) or TC/IP (standard) open protocol
- LONWORKS protocol (option)
- BACNET IP protocol (option)

CIAT SYSTEM FUNCTIONALITY

Communication with the Hysys system (generator, transmitter, air handling unit), controlled by a EasyCIAT control

or Smart CIATControl touch tablet.

- **Logging** of consumption data and temperatures
- **Optimal Water®**: optimisation of producer performance based on building requirements
- **Optimal Stop and Start** : optimisation of the restart time for the building

Order No: NA20.749A. Supersedes order No: NA19.749A.
Manufacturer: Carrier SCS, Montluel, France.