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AQUACIAT 2 HYBRID

ILDC - ILDH

Gas modules (MG)

Instruction manual

EN

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ORIGINAL TEXT: FRENCH VERSION

1. GENERAL INFORMATION

Thank you for choosing the **AQUACIAT2 HYBRID** heat pump. Your machine has been designed and manufactured using all the expertise of CIAT's teams of technicians and refrigeration specialists.

1.1 Intended use

AQUACIAT2 HYBRID ILDC - Gas modules (MG) models are heat pumps connected to a condensation gas boiler and designed to produce hot water and chilled water for heating, air conditioning and, as an option, domestic hot water (gas boiler only).

1.2 Documentation

This manual contains all of the operating instructions for your machine. Before carrying out any work on the machine, please read all of the instructions and make sure you have all the necessary documentation. This manual must be kept in the immediate vicinity of the unit. It does not cover the entire installation.

For more details about the installation and system start-up phases, please also refer to:

- The order documents
- The technical manual
- The dimensional drawing and assembly of modules
- The delivery note
- The wiring diagram(s)
- The hydraulic diagram of this manual, technical manual, or specific diagram of the case
- The individual manuals for any accessories
- The Connect 2 control module manual
- The labels affixed to the unit

1.3 Warranty

See general terms and conditions of sale

The CIAT system start-up procedure is carried out once the assembly completion notice has been sent with the order acknowledgement of receipt and the installation's certificate of conformity.

2. SAFETY INSTRUCTIONS

⚠ Before working on the "**Gas modules" (MG)**, make sure the gas and electrical supplies are switched off and locked.

Only experienced, qualified technicians may work on the machine. They must be provided with personal protective equipment (PPE): glasses, gloves, safety shoes and hearing protection.

To prevent the risk of accidents, you must take into account the specific features of the product throughout its life cycle, in particular:

- Pressurised hydraulic circuits containing a glycol/water mix;
- Pressurised refrigeration circuits containing refrigerant;
- Presence of voltage.
- Gas supply.

3. REGULATIONS

3.1 General information

- All **AQUACIAT2 HYBRID** units and all "**Gas modules"** are factory tested and checked.
- In addition to this manual, please comply with the regulations and legislation in force on the work site.
- This unit is not required to withstand earthquakes.
Earthquake resistance has therefore not been checked.

3.2 Applicable standards and directives

The **AQUACIAT2 HYBRID** conforms to:

- **EUROPEAN DIRECTIVES**
  - Machinery directive 2006/42/EC
  - Low Voltage Directive 2006/95/EC
  - Electromagnetic Compatibility Directive EMC 2004/108/EC
  - Pressure equipment PED 97/23/EC
  - Boiler efficiency directive 92/42/EWG
  - Gas appliance directive 2009/142/EWG
- **REGULATIONS:**
  - Reach
  - Fire protection regulations - CH articles applicable to the Gas modules (smoke evacuation, M0 walls, etc.)
  - Order dated 23 June 1978
  - Specifications C. 321.4

As well as the standards in the heat pump manual.

- RESPONSES TO EUROPEAN STANDARDS:

- EN 60-204, EN 378-2 and C1500
- EN 298
- EN 483
- EN 15420
- EN 55014-1 / -2
- EN 61000-3-2 / -3
- EN 60 335-1 / -2

3.3 Accreditation

The following accreditation is required to work on the unit:

- On the heat pump
  - **accreditation for work with refrigerant** in accordance with regulations, refer to heat pump manual N12-50
- Near or on electrical components
  - **electrical accreditation** in accordance with regulations.
- Near or on gas components
  - **gas accreditation** in accordance with regulations.

Technicians who install, commission, operate and service the unit must possess the necessary training and certifications, understand the instructions given in this manual and be familiar with the specific technical characteristics of the installation site.

3.4 Pressure and temperature

Pressure and temperature:

Pressure test (PT):
3 x PS pipes + nitrogen sealing test at 0.5 bar

Shipment temperature:
- Min. -25°C - Max. +50°C.

Storage temperature:
- Min. -25°C - Max. +50°C.

Operating temperature:
- Min. -15°C - Max. +46°C.

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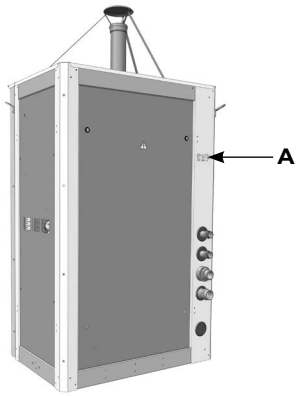
4. IDENTIFICATION

4.1 Data plate

Each AQUACIAT2 HYBRID Gas Module has a manufacturer's name plate (A) bearing the unit's identification number and description.

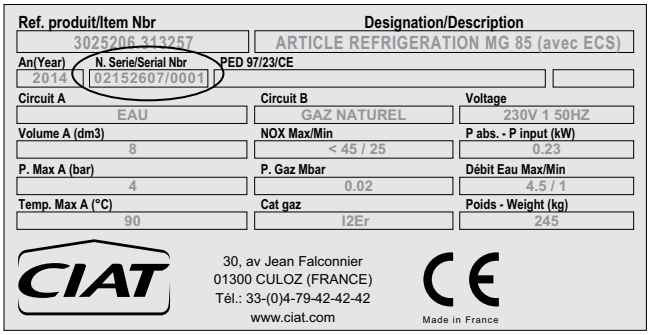
Make sure this information matches that on the order.

Markings (data plate, punch marks, labels) must remain visible. They must not be altered, removed or modified.



Key:

- **Désignation/Description:** Unit type (with DHW if option included).
- **An(Year):** Year manufactured.
- **N° série/Serial No.:** Production number. (to be quoted in all correspondence)
- **Circuit A:** Fluid type.
- **Volume A (dm3):** Capacity in dm3.
- **Max. P A (bar):** Maximum permissible pressure in bar.
- **Max. temp. A (°C):** Maximum temperature in °C.
- **Circuit B:** Fluid type.
- **Max/Min NOX:** Max./min. NOX level in mg/kWh.
- **Gas P Mbar:** H gas pressure (G20) in mbar.
- **Gas cat.:** Gas category.
- **Voltage:** Power supply (voltage).
- **Abs. P - input P (kW):** Power input in kW.
- **Max./Min. water flow rate:** Max. and min. water flow rate in gas boiler
- **Poids/Weight kg**: Operating weight of the unit in kg.



Ref. produit/Item Nbr		Designation/Description	
3025206 313257		ARTICLE REFRIGERATION MG 85 (avec ECS)	
An(Year)	N. Serie/Serial Nbr	PED 97/23/CE	
2014	02152607/0001		
Circuit A	Circuit B	Voltage	
EAU	GAZ NATUREL	230V 1 50HZ	
Volume A (dm3)	NOX Max/Min	P abs. - P input (kW)	
8	< 45 / 25	0.23	
P. Max A (bar)	P. Gaz Mbar	Débit Eau Max/Min	
4	0.02	4.5 / 1	
Temp. Max A (°C)	Cat gaz	Poids - Weight (kg)	
90	I2Er	245	

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www.ciat.com
CE
Made in France

Please include the identification number in all correspondence with CIAT.

5. DESCRIPTION

5.1 Main components

- Heat Pump (PAC)

- Gas Module (MG) comprising:

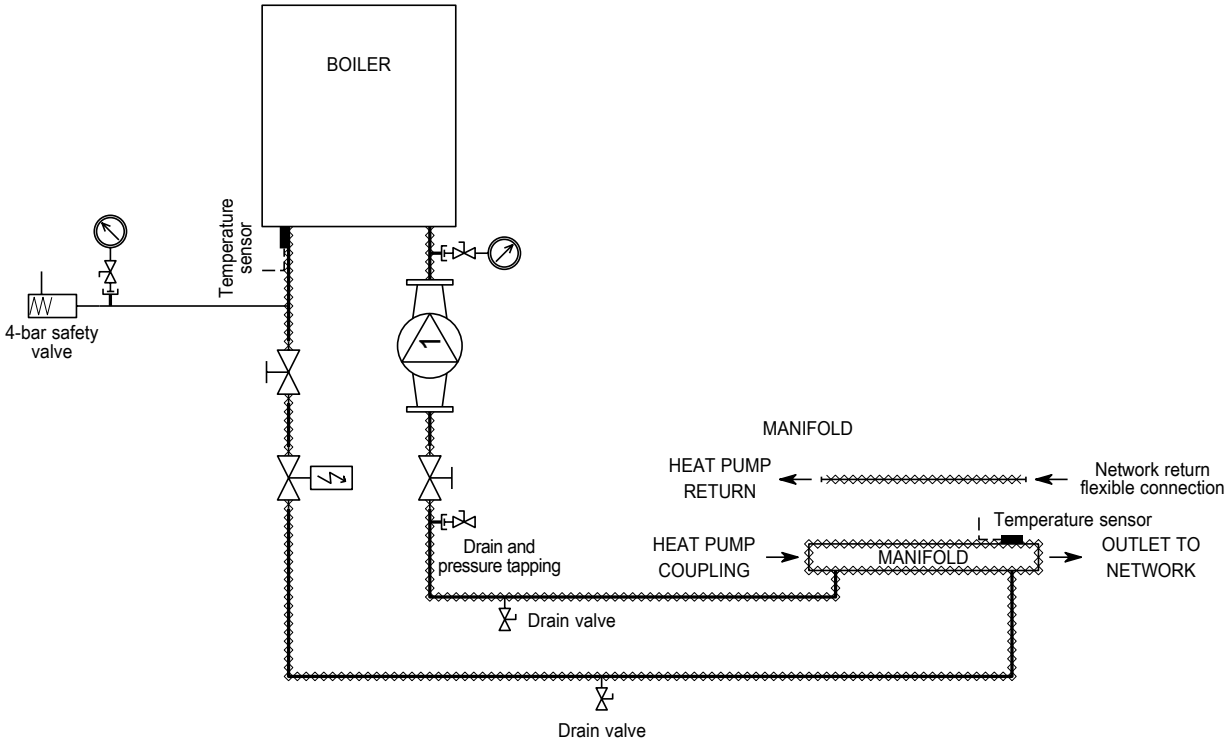
- **Boiler**
  - Gas modules use ELCO modulating condensation boilers.
- **Accelerator pump**
  - Complies with ErP 2015 directive with an Energy Efficiency Index (EEI) < 0.23.
  - LCD screen for pump configuration, control and fault signalling.
- **2- or 3-way valve**
  - 2-way sealed anti-thermosiphon, 3-way for DHW option.
  - 1 safety valve.
  - 1 drain hole with valve.
  - 1 accelerator pump shut-off valve assembly.

An optional 200 litre hydraulic module can be coupled to the heat pump.

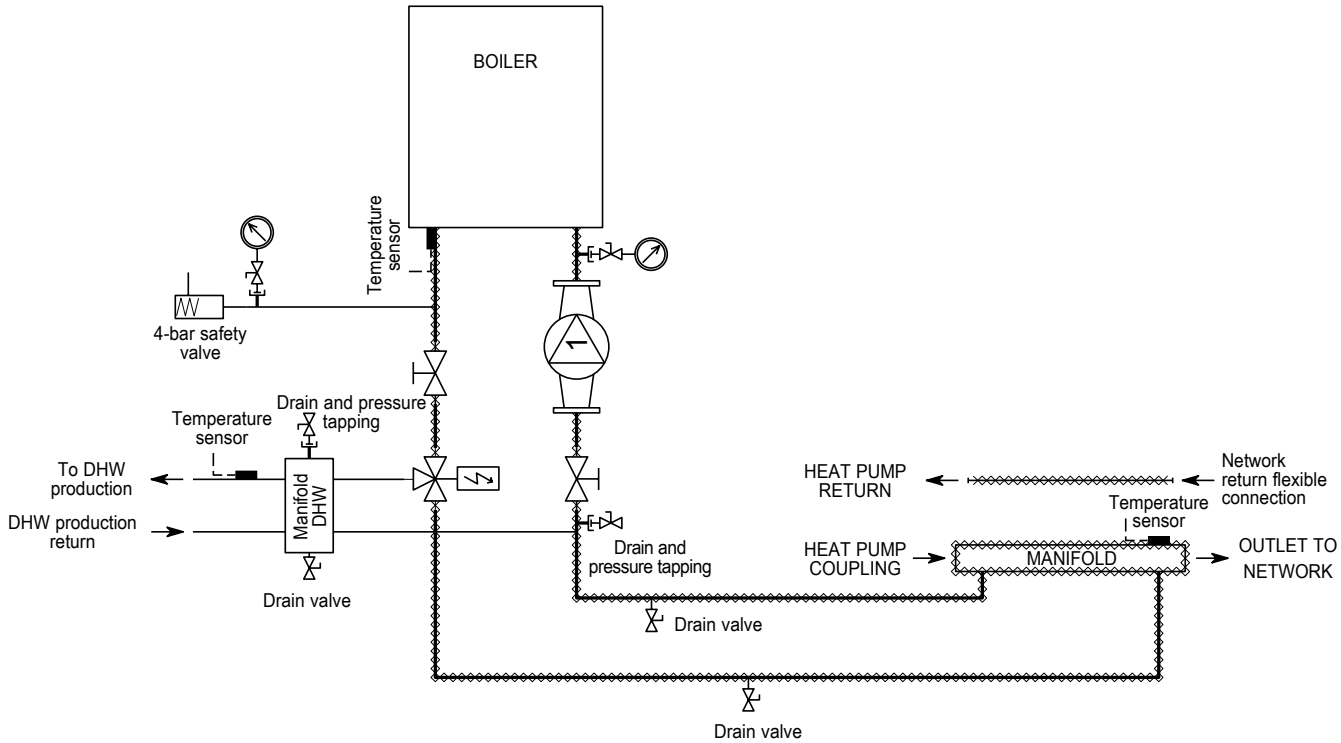
5.2 Hydraulic circuit (GAS module)

Schematic diagram

- **Standard**



- **With DHW option**



- **Key:**

Pressure gauge.

Pressure tapping.

Insulation.

Shut-off valve.

5.3 Operating ranges

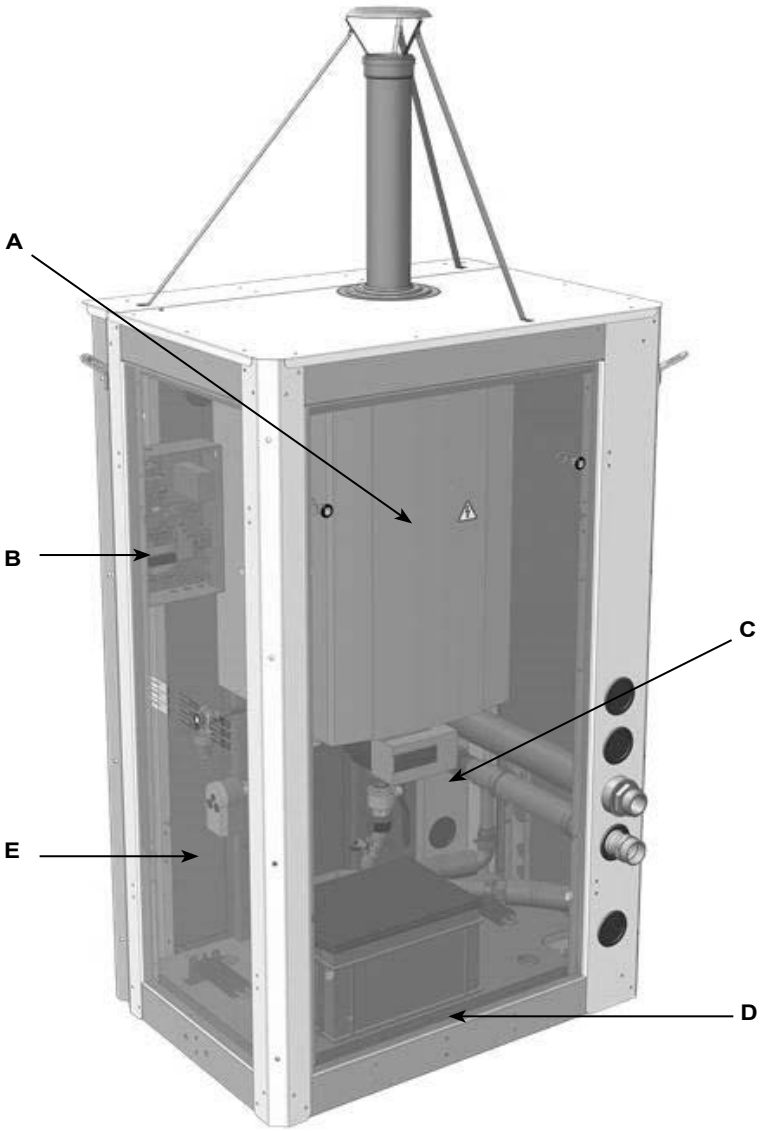
- Boiler
  - Boiler minimum T°: -25°C
- Heat pump
  - In cooling mode: -15°C / + 50°C
  - In heating mode: -12°C / + 20°C

5.4 Location of the main components

- STANDARD (STD) version

Key:

A: Gas boiler
B: Electrical panel
C: Boiler accelerator pump
D: Drain pan (option)
E: 2-3-way valve



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6. SPECIFICATIONS

6.1 Technical specifications

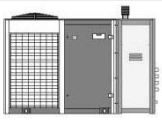
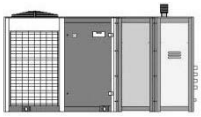
6.1.1 Heat pump

See AQUACIAT2 manual, version (NA12-50)

6.1.2 GAS only boiler module

ILDC - MG		MG 50	MG 65	MG 85
Nominal capacity 75-60°C	kW	45.8	60.9	81.3
Nominal capacity 40-30°C	kW	48.0	63.9	85.3
Efficiency at 100% 80-60°C NCV	%	97.6	97.4	97.4
Efficiency at 100% 40-30°C NCV	%	104.4	102.4	102.4
Modulating accelerator pump power input	W	130	130	130
Gas category			I2 Er	
Condensate max. flow rate	l/h	6	7	10
H gas max. consumption (G20) - 10.9 kWh	m^3/h	4.3	5.7	7.6
H gas max. consumption (G25) - 8.34 kWh	m^3/h	5.6	7.5	10.0
H (G20) and L (G25) gas pressure	mbar		20 and 25	
Maximum gas pressure	mbar		50	
Sound power level	dB(A)	56	56	56
Boiler			Condensation/Modulating forced draught burner	
CE certificate no. -			CE-0063CM3576	
Burner modulation range	%		100 to 17	
Combustion gas connections			Chimney (B23; B23P)	
Flue gas connection	mm	100	100	100
Boiler gas connection		Male 3/4"	Male 3/4"	Male 3/4"
Max. flue gas temperature at 80/60°C max./min.	°C	76/63	76/63	76/65
Max. flue gas temperature at 40/30°C max./min.	°C	55/39	55/39	55/41
Max. flue gas volume max./min.	m^3/h	89/14	119/19	159/25
Max./min. NOX level	mg/kWh	< 45 / 25	< 45 / 25	< 45 / 25
CO2 level G20/G25 natural gas at Pn	%	8,5	8,5	8,5
Fan max./min. operating pressure	Pa	150/15	150/15	150/15
Condensate outlet diameter	mm	22	22	22
Max. water temperature (safety thermostat)	ºC	96	96	96
Max. heating hot water outlet	°C		+60	
Max. DHW hot water outlet	°C		+80	
Boiler min. water flow rate at Pmin.	m^3/h	0.6	0.8	1.0
Boiler max. water flow rate at Pn (dT = 15)	m^3/h	2.7	3.5	4.5
Boiler water connections		R1.1/4"	R1.1/4"	R1.1/4"
Max./min. operating pressure	bar		4/1.5	
Module water capacity	l	7.0	7.0	8.0
Boiler accelerator pump	No.	-	-	-
Weight of boiler only	kg	60	60	68
Height without accessories	mm		1671	
Height with chimney	mm		2293	
Length/+couplings	mm		681/756	
Depth	mm		1055	
Storage temperature	°C		+50	
Water connections - heating circuit		R 2"	R 2"	R 2"
Water connections - DHW circuit		R1.1/4"	R1.1/4"	R1.1/4"
Gas connection -		R3/4"	R3/4"	R3/4"
Condensate connection	mm	22	22	22
MG/+ILDC height	mm		1671/1768	
Height with chimney	mm		2293	
Depth	mm		1055	
MG/+coupling width	mm		681/756	
Width (including couplings) MG/+ILDC/+MH	mm		756 / 2750 / 3430	
Module water capacity	l	7.0	7.0	8.0
GAS module empty weight	kg	220	220	230
MG operating weight	kg	235	235	245
Power supply	ph/Hz/V		1~50 Hz 230 V (+10%/-10%) + Earth	
Power protection device		IP44	IP44	IP44
Max./min. power input	W	198/151	228/156	297/168

6.1.3 AQUACIAT2 HYBRID assemblies

Possible combinations		No.1	No.2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
ILDC - MG	**Sizes**	**180V**	**180V**	**180V**	**200V**	**200V**	**240V**	**240V**	**300V**
Net cooling capacity	kW	46,77	46,77	46,77	53,16	53,16	61,50	61,50	75,29
Thermodynamic heating power	kW	48,74	48,74	48,74	55,25	55,25	64,12	64,12	81,75
Boiler heating capacity	kW	48.00	63.90	85.30	63.90	85.30	63.90	85.30	85.30
ILDC version without buffer tank									
Height without accessories	mm	1768	1768	1768	1768	1768	1768	1768	1768
Height with chimney	mm	2293	2293	2293	2293	2293	2293	2293	2293
Length	mm	2677	2677	2677	2677	2677	2677	2677	2677
Depth	mm	1055	1055	1055	1055	1055	1055	1055	1055
Weight (empty)	kg	868	868	878	871	881	876	886	1019
Total water capacity	l	11	11	12	11	12	11	12	12
Operating weight	kg	879	879	890	882	893	887	898	1031
ILDC version with buffer tank									
Height without accessories	mm	1768	1768	1768	1768	1768	1768	1768	1768
Height with chimney	mm	2293	2293	2293	2293	2293	2293	2293	2293
Length	mm	3358	3358	3358	3358	3358	3358	3358	3358
Depth	mm	1055	1055	1055	1055	1055	1055	1055	1055
Weight (empty)	kg	1065	1065	1075	1068	1078	1073	1083	1216
Total water capacity	l	211	211	212	211	212	212	213	216
Operating weight	kg	1276	1276	1287	1279	1290	1284	1295	1428

6.1.4 Hydraulic module

Maximum system capacity depending on expansion vessel fitted on unit. The buffer tank is already taken into consideration.
If the system has a greater capacity, an expansion vessel must be added to the installation to meet the excess capacity.

ILDC-ILDH			180V to 300V
Pure water	Max. 36°C water (1)	litre	2303
	Max. 46°C water (1)	litre	1367
Glycol/water mix	Max. 36°C water (1)	litre	1612
	Max. 46°C water (1)	litre	957

(1) The water temperatures given are those which can be reached when the machine is off.

6.2 Sensor specifications

Temperature sensors															
Temperature (°C)			-10	-5	0	5	10	15	20	25	30	35	40	45	50
Sensor resistance in Ω	Sensor	10 kΩ	55150	42250	32630	25390	19910	15720	12500	10000	8054	6527	5321	4363	3597

7. DELIVERY - HANDLING

7.1 Delivery

Two separate modules: Heat pump and gaz modules (MG)

These two elements are to be connected by the installer.
The condition of the equipment must be inspected as soon as it is received. Check that it has not been damaged in transit and that there are no accessories missing. Indicate any damaged or missing items on the delivery slip and notify the carrier of said damaged or missing items by registered letter within three days of delivery, with a copy sent to CIAT.

7.2 Lorry shipment:

During shipment, the load must be securely strapped in place to prevent any movement and to protect the unit from damage.

7.3 Lifting instructions

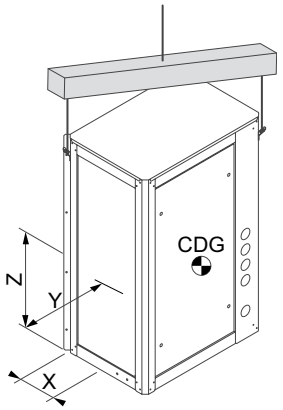
The equipment must be unloaded and positioned using suitable, standardised tools. Before handling, check that the path leading to the installation location is accessible and free from obstacles.

The weight and centre of gravity are shown on the handling label (affixed to the unit) and on the dimensional drawing.

Safety when lifting can only be guaranteed if all the instructions below are followed. Otherwise, there is a risk of damage to the equipment and personal injury.

- Take the time to read all of the labels affixed to the unit and follow the instructions they contain.
- Only attach the slings to the anchorage points intended for this purpose and designated by labels.
- Use slings with a suitable lifting capacity and follow the lifting instructions on the labels and drawings provided with the unit.
- The centre of gravity is not in the middle of the unit, and the forces applied to the slings are therefore not always identical.
- When lifting and positioning the unit, be careful not to tilt it (max. angle: 15°).
- To prevent damage to the casing, use textile slings with shackles.
- The slings must be kept apart using a spreader beam (or separator) to prevent damage to the casing.

- The unit must not be moved using a forklift truck.



ILDC-MG	Weight (kg)	Centre of Gravity (CoG)		
		X	Y	Z
50 - 65	235	289	520	920
85	245	290	518	924

8. INSTALLATION

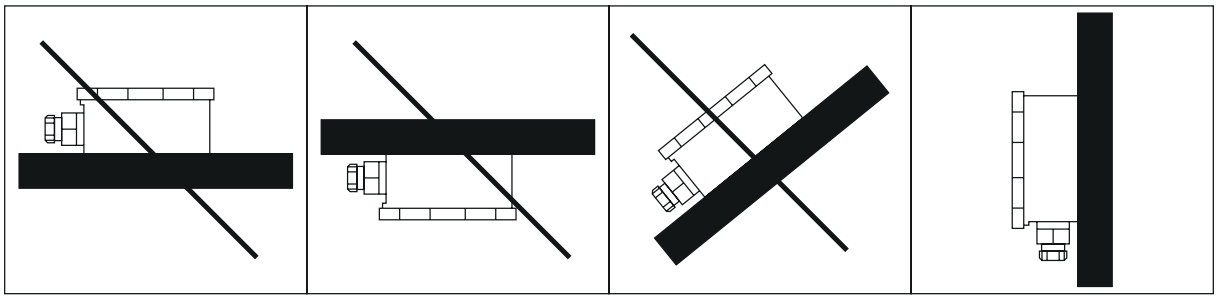
8.1 Warning for the installer

- The hydraulic circuits must be protected against the risk of freezing by installing heating elements or using a special energy transfer fluid (see § 9.7 "Frost protection"). If antifreeze is not added to the circuits and the unit is not operated during periods of freezing weather, the pipes must be drained.
- If the area is not secure, install an anti-break-in system with risk warnings including burns, injury, etc.
- In order to meet the operating conditions (flow rates, pressure drops), a dimensioning study must be performed.

8.2 Selecting a location

8.2.1 External temperature sensor

- The setting-up of the AQUACIAT2 HYBRID will have to allow location of the probe of outside temperature in north facade of the closest building(wire length available: 25 m). Where necessary, the probe must be positioned on the north face of the unity, has the shelter of any circulation of air (ventilator of the Heat pump, walked from the boiler). If none of these criteria can be respected, the customer will have to set up a meteo mast. (Not supplied by CIAT).
- The sensor cable must be protected from external aggression.
- Do not expose the outdoor sensor in direct sunlight and place the sensor in a vertical position:



8.2.2 AQUACIAT2 HYBRID

- The unit must be installed outdoors, in a well-ventilated area away from an ATEX area.
- Remember that certain components may be damaged by a corrosive atmosphere.
- The **AQUACIAT2 HYBRID** must be positioned outside in a location inaccessible to the public or animals, or which has an enclosure at least 2 m high that complies with local regulations relating to the installation of a combustion unit operating in the open air.
- The surface area of the ground or structure must be strong enough to bear the unit's weight.
- The selected location must not be liable to flooding.
- Position the unit above the average snow depth in the region where the unit is installed.
- The unit must be perfectly level.
- The area where the unit will be located must be completely accessible so that maintenance, service and cleaning operations can be carried out with ease.
- Several regulations relating to fire protection and the location of machines must be complied with, depending on the country in which the equipment is installed.
- The units must be placed on a floor constructed from M0 class incombustible material with the characteristics of a 2-hour fire protection rated component.
- In accordance with the local statutory constraints relating to boiler condensation discharge, a neutralisation device may be required (option).
- The unit should not cause a noise disturbance to the surrounding area.

- **Units operating in France** must be considered as "complete prefabricated assemblies designed to operate outdoors", able to be installed outdoors provided they comply with certain provisions.
  In terms of protection against fire risks, numerous statutory instruments relating to the location of units must be complied with, depending on the use of the building:

- Non-EOP buildings (Residential and Offices) and group 2 EOP buildings (category 5):

  There are currently no specific regulations, and it is recommended to apply the rules set out by the Association Française du Gaz (French Association of Natural Gas) in the two specifications for 2006 and 2010.

  These documents, which have been validated by public authorities, define the location of thermodynamic combustion cooling and/or heating production units operating in the open air and servicing office buildings.

  It is also possible to apply the regulations governing establishments open to the public (EOP).

- For Group 1 establishments open to the public (EOP) (category 1 to 4):
  Depending on the burner's output power, application of article CH6 or CH5 of the order dated 25/06/1980.

	Use of the building					
	Residential buildings		**Non-EOP residential and office buildings (or EOP Group 2 category 5)**		**Establishments open to the public (EOP Group 1 (category 1 to 4)**	
Statutory instruments	❸ CCH AFG 2010-01		❸ CCH AFG 2006-02		Order dated 25/06/1980 (CH articles)	
Capacity (heating or output power)	Total heating capacity ❶		Total heating capacity ❶		Output power ❷	
	> 35 kW and ≤ 85 kW	> 85 kW	> 35 kW and ≤ 85 kW	> 85 kW	> 30 kW and ≤ 70 kW	> 70 kW
Rules to be adhered to	Apply the EOP rules unless otherwise specified	Order dated 23/06/1978	Apply the EOP rules unless otherwise specified	Order dated 23/06/1978	Article CH6	Article CH5

❶ Heating capacity (non-EOP): burner input power
❷ Output power (EOP): machine output power
❸ CCH AFG: French Natural Gas Association specifications

N.B: The installation recommendations or regulations are included for information only and under no circumstances engage CIAT's liability.
Compliance with the local installation rules remains the strict responsibility of the machine installer.

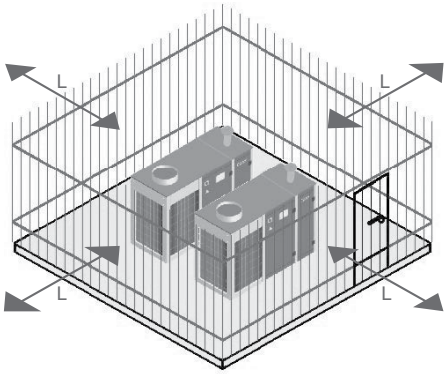
- **Outdoor installation rules (France)**

The unit must be installed outdoors, on the ground or on a terrace, on an M0 incombustible base.

Depending on the purpose of the building (Residential, offices, EOP) and the heating capacity or output power, a fire safety distance must be ensured between the unit(s) and the property boundary, a third-party property and the serviced building.

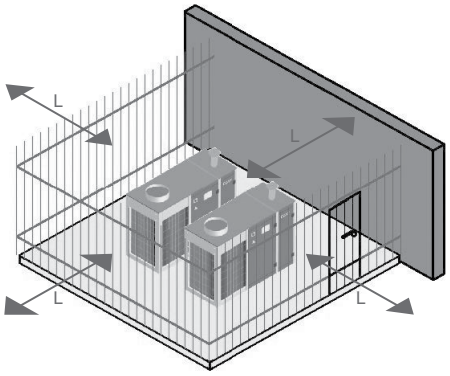
- If the min. safety distance (L) is respected

The unit may be installed in a location inaccessible to the public or rendered inaccessible by an enclosure at least 2 metres high.



- If a min. safety distance (L) cannot be respected

If the safety distance cannot be respected, a fire wall may be constructed, the dimensions and technical specifications of which will depend on the building use.
For EOP buildings, and depending on the proximity of the neighbouring buildings or public thoroughfares, fire resistance specifications will also be applicable to neighbouring façades (comply with the regulations).



Use of the building		
Residence	**Offices or Group 2 EOP**	**Group 1 EOP**
Rules: CCH AFG 2010-01	Rules: CCH AFG 2006-02	Rules: CH5 or CH6
If heating capacity > 35 kW and ≤ 85 kW **Min. distance L = 4.0 metres**	If heating capacity > 35 kW and ≤ 85 kW **Min. distance L = 5.0 metres**	If output power > 30 kW and ≤ 70 kW **Min. distance L = 5.0 metres**
If heating capacity > 85 kW **Min. distance L = 8.0 metres**	If heating capacity > 85 kW **Min. distance L = 10.0 metres**	If output power > 70 kW **Min. distance L = 10.0 metres**

Use of the building		
Residence	**Offices or Group 2 EOP**	**Group 1 EOP**
Rules: CCH AFG 2010-01	Rules: CCH AFG 2006-02	Rules: CH5 or CH6
If heating capacity > 35 kW and ≤ 85 kW **Fire protection rating = 1 hour**	If heating capacity > 35 kW and ≤ 85 kW **Fire protection rating = 1 hour**	If output power > 30 kW and ≤ 70 kW **Fire protection rating = 1 hour**
If heating capacity > 85 kW **Fire protection rating = 2 hours**	If heating capacity > 85 kW **Fire protection rating = 2 hours**	If output power > 70 kW **Fire protection rating = 2 hours**

N.B: The system schematic diagrams are provided for information purposes only; under no circumstances do they constitute a model for installation.

8.3 Gas supply

The Aquaciat2 HYBRID gas boiler module is reserved exclusively for use with natural gas.
The gas supply must comply fully with applicable national and local standards and regulations.
The maximum gas inlet pressure is measured under standard machine operating conditions, and a pressure controller will be installed if necessary, as well as a gas filter.
A rapid shut-off device must be installed on or near the gas modules supply in accordance with the statutory requirements.

8.4 Water quality

▪ **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 operation of the chilled water/hot water production unit and its service life. The use of untreated or incorrectly treated water may result in deposits of scale, algae, micro-organisms or sludge, or cause corrosion or erosion in the hydraulic circuit.
- The permanent introduction of oxygen into the system must be avoided. To ensure this, the pressure in the system must be above atmospheric pressure throughout the installation.
- To protect parts of the installation made from "ordinary" steel, it is recommended to ensure a pH of above 8 and a chloride level of no more than 50 mg/l.
- The water must be tested to determine whether it is suitable for the unit and whether chemical treatment will suffice to make it of acceptable quality and if a water softening/ demineralising system should be installed.
- The results of the analysis must confirm whether the site's water is compatible with the various materials used on the CIAT unit's circuit:
  - 99.9% copper tubes brazed with copper and silver,
  - Threaded bronze couplings or flat steel flanges, depending on the unit model,
  - Plate heat exchangers and connections made of AISI 316/ DIN 1.4401 stainless steel brazed with copper and silver.

Heating source and heat exchanger in austenitic stainless steel.
Comply with the antipollution standards in force if connecting the heating system to a drinking water system, and fit a check valve.

> **Warning:** CIAT shall not be held liable for damage resulting from the use of untreated or incorrectly treated water, or of saline, brackish or poorly filtered water.

8.5 Sound level

- Our units are designed to operate at moderate sound levels for this type of equipment. However, when designing the installation you must take into account airborne and solid-borne noise transmission (vibrations).
- To limit vibrations transmitted by solid materials as much as possible, all of the unit's interfaces must be insulated by placing sleeves on the air ducts, flexible couplings on the hydraulic pipes and anti-vibration mounts between the support and the base frame (see § 9.8 LOCATION).

8.6 Condensate draining

- Condensing water from the boiler is evacuated outside the gas module via a flexible connection with a siphon. In accordance with local regulations, the water can be drained onto a gravel bed, or connected to the sewer via a drain pipe with frost protection.

Depending on the local statutory constraints governing condensate discharge, the gas modules (MG) may be equipped with a device designed to neutralise it. (option).

8.7 Frost protection

- The frost protection is made up of finned heaters arranged in the gas module to remove the risk of frost in the hydraulic circuit.

The boiler protects itself against frost.

- To benefit from "frost protection", the electrical cabinet must be constantly powered on. All precautions must be taken to prevent accidental power outages.
  The external pipes must be protected from frost.

▪ **Using a glycol/water mix**

> ⚠ Only MPG can be used with the DHW option

If you use a concentrated dilutable solution to protect your hydraulic circuit, please follow the instructions below:

- Always dilute the antifreeze with water before adding it to the system. Never add them separately;
- Always mix the correct amounts of water, antifreeze and corrosion inhibitor in a container before adding them to the system.

▪ **Procedure**

1. Always rinse and flush the system completely to remove any remaining water.
2. Follow up the final rinse with a complete drain of the system.
3. Add the water/antifreeze/corrosion inhibitor and pressurise with the hydraulic pump. We recommend that you use a filling device which has a check valve. This will ensure compliance with water protection standard NF EN1717. The device must not, under any circumstances, be connected to the municipal water supply if the additives used in the hydraulic circuit have not been approved by the Ministry of Health (e.g. monopropylene glycol (MPG) products with approval: NEUTRAGEL SANIT or HELIOGEL CS 80).
4. Drain the system thoroughly.
5. Allow the mixture to run through the entire system for at least 2 hours before starting the unit.
6. Use a hydrometer or a refractometer to check the final proportion obtained.
7. Use litmus paper or a pH meter to check the pH obtained.
8. Affix a label, in a visible location, stating:
   - That the system contains antifreeze,
   - The name of the product and its supplier,
   - The proportion and the pH at system start-up.

Always top up with the same type of mix initially used.

The table and the curves below indicate the minimum percentages of glycol with which the system must be provided depending on the freezing point.

WARNING:

The glycol concentration must protect the fluid to at least 6°C below the water outlet temperature specified for the evaporator to allow correct setting of the minimum pressure regulator at the evaporator.

Concentration	%	0	10	20	30	40	50
Propylene glycol	°C	0	-2	-5	-10	-15	-21

8.8 Location

8.8.1 On site

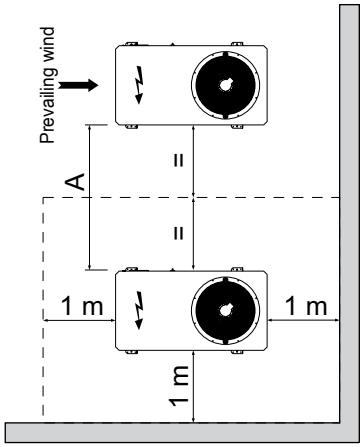
See § 8.2.2 AQUACIAT2 HYBRID

8.8.2 Positioning of the machines on the ground

- **Clearances to be maintained**

Dimensions and clearance (to be adhered to) required for maintenance of the unit (see dimensional drawing supplied with the unit)
It is important for the chillers to be installed with the necessary clearances:

- So that air discharged by the condenser is not drawn back in through the intake.
- To allow sufficient room for maintenance on the unit
- To enable the electrics box access door to be opened (see dimensional drawing).
- Where possible, follow the guidelines for positioning the equipment in relation to the prevailing winds.



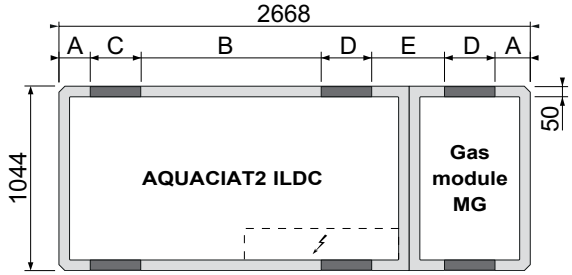
2 units: A = 2 m,
3 or more units: A = 3 m

EN

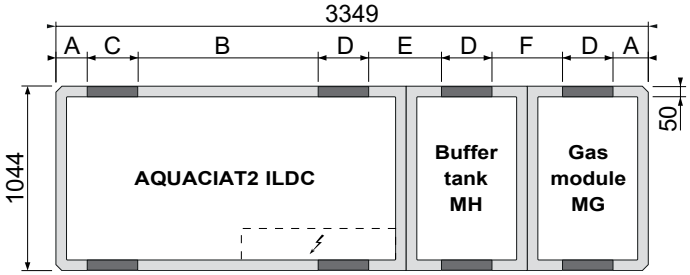
8.8.3 Anti-vibration mounts

The units are equipped as standard with anti-vibration mounts supplied in strips and designed to be positioned under the frame as shown in the diagram below.
This type of strip does not allow the frame to be affixed mechanically to the floor.

AQUACIAT2 HYBRID ILDC
(without buffer tank)



AQUACIAT2 HYBRID ILDH
(with buffer tank)

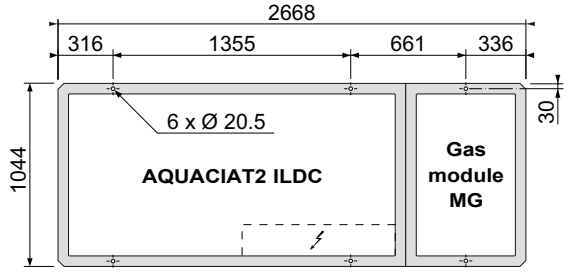


Size	A	B	C	D	E	F
180V-G50	196	1126	P25 50 x 150	P25 50 x 200	600	481
180V-G65	196	1126	P25 50 x 150	P25 50 x 200	600	481
180V-G85	196	1126	P25 50 x 150	P25 50 x 200	600	481
200V-G65	196	1126	P25 50 x 150	P25 50 x 200	600	481
200V-G85	196	1126	P25 50 x 150	P25 50 x 200	600	481
240V-G65	196	1126	P25 50 x 150	P25 50 x 200	600	481
240V-G85	196	1126	P25 50 x 150	P25 50 x 200	600	481
300V-G85	196	1076	P25 50 x 200	P25 50 x 200	600	481

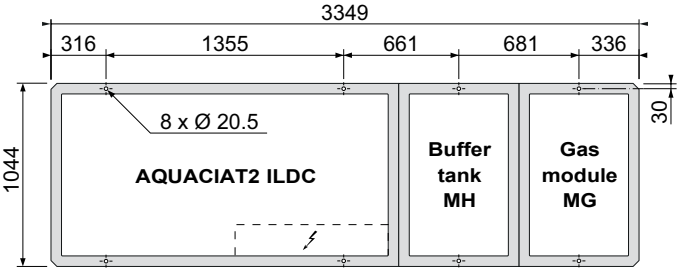
8.8.4 Ground mounting of base frame

The frames can be affixed mechanically to the mounts using bolts (NOT supplied by CIAT).
Six drilled holes for the ILDC and 8 drilled holes for the ILDH, of a diameter of 20.5 mm, are provided for this purpose underneath the frames.
The hardness is defined by the unit's weight distribution and centre of gravity.

AQUACIAT2 HYBRID ILDC
(without buffer tank)



AQUACIAT2 HYBRID ILDH
(with buffer tank)



9. CONNECTIONS

9.1 Assembling the hydraulic module

See attached drawings

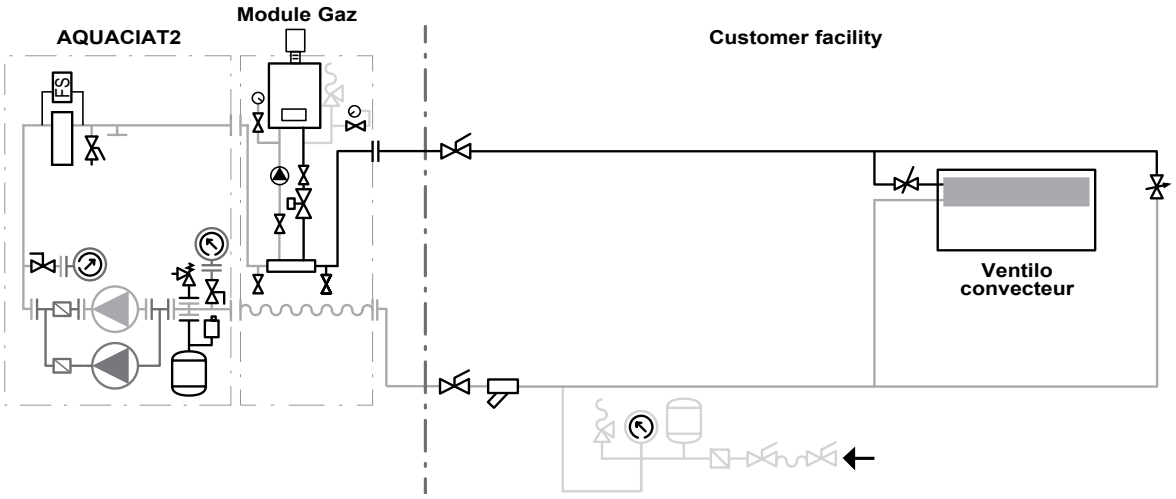
9.2 Hydraulic schematic diagrams

The system schematic diagrams are provided for information purposes only; under no circumstances do they constitute a model for installation.

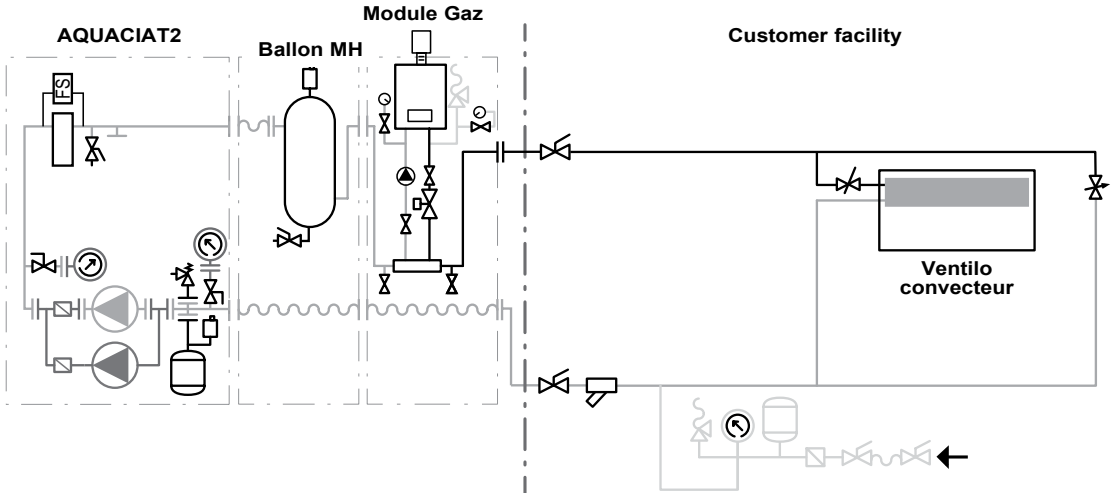
9.2.1 Chilled water/hot water hydraulic circuit

- **2-tube standard version**

AQUACIAT2 HYBRID ILDC (with pump only)



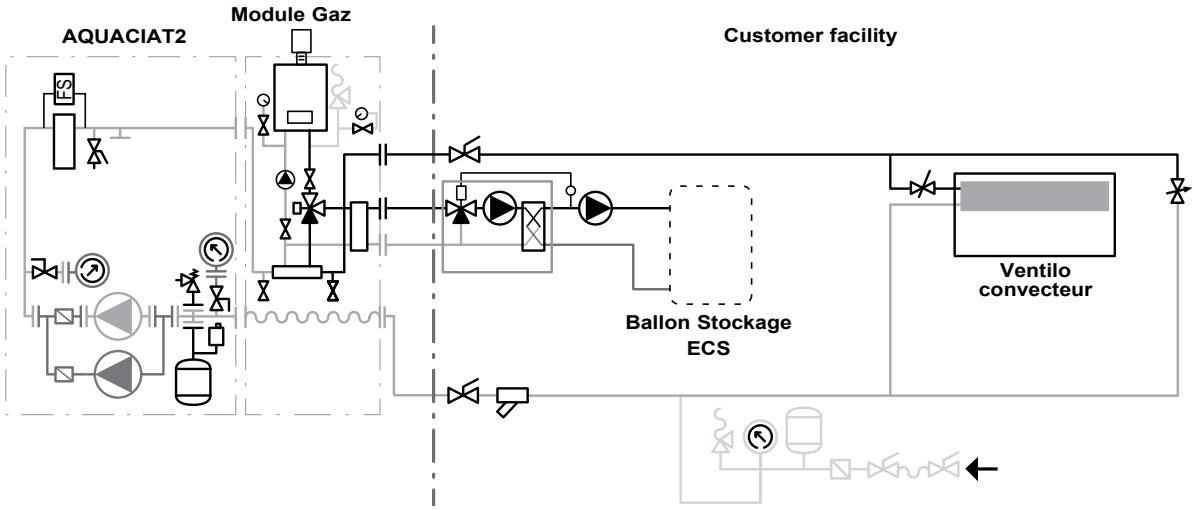
AQUACIAT2 HYBRID ILDH (with pump and buffer tank)



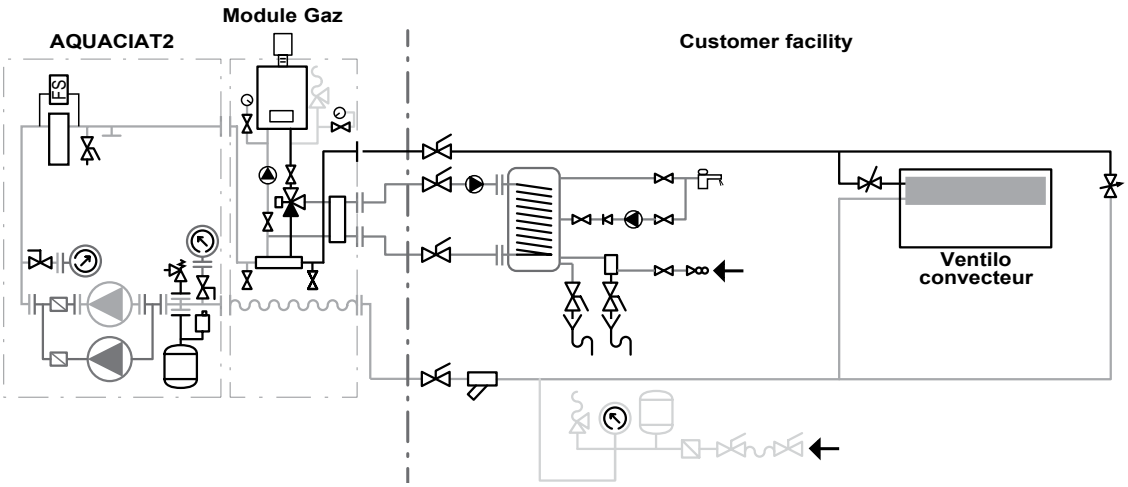
9.2.2 High-temperature primary hydraulic circuit for DHW heating

- **4-tube version (option)**

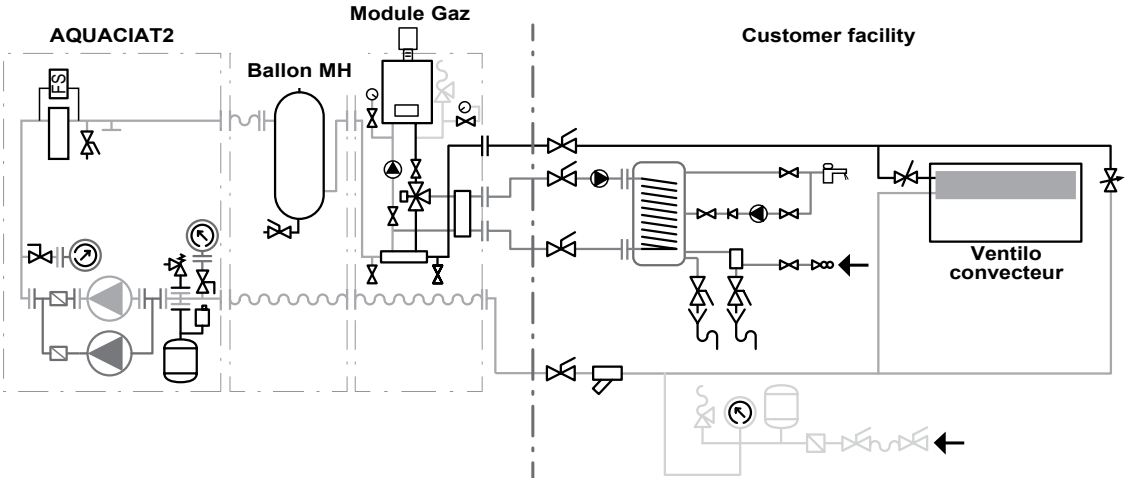
AQUACIAT2 HYBRID ILDC (with DHW production by a Saniciat2)



AQUACIAT2 HYBRID ILDC (with DHW production by coil in a DHW tank)



AQUACIAT2 HYBRID ILDC (with DHW production by coil in tank with buffer tank)



9.3 Hydraulic connections

These must meet the following requirements:

- Respect the connection direction (inlet/outlet) indicated on the module and the dimensional drawing.
- Install shut-off valves near the water inlets and outlets in order to isolate the module.
- Thermally insulate the pipes and hoses to prevent heat loss and condensation.
- Install manual or automatic air bleed valves at the high points of the circuit(s). The bleed valves mounted on the machine are not designed to bleed the rest of the hydraulic circuit.
- We recommend connecting the gas modules (MG) with flexible couplings to reduce the transmission of vibrations to the building as far as possible (essential if the module is installed on anti-vibration mounts).
- The system pipework must be secured to the wall of the building or the ground and must not place any additional load on the unit.
- The installer must provide the necessary systems for filling and draining the energy transfer fluid.
- The piping must not transmit any force or vibrations to the unit.
- Accessories essential to any hydraulic circuit (balancing valve, air bleed valves, low point connections for draining, expansion vessel, thermometer pockets, filter, etc.).

9.4 Electrical connections

- **CONNECTING THE HEAT PUMP:** Refer to the heat pump manual
  - All wiring must be connected in accordance with the codes and regulations that apply to the installation site (in France, NF C 15100).
  - Always refer to the wiring diagram provided with the unit.
  - Observe the power supply specifications indicated on the name plate.
  - The voltage must remain within the range indicated:
  - Power circuit: 400 V(+/-10%) – 3 ph – 50 Hz + Earth.
  - Control circuit: 230 V (+/-10%) - 1 Ph – 50 Hz + Earth.
  - The frame of the unit must be earthed.

9.5 Natural gas connection

The boiler module must be connected to a natural gas supply pipe with a pressure of 20 mbar.
This operation must comply with local regulations governing the connection of a boiler to the gas system and be carried out by qualified personnel.

9.6 Assembling separately supplied accessories

The valve, filter and gas supply pipes must be installed by qualified personnel.
The chimney must be positioned using stays (see assembly drawing)
Remove the condensate drain pipe
If the recovery pan and condensate treatment option is installed, fill the pan with the supplied granules in accordance with the instructions supplied with the pan.

10. CONTROL

10.1 Control principle

The Boiler operation is controlled by the Connect2 control module based on the outdoor temperature and the cost of the energy supplies, electricity and gas. It switches between the heat pump and the boiler.
In the standard configuration, the hot or cold water control sensor is located on the heating system water return.

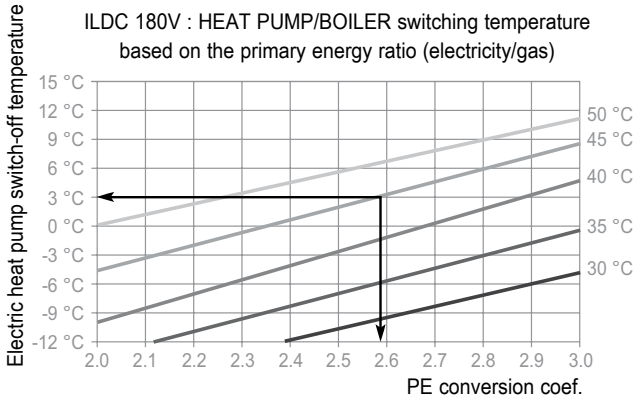
- During heat pump operation, if necessary, the control system can activate and deactivate the boiler as a third stage; likewise, during boiler operation, the control system can, if necessary, activate and deactivate the two heat pump stages as the gas modules (MG's) second and third stage.
- In HEATING mode, two usage profiles are possible to govern the operating priority between the heat pump and the gas boiler :
  - Either according to a primary energy performance criterion based on a minimum COP for the heat pump.
  - Or according to an economic criterion based on the ratio between the cost of electricity and the cost of gas.

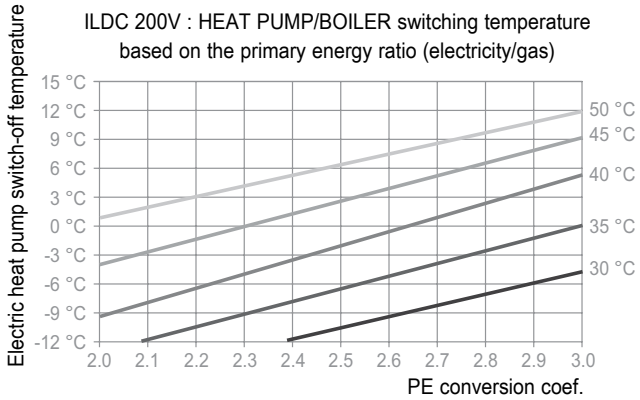
Operation based on primary energy

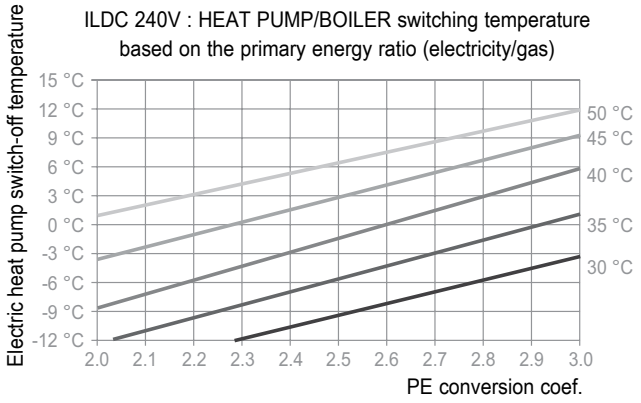
The principle relies on determining the outdoor temperature at witch the heat pump's minimum COP value will be obtained (2,58 for France), based on the required hot water outlet temperature.
Below this temperature, the boiler will be switched on and the heat pump stopped.
Applied to electricity, this conversion coefficient means that in France, 2.58 kWh of primary energy are required to supply 1 kWh of electrical energy, with natural gas having a value of 1.00.
Therefore:1 kWh of electricity = 2.58 kWh of primairy energy (gas)

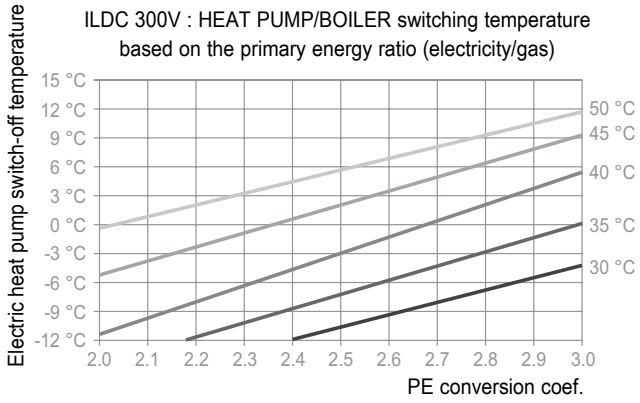
Determining the outdoor temperature for activating the boiler (primary energy)

In the example below, for a hot water production temperature setpoint of +45°C, the gas boiler will be activated in France at an outdoor temperature of approximately 3°C with a coefficient of 2,58.









Operation based on energy costs

This involves determining the outdoor temperature at which a COP value for the heat pump corresponding to the equilibrium point between electricity and gas will be reached, in terms of energy consumption level costs.

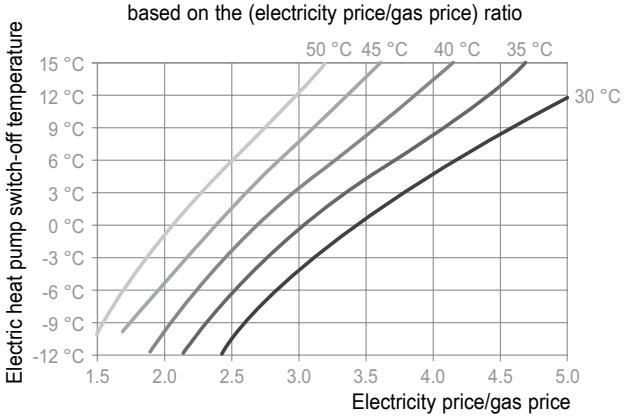
$$\text{COP equilibrium} = \frac{\text{Price of kWh electricity}}{\text{Price of kWh of gas}} \times \text{Boiler output}$$

This coefficient of performance depends on the required hot water temperature setpoint for a given outdoor temperature and corresponds to the ratio between the cost of a kWh of electricity and of a kWh of gas.
Below this COP equilibrium value, the gas boiler will be switched on and the heat pump stopped. Above this value, the operating priority will be given to the heat pump, as the cost of its electricity consumption will be less than that of gas.

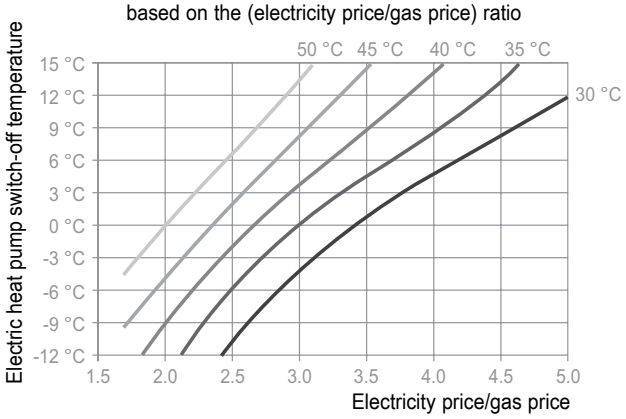
Determining the outdoor temperature for activating the boiler (energy cost)

In the example below, for a hot water production temperature set point of +45 °C, and a price for electricity witch is 2,5 times the price of natural gas, the gas boiler will be activated at an outdoor temperature of approximately +3 °C.

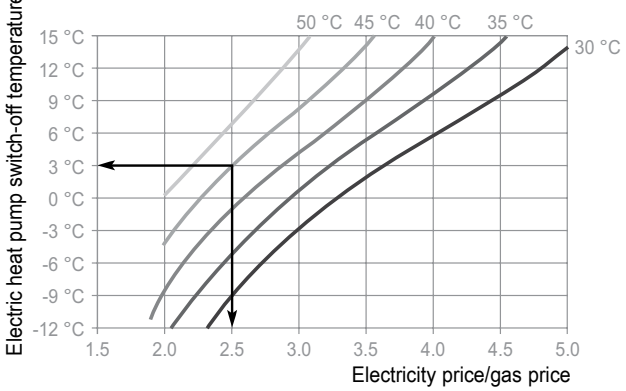
ILDC 180V : HEAT PUMP/BOILER switching temperature based on the (electricity price/gas price) ratio



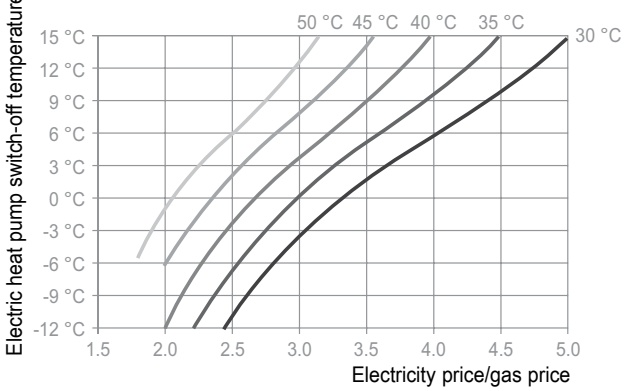
ILDC 200V : HEAT PUMP/BOILER switching temperature based on the (electricity price/gas price) ratio



ILDC 240V : HEAT PUMP/BOILER switching temperature based on the (electricity price/gas price) ratio



ILDC 300V : HEAT PUMP/BOILER switching temperature based on the (electricity price/gas price) ratio



DHW mode OPTION: This involves production, by the gas boiler only, of a high-temperature primary, which enables DHW to be heated either by a tank with a coil or with a heat exchanger or SANICIAT2 type DHW preparer.

The hybrid heat pump is designed to produce DHW through semi-accumulation or accumulation, but never through instantaneous production.

The production of DHW with natural gas is independent of that of the heating and air conditioning, allowing the heat pump to continue to operate in accordance with energy rulings for its control in COOLING and HEATING modes.

The integration of a hydraulic compensator inside the module helps eliminate pressure drops in the primary network between the gas module and the DHW preparer:

- The boiler accelerator pump guarantees operation between the boiler and the hydraulic compensator.
- On the installation side, an accelerator pump guarantees the primary water flow between the DHW preparer and the gas module.

N.B.: To benefit from the highest possible primary temperature at the outlet of the hydraulic compensator, the flow rate in the preparer primary circuit must be lower than the flow rate entering the gas boiler. (see below for table of maximum flow rates in the boilers)

Gas module (MG)		MG50	MG65	MG85
Boiler max. water flow rate	**m/h**	2.7	3.5	4.5

The production of High-Temperature Water is controlled by an on/off input (on connector J2 terminals 5-6 of the gas module's add2 board) or by a Bus connection from the operator.

The hybrid heat pump has two DHW modes. The first gives priority to DHW production, and the second to the heating comfort temperature, when the minimum comfort temperature is reached (configurable temperature), the DHW cycle is interrupted for the time required to increase the temperature of the heating network to the temperature setpoint.

A maximum DHW cycle time can be configured as a safety measure.

10.2 Connect 2 control module

The gas modules are equipped with an expansion board connected via a modbus connection to the heat pump's Connect2 control and display module (minimum version V17)

- **Main functions:**
  - Water temperature control.
  - There are three control options:
    1. Water return difference.
    2. PI on the water return in gas boiler operation.
    3. Temperature setpoint drift based on the outdoor temperature (water laws).
  - On the heat pump console, set the specific gas modules parameters:
  - Parameter P22.1 (heat pump-hybrid) at 1 – YES without DHW or 2 YES with priority DHW, or 3 with comfort DHW, depending on whether gas modules has DHW
  - Parameter P22.2 at 0 or 1 (DHW cycle with heating assistance) Authorisation of the heat pump operation below the DHW switching point.

For a detailed description of all these functions, refer to the **Connect 2** practical manual.

10.3 Customer connection module for remote control functions on the Gas Module

Off-peak/peak times contact:
- J2 connector terminals 4-5

DHW demand: (see parameter P119.1)
- By on/off connector J2 terminals 5-6 of the gas module's add2 board.
- By Bus connection

These are potential-free contacts

The heat pump's Connect2 control and display module is equipped with:
- RS485 output for CMS link (ModBus-JBus),
- Ethernet output for CMS link (ModBus-TCP),

10.4 Control and safety devices

All of the heat pump-hybrid unit's safety devices are managed by the electronic circuit board in the Connect 2 module. If a safety device trips and deactivates the unit, look for the fault, reset if necessary and clear the fault using the RESET button on the console.
- The unit will restart when the minimum time required by the short-cycle protection has elapsed.
- To find out the setting values of the various safety devices and the fault clearance procedures, refer to the manual for the Connect 2 control module.

11. SYSTEM START-UP

AQUACIAT2 HYBRID machines must be started up by CIAT or a CIAT-authorised company.

11.1 Preliminary checks

- Check the following points:
  1. Check that the network voltage matches the unit voltage and that its value remains within the authorised limits (+10% to -10% compared to rated voltage).
  2. Check that the unit complies with the hydraulic and wiring diagrams.
  3. Check that all components are as specified on the drawings.
  4. Check that all documents and safety devices required by applicable European standards are present.
  5. Check that there is sufficient clearance around the system for maintenance and emergency purposes.
  6. Check that the clamps on all pipes are secure.
  7. Check the tightness of the hydraulic couplings and gaskets. Check there are no leaks on the hydraulic circuit.
  8. Check that all mechanical guards are in place and functional.
  9. Close the pipe drain valves.
  10. Before opening the boiler's water circuit valves, ensure that the heating and DHW preparer circuit has been correctly drained (if DHW option included). **Warning:** the boiler draining procedure does not drain the entire system. After opening the boiler's water circuit valves, drain the boiler (the boiler has an automatic bleed valve, referring to the boiler manual for the instructions).
  11. Checking the gas supply and pressure.
  12. Check the gas connection sealing.
  13. Ensure that the condensate connection siphon is full of water - if not, fill it.

11.2 Commissioning the heat pump

- The system must be started and commissioned by a qualified technician (refer to instruction manual NA12.50).
- Operating readings are created

11.3 Commissioning the boiler

- The system must be started and commissioned by a qualified technician. (refer to the boiler instruction manual).
- Operating readings are created

11.4 Essential points that must be checked

- Verify the boiler accelerator pump's direction of rotation and that its flow rate matches that indicated on the name plate. (For setting, refer to the sheet suplied with the gas module)
- Ensure that the motorised valve is reset when powering up.
- Verify the position of the 2-way motorised valve (3-way with DHW option) 00% during operation of the AIR CONDITIONING or DHW, 100% when the boiler is in heating mode.
- Verify the rise in temperature. The boiler must have a temperature difference of 15 K.

12. USE

12.1 Recommendations for use

- **Noise**
  - While short-term exposure to a moderate noise level does not pose a risk, we recommend that persons working near to sources of significant noise wear hearing protection. However, this must not prevent the use of other essential protective equipment such as safety glasses and gas masks.

12.2 Prolonged stoppages

- Long stoppages can cause corrosion to develop or lead to its acceleration by differential aeration or bacterial development, mainly due to the presence of water. As soon as an installation is stopped for a few weeks (downtime, closing down for holidays, etc.) the water circuit must be carefully drained. If necessary, use compressed air to remove any stagnant water, especially from inside pipes.
- If the circuit is left without water for over a month, fill it with nitrogen to prevent corrosion.

13. MAINTENANCE

13.1 Recommendations for maintenance

- To ensure the unit operates correctly, we recommend that you sign a maintenance contract with your installer or an approved maintenance company.
- All work on the unit's electrical or hydraulic systems must be carried out by a qualified authorised technician.
- Perform operating inspections in accordance with national regulations.
- Do not work on any electrical components without first switching off the unit's main disconnect switch in the electrics box.
- Keep the unit clean. Retouch the paintwork if necessary.
- To prevent accidents and ensure proper ventilation, keep the unit and the space around it clean and clear of clutter.
- Do not climb on the unit. Use a platform when working at height.
- Any opening or closing of a shut-off valve must be performed with the unit off.

13.2 Preventive maintenance

- Keep informed about current environmental standards and applicable regulations concerning the site, particularly regarding regular inspections.
- The intervals for cleaning are given as a guide and should be adapted to each unit.

- **Weekly checks**

  With the unit running at full capacity, check the following values:
  - Look for traces of water under or around the unit, and listen for any unusual noises;
  - The water inlet and outlet temperatures in the exchangers;
  - Check whether the safety devices operate correctly.

- **Monthly checks**

  In addition to the weekly checks, you should also check:
  - For corrosion on all metal parts (frame, casing, exchangers, electrics boxes, etc.).
  - The condition of the insulating foam (detachment or tears).
  - The energy transfer fluids for any impurities which could cause wear or corrosion in the exchanger.
  - The sealing of the various circuits.
  - Whether the safety devices and expansion valves operate correctly.

- **Annual checks**

  In addition to the monthly checks, you should also check:
  - The electrical connections to ensure they are tight and in good condition.
  - For the presence of moisture in the electrics box.
  - The water quality or condition of the heat transfer fluid.
  - The concentration of the frost protection (MPG).
  - Clean the water filter and bleed air from the circuit.

13.3 Corrective maintenance

- Experience shows that common faults are often easy to fix. There are three such causes in particular:
  1. Problems with the hot or cold fluid circuits.
  2. Failures of electric components such as relay coils or electrical valves, etc.
- Faults detected by the safety devices are not necessarily caused by a sudden change in the measurement being monitored. Taken regularly, readings should make it possible to anticipate future trips.
- Perform the checks listed in the table of § 15. Operating readings. If you notice that a magnitude deviates from its normal value and gradually moves closer to the safety limit. du § 15. OPERATING READINGS.

14. PERMANENT SHUTDOWN

14.1 Decommissioning

- Separate the units from their energy sources, allow them to cool then drain them completely.

14.2 Dismantling recommendations

- Use the original lifting equipment.
- Sort the components according to their material for recycling or disposal, in accordance with regulations in force.
- Check whether any part of the unit can be recycled for another purpose.

14.3 Fluids to be recovered for treatment

- Energy transfer fluid: depending on the system, water, glycol/water mix, etc.

14.4 Materials to be recovered for recycling

- Steel
- Copper
- Aluminium
- Plastics
- Polyurethane foam (insulation)

14.5 Waste Electrical and Electronic Equipment (WEEE)

- At the end of its life, this equipment must be disassembled and contaminated fluids removed by professionals and processed via approved channels for electrical and electronic equipment (WEEE).
- In France, CIAT has formed a partnership with ECOLOGIC for the collection and recovery of professional waste governed by European Directive WEEE 2012/19/EU. This partnership simplifies the mandatory administrative procedures and ensures that old equipment is recovered via an official, structured channel. In terms of renovation work in France (mainland and overseas), for every CIAT unit installed, our partner will collect and dismantle your existing equipment (see conditions with Ecologic).
- To request collection, please contact:
  Ecologic +33 (0)1.30.57.79.14 - operation-pro@ecologic-france.com
- For other countries, please refer to the legislation in force and the specific solutions available to ensure your waste is processed legally.

15. OPERATING READINGS

Record the operating readings at least twice a year and at each start-up for units used seasonally.

	Date/Time					
Gas boiler	Water inlet temperature	°C				
	Water outlet temperature	°C				
		°C				
	Flue outlet temperature	°C				
Gas module	Water inlet temperature	°C				
	Water outlet temperature	°C				

Date/Time					
Nominal voltage	V				
Voltage at terminals	V				
Input current	A				
Pump motor input current	A				
Antifreeze protection triggering temperature	°C				
Mechanical check: pipes, screws, etc.					
Electrical connection tightness check					
Control check					

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