

Installation, Use and Maintenance Manual

Gitié - AHAY

Integrated group for outdoor installation

with absorption heat pump and condensing boiler



Revision: C
Code: D-LBR723

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I. INTRODUCTION

Manual



This Manual is an integral part of the unit Gitié - AHAY and must be handed to the end user together with it.

Recipients

This Manual is intended for:

- ▶ end user, for appropriate and safe use of the appliance;
- ▶ qualified installer, for correct appliance installation;
- ▶ planner, for specific information on the appliance.

Control device

In order to be able to work, the unit Gitié - AHAY needs a control device (DDC or external enables), which must be connected by the installer.

II. SYMBOLS AND DEFINITIONS

1 KEY TO SYMBOLS



DANGER



WARNING



NOTE



PROCEDURE



REFERENCE (to other document)

2 TERMS AND DEFINITIONS

Gitié AHAY Appliance/Package = equivalent terms, both used to designate the integrated package consisting of a GAHP-A unit and a condensation boiler AY00-120.

GAHP Appliance/Unit = equivalent terms, both used to designate the gas powered absorption heat pump GAHP (Gas Absorption Heat Pump).

AY00-120 Boiler/Unit = equivalent terms, both used to designate the condensation boiler AY00-120.

CAT = Technical Assistance Centre authorised by Robur.

External enable = generic control device (e.g. thermostat, clock or any other system) equipped with a NO clean contact and used as control to start/stop the GAHP unit and the AY00-120 boiler.

DDC Control (Direct Digital Controller) = optional Robur adjustment device to control one or more Robur appliances (GAHP heat pumps, GA chillers and AY00-120 boilers) in ON/OFF mode.

RB100/RB200 Devices (Robur Box) = optional interface devices complementary to DDC, which may be used to broaden its functions (heating/cooling/DHW production service demands, and control of system components such as third party generators, adjustment valves, circulators, probes).

Thermal generator = equipment (e.g. boiler, heat pump, etc..) for heat production for heating and/or DHW.

GUE (Gas Utilization Efficiency) = efficiency index of gas chillers and heat pumps, equal to the ratio between the thermal energy produced and the energy of the fuel used (relative to LCV, lower calorific value).

First Switch-One = appliance commissioning operation which may only and exclusively be carried out by a TAC.

S61/Mod10/W10 Boards = electronic boards on the GAHP unit, to control all functions and to provide interface with other devices and with the user.

S70/AY10 Boards = electronic boards on the AY00-120 boiler, to control all functions and to provide interface with other devices and with the user.

III. WARNINGS

1 GENERAL AND SAFETY WARNINGS



Installer's qualifications

Installation must exclusively be performed by a Qualified Firm and by Skilled Personnel, with specific knowledge on heating, cooling, electrical systems and gas appliances, in compliance with the laws in force in the Country of installation.



Declaration of Conformity

Upon completing installation, the installing firm shall issue to the owner/client the appliance's Workmanlike Conformity Declaration, according to national/local

regulations in force and the manufacturer's instructions/provisions.



Misuse

The appliance must only be used for the purposes for which it has been designed. Any other use is deemed hazardous. Incorrect use may affect operation, duration and safety of the appliance. Adhere to the manufacturer's instructions.



Hazardous situations

- ▶ Do not start the appliance in hazardous conditions, such as: gas smell, problems with the plumbing/electrical/gas system, parts of the appliance under water

or damaged, malfunctioning, disabling or bypassing control and safety devices.

- ▶ In case of danger, request intervention by skilled personnel.
- ▶ In case of danger, switch off the electrical power and gas supplies only if this can be done in total safety.
- ▶ Do not entrust children, persons with physical, sensory or mental disabilities or persons with poor knowledge and experience with use of the appliance.



Gas component tightness

- ▶ Before performing any operation on gas ducting components, close the gas cock.
- ▶ Upon completing any procedure, perform the tightness test according to regulations in force.



Gas smell

If you smell gas:

- ▶ Do not use electrical devices such as telephones, multimeters or other equipment that may cause sparks next to the appliance.
- ▶ Shut off the gas supply by turning the cock off.
- ▶ Disconnect electrical power supply by means of the external isolation switch in the power supply electrical panel.
- ▶ Use a telephone away from the appliance to ask for intervention from skilled personnel.



Poisoning

- ▶ Ensure the flue gas ducts are tightness and compliant with the regulations in force.
- ▶ Upon completing any procedure, ensure components are tightness.



Moving parts

The appliance contains moving parts.

- ▶ Do not remove guards during operation, and in any case prior to disconnecting the power supply.



Burn hazard

The appliance contains very hot parts.

- ▶ Do not open the appliance and do not touch internal components before the appliance has cooled down.



Pressure vessels

The appliance has a sealed circuit classified as pressure vessel, the tightness of which is tested by the manufacturer.

- ▶ Do not carry out any intervention on the sealed circuit or on the appliance's valves.



Water-ammonia solution

The GAHP unit uses the ammonia-water absorption cycle. The water-ammonia solution is contained in the sealed circuit. The solution is harmful for health if it is ingested, inhaled or comes in contact with the skin.

- ▶ In the event of coolant leak keep away and disconnect the power and gas supply (only if it is possible to do so with no danger).
- ▶ Request assistance from the TAC.



Electrocution hazard

- ▶ Disconnect the electrical power supply before any work/procedure on appliance components.
- ▶ For electrical connections exclusively use compliant components and according to the specifications provided by the manufacturer.
- ▶ Ensure the appliance cannot be accidentally switched back on.



Earthing

Electrical safety depends on effective earthing system, correctly connected to the appliance and installed according to the regulations in force.



Distance from combustible or flammable materials

- ▶ Do not store flammable materials (paper, solvents, paint, etc.) in the vicinity of the appliance.



Limescale and corrosion

Depending on the chemical/physical properties of the system water, limescale or corrosion may damage the appliance (Paragraph 3.7 p. 28).

- ▶ Check system sealing.
- ▶ Avoid frequent top-ups.



Chloride concentration

The concentration of chlorides or free chlorine in the system water must not exceed the values in Table 3.2 p. 28.



Aggressive substances in air

Halogenated hydrocarbons containing chlorine and fluorine compounds cause corrosion. The supply/ventilation air of the appliance must be free from aggressive substances.



Acid flue gas condensate

- ▶ Discharge the acid condensate of combustion flue gas, as indicated in Paragraph 3.13 p. 31, in compliance with current exhaust regulations.



Switching the appliance off

- ▶ Except in the case of danger, do not disconnect the power supply to switch off the appliance, but always and exclusively act through the control device provided (DDC or external enable).
- ▶ Disconnecting the power supply while the appliance is running may cause permanent damage to internal components.



In the event of failure

- ▶ In the event of failure of the appliance and/or breakage of any component, do not attempt to repair and/or restore and immediately contact the TAC.

Operations on internal components and repairs may exclusively be carried out by a TAC, only using original parts.



Routine maintenance

Proper maintenance ensures the efficiency and good operation of the appliance over time.

- ▶ Maintenance must be performed according to the manufacturer's instructions (see Chapter 7 p. 41) and in compliance with current regulations.
- ▶ Appliance maintenance and repairs may only be entrusted to firms legally authorised to work on gas appliances and systems.
- ▶ Enter into a maintenance contract with an authorised specialised firm for routine maintenance and for servicing in case of need.
- ▶ Only use original parts.



Decommissioning and disposal

If the appliance is to be disposed of, contact the manufacturer for its disposal.



Keep the Manual

This "Installation, Use and Maintenance Manual" must always accompany the appliance and must be handed to the new owner or installer in the event of sale or removal.

2 CONFORMITY

EU Directives and standards

The integrated Gitié packages comply with the requirements of the following Directives:

- ▶ UNI EN 12309-1 and 2:2000, gas absorption heat pumps and chillers with thermal capacity not exceeding 70 kW.
- ▶ Gas Directive 90/396/EEC as amended and added.
- ▶ Efficiency Directive 92/42/EEC as amended and added.
- ▶ Electromagnetic compatibility Directive 89/336/EEC as amended and added.
- ▶ Low Voltage Directive 73/23/EEC as amended and added.
- ▶ Machinery Directive 2006/42/EC.
- ▶ Pressurised Equipment Directive (PED) 97/23/EEC as amended and added.

1 FEATURES AND TECHNICAL DATA

The Gitié AHAY package consists of a heat pump GAHP-A and a condensation boiler AY00-120.

- ▶ UNI EN 677 Specific requirements for condensing boilers with nominal heating capacity up to 70 kW.
- ▶ EN 378 Refrigerating systems and heat pumps.
- ▶ UNI EN 483 Type C boilers with nominal thermal capacity no greater than 70 kW.

Other applicable provisions and standards

The design, installation, operation and maintenance of the systems shall be carried out in compliance with current applicable regulations, depending on the Country and location, and in accordance with the manufacturer's instructions.

In particular, regulations regarding the following shall be complied with:

- ▶ Gas systems and equipment.
- ▶ Electrical systems and equipment.
- ▶ Heating and air conditioning systems, and heat pumps.
- ▶ Environmental protection and combustion products exhaust.
- ▶ Fire safety and prevention.
- ▶ Any other applicable law, standard and regulation.

3 EXCLUSIONS OF LIABILITY AND WARRANTY



Any contractual or extra-contractual liability of the manufacturer for any damage caused by incorrect installation and/or improper use and/or failure to comply with regulations and with the manufacturer's directions/instructions shall be disclaimed.



In particular, the warranty on the appliance may be rendered void by the following conditions:

- ▶ Incorrect installation.
- ▶ Misuse.
- ▶ Failure to comply with the manufacturer's indications on installation, use and maintenance.
- ▶ Alteration or modification of the product or any part thereof.
- ▶ Extreme operational conditions or however outside of the operational ranges set forth by the manufacturer.
- ▶ Damages caused by external agents such as salts, chlorine, sulphur or other chemical substances contained in the installation water or present in the air of the installation site.
- ▶ Abnormal actions transmitted by the plant or installation to the appliance (mechanical stresses, pressure, vibrations, thermal dilations, power surges...).
- ▶ Accidental damages or due to force majeure.

1.1 FEATURES

1.1.1 GAHP-A Unit features

Operation

Based on the thermodynamic water-ammonia absorption cycle ($\text{H}_2\text{O}-\text{NH}_3$), the appliance produces hot water using outdoor air

as a renewable energy source (cold source) and natural gas (or LPG) as primary energy.

The thermodynamic cycle takes place within a hermetically sealed circuit, in welded construction, perfectly tight, factory-tested, which does not require any maintenance or coolant top-ups.

Mechanical and thermo-hydraulic components

- ▶ steel sealed circuit, externally treated with epoxy paint;
- ▶ sealed combustion chamber (type C) suitable for outdoor installations;
- ▶ metal mesh radiant burner equipped with ignition and flame detection device, controlled by an electronic control unit;
- ▶ titanium stainless steel shell-and-tube water heat exchanger, externally insulated;
- ▶ stainless steel, flue gas latent heat recovery exchanger;
- ▶ air heat exchanger with single-row finned coil, with steel pipe and aluminium fins;
- ▶ automatic microprocessor-controlled finned coil automatic defrosting valve;
- ▶ standard or silenced fan S1 (reduction of electrical consumption and reduction of sound emission).

Control and safety devices

- ▶ S61 electronic board with microprocessor, LCD display and knob;
- ▶ Mod10 additional electronic board (integrated in S61);
- ▶ auxiliary W10 electronic board
- ▶ installation water flowmeter;
- ▶ generator limit thermostat, with manual reset;
- ▶ manually reset flue gas temperature thermostat;
- ▶ generator fins temperature probe;
- ▶ sealed circuit safety relief valve;
- ▶ by-pass valve, between high and low pressure circuits;
- ▶ ionisation flame controller;
- ▶ gas solenoid valve with double shutter;
- ▶ anti-icing function for water circuit;
- ▶ condensate discharge obstruction sensor.

1.1.2 AY00-120 Unit features

Operation

The AY00-120 condensation boiler produces hot water through a plate heat exchanger on an internal closed circuit.

Mechanical and thermo-hydraulic components

- ▶ premixed multigas burner with low NOX and CO emissions;
- ▶ stainless steel plate heat exchanger, combining a hydraulic separator;
- ▶ internal circuit expansion tank;
- ▶ automatic and manual air bleeds on the internal circuit;
- ▶ flue gas discharge duct with relevant terminal, for type B53P configuration;
- ▶ anti-freeze thermostat for the condensate drain trap resistor;

Control and safety devices

- ▶ AY10 electronic board with integrated microprocessor, display and knob;
- ▶ S70 electronic board;
- ▶ ionisation flame controller;
- ▶ gas solenoid valve with double shutter;
- ▶ system water antifreeze function;
- ▶ water anti-freeze protection of the machine's internal circuit;
- ▶ automatically resettable water temperature limiting thermostat;
- ▶ flue gas temperature limit thermostat (thermal fuse);
- ▶ system water differential pressure switch;
- ▶ internal machine circuit water differential pressure switch with anti-bonding function;
- ▶ pressure relief valve for internal machine circuit;

1.1.3 AHAY Integrated package features

The Gitié package is available in the following versions (Figure 1.6 p. 11):

- ▶ **Base version**
- ▶ **Version KIT/4 C1**
- ▶ **Version KIT/2 C0**
- ▶ **Version KIT/2 C1**

In all versions units operation may be simultaneous or independent.

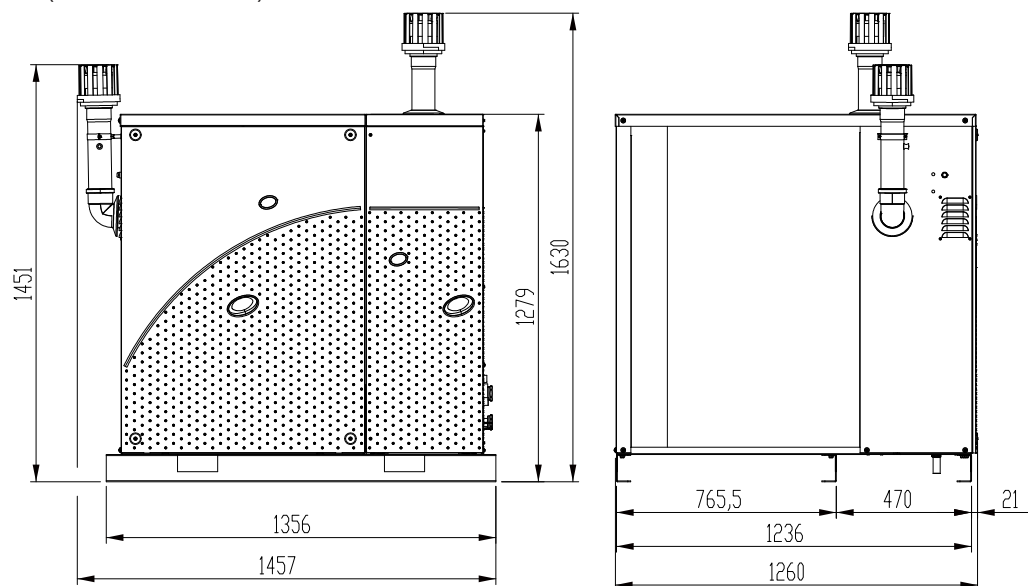
The Table 1.1 p. 7 shows the features of the various versions in detail.

Table 1.1 – Versions of Gitié integrated package.

Version	Pipes	Circulating pumps	Motorised 2-way valves	Hydraulic circuits
Base	4	No	No	independent
KIT/4 C1	4	Yes	No	independent
KIT/2 C0	2	No	Yes	single
KIT/2 C1	2	Yes	No	single

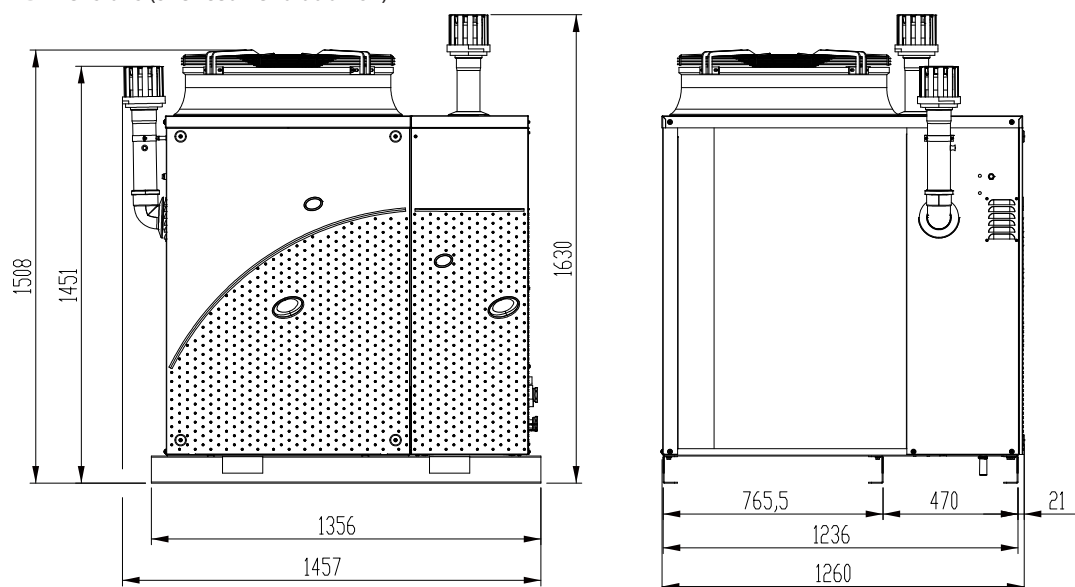
1.2 DIMENSIONS

Figure 1.1 – Size (Standard ventilation)



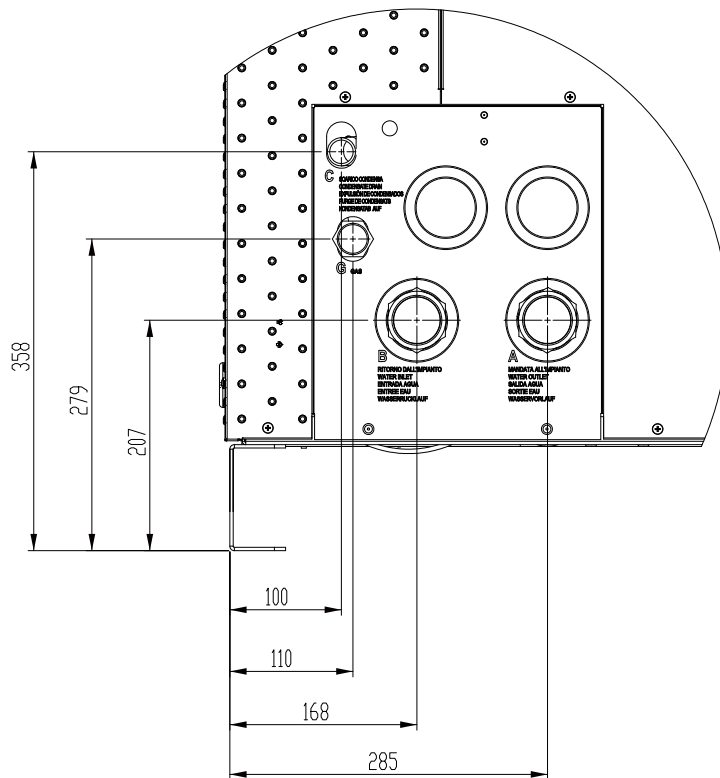
Front and side views (dimensions in mm).

Figure 1.2 – Dimensions (Silenced ventilation S1)



Front and side views (dimensions in mm).

Figure 1.3 – 2 pipe package service plate (KIT/2 C0 and C1)

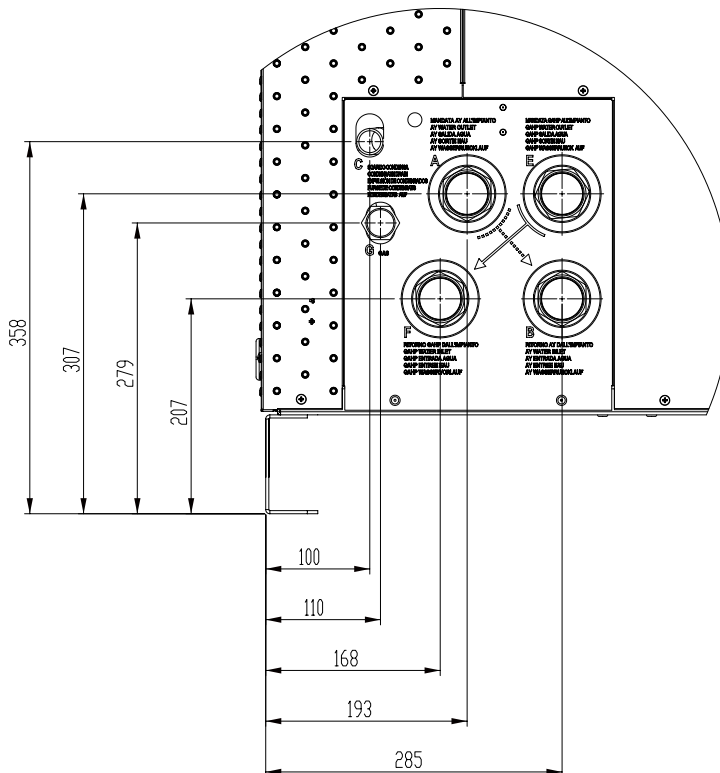


LEGEND

- A Water outlet fitting Ø 1½" F
- B Water inlet fitting Ø 1½" F
- C Boiler condensate drain AY00-120
- G Gas fitting Ø ¾" M

Hydraulic/gas unions detail

Figure 1.4 – 4 pipe package service plate (base version and KIT/4 C1)



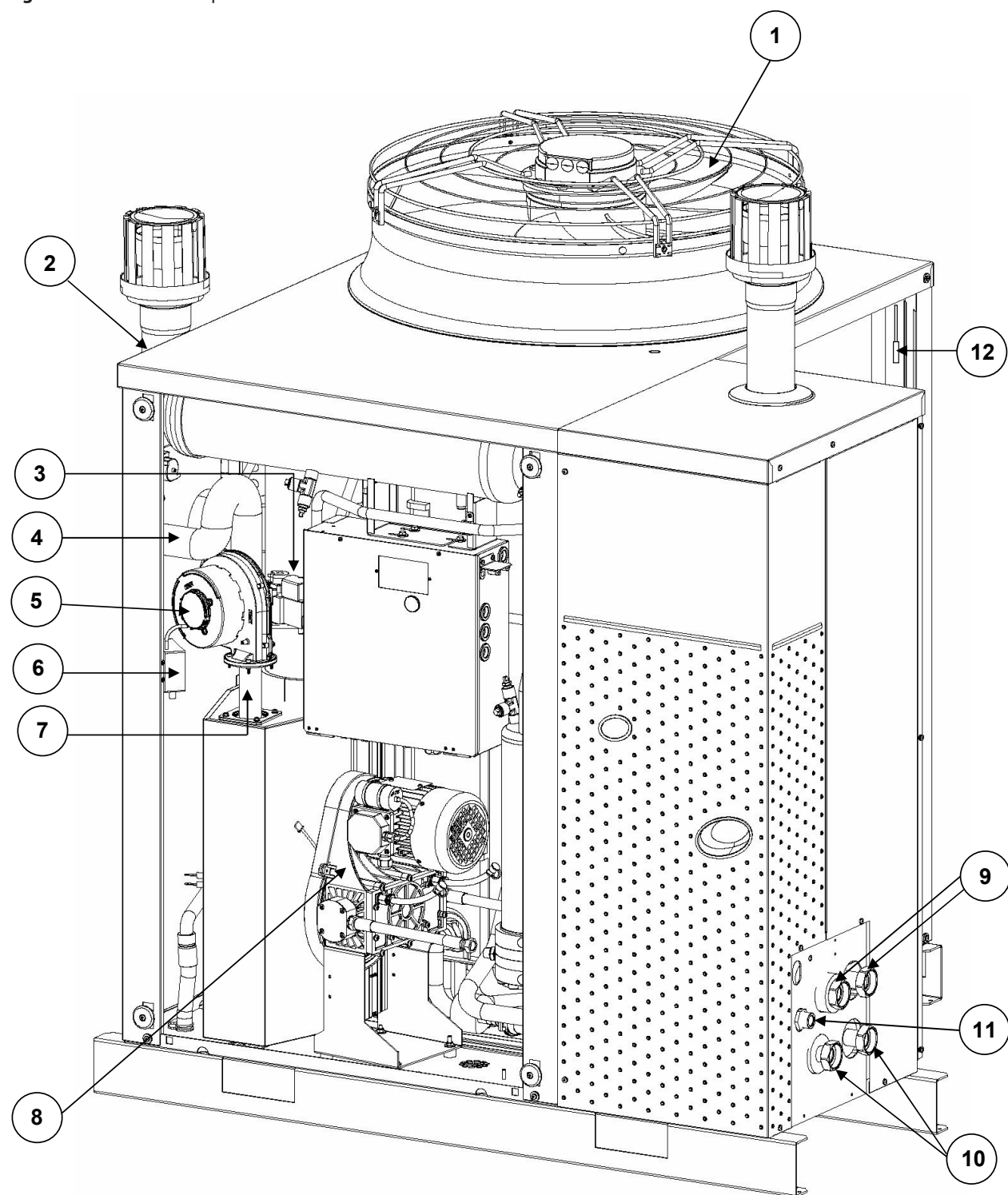
LEGEND

- A AY - Water outlet fitting Ø 1¼" F
- B AY - Water inlet fitting Ø 1¼" F
- C Boiler condensate drain AY00-120
- E GAHP/GA - Water outlet fitting Ø 1¼" F
- F GAHP/GA - Water inlet fitting Ø 1¼" F
- G Gas fitting Ø ¾" M

Hydraulic/gas unions detail

1.3 COMPONENTS

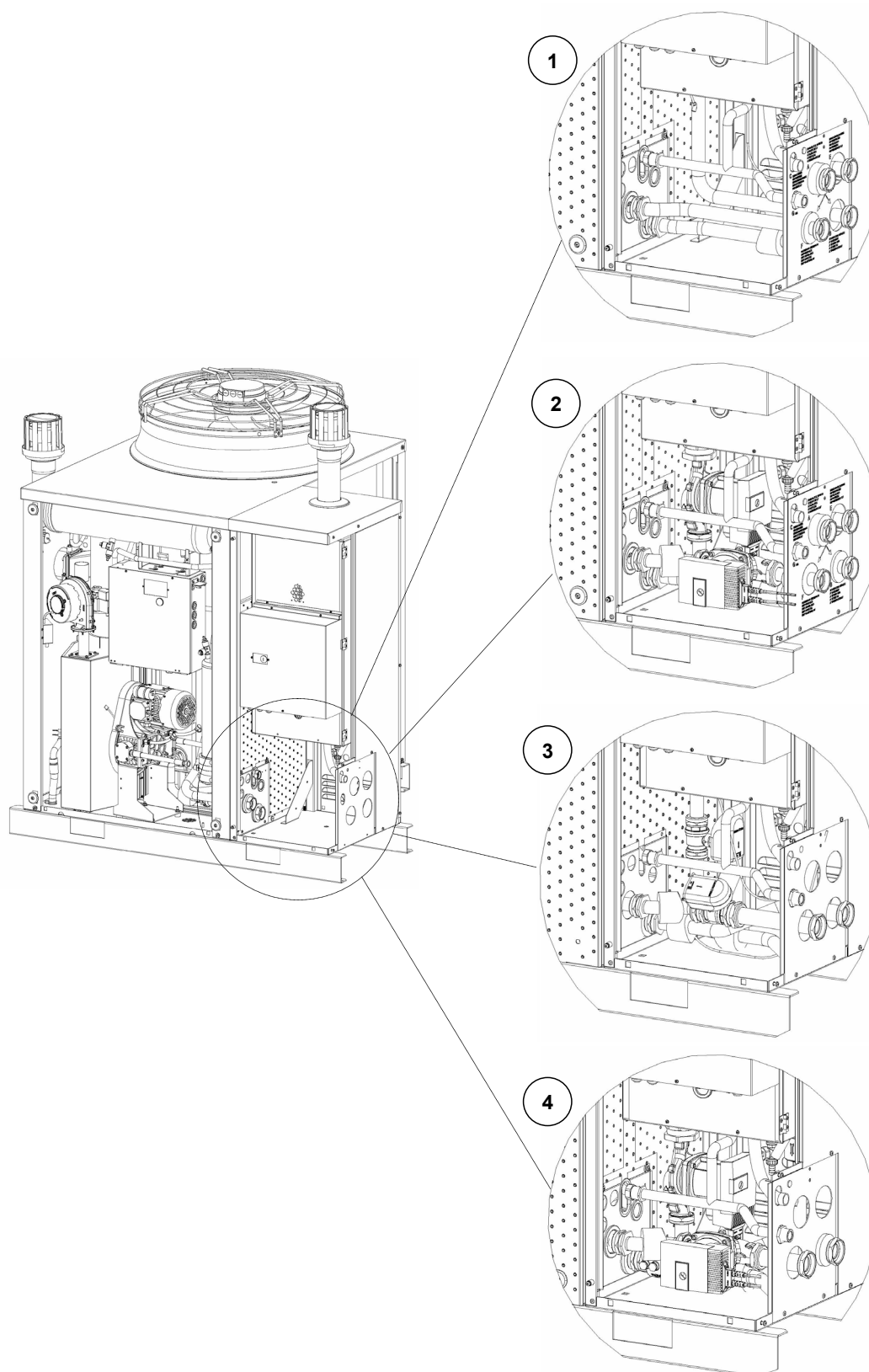
Figure 1.5 – Internal components - front view



LEGEND

1	Fan (version S1)	7	Tmix Probe
2	Flue gas drawing cap	8	Oil pump
3	Gas valve	9	Water delivery fitting: "G 1 1/4 F
4	Combustion air restart	10	Water return fitting: "G 1 1/4 F
5	Blower	11	Gas fitting
6	Ignition transformer	12	TA Probe

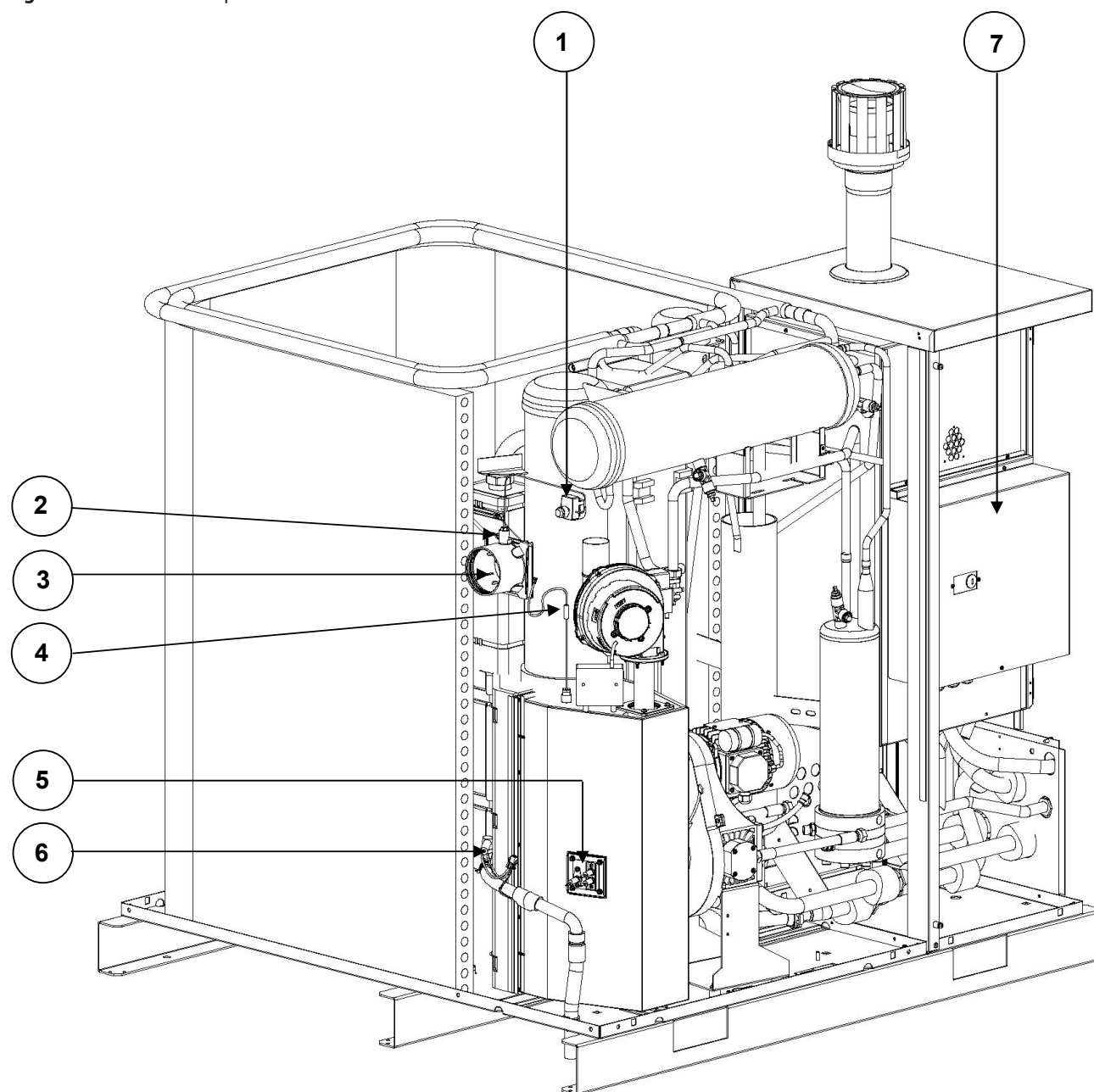
Figure 1.6 – Version components



LEGEND

- 1 BASE Version (2 independent circuits without circulating pumps)
- 2 Kit/4 C1 (2 independent circuits with on board circulators)
- 3 Kit/2 C0 (single circuit with two 2-way motorised valves)
- 4 Kit/2 C1 (single circuit with on board circulators)

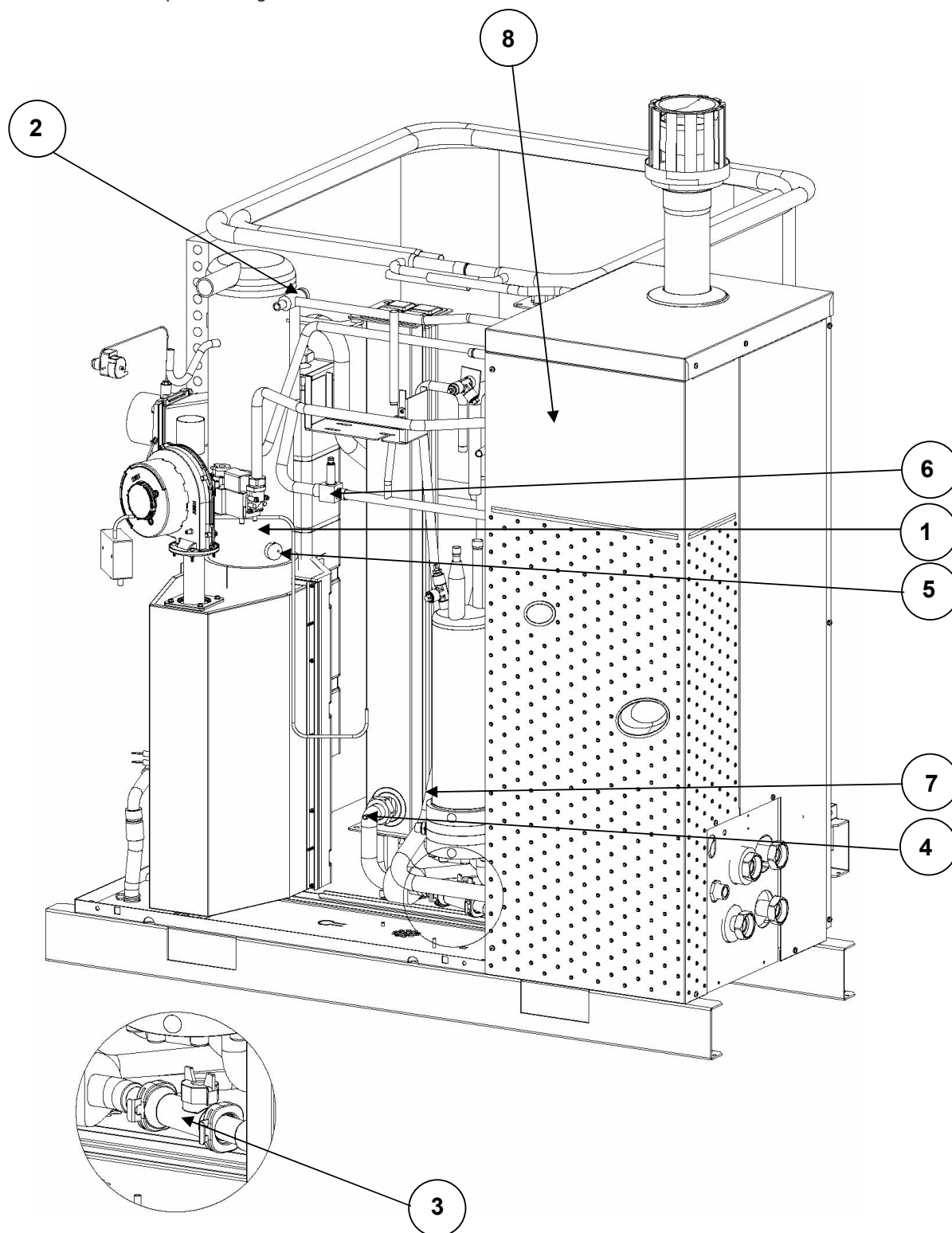
Figure 1.7 – Internal components - left side view



LEGEND

- 1 Flue gas thermostat reset
- 2 Flue gas thermostat bulb
- 3 Flue gas discharge Ø 80mm
- 4 PT 1000 Flue gas Temperature Probe
- 5 Switch on and detection electrodes
- 6 Condensate sensor
- 7 Electrical panel

Figure 1.8 – Internal components - right side view

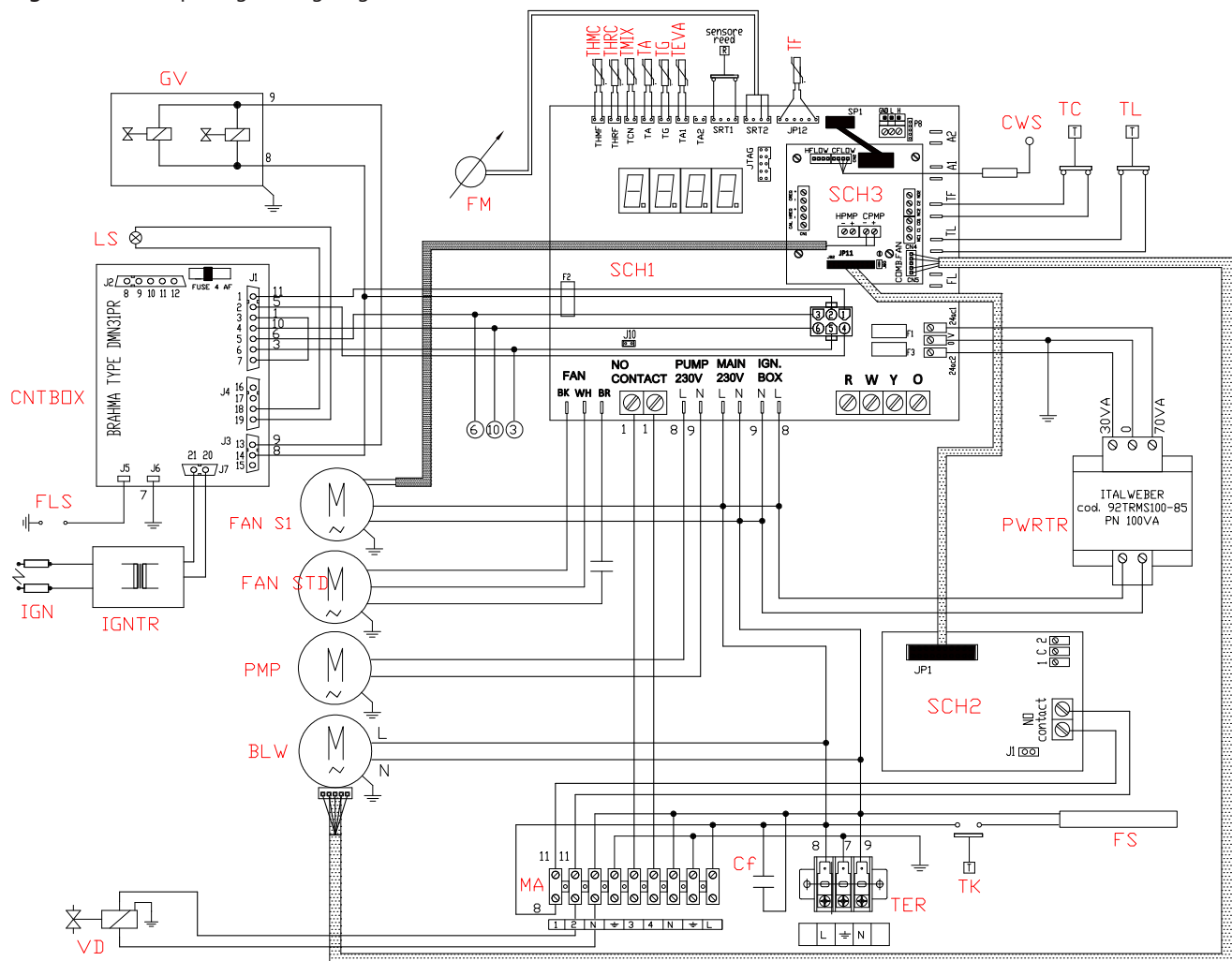


LEGEND

- | | | | |
|---|----------------------------|---|--------------------------|
| 1 | TG Probe | 5 | Limit thermostat |
| 2 | Safety valve | 6 | Defrosting valve |
| 3 | Delivery pipe flow meter | 7 | Return temperature probe |
| 4 | Delivery temperature probe | 8 | Teva Probe |

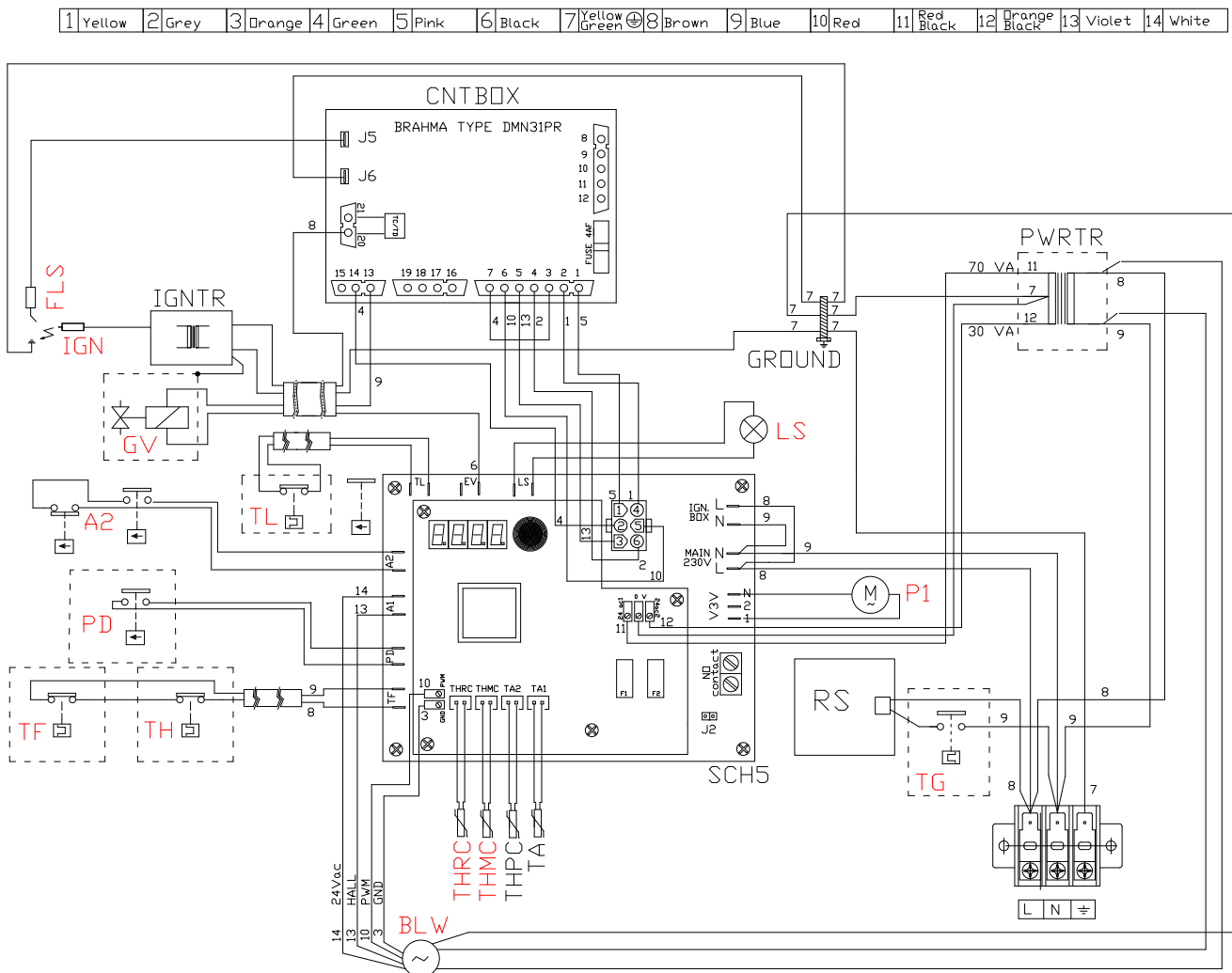
1.4 WIRING DIAGRAMS

Figure 1.9 – Gitié package wiring diagram (GAHP-A unit)



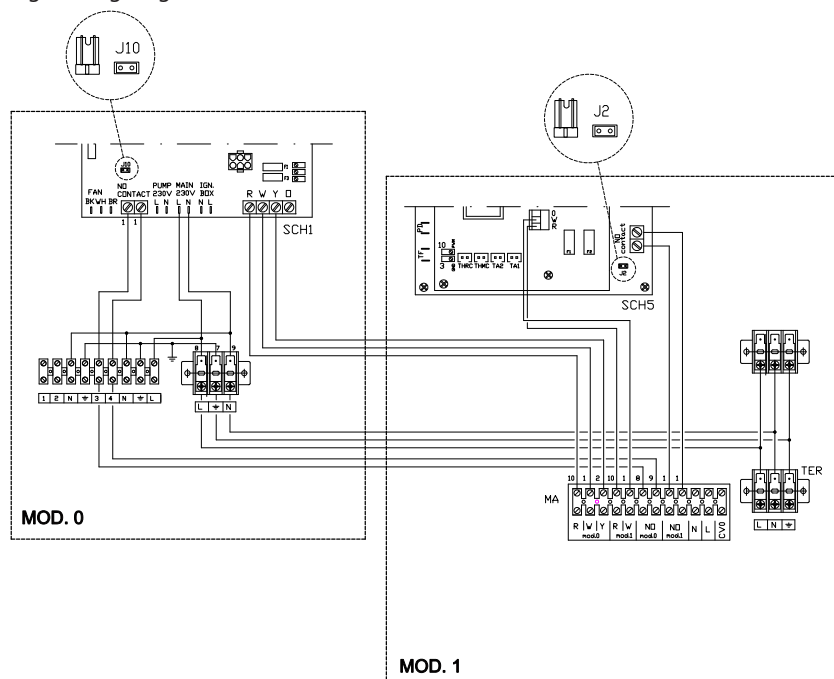
LEGEND

SCH1	Controller S61	GV	Gas solenoid valve	TMIX	Combustion air temperature sensor
SCH2	W10 circuit board	TC	Manual flue gas thermostat	TA	Ambient air temperature sensor
SCH3	Mod10 circuit board	TL	Generator limit thermostat	TG	Generator temperature sensor
TER	Appliance power terminal block	FM	Flowmeter	TF	Fumes temperature sensor or generator fin sensor
CNTBOX	Flame controller	CWS	Condensate water sensor	TEVA	Evaporator outlet temperature sensor
PWRTR	Board transformer	VD	Defrosting valve	TK	Condensate discharge heating element thermostat
BLW	Blower	FAN STD	Standard fan	MA	Terminal block
PMP	Oil pump	FAN S1	Low energy consumption fan	REED	Oil pump rotation sensor
IGNTR	Ignition transformer	CF	Filter capacitor		
IGN	Ignition electrodes	FS	Condensate hose heating element		
FLS	Flame sensor	THRC	Hot water return temperature probe		
LS	Gas valve ON indicator lamp	THMC	Hot water flow temperature probe		

Figure 1.10 – Gitié package wiring diagram (unit AY00-120)**LEGEND**

SCH5	electronic boards S70+AY10	TF	exhausted gas thermostat	IGN	ignition electrodes
TA	room temperature probe	PD	differential water pressure switch (internal machine circuit)	FLS	flame sensor
THPC	delivery water temperature probe (internal machine circuit)	A2	differential water pressure switch (system circuit)	CNTBOX	flame control unit
THMC	output water temperature probe (system circuit)	TL	water limit thermostat	BLW	blower
THRC	input water temperature probe (system circuit)	P1	water circulator	MC	230Vac power supply terminal box
TH	combustion unit limit thermostat (internal machine circuit)	LS	gas valve ON signal lamp	PWRTR	board transformer
		GV	gas solenoid valve	TG	antifreeze thermostat for syphon resistance
		IGNTR	ignition transformer	RS	syphon resistance

Figure 1.11 – Gitié package wiring diagram - base version

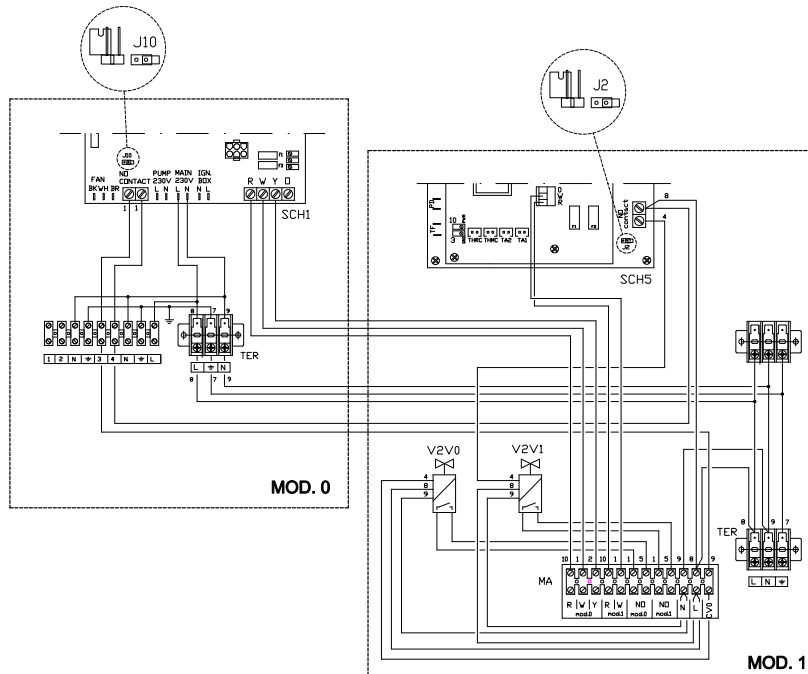


LEGEND

MA Terminal block
MOD.0 GAHP or ACF unit
MOD.1 unit AY00-120
SCH1 electronic board S61

SCH5 electronic boards S70+AY10
TER unit power supply terminal box
J2-J10 control jumpers of system water pumps ("closed")

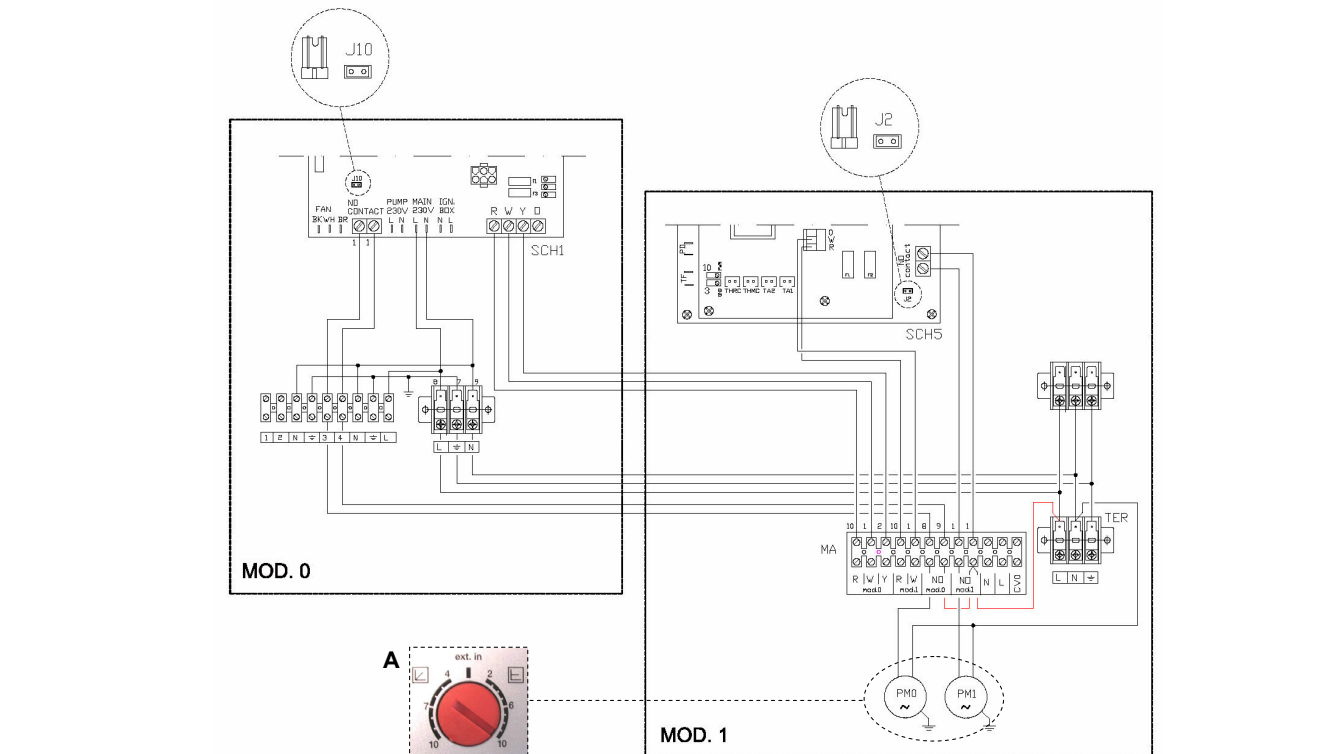
Figure 1.12 – Gitié package wiring diagram with KIT/2 C0



LEGEND

MOD.0 GAHP or ACF unit
MOD.1 unit AY00-120
SCH1 electronic board S61
SCH5 electronic boards S70+AY10

TER unit power supply terminal box
J2-J10 control jumpers of system water pump ("open")
MA connection terminal block
V2V0-V2V1 motorised valves



LEGEND

MOD.0 GAHP or ACF unit

MOD.1 unit AY00-120

MOD.1	unit AT100-120
SCH1	electronic board S61

SCH1	electronic board S61
SCH5	electronic boards S70+AY10

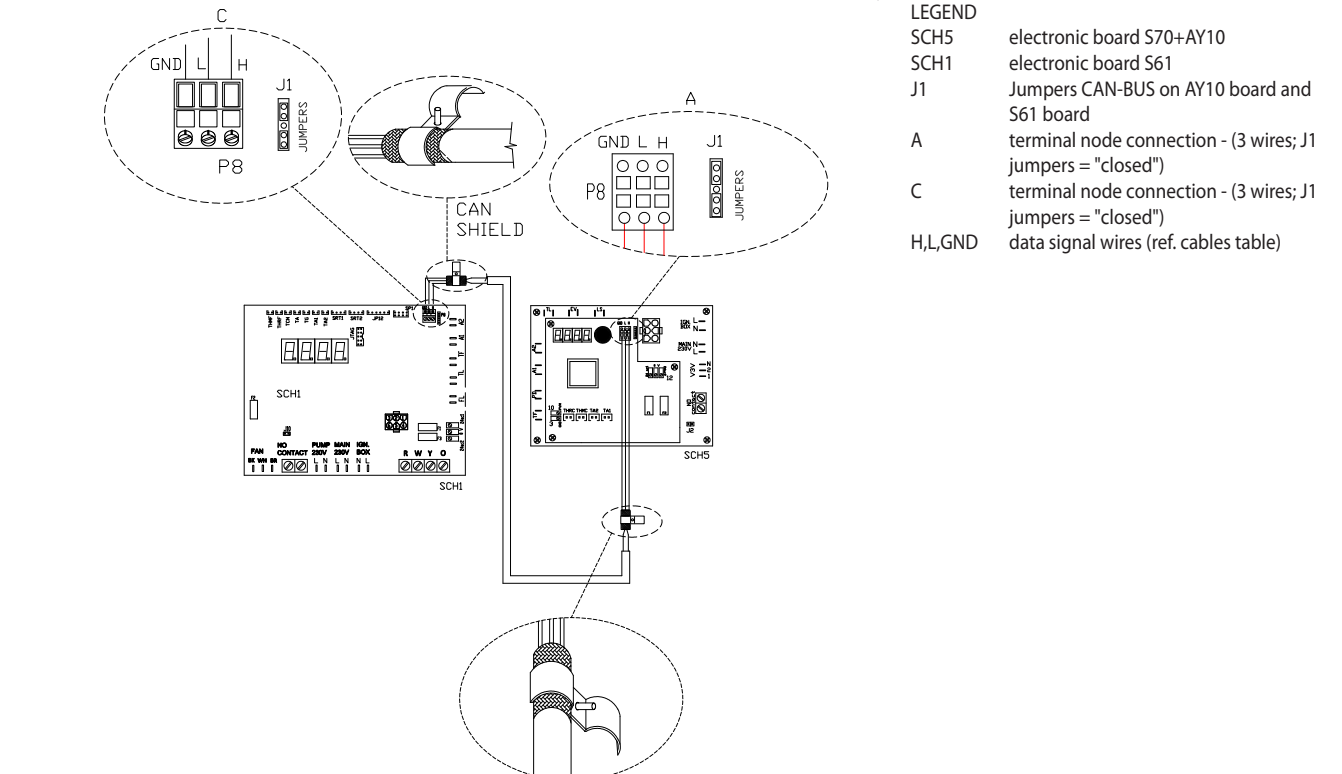
TER unit power supply terminal box

J2-J10 control jumpers of system water pumps ("closed")

MA connection terminal block

MA	connection terminal
PM0-PM1	system water pumps

A Position of pumps flow rate adjustment screw



LEGEND

LEGEND
SCH5 electronic board S70+AY10

GND | L | H

SCM1 electronic board S61
J1 Jumpers CAN-BUS on AY10 board and S61 board

A

Diagram C shows a terminal block connection. A 4-pin terminal block labeled "JUMPER" is shown. The first two pins are connected to a "CAN SENSE" line. The last two pins are connected to a "P8" terminal block. The "P8" terminal block has four pins, with the first two connected to the "JUMPER" block and the last two connected to a "CAN SENSE" line.

SHIELD
H,L,GND
jumpers = closed /
data signal wires (ref. cables table)

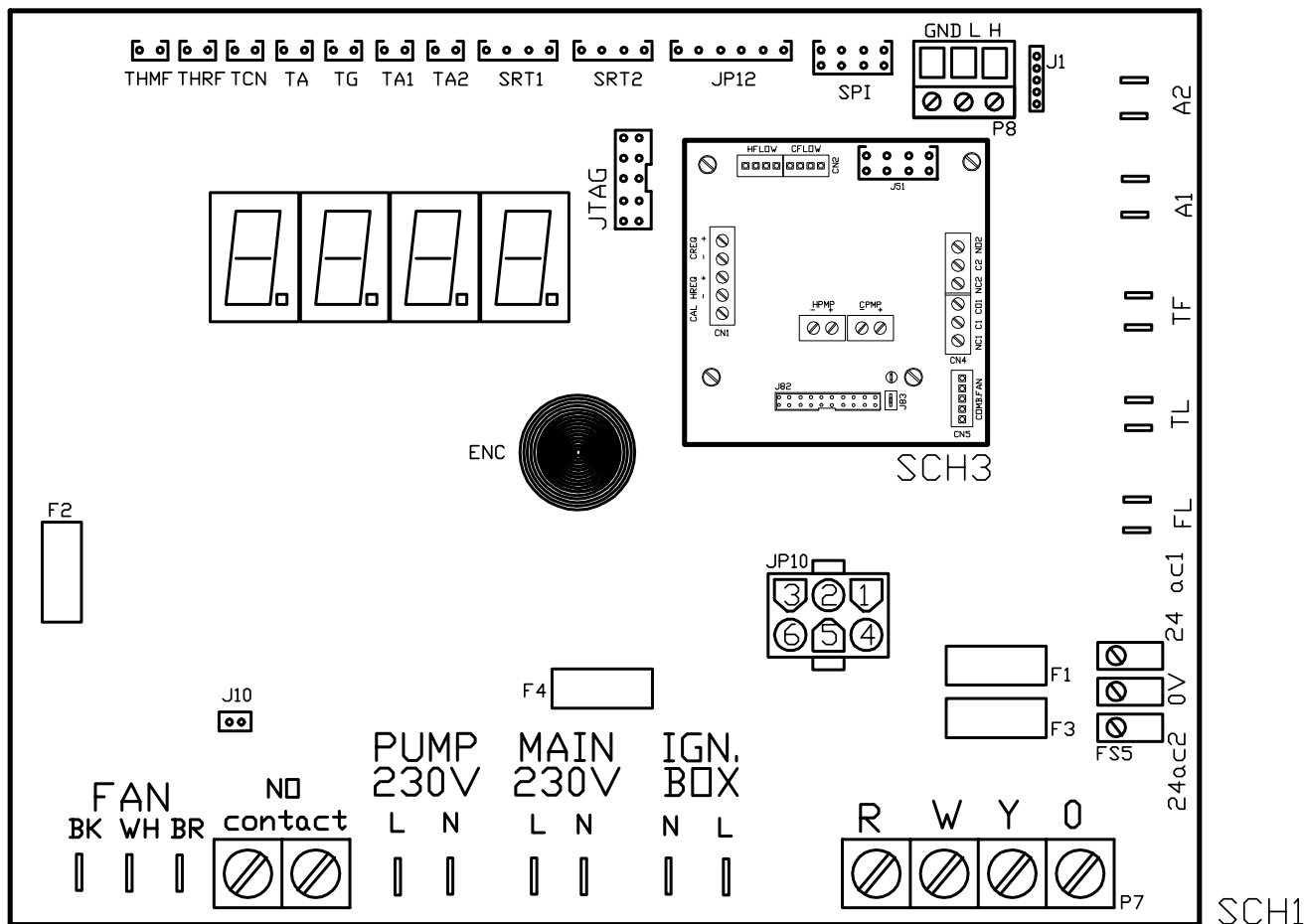
1.5 ELECTRONIC BOARDS

GAHP-A Unit electronic boards (S61+Mod10+W10)

The GAHP-A Unit's electrical panel contains:

- **Electronic Board S61** (Figure 1.15 p. 18), with microprocessor, it controls the appliance and displays data, messages
- **Auxiliary Mod10 electronic board** (Figure 1.16 p. 19), overlapping S61, it handles power modulation of the burner, fan and water circulation pump.
- **Satellite W10 electronic board** (Figure 1.17 p. 19), interconnected to the S61 board and located next to it, used to control defrosting operations of the GAHP unit.

Figure 1.15 – Electronic board S61

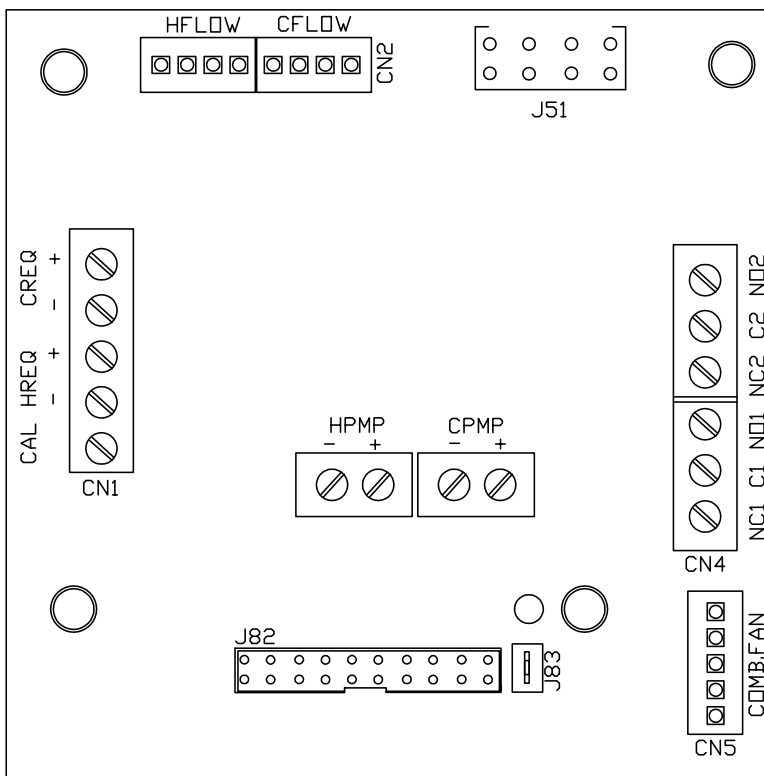


LEGEND

SCH1	Electronic board S61	J1	Jumper CAN BUS	SPI	Communication port with board Mod10
SCH3	Electronic board Mod10 (see specific picture for more details)	J10	Jumper N.O. contact	SRT1	Oil hydraulic pump rotation sensor input
A1, A2	Auxiliary inputs	J82	Board connector W10 (on Mod10)	SRT2	Hot water flow meter input
ENC	Knob	JP10	6 pole flame control unit connector	TA	Ambient air temperature probe
F1	Fuse T 2A	JP12	Flue gas probe input or generator fin probe	TA1	Evaporator output probe input
F2	Fuse T 10A	JTAG	Connector for board programming S61	TA2	Not used
F3	Fuse T 2A	MAIN	230V (L, N) Board power supply S61	TCN	Combustive air temperature probe input
F4	Fuse T 3,15A	CONTACT	Normally open pump contact	TF	Flue gas thermostat input
FAN	(BK, WH, BR) Fan output	P7	(R, W, Y, O) Enable input		
FS5	(24V AC) Board power supply 24-0-24 Vac	P8	(GND, L, H) Connector CAN BUS		
IGN.BOX (L, N)	Flame control unit power supply 230 Vac	PUMP	230V (L, N) Oil hydraulic pump power supply output		

SCH S61

Figure 1.16 – Mod10 controller

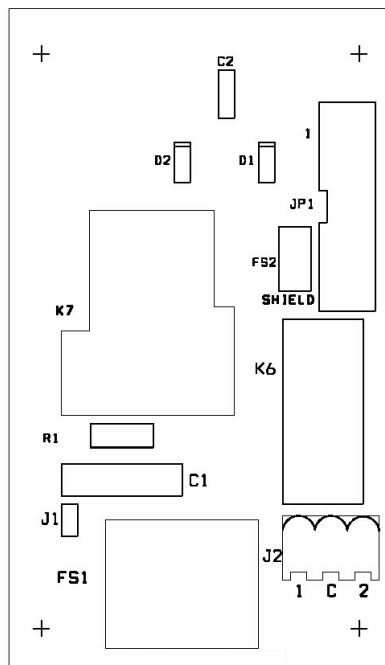


LEGEND

HFLOW	Not used
CFLOW	Condensation water sensor control
J51	SPI connector
HPMP	Primary circuit hot water pump control output (0-10 V)
CPMP	Low consumption fan control output (0-10V)
NC1-C1	Status indication of locking warnig/error
CN5	Blower control
J82	W10 auxiliary controller connector
J83	W10 cable shielding connection W10
CN1	Inputs 0-10V (not used)

Mod10 controller

Figure 1.17 – W10 electronic controller



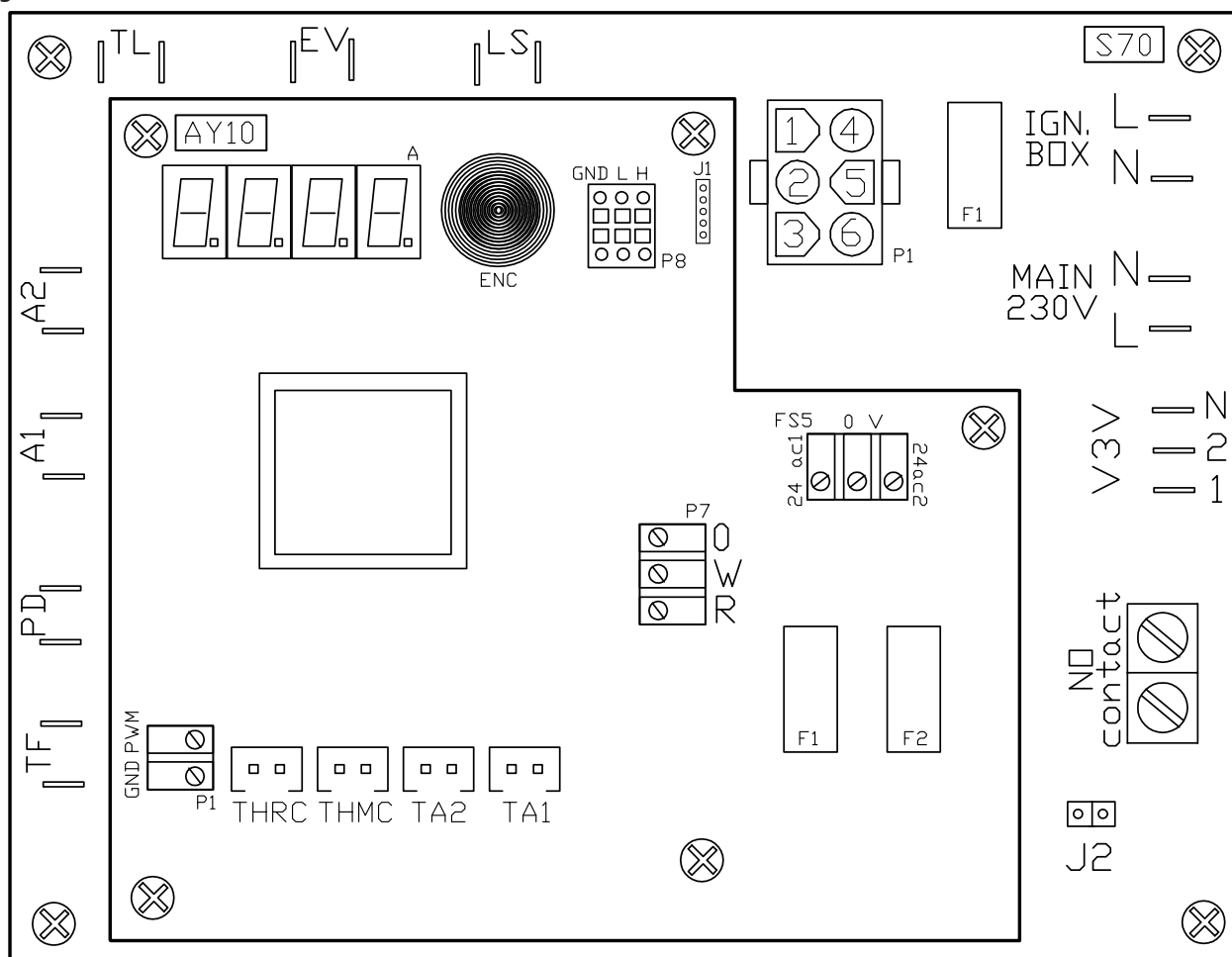
LEGEND

FS1	Defrosting valve contact
JP1	Communication with S61/Mod10

AY00-120 Unit electronic boards (S70+AY10)

The AY00-120 Unit's electrical panel contains:

- **Electronic Board S70** (Figure 1.18 p. 20), with microprocessor, it controls the appliance and displays data, messages and operative codes. The appliance is monitored and programmed by interacting with the display and knob.
- **AY10 Electronic board** (Figure 1.18 p. 20) overlapping the S70 board.

Figure 1.18 – Series AY00-120 - electronic boards AY10+S70

LEGEND
ELEMENTS OF BOARD S70

TL	limit thermostat connector
EV	gas solenoid valve connector
LS	gas valve ON signal lamp connector
P1	flame control unit connector
TF	exhausted gas thermostat connector
PD	system water differential pressure switch
A1-A2	auxiliary connectors
J2	system water circulator control jumper
NoContact	system water circulator control terminals (max 700W)
V3V	machine circulator control terminals
MAIN 230V	electrical supply connector
IGN. BOX	ignition control unit connector

ELEMENTS OF BOARD AY10

P1	connector for blower drive
PWM	signal output

THRC	input hot water temperature connector
THMC	output hot water temperature connector
TA2-TA1	auxiliary temperature probes connector
J1	CAN BUS jumper
P8	CAN port/connector
H	=data signal high
L	=data signal low
GND	=common data signal
P7	operation enable connector
R	= common terminal
W	= Heat enable terminal
0	= terminal not used
FS5	board supply connector
F1 - F2	fuses

Main elements of electronic boards on the machine AY00-120.

1.6 CONTROLS

Control device

The appliance may only work if it is connected to a control device, selected from:

- (1) **preconfigured DDC control**
- (2) **external enables**

1.6.1 Adjustment system (1) with pre-configured DDC control

The main functions are:

- adjustment and control of the GAHP/GA unit and AY00-120 unit in cascade (ON/OFF mode);
- parameter figures display and setting;
- hourly programming;
- climate curve control;
- diagnostics;
- reset errors;
- possibility to interface with a BMS;

DDC functionality may be widened with auxiliary Robur devices RB100 and RB200 (service requests, DHW production, Third Party generator control, probe control, system valves or circulators, ...).

1.6.2 Adjustment system (2) - control with external enables

The appliance may also be controlled via generic enable devices (e.g. thermostats, clocks, buttons, contactors...) fitted with NO clean contacts. This system only provides elementary control (on/off, with fixed set-point temperature), without the important

system functions (1). Control of the cascade between GAHP/GA and AY00-120 is left to the user.



For connection of the selected device to the appliance's electronic board please refer to Paragraph 4.4 p. 33.

1.7 TECHNICAL CHARACTERISTICS

1.7.1 AHAY Integrated package technical specifications

Table 1.2 – Technical specifications Gitié AHAY

TECHNICAL DATA		AHAY	
BURNER FEATURES			
Seasonal space heating energy efficiency class (ErP)	medium-temperature application (55 °C)	A++	
	low-temperature application (35 °C)	A+	
Maximum thermal capacity		kW	60,1
Maximum gas consumption	G20 - G25	m ³ /h	6.4 ⁽¹⁾
	G25	m ³ /h	7.5 ⁽²⁾
	G30	kg/h	4.8 ⁽³⁾
	G31	kg/h	4.7 ⁽³⁾
HYDRAULIC FEATURES			
Water flow rate 4 pipes (max/nominal/min)	GAHP-A	l/h	4000/2900/1400
	AY00-120	l/h	3200/2700/1500
Water flow rate 2 pipes C0 version (max/nominal/min)		l/h	7200/5600/2900
Pressure loss at nominal flow rate	base version - GAHP-A	bar	0,430
	- AY00-120	bar	0,395
	version KIT/2 C0 simultaneous operation	bar	0,560
Residual pressure head at nominal flow rate	version KIT/4 C1 - GAHP-A	bar	0,240
	- AY00-120	bar	0,280
	version KIT/2 C1	bar	0,200
Ambient air temperature (dry bulb)	maximum	°C	40
	minimum	°C	-15 ⁽⁴⁾
ELECTRICAL SPECIFICATIONS			
Power supply	voltage	V	230
	TYPE		Single phase
	frequency	50 Hz supply	50
Electrical power input (nominal)	Standard fan	kW	1,025 ⁽⁵⁾⁽⁶⁾
	Silenced fan S1	kW	0,955 ⁽⁵⁾⁽⁶⁾
ELECTRICAL PROTECTION RATING		IP	X5D
INSTALLATION DATA			
Sound power Lw	Standard fan	dB(A)	79,6 ⁽⁷⁾
	Silenced fan S1	dB(A)	74 ⁽⁷⁾
Sound pressure Lp at 5 metres	Standard fan	dB(A)	57,6 ⁽⁸⁾
	Silenced fan S1	dB(A)	52 ⁽⁸⁾
Minimum storage temperature		°C	-30
Maximum operating pressure		bar	4
Water content inside the appliance		l	6
Weight in operation/transport	Standard fan	kg	490/515
	Silenced fan S1	kg	500/525
Fittings	delivery/return water (4 pipe version)	"F	1 ¹ / ₄
	delivery/return water (2 pipe version)	"F	1 ¹ / ₂
	gas	"M	3/4
	flue gas exhaust pipe GAHP-A	mm	80
	flue gas exhaust pipe AY00-120	mm	80
Dimensions	width	mm	1457
	depth	mm	1260
	height	mm	1630

Notes

- (1) PCI (G20) 34.02 MJ/m³ (1013 mbar 15 °C).
 (2) PCI (G25) 29.25 MJ/m³ (1013 mbar 15 °C).
 (3) PCI (G30/G31) 46.34 MJ/kg (1013 mbar 15 °C)
 (4) As an option, a special version for operation at -30 °C is available.

- (5) $\pm 10\%$ depending on power supply voltage and absorption tolerance of electric motors.
(6) Add 280 W in versions with circulating pumps.
(7) Sound power values measured according to EN ISO 9614 standard methods.
(8) Maximum sound pressure values in free field, with directionality factor 2, obtained from sound power level in compliance with EN ISO 9614 standard.

1.7.2 GAHP-A Unit technical data

Table 1.3 – GAHP-A Unit technical data

TECHNICAL DATA			GAHP-A
HEATING MODE			
A7W50 OPERATION POINT	G.U.E. gas usage efficiency	%	152 ⁽¹⁾
	Thermal power	kW	38,3 ⁽¹⁾
A7W65 OPERATION POINT	G.U.E. gas usage efficiency	%	124 ⁽¹⁾
	Thermal power	kW	31,1 ⁽¹⁾
A-7W50 OPERATION POINT	G.U.E. gas usage efficiency	%	127 ⁽¹⁾
	Thermal power	kW	32,0 ⁽¹⁾
NOx emission class			5
NOx emission		ppm	25
CO emission		ppm	36
Hot water delivery temperature	maximum for heating	°C	65
	maximum for DHW	°C	70
Hot water inlet temperature	maximum for heating	°C	55
	maximum for DHW	°C	60
	minimum temperature in continuous operation	°C	20 ⁽²⁾
INSTALLATION DATA			
Type of installation			B23P, B33, B53P
Maximum condensation water flow rate		l/h	4
Fume outlet	Residual head	Pa	80
Maximum pressure of the cooling circuit		bar	32
PED data			
Cooling fluid	Ammonia R717	kg	7
	Water H ₂ O	kg	10
Components under pressure	Generator	l	18,6
	Leveling chamber	l	11,5
	Evaporator	l	3,7
	Cooling volume transformer	l	4,5
	Cooling absorber solution	l	6,3
	Solution pump	l	3,3
Test pressure (in air)		bar g	55
Safety valve pressure calibration		bar g	32
Filling ratio		kg of NH ₃ /l	0,146
Fluid group			Group 1°

Notes:

- (1) As per EN12309-2 standard assessed on actual thermal capacity. For operating conditions other than nominal, refer to the Design Manual.
(2) In transient operation, lower temperatures are allowed.

1.7.3 AY00-120 Unit technical data

Table 1.4 – Technical specifications AY00-120

TECHNICAL DATA			AY00-120
HEATING MODE			
OPERATING POINT: Tm80/Tr60 and nominal thermal capacity	Available power	kW	34.4
	Efficiency	%	98.6
OPERATING POINT: Tm80/Tr60 and minimal thermal capacity	Efficiency	%	97.3
OPERATING POINT: Tm70/Tr50 and nominal thermal capacity	Efficiency	%	100,6
Efficiency classes			****
NOx emission class			5
Hot water delivery temperature	maximum	°C	80
	minimum	°C	25
	nominal	°C	60

TECHNICAL DATA			AY00-120
Hot water inlet temperature	maximum	°C	70
	minimum	°C	20
	nominal	°C	50
INSTALLATION DATA THERMAL YIELD			
Efficiency at MEAN thermal capacity Tm80/Tr60		%	98.3
Efficiency at MIN thermal capacity Tm80/Tr60		%	97.3
Efficiency at nominal thermal capacity Tm50/Tr30		%	104.6
Efficiency at 30% of nominal thermal capacity Tr=30°C		%	107.5
Efficiency at 30% of nominal thermal capacity Tr=47°C		%	100.3
Operational heat loss to jacket		kW	0,15
Operational heat loss to jacket		%	0.44
Operational heat loss to flue		kW	0,86
Operational heat loss to flue		%	2.54
Heat loss in off mode		kW	0,058
Heat loss in off mode		%	0,2
INSTALLATION DATA			
Type of installation			B23P-B33-B53P-C13-C33-C43-C53-C63-C83
Maximum condensation water flow rate		l/h	5,5
Fume outlet	Residual head	Pa	100

2 TRANSPORT AND POSITIONING

2.1 WARNINGS



Damage from transport or installation

The manufacturer shall not be liable for any damage during appliance transport and installation.



On-site inspection

- Upon arrival at the site, ensure there is no transport damage on packing, metal panels or finned coil.
- After removing the packing materials, ensure the appliance is intact and complete.



Packing

Only remove the packing after placing the appliance on site.



Do not leave parts of the packing within the reach of children (plastic, polystyrene, nails...) since they are potentially dangerous.



Weight

- The crane and lifting equipment must be suitable for the load.
- Do not stand under suspended loads.

- To lift the appliance use straps or slings inserted in the holes of the base (Figure 2.1 p. 24).
- Use lifting beams to avoid damaging the outer panels and finned coil (Figure 2.1 p. 24).
- Comply with safety regulations at the installation site.



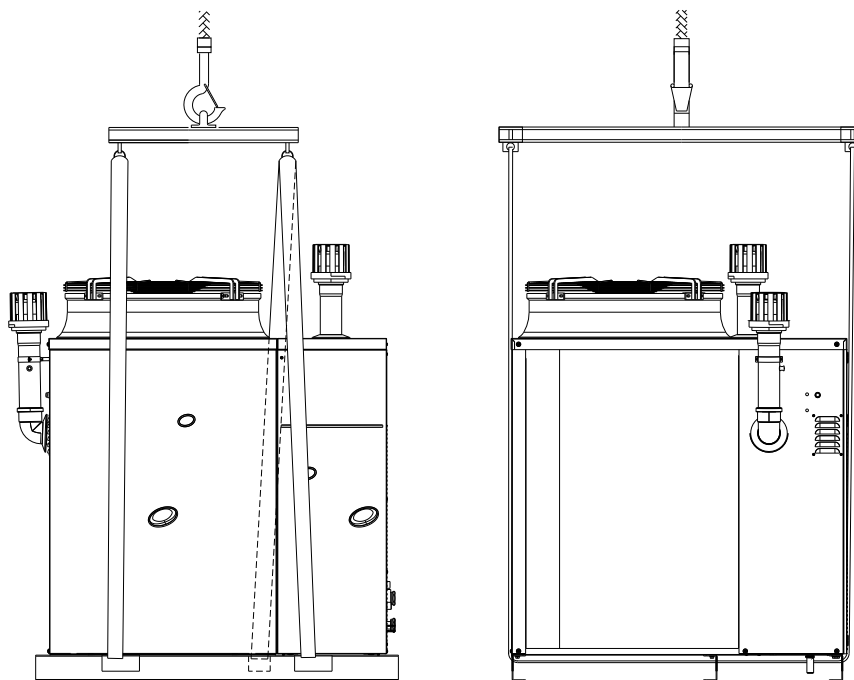
In the event of handling with forklift or pallet truck comply with the handling methods shown on the packing.

2.2 HANDLING

Handling and lifting

- Always handle the appliance in its packing, as delivered by the factory.

Figure 2.1 – Instruction for lifting



2.3 APPLIANCE PLACEMENT



- Do not install inside a room
The appliance is NOT suitable for indoor installation.
- ▶ Do not install inside a room, not even if it has openings.
 - ▶ In no event start the appliance inside a room.



Unit ventilation

- ▶ The aerothermic appliance requires a large space, ventilated and free from obstacles, to enable smooth flow of air to the finned coil and free air outlet above the mouth of the fan, with no air recirculation.
- ▶ Incorrect ventilation may affect efficiency and cause damage to the appliance.
- ▶ The manufacturer shall not be liable for any incorrect choices of the place and setting of installation.

Where to install the unit

- ▶ The appliance may be installed at ground level, on a terrace or on a roof, compatibly with its dimensions and weight.
- ▶ It must be installed outside buildings, in an area of natural air circulation, outside the dripping path of drainpipes or similar. It does not require protection from weathering.
- ▶ No obstruction or overhanging structure (protruding roofs, canopies, balconies, ledges, trees) shall interfere either with the exhaust air flowing from the top of the appliance or with the exhaust flue gas.
- ▶ The appliance's flue gas exhaust must not be immediately close to openings or air intakes of buildings, and must comply with environmental regulations.
- ▶ Do not install near the exhaust of flues, chimneys or hot polluted air. In order to work correctly, the appliance needs clean air.



Defrosting water drainage

In winter, it is normal for frost to form on the finned coil and for the appliance to perform defrosting cycles.

- ▶ To prevent overflowing and damage provide for a drainage system.

Acoustic issues

- ▶ Pre-emptively assess the appliance's sound effect in connection to the site, taking into account that building corners, enclosed courtyards, restricted spaces may amplify the acoustic impact due to the reverberation phenomenon.

2.4 MINIMUM CLEARANCE DISTANCES

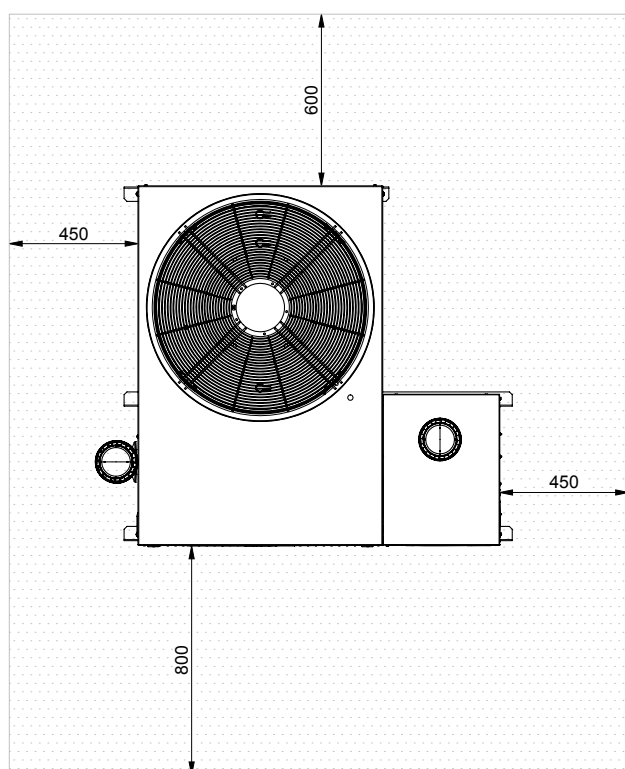
Distances from combustible or flammable materials

- ▶ Keep the appliance away from combustible or flammable materials or components, in compliance with applicable regulations.

Clearances around the appliance

The **minimum clearance distances** shown in Figure 2.2 p. 25 (bar any stricter regulations) are required for safety, operation and maintenance.

Figure 2.2 – Clearances



2.5 MOUNTING BASE

Mounting base constructive features

- Place the appliance on a levelled flat surface made of fire-proof material and able to withstand its weight.

(1) - installation at ground level

- Failing a horizontal supporting base, make a flat and levelled concrete base, at least 100-150 mm larger than the appliance dimensions per side.

(2) - installation on terrace or roof

- The structure of the building must support the total weight of the appliance and the supporting base.
- If necessary, provide a maintenance walkway around the appliance.

Anti vibration mountings

Although the appliance's vibrations are minimal, resonance phenomena might occur in roof or terrace installations.

- Use anti-vibration mountings.
- Also provide anti-vibration joints between the appliance and water and gas pipes.

3 HEATING ENGINEER

3.1 WARNINGS



General warnings

Read the warnings in Chapter III p. 4, providing important information on regulations and on safety.



Compliance with installation standards

Installation must comply with applicable regulations in force, based on the installation Country and site, in matters of safety, design, implementation and maintenance of:

- heating systems;
- cooling systems;
- gas systems;
- flue gas exhaust;
- flue gas condensate discharge.



Installation must also comply with the manufacturer's provisions.

3.2 INSTALLATION

Primary and secondary circuit

- In many cases it is advisable to divide the hydraulic system into two parts, primary and secondary circuit, uncoupled by

a hydraulic separator, or possibly by a tank that also acts as inertial volume/thermal inertia.

Minimum water content

High thermal inertia is conducive to efficient appliance operation. Very short ON/OFF cycles are to be avoided.

- If necessary, provide for an inertial volume, to be suitably sized (see design manual).

3.3 HYDRAULIC CONNECTIONS

4-pipe version hydraulic connections

on the right, at the bottom, connection plate (Figure 1.4 p. 9).

- A (= out) 1"1/4 F - WATER OUTPUT AY (m = delivery AY to the system)
- B (= in) 1"1/4 F - WATER INPUT AY (r = return AY from the system)
- E (= out) 1"1/4 F - WATER OUTPUT GAHP/GA (m = delivery GAHP/GA to the system)
- F (= in) 1"1/4 F - WATER INPUT GAHP/GA (r = return GAHP/GA from the system)

2-pipe version hydraulic connections

on the right, at the bottom, connection plate (Figure 1.3 p. 9).

- A (= out) 1"1/2 F - WATER OUTPUT (m = delivery to the system)
- B (= in) 1"1/2 F - WATER INPUT (r = return from the system)

Hydraulic pipes, materials and features

- Use pipes for heating/cooling systems, protected from weathering, insulated for thermal dispersion.



Pipe cleaning

Before connecting the appliance, accurately wash the water and gas piping and any other system component, removing any residue.

Minimum components of the primary hydraulic circuit (2-pipe version or each of the two circuits GAHP-GA/AY00-120 of the 4-pipe versions)

Always provide, near the appliance:

on water piping, both output and input (m/r)

- 2 ANTIVIBRATION JOINTS on water fittings;
- 2 PRESSURE GAUGES;
- 2 ISOLATION BALL VALVES;

on the input water piping (r)

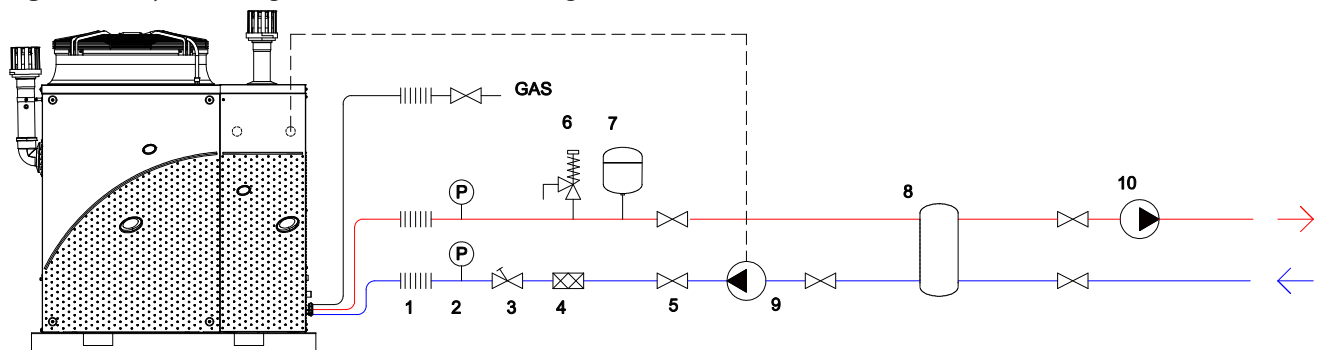
- WATER CIRCULATION PUMP with thrust towards the unit (for the C0 version - without circulating pumps)

- 1 DIRT SEPARATOR FILTER
- 1 FLOW REGULATOR VALVE

on the output water piping (m)

- 1 SAFETY VALVE (3 bar);
- 1 EXPANSION TANK of the individual unit.

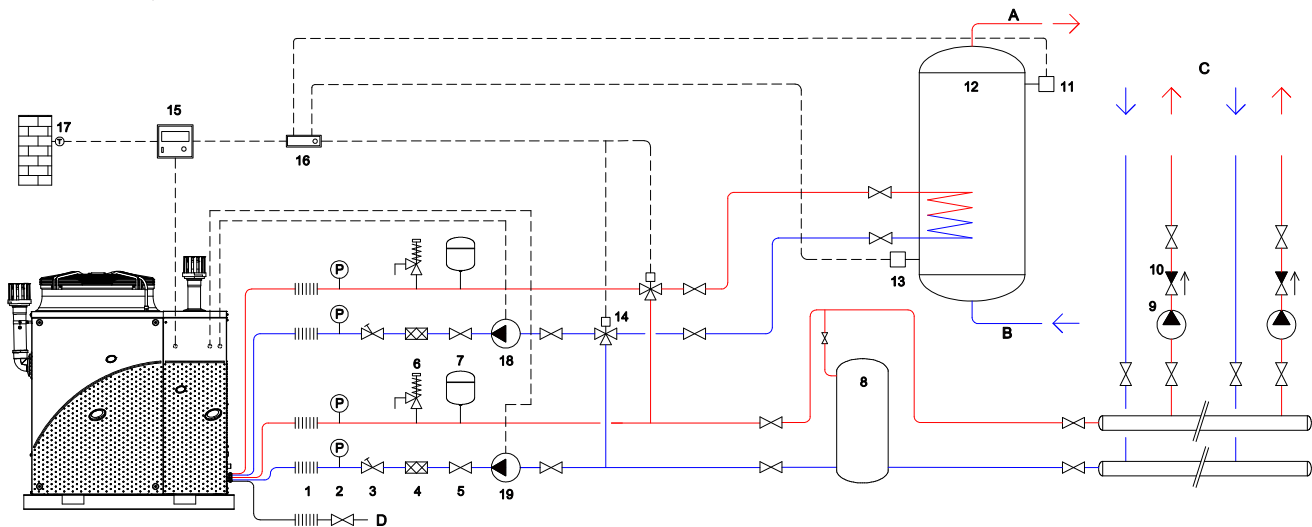
Figure 3.1 – Hydraulic diagram Gitié KIT/2 C0 with storage



LEGEND

1	Anti-vibration connection	6	Safety valve 3 bar
2	Pressure gauge	7	Expansion tank
3	Flow regulator valve	8	Hydraulic separator or inertial tank
4	Dirt separator filter	9	Primary external circulator
5	Shut-off valve	10	Secondary circulator

INDICATIVE DIAGRAM NOT VALID FOR EXECUTION PURPOSES

Figure 3.2 – Hydraulic diagram Gitié KIT/4 C0 DHW**LEGEND**

1	Anti-vibration connection	10	Check valve	17	External air temperature probe
2	Pressure gauge	11	Separable DHW service activation thermostat	18	Primary boiler external circulator
3	Flow regulator valve	12	DHW storage tank	19	Primary GAHP external circulator
4	Water filter	13	Anti-legionella service activation thermostat	A	D.H.W.
5	Shut-off valve	14	3-way diverter valve	B	Water mains
6	Safety valve 3 bar	15	DDC	C	Heating system
7	Unit expansion tank	16	RB100	D	Gas
8	Storage tank with anti-mixing baffles				
9	Secondary circuit circulator				

INDICATIVE DIAGRAM NOT VALID FOR EXECUTION PURPOSES

3.4 WATER CIRCULATION PUMPS

3.4.1 Versions C0

Circulation pumps (flows and heads) must be selected and installed based on pressure losses of hydraulic circuits (piping + components + exchange terminals + appliance).

For the appliance's pressure losses refer to Table 1.2 p. 21.

Circulation pumps will be controlled at constant flow.



For pump sizing in the version KIT/2 C0 also consider the alternate operation case.

For electrical connections of the pumps refer to Paragraph 4.5 p. 35.

3.4.2 Versions C1

Water circulation pumps are supplied on the appliance.

For available water flow and residual head features refer to Table 1.2 p. 21.

3.5 ANTI-ICING FUNCTION

Active anti-icing self-protection

The appliance is equipped with an active antifreeze self-protection system to prevent freezing. The antifreeze function (activated by default) automatically starts primary circulation pumps and, if required, the burner too, when the outside temperature approaches zero.



Electrical and gas continuity

The active anti-icing self-protection is only effective if the power and gas supplies are assured. Otherwise, anti-icing liquid might be required.

3.6 ANTI-ICING LIQUID



Precautions with glycol

The manufacturer disclaims any liability for any damage caused by improper glycol use.

- Always check product suitability and its expiry date with the glycol supplier. Periodically check the product's preservation state.
- Do not use car-grade anti-icing liquid (without inhibitors), nor zinc-coated piping and fittings (incompatible with glycol).

Glycol modifies the physical properties of water (density, viscosity, specific heat...).

- Size the piping, circulation pumps and thermal generators accordingly.

With automatic system water filling, a periodic check of the glycol content is required.



With high glycol percentage (> 20...30%)

If the glycol percentage is $\geq 30\%$ (for ethylene glycol) or $\geq 20\%$ (for propylene glycol) the TAC must be alerted before first start-up.

Type of anti-icing glycol

- **Inhibited type glycol** is recommended to prevent oxidation phenomena.

Glycol effects

The Table 3.1 p. 28 shows, indicatively, the effects of using glycol depending on the %.

Table 3.1 – Technical data for filling the hydraulic circuit

GLYCOL %	10	15	20	25	30	35	40
WATER-GLYCOL MIXTURE FREEZING TEMPERATURE	-3°C	-5°C	-8°C	-12°C	-15°C	-20°C	-25°C
PERCENTAGE OF INCREASE IN PRESSURE DROPS	--	6%	8%	10%	12%	14%	16%
LOSS OF EFFICIENCY OF UNIT	--	0,5%	1%	2%	2,5%	3%	4%

3.7 SYSTEM WATER QUALITY



Responsibility of the user/operator/installer

The installer, operator and user must assure system water quality (Table 3.2 p. 28). Failure to comply with the manufacturer's guidelines may affect operation, integrity and life of the appliance, voiding the warranty.

System water features

Free chlorine or water hardness may damage the appliance. Adhere to the chemical-physical parameters in Table 3.2 p. 28 and the regulations on water treatment for residential and industrial heating systems.

Table 3.2 – Chemical and physical parameters of water

CHEMICAL AND PHYSICAL PARAMETERS OF WATER IN HEATING/COOLING SYSTEMS		
PARAMETER	UNIT OF MEASUREMENT	ALLOWABLE RANGE
pH	\	>7 ⁽¹⁾
Chlorides	mg/l	< 125 ⁽²⁾
Total hardness (CaCO ₃)	°f	< 15
	°d	< 8,4
Iron	mg/kg	< 0,5 ⁽³⁾
Copper	mg/kg	< 0,1 ⁽³⁾
Aluminium	mg/l	< 1
Langelier's index	\	0-0,4
HARMFUL SUBSTANCES		
Free chlorine	mg/l	< 0,2 ⁽³⁾
Fluorides	mg/l	< 1
Sulphides		ABSENT

- 1 with aluminium or light alloys radiators, pH must also be lower than 8 (in compliance with applicable rules)
- 2 value referred to the maximum water temperature of 80 °C
- 3 in compliance with applicable rules

Water topping up

The chemical-physical properties of the system's water may alter over time, resulting in poor operation or excessive topping up.

- Ensure there are no leaks in the installation.
- Periodically check the chemical-physical parameters of the water, particularly in case of automatic topping up.



Chemical conditioning and washing

Water treatment/conditioning or system washing carried out carelessly may result in risks for the appliance, the system, the environment and health.

- Contact specialised firms or professionals for water treatment or system washing.
- Check compatibility of treatment or washing products with operating conditions.
- Do not use aggressive substances for stainless steel or copper.

- Do not leave washing residues.

3.8 INSTALLATION FILLING

How to fill up the system



After completing all water, electrical and gas connections:

1. Pressurise (at least 1.5 bar) and vent the hydraulic circuit.
2. Let water flow (with appliance off).
3. Check and clean the filter on the inlet pipe.
4. Repeat items 1, 2 and 3. until the pressure has stabilised (1.5 bar).

3.9 FUEL GAS SUPPLY

Gas connection

► 3/4" M

on the right, at the bottom, **connection plate** (Figure [Ref] p.).

- Install an anti-vibration connection between the appliance and the gas piping.

Mandatory shut-off valve

- Provide a gas shut-off valve (manual) on the gas supply line, to isolate the appliance when required.
- Perform connection in compliance with applicable regulations.

Gas pipes sizing

The gas pipes must not cause excessive load losses and, consequently, insufficient gas pressure for the appliance.

Supply gas pressure

The appliance's gas supply pressure, both static and dynamic, must comply with Table 3.3 p. 29, with tolerance $\pm 15\%$.

Table 3.3 – Network gas pressure

Product categories	Countries of destination	Gas supply pressure						
		G20 [mbar]	G25 [mbar]	G30 [mbar]	G31 [mbar]	G25.1 [mbar]	G27 [mbar]	G2,350 [mbar]
II _{2H3B/P}	AL, BG, CY, CZ, DK, EE, FI, GR, HR, IT, LT, MK, NO, RO, SE, SI, SK, TR	20		30	30			
	AT, CH	20		50	50			
II _{2H3P}	AL, BG, CZ, ES, GB, HR, IE, IT, LT, MK, PT, SI, SK, TR	20			37			
	RO	20			30			
II _{2ELL3B/P}	DE	20	20	50	50			
II _{2ES3P}	FR	20	25		37			
II _{2HS3B/P}	HU	25		30	30	25		
II _{2E3P}	LU	20			50			
II _{2L3B/P}	NL		25	50	50			
II _{2E3B/P}	PL	20		37	37			
II _{2ELwL3B/P}		20		37	37		20	13
II _{2ELwL3P}		20			37		20	13
I _{2E(S);13P}	BE	20	25		37			
I _{3P}	IS				30			
I _{2H}	LV	20						
I _{3B/P}	MT			30	30			
I _{3B}				30				



Non compliant gas pressure (Table 3.3 p. 29) may damage the appliance and be hazardous.

Vertical pipes and condensate

- ▶ Vertical gas pipes must be fitted with siphon and discharge of the condensate that may form inside the pipe.
- ▶ If necessary, insulate the piping.

LPG pressure reducers

With LPG the following must be installed:

- ▶ a first stage pressure reducer, close to the liquid gas tank;
- ▶ a second stage pressure reducer, close to the appliance.

3.10 GAHP-A UNIT COMBUSTION PRODUCTS EXHAUST



Compliance with standards

The appliance is approved for connection to a combustion products exhaust duct for the types shown in Table 1.3 p. 22.

Flue gas exhaust connection

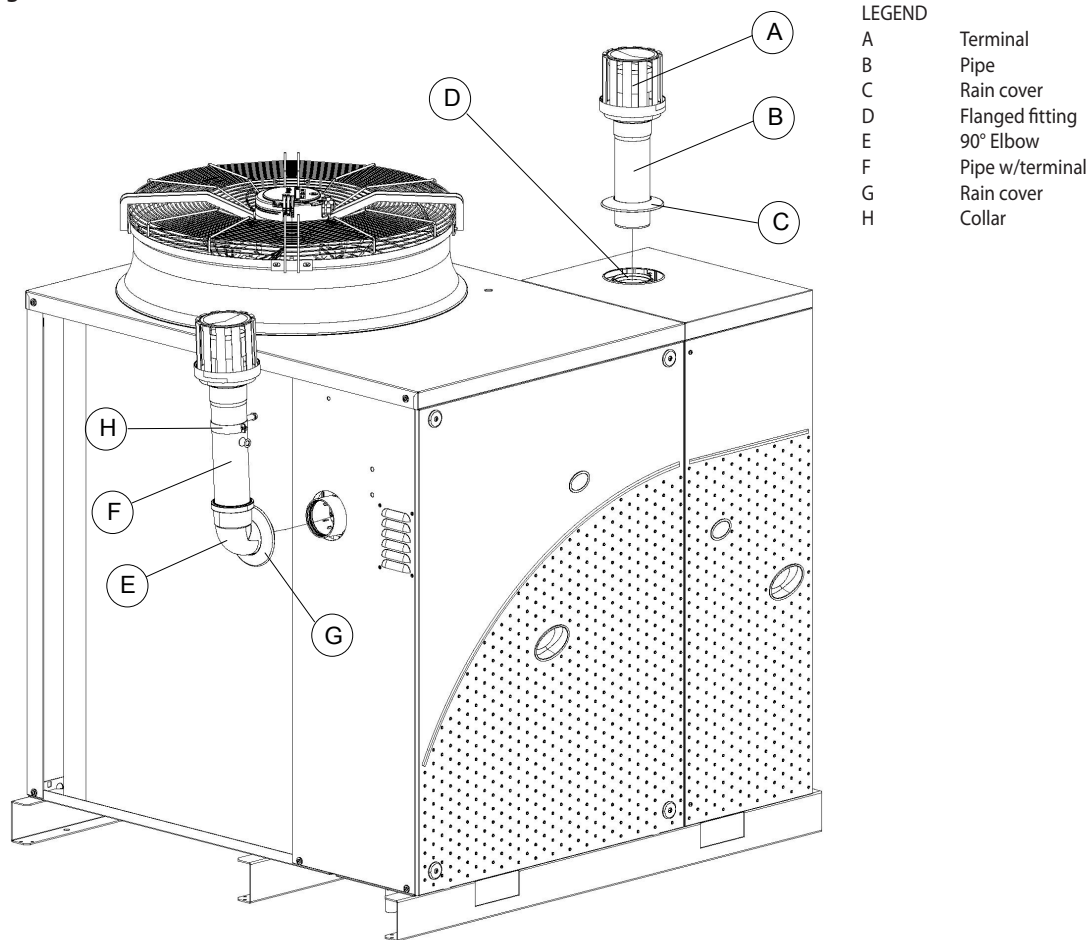
- ▶ Ø 80 mm (with gasket), on the left, at the top (Figure 3.3 p. 30).

Flue gas exhaust kit

The appliance is supplied with flue gas exhaust kit, to be fitted by the installer, including (Figure 3.3 p. 30):

- ▶ 1 pipe Ø 80 mm, length 300 mm, with terminal and socket for flue gas analysis;
- ▶ 1 support collar;
- ▶ 1 90° elbow Ø 80 mm;
- ▶ 1 rain cover.

Figure 3.3 – Fume outlet



LEGEND

A	Terminal
B	Pipe
C	Rain cover
D	Flanged fitting
E	90° Elbow
F	Pipe w/terminal
G	Rain cover
H	Collar

How to install the flue gas kit



Figure 3.3 p. 30:

1. Remove the front panel;
2. Fasten the collar (H) with its spacer to the left side panel of the appliance;
3. Fit the terminal/pipe assembly (F) to the elbow (E).
4. Fit the rain cover (G) onto the elbow (E);
5. Remove the protection cover;
6. Insert the elbow/terminal/pipe assembly into the flue gas exhaust;
7. Fit the assembly closing the collar (H) and place the rain cover.
8. Fit the front panel back on.

3.11 AY00-120 UNIT COMBUSTION PRODUCTS EXHAUST



Compliance with standards

The appliance is approved for connection to a combustion products exhaust duct for the types shown in Table 1.2 p. 21.

Flue gas exhaust connection

- Ø 80 mm

in the upper part (Figure 3.3 p. 30).

Flue gas exhaust kit

The appliance is supplied with flue gas exhaust kit, to be fitted by the installer, including (Figure 3.3 p. 30).

- 1 terminal;
- 1 extension pipe Ø 80 mm, length 209 mm;
- 1 rain cover;

How to install the flue gas kit



Figure 3.3 p. 30:

1. Fit the terminal (A) onto the pipe (B);
2. Fit the rain cover (C) onto the pipe (B);
3. Remove the protection cover located on the upper panel;
4. Fit the rain cover/pipe/terminal assembly onto the flanged fitting (D) and place the rain cover.



The protection cover has the purpose of preventing ingress of water and/or foreign matter into the appliance before installation of the flue gas kit. It is therefore important to remove the protection only upon completing installation of the kit.

3.12 COMBUSTION PRODUCTS EXHAUST THROUGH THE FLUE

If necessary, the appliance may be connected to a flue.

- To size the flue refer to Table 1.4 p. 22, Table 1.3 p. 22 and Design Manual.
- If the flue gas exhaust of the GAHP and that of the AY00-120 boiler are connected to a single flue, it is mandatory to install a flap valve on the exhaust of each.

The flue must be designed, sized, tested and constructed by a skilled form, with materials and components complying with the regulations in force in the country of installation.

- Always provide a socket for flue gas analysis, in an accessible position.

- Dilute, if possible, with domestic waste water (bathrooms, washing machine, dish washers...), basic and neutralising.

3.13 FLUE GAS CONDENSATE DISCHARGE

The GAHP-A unit and the AY00-120 unit are condensation appliances which therefore produce condensation water from combustion fumes.



Condensate acidity and exhaust regulations

The fume condensation water contains aggressive acid substances.

Refer to applicable regulations in force for condensate exhaust and disposal.

- If required, install an acidity neutraliser of adequate capacity (Tables 1.3 p. 22 and 1.4 p. 22).



Do not use gutters to discharge the condensate

Do not discharge the fume condensate water in gutters, due to the risk of materials corrosion and ice formation.

GAHP-A Unit flue gas condensate fitting

The fitting for flue gas condensate discharge is located on the left side of the appliance (Figure 3.4 p. 32).

- The distance L between the sleeve and the base must not exceed 110 mm.
- The corrugated condensate discharge pipe must be connected to a suitable discharge manifold.
- The junction between the pipe and the manifold must remain visible.

AY00-120 Unit flue gas condensate fitting

The fitting for flue gas condensate discharge is located on the right side of the appliance at the service plate (Figure 1.3 p. 9 and Figure 1.4 p. 9).

- The condensate discharge pipe must be connected to a suitable discharge manifold.
- The junction between the pipe and the manifold must remain visible.

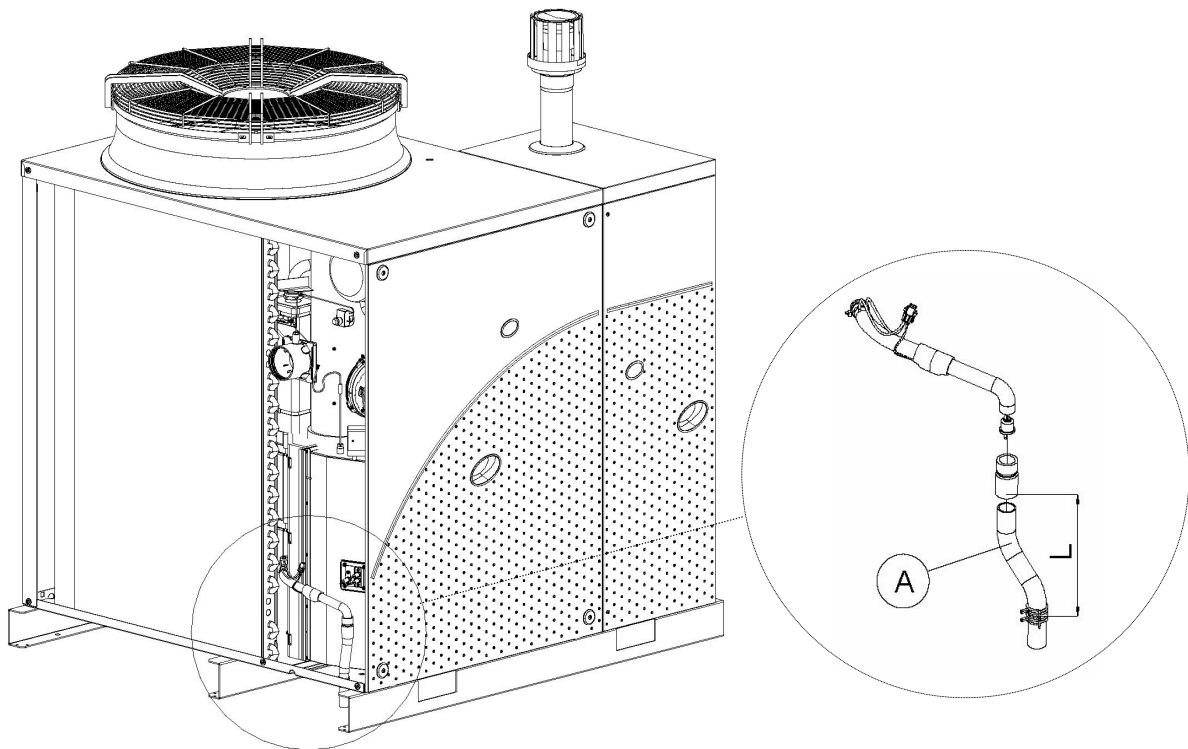
Flue gas condensate discharge manifold

If necessary the condensate discharge manifold may be in common between the 2 units the Gitié package consists of.

To make the condensate discharge manifold:

- Size the ducts for maximum condensation capacity (Tables 1.4 p. 22 and 1.3 p. 22).
- Use plastic materials resistant to acidity pH 3-5.
- Provide for min. 1% slope, i.e. 1 cm for each m of the length (otherwise a booster pump is required).
- Prevent icing.

Figure 3.4 – Condensate discharge



LEGEND

- A Condensate discharge hose
L ≤ 110 mm

3.14 DEFROSTING WATER DRAINAGE



Defrosting

In winter, frost may form on the finned coil and the appliance performs defrosting cycles.

Collection basin and drainage system

- Provide for a collection basin or containment rim and a discharge system of the defrosting water, to avoid overflowing, icing and damage.

4 ELECTRICAL INSTALLER

4.1 WARNINGS



General warnings

Read the warnings in Chapter III p. 4, providing important information on regulations and on safety.



Compliance with installation standards

Installation must comply with applicable regulations in force, based on the installation Country and site, in matters of safety, design, implementation and maintenance of electrical systems.

Installation must also comply with the manufacturer's provisions.



Live components

After placing the appliance in the final position, and prior to making electrical connections, ensure not to work on live components.



Earthing

- The appliance must be connected to an effective earthing system, installed in compliance with regulations in force.
- It is forbidden to use gas pipes as earthing.



Cable segregation

Keep power cables physically separate from signal ones.



Do not use the power supply switch to turn the appliance on/off.

- Never use the external isolation switch (GS) to turn the appliance on and off, since it may be damaged in the long run (occasional black outs are tolerated).
- To turn the appliance on and off, exclusively use the suitably provided control device (DDC or external enable).



Control of water circulation pumps

The water circulation pumps of the hydraulic circuit must mandatorily be controlled by the unit's electronic boards. It is not admissible to start/stop circulating pumps with no enable from the appliance.

4.2 ELECTRICAL SYSTEMS

Electrical connections must provide:

- (a) power supply (Paragraph [Ref] p.);
- (b) control system (Paragraph 1.6 p. 20).

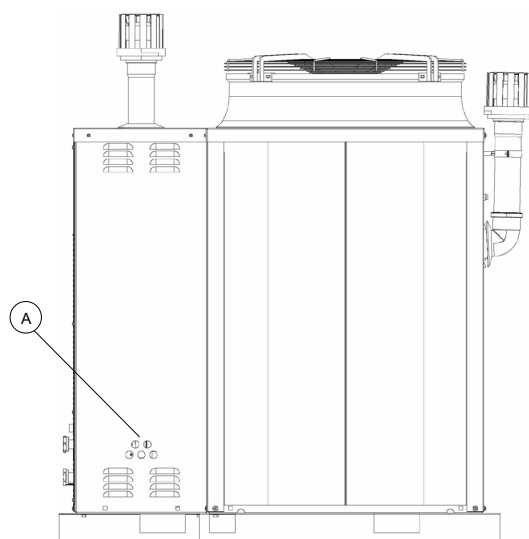
How to perform connections



All electrical connections must be made in the Electrical Panel of boiler AY 00-120 (Figure 1.7 p. 12, reference 7):

1. Ensure the appliance's Electrical Panel is not live.
2. Remove the front panel of the boiler and the cover of the Electrical Panel.
3. Insert the wires through the suitable holes located on the rear panel of the boiler (Figure 4.1 p. 33).
4. Make the connections by running the wires through the suitable cable glands in the Electrical Panel.
5. Close the Electrical Panel and fit the front panel back on.

Figure 4.1 – Electrical cables routing holes position



LEGEND

A Holes for electrical cable routing

4.3 ELECTRICAL POWER SUPPLY

Power supply line

Provide (by the installer) a protected single phase line (230 V 1-N 50 Hz) with:

- 1 three-pole cable type FG7(O)R 3Gx1.5;
- 1 two-pole switch with two 8 A fuses type T, (GS) or one 10A magnetothermic breaker.



The switches must also provide disconnecter capability, with min contact opening 4 mm.

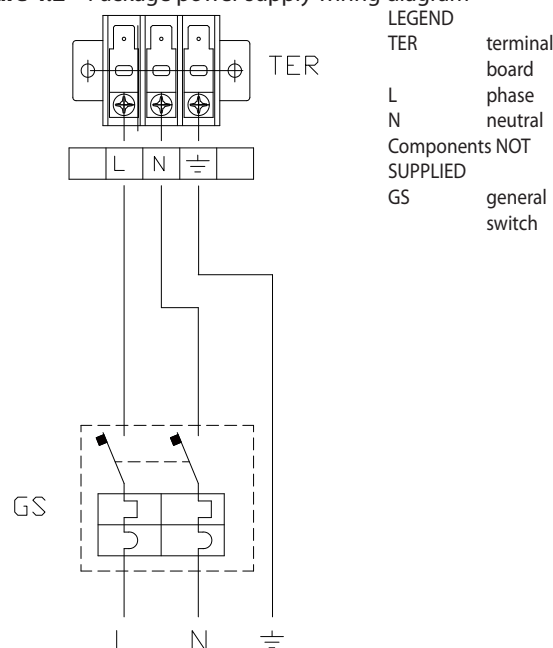
How to connect the power supply



To connect the three-pole power supply cable (Figure 4.2 p. 33):

1. Connect the three lead-in wires to the terminal (TER) in the electrical panel on the machine.
2. Provide the earth lead-in wire longer than live ones (last to be torn in the event of accidental pulling).

Figure 4.2 – Package power supply wiring diagram



Connecting the appliance to the power supply mains (230V 1N - 50Hz)

4.4 SET-UP AND CONTROL

Control systems, options (1) (2)

Two separate adjustment systems are provided, each with specific features, components and diagrams (see Paragraph 1.6 p. 20):

- System (1), with **DDC control (with CAN-BUS connection)**.
- System (2), with **external enables**.

4.4.1 Control with DDC

CAN-BUS communication network

The CAN-BUS communication network, implemented with the cable of the same name, makes it possible to connect and remotely control one or more Robur appliances with the DDC control device.

It entails a certain number of serial nodes, distinguished in:

- intermediate nodes, in variable number;
- terminal nodes, always and only two (beginning and end);

Each component of the Robur system, appliance (GAHP, GA, AY, Gitié, ...) or control device (DDC, RB100, RB200, CCI, ...), corresponds to a node, connected to two more elements (if it is an intermediate node) or to just one other element (if it is a terminal

node) through two/one CAN-BUS cable section/s, forming an open linear communication network (never star or loop-shaped).

CAN-BUS signal cable

The DDC controller is connected to the appliance through the CAN-BUS signal cable, shielded, compliant to Table 4.1 p. 34 (admissible types and maximum distances).

Table 4.1 – CAN BUS cables type

CABLE NAME	SIGNAL / COLOR			MAX LENGTH	Note
Robur					Ordering Code OCVO008
ROBUR NETBUS	H= BLACK	L= WHITE	GND= BROWN	450 m	
Honeywell SDS 1620					In all cases the fourth conductor should not be used
BELDEN 3086A	H= BLACK	L= WHITE	GND= BROWN	450 m	
TURCK type 530					
DeviceNet Mid Cable					
TURCK type 5711	H= BLUE	L= WHITE	GND= BLACK	450 m	
Honeywell SDS 2022					
TURCK type 531	H= BLACK	L= WHITE	GND= BROWN	200 m	

For lengths ≤ 200 m and max 4 nodes (e.g. 1 DDC + 1 Gitié), a simple 3x0.75 mm shielded cable may even be used.

How to connect the CAN BUS cable to the package

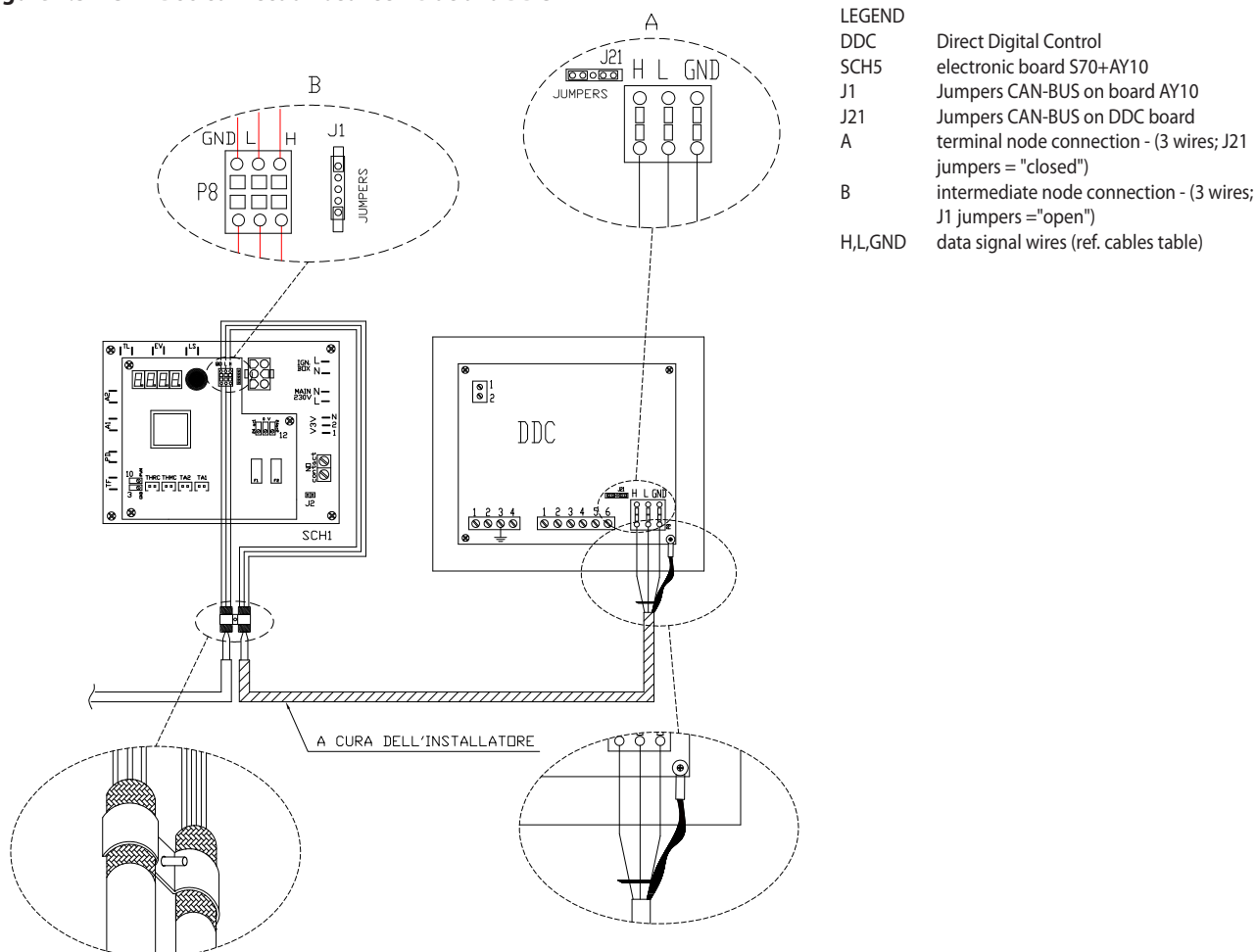


To connect the CAN-BUS cable to the AY10 electronic board (Paragraph 1.5 p. 18), located in the Electrical Panel inside the AY 00-120 unit, Figure 4.3 p. 34, Details A and B:

1. access the Electrical Panel (procedure Paragraph 4.2 p. 33)

2. connect the CAN-BUS cable to terminals GND + L and H (shielding/earthing + two signal conductors) of the AY10 board;
3. place the Jumper J1, of the AY10 board, OPEN;
4. connect the DDC to the CAN-BUS cable to terminals GND + L and H (shielding/earthing + two signal conductors) of the DDC;
5. the CAN connection between the AY10 board and the S61 board is pre-wired (Figure 1.14 p. 17);

Figure 4.3 – CAN-BUS connection between Gitié and DDC



4.4.2 Control with external enables

How to connect external enables



Connection of external enables is effected on the terminal block located in the Electrical Panel inside the AY00-120 unit.

If you wish the heating enables of the two units to be simultaneous follow the connection diagram shown in Figure 4.4 p. 35. Should you wish the enables of the two units to be separate follow the connection diagram shown in Figure 4.5 p. 35.

Figure 4.4 – Connection diagram of simultaneous hot external enables

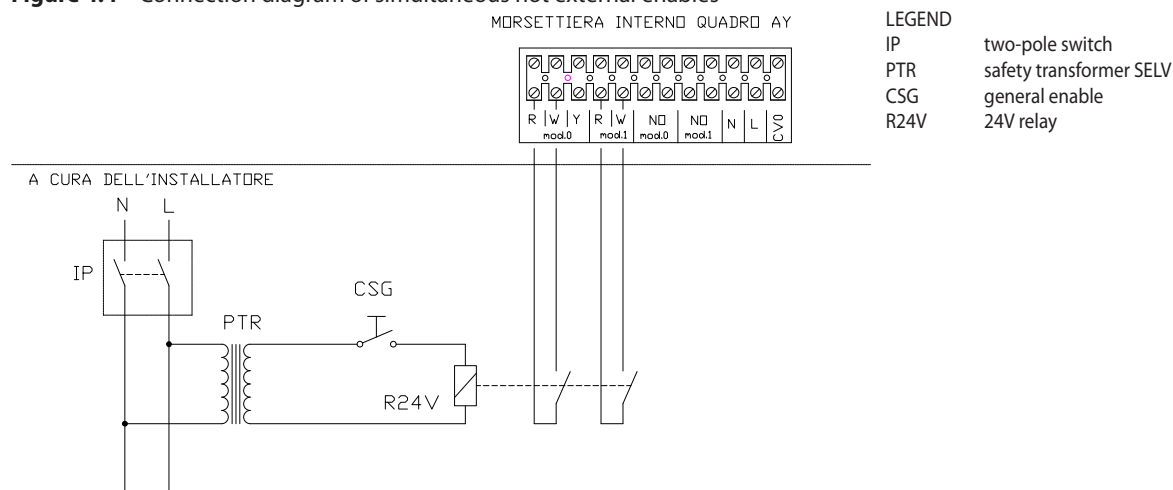
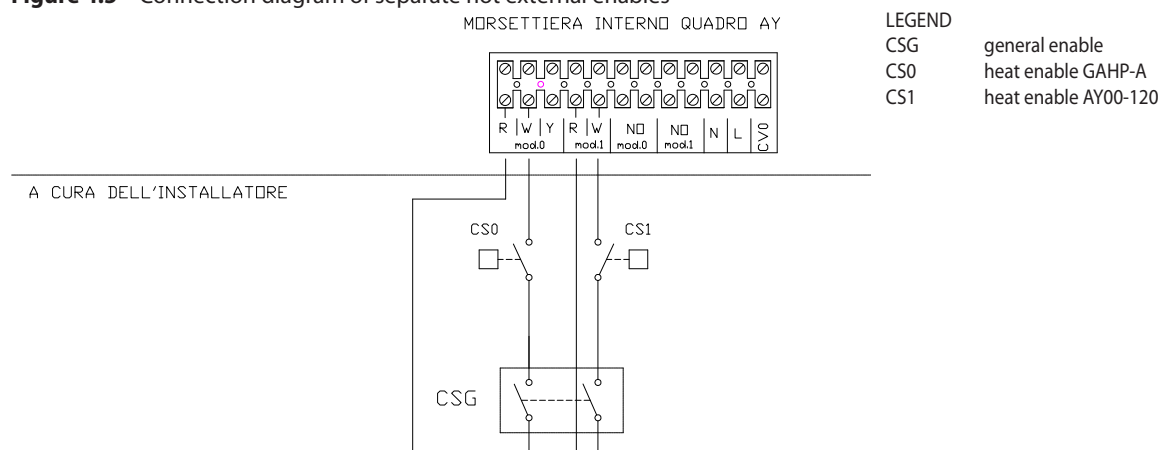


Figure 4.5 – Connection diagram of separate hot external enables



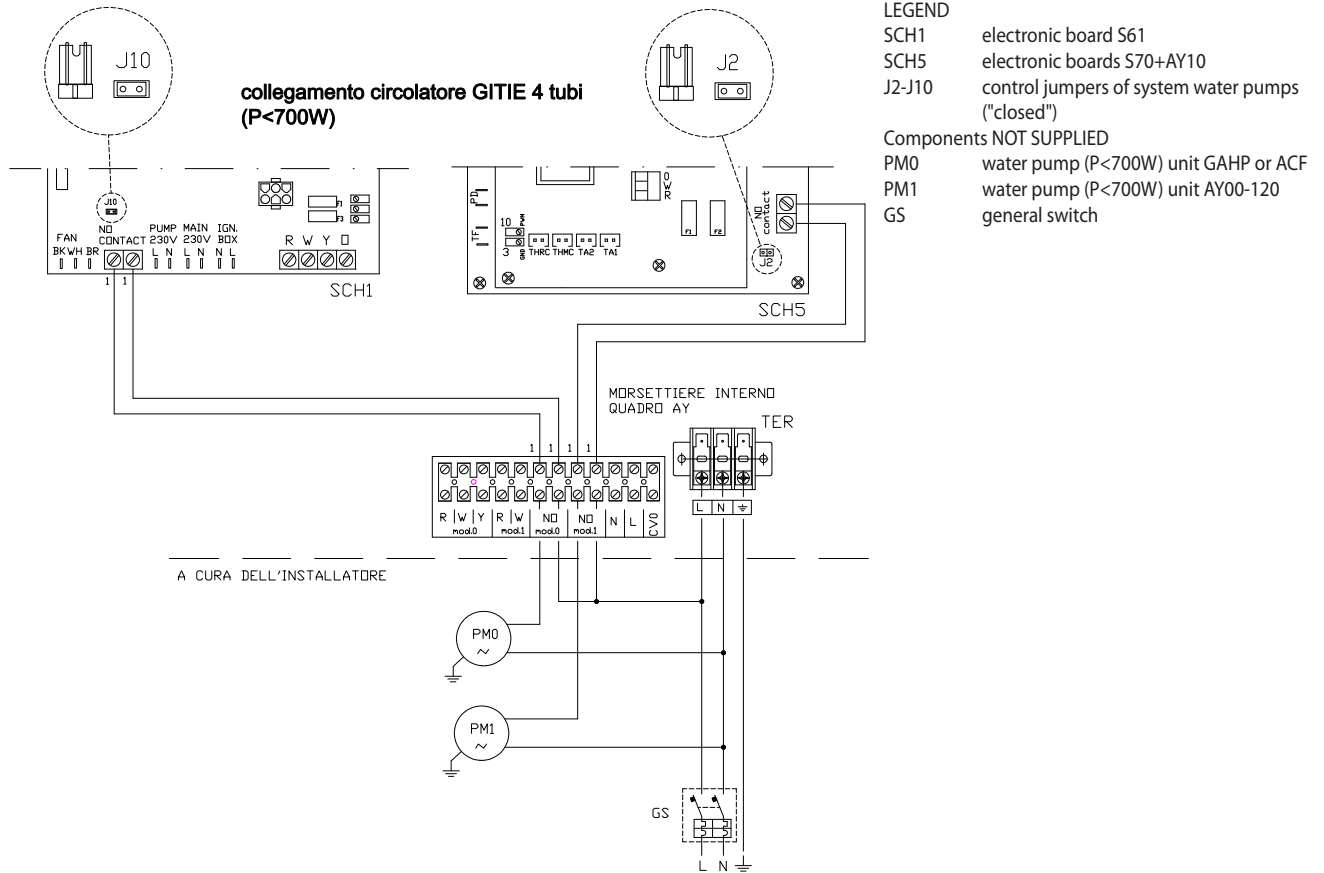
4.5 WATER CIRCULATION PUMPS (VERSIONS C0)



System water pumps will be controlled at constant flow.

4-pipe versions

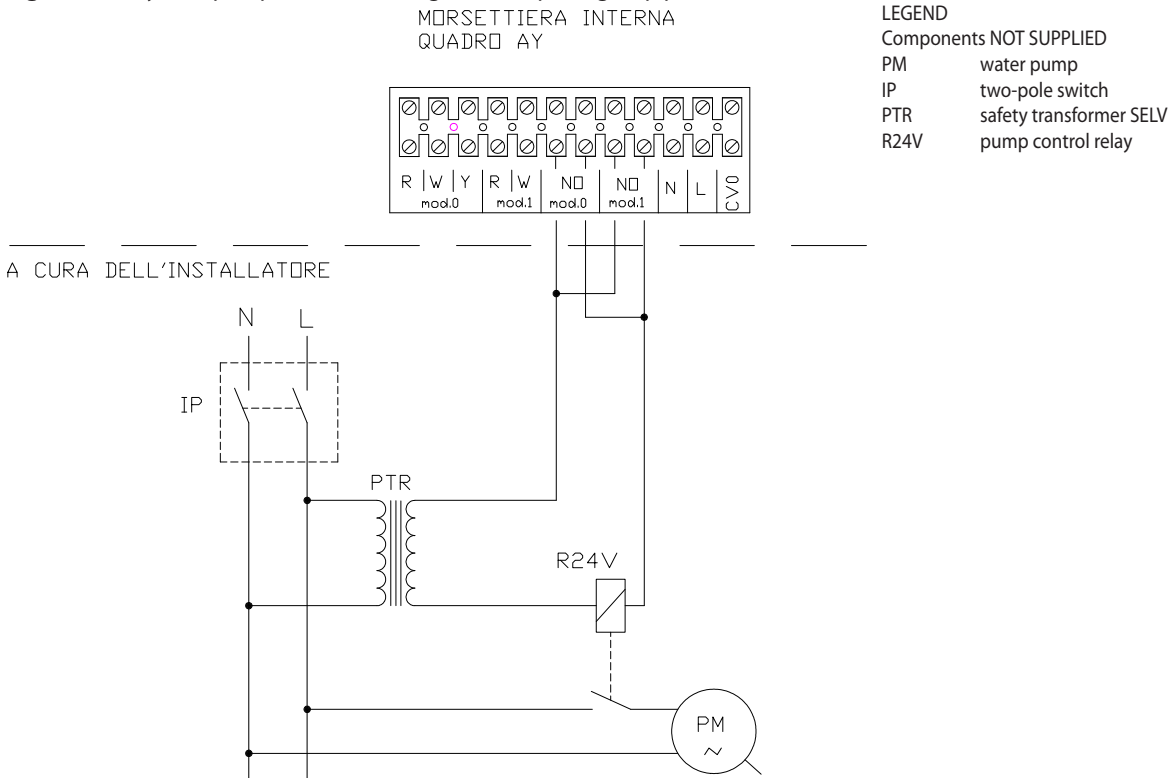
Figure 4.6 – System pump connection diagram Gitie package base version (P



The diagram in Figure 4.6 p. 36 is for pumps < 700 W. For pumps > 700 W it is necessary to add a control relay and arrange Jumpers J10 and J2 OPEN.

2-pipe versions

Figure 4.7 – System pump connection diagram Gitié package 2 pipe version (KIT/2 C0)



5 FIRST START-UP



First Switch-On entails checking/adjusting the combustion parameters and must be carried out ONLY by a Robur TAC. In this stage, NEITHER the user NOR the installation technician is authorised to perform such operations, under penalty of voiding the warranty.

5.1 PRELIMINARY CHECKS

Preliminary checks for First start-up

Upon completing installation, before contacting the TAC the installer must check:

- ▶ water-heating, electrical and gas systems suitable for the required capacities and equipped with all safety and control devices required by the regulations in force;
- ▶ absence of leaks in the water and gas systems;
- ▶ type of gas for which the appliance is designed;
- ▶ supply gas pressure complying with the values of Table 3.3 p. 29, with max tolerance $\pm 15\%$;
- ▶ Power supply mains complying with the appliance's rating plate data;
- ▶ appliance correctly installed, according to the manufacturer's instructions;
- ▶ system installed in a workmanlike manner, according to national and local regulations.

Abnormal or hazardous installation situations

Should any abnormal or hazardous installation situations be found, the TAC shall not perform First start-up and the appliance shall not be commissioned.

These situations may be:

- ▶ appliance installed inside a room;
- ▶ failed compliance with minimum clearances;
- ▶ insufficient distance from combustible or flammable materials;
- ▶ conditions that do not warrant access and maintenance in safety;
- ▶ appliance switched on/off with the main switch, instead of the control device provided (DDC, or external enable);
- ▶ appliance defects or faults caused during transport or installation;
- ▶ gas smell;
- ▶ non-compliant mains gas pressure;
- ▶ non-compliant flue gas exhausts;
- ▶ all situations that may involve operation abnormalities or are potentially hazardous.

Non-compliant system and corrective actions

Should the TAC find any non conformities, the user/installer is bound to perform any corrective procedures required by the TAC.

After performing the remedial actions (the installer's responsibility), if the TAC deems that safety and conformity conditions are in place, "First start-up" may be effected.

6 NORMAL OPERATION

This section is for the end user.

6.1 WARNINGS



General warnings

Prior to using the appliance carefully read the warnings in Chapter III p. 4, providing important information on regulations and on safety.



First start-up by TAC

First Switch-on may exclusively be carried out by a Robur TAC (Chapter 5 p. 37).



Never power the appliance off while it is running

NEVER power the appliance off while it is running (except in the event of danger, Chapter p. 4), since the appliance or system might be damaged.

6.2 SWITCH ON AND OFF



Routine switching on/off

The appliance may exclusively be switched on/off by means of the suitably provided control device (DDC or external enable).



Do not Switch On/Off with the power supply switch

Do not switch the appliance on/off with the power supply switch. This may be harmful and dangerous for the appliance and for the system.



Inspections before switching on

Before switching on the appliance, ensure that:

- ▶ gas cock open;
- ▶ appliance electrical power supply (main switch (GS) ON);
- ▶ DDC power supply (if any);
- ▶ water circuit ready.

How to switch on/off

- ▶ If the appliance is controlled by a DDC, case (1), refer to the relevant manual.
- ▶ If the appliance is controlled by external enables (e.g. thermostat, clock, button, ... with clean contact NO), case (2), the appliance is switched on/off by the ON/OFF positions of the external control devices.

After switching on with the control, in normal operating conditions, the appliance starts/stops automatically according to the user's needs, supplying water at the programmed temperature.



Although the external enable is in the "ON" position, this does not mean the appliance will start immediately, but it will only start when there are actual service demands.

6.3 MESSAGES ON THE DISPLAY

4 digit display

The S61 board and the AY10 board (Figures 6.1 p. 39 and 6.2 p. 39) are fitted with a 4-digit display, visible through the sight glass of the respective front panels.

- ▶ When the appliance is powered on, all the LEDs switch on for 3 sec, then the board name is displayed.
- ▶ After another 15 sec, the appliance is ready to operate.

Signals in normal operation

- ▶ During normal operation, water temperature values alternate on the display: output, input and the difference between the two.

Signals in the event of fault

In the event of fault the display blinks indicating an operational code (first letter on the display: "E" = error, or "U" = warning)

- ▶ If it is only a temporary warning, the appliance may continue working.
- ▶ If it is a permanent error or warning the appliance stops (Table 8.1 p. 42 and Table 8.2 p. 45)

6.4 ELECTRONIC ADJUSTMENT ON THE MACHINE – MENUS AND PARAMETERS OF THE S61 BOARD AND OF THE AY10 BOARD

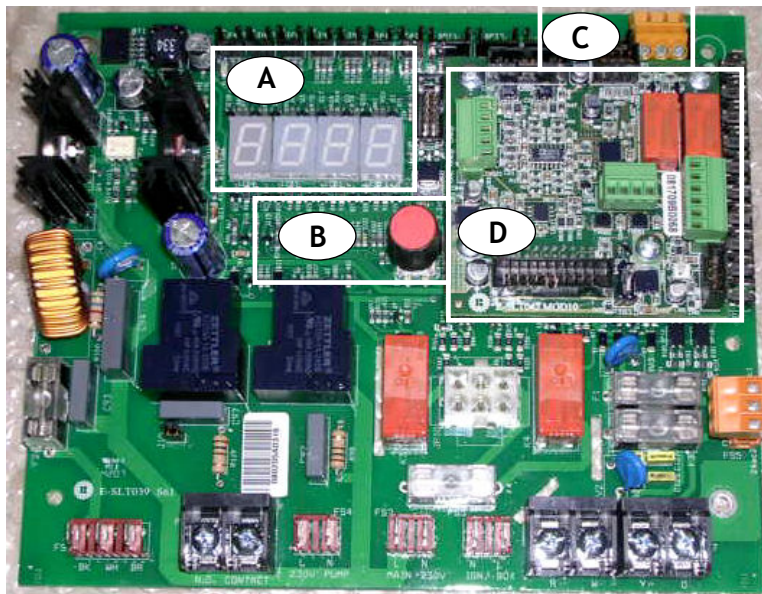


Firmware

The instructions on the use of the S61 electronic board concern the **firmware version 3.028**.

Le istruzioni sull'utilizzo della scheda elettronica AY10 sono relative al **firmware versione 3.106**.

Figure 6.1 – GAHP unit electronic board

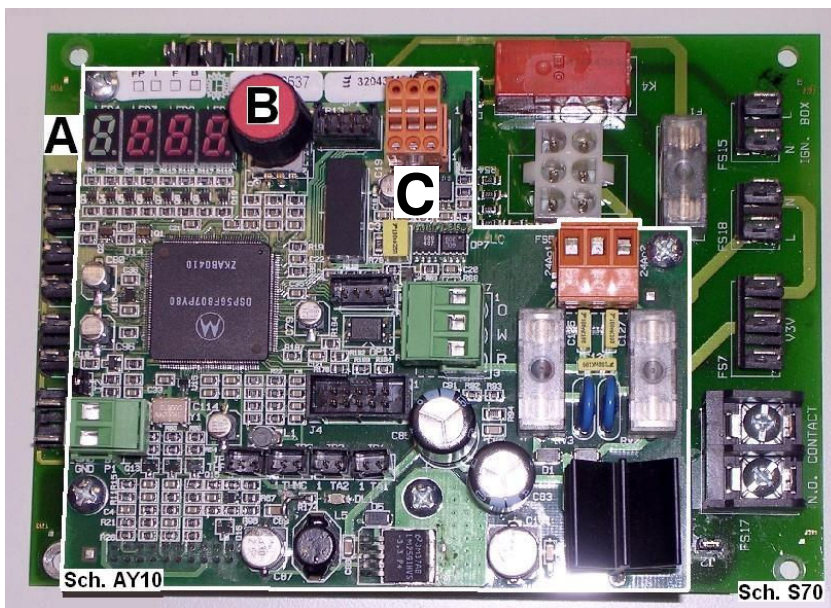


LEGEND

A	4 digit display
B	Knob
C	CAN port
D	Mod10 controller

S61 + Mod10

Figure 6.2 – AY00-120 unit on-board electronics



LEGEND

A	4 digit display
B	Knob
C	CAN port

Controllers AY10 and S70.

Display

The 4-digit displays of the boards (Detail A in Figure 6.1 p. 39 and in Figure 6.2 p. 39) are as follows:

- ▶ the **first digit** on the left, green) indicates the menu number (e.g. "0.", "1.", "2.", ... "8.");
- ▶ the **last three digits** (on the right, red) indicate a **code** or a **value** for a parameter, among those included in the selected menu (e.g. "_6" "_20", "161").

(e.g. menu+parameter "1._6", "2._20", "3.161").

Knob

One of the following actions may be done with the board knob (Detail B in Figure 6.1 p. 39 and in Figure 6.2 p. 39):

- ▶ Enter the menu list (by pressing the first time);

- ▶ Scroll the menu list, or a series of parameters in a menu (by turning);
- ▶ Select a menu or a parameter (by pressing);
- ▶ Modify and confirm the setting of a parameter (turning and pressing);
- ▶ Execute a command (by pressing);
- ▶ Exit a menu and go back to the higher level by selecting the letter "E" which is displayed at the end of the menu list or of a series of parameters in a menu.

The letter "E" is displayed at the end of the menu list or of a series of parameters in a menu, and indicates the exit to go back to the higher level by pressing the knob.

Menus and Parameters

The menus may be display only (functional data or parameters), display and setting (parameters) or control (reset)

Menu for the user (but for the installer and TAC as well)

- ▶ the menu "0.", display only, for functional data detected in real time;
- ▶ the menu "1.", display only, for current values of appliance parameters;
- ▶ menu "2.", control, to execute flame control unit reset operations, reset errors (Paragraph 6.6 p. 40);
- ▶ menu "3.", display and setting, to set the value of some system parameters (e.g. water set point temperature); the values are initialised by the TAC at First Switch-On.

It is accessed without password.

Menu for the installer or TAC (not accessible to the user)

- ▶ Menu "4.", "5." and "6." are password-protected. These are specific sections, exclusively intended for skilled personnel (installer or TAC). For information see the technical Assistant Manual.
- ▶ Menu "7." is display only and intended for the manufacturer.
- ▶ Menu "8." is empty, it may be selected but not used.



Special key for the knob

- ▶ To access the menus and parameters of the boards, use the special standard supplied key (fastened on the gas pipe above the electrical panel). The key allows the knob to be operated through the suitable hole in the Electrical Panel cover, operating safely away from live components.
- ▶ Always keep the key for future uses.

How to access the Menus and Parameters

Before Starting:

1. Power supply switch "ON";
2. Display of the board showing in sequence the detected water temperature data (if the appliance is in normal operation), or the flashing malfunction and failure codes (if the appliance is in failure).



To access the menus and parameters of the board, proceed as follows (see also Figure 6.1 p. 39 and Figure 6.2 p. 39).

1. Remove the front panel by removing the fixing screws.
2. Remove the cover of the electrical panel to access the board knob.
3. Act on the knob by means of the special key through the suitable hole.
4. Press the knob once to display the menus: the first menu is displayed, "0." (= menu 0).
5. Turn the knob clockwise to scroll down and display the other/subsequent menus; the menu numbers will be displayed in order, "1.", "2.", ..., "6." ... or "E" (= exit).
6. Select the menu of interest (e.g. display "2.____" = menu 2) by pressing the knob; the first parameter code will be displayed, in menu order (e.g. display "2._20" = parameter 20 in menu 2).
7. Turn the knob clockwise to scroll down the other parameters in the menu; the codes will be displayed in order (e.g. display "2._20", "2._21", ... "2._25" = parameters 20, 21, ... 25 in menu 2), or letter "E" (= exit) at the end of the list. "
8. Select the parameter of interest (e.g. with code 161 in menu 3) by pressing the knob; the figure previously assigned to the parameter will be displayed, read only or to be set (e.g.

the figure "45" for parameter 161 in menu 3 = water temperature set-point at 45 °C); if instead of a figure/setting it is a command, a flashing code is displayed (e.g. "reS1" for the flame block reset command).

9. Press the knob to reconfirm the figure; or rotate the knob to modify the figure, and press at the end to confirm or set the new figure; if however, it is a matter of controlling an appliance operation, press the knob to execute it.
10. To exit a parameter menu or the menu list and go back to the higher level, turn the knob to display the letter "E" for exit, then press the knob again.
11. Place the cover back on the electrical panel opening and fit the appliance's front panel back on.

6.5 HOW TO MODIFY SETTINGS



Modify settings via the DDC

If the device is connected to the DDC control, refer to the relevant manual to modify settings.

How to raise/lower the water temperature set-point

The water temperature set-point establishes the delivery temperature to the system (water output from the appliance), or return from the system (water input in the appliance). The temperature is pre-set by the TAC upon First Switch-On.



If the appliance is not connected to a DDC control, to raise/lower the water temperature set-point with the S61 or AY10 board, proceed as follows:

1. Access menu 3 under parameter 161 (= water temperature set-point) by rotating and pressing the knob; "3.161" must be displayed (procedure Paragraph 6.4 p. 38);
2. Display the parameter value by pressing the knob; the previously set value is displayed (from 10 to 65 °C); to reconfirm the pre-existing value press the knob again, otherwise go to point 3.
3. Turn the knob to modify the value, increasing or decreasing it, and press it to set the new value;
4. Exit menu 3, and from the menu list, by selecting and pressing letter "E" twice, and go back to the normal display of detected temperature data.



Do not modify complex settings

Specific technical and system knowledge is required for complex settings. Contact a TAC.

6.6 HOW TO RESTART A LOCKED-DOWN UNIT - RESET

Fault signals on the display

In the event of locked-down appliance, an operational code flashes on the display (first green figure on the left, letter "U" = warning or "E" = error).

- ▶ To restart the appliance you must know and perform the procedure concerning the issue signalled and identified by the code (Paragraph 8.1 p. 42).
- ▶ Only act if you are familiar with the issue and with the procedure (technical expertise and professional qualifications might be required).

- If you do not know the code, the problem, or the procedure, or you do not have sufficient skills, and in any case of doubt, contact the TAC.

Locked-down appliance

An external intervention (reset or repair) is required due to an appliance fault or problem with the system.

- A reset may be enough for a temporary and provisional anomaly.
- For a fault or breakdown, alert the maintenance technician or TAC.

Reset

There are two options for resetting a fault:

- (1) If the appliance is connected to a DDC you may act through the control device, as described in the relevant manual.
- (2) You may act directly from the S61 board and/or the AY10 board as described below (if the appliance is controlled with external enable, this is the only option).

How to perform reset from the S61 and AY10 boards

To perform the reset directly from the board:

1. Access Menu 2 under Parameter "_20", to reset flame block (Error E_12), or Parameter "_21", for any other generic reset, turning and pressing the knob; "2._20"/"2._21" must be displayed (procedure Paragraph 6.4 p. 38);
2. Press the knob to display the flashing reset request (e.g. "reS1" to reset flame block).
3. Press the knob again (the second time) to perform the reset; the reset request stops flashing, then "2._XX" is displayed again (e.g. "2._20"). The reset operation has been performed.
4. Exit menu 2 and the menu list, by selecting and pressing letter "E" twice, and go back to the normal display of detected temperature data.


6.7 EFFICIENCY HANDBOOK


For increased appliance efficiency:


- Keep the finned coil clean;
- Adjust maximum water temperature to the actual system requirement;
- Reduce repeated switch-ons to the minimum (low loads);
- Program appliance activation for actual periods of use;
- Keep water and air filters on plumbing and ventilation systems clean.


7 MAINTENANCE


7.1 WARNINGS


 Correct maintenance prevents problems, assures efficiency and keeps running costs low.


 Maintenance operations described herein may exclusively be performed by the TAC or skilled maintenance technician.

 Any operation on internal components may exclusively be performed by the TAC.

 Before performing any operation, switch off the appliance by means of the control device (DDC or external enable) and wait for the end of the switching off cycle, then disconnect power and gas supply, by acting on the electrical disconnecter and gas cock.

 The efficiency check and every other "check and maintenance operation" (see Tables 7.1 p. 41 and 7.2 p. 42) **must be performed with a frequency in agreement to current regulations** or, if more restrictive, according to the provisions set forth by the manufacturer, installer or TAC.

 **Responsibility** for efficiency checks, to be carried out for the aims of restricting energy consumption, **lies with the system manager.**

 **Heavy-duty use**
If the unit is subject to heavy duty use (for example in process plants or in other conditions of continuous operation), maintenance operations must be more frequent.

7.2 PRE-EMPTIVE MAINTENANCE

For pre-emptive maintenance, comply with the recommendations in Table 7.1 p. 41.

Table 7.1

GUIDELINES FOR THE PREVENTIVE MAINTENANCE OPERATIONS					
Check of the unit	GAHP-A	GAHP-GS/WS	AY	ACF	GAHP-AR
Visually check of the general condition of the unit and of its air heat exchanger (1)	√			√	√
Check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
Check the % value of CO ₂	√	√	√		
check gas pressure to the burners				√	√
Check that the condensate discharge is clean [If necessary, frequency of the maintenance operation must be increased]	√	√	√		
Replace the belts after 6 years or 12,000 hours of operation	√	√		√	√
Check/restore the pressure of the primary hydronic circuit			√		
Check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit			√		
Check for every DDC or CCI	DDC or CCI				

GUIDELINES FOR THE PREVENTIVE MAINTENANCE OPERATIONS

Check that the plant is able to achieve the setpoint temperature	√
Download the historical events	√

1 - It is suggested the cleaning of the air heat exchanger once every 4 years [the optimal frequency of this operation is in any case a consequence of the installation site].

7.3 SCHEDULED ROUTINE MAINTENANCE

For scheduled routine maintenance, perform the operations in Table 7.2 p. 42, at least once every 2 years.

Table 7.2

SCHEDULED MAINTENANCE OPERATIONS	TO BE PERFORMED AT LEAST ONE EVERY TWO YEARS				
	GAHP-A	GAHP-GS/WS	AY	ACF	GAHP-AR
Check of the unit					
Clean the combustion chamber	√*	√*	√	√	√*
Clean the burner	√*	√*	√	√	√*
Clean the electrodes of ignition and flame sensing	√	√	√	√	√
Check that the condensate discharge is clean	√	√	√		
Replace the silicone gasket between the front plate and the exchanger			√		

*Only in case the analysis of combustion products is non-compliant

7.4 PERIODS OF INACTIVITY

Avoid emptying the installation

Emptying the system may cause damage due to corrosion of the water pipes.



Deactivate the system in winter

Should you intend to stop the appliance in the winter season, ensure at least one of the following conditions:

1. anti-icing function active (Paragraph 3.5 p. 27);
2. sufficient anti-icing glycol (Paragraph 3.6 p. 27).

Prolonged periods of inactivity

- Should you foresee to leave the appliance inactive for a long period of time, disconnect it from the electrical and gas mains. These operations must be performed by Qualified Personnel.

How to deactivate the appliance for long periods of time

1. Switch the appliance off (Paragraph 6.2 p. 38).
2. Only when the appliance is completely off, power it off with the main switch/disconnector switch (Detail GS in Figure [Ref] p.).
3. Close the gas valve

4. If necessary, add water with glycol (if the appliance is disconnected from the power and gas mains, the active antifreeze protection is missing, Paragraph 3.5 p. 27).

How to reactivate the appliance after long periods of inactivity

Before reactivating the appliance, the operator/maintenance technician of the system must first of all:

- Check whether any maintenance operations are required (contact the TAC; see Paragraphs 7.2 p. 41 and 7.3 p. 42).
- Check content and quality of the water in the system, and if necessary top it up (Paragraphs 3.8 p. 28, 3.7 p. 28 and 3.6 p. 27).
- Ensure the flue gas exhaust duct is not obstructed, and that the condensate drain is clean.



After completing the above checks:

1. Open the gas cock and ensure there are no leaks; should gas smell be noticed, close the gas cock again, do not switch any electrical devices on and request intervention by Skilled Personnel.
2. Power on with the main power supply switch (GS, Figure [Ref] p.).
3. Switch on the appliance by means of the provided control device (DDC or external enable, Paragraph 4.4 p. 33).

8 DIAGNOSTICS**8.1 OPERATIVE CODES****Table 8.1** – Operative Codes

CODES	DESCRIPTION	Warning (u)	Error (E)
400	FAULT ON RESET CIRCUIT OF FLAME CONTROL UNIT	NA	Power cycle the appliance. If the code persists, shows up again or in case of doubt, contact the TAC.
401	GENERATOR LIMIT THERMOSTAT TRIP	Contact authorised Technical Assistance	
402	FLUE GAS THERMOSTAT TRIP	Contact authorised Technical Assistance	

CODES	DESCRIPTION	Warning (u)	Error (E)
405	AMBIENT TEMPERATURE EXCEEDING OPERATIVE LIMITS	NA	Reset is automatic when the triggering condition ceases.
406	AMBIENT TEMPERATURE LOWER THAN OPERATIVE LIMITS	Non-blocking Warning (informative code). The code is reset automatically when the triggering condition ceases.	NA
407	GENERATOR TEMPERATURE HIGH	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
408	FLAME CONTROL UNIT ERROR	NA	Contact authorised Technical Assistance
410	INSUFFICIENT WATER FLOW	Reset is automatic when the triggering condition ceases.	Check and clean water filters on the system. Check for air in the system. Check water flow pump. Power cycle the appliance. Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
411	INSUFFICIENT ROTATION OF OIL PUMP	Reset occurs automatically 20 minutes after the code is generated.	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
412	FLAME CONTROLLER UNIT ARREST	Reset is automatic up to 4 attempts (in about 5 minutes).	Gas supply check. Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 20). If the code persists or in case of doubt, contact the TAC.
416	FAULTY HOT OUTLET WATER TEMPERATURE PROBE	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
417	FAULTY HOT OUTLET WATER INLET TEMPERATURE PROBE	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
420	FAULTY GENERATOR TEMPERATURE PROBE	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
422	FAULTY WATER FLOWMETER	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
423	FAULTY AIR/GAS MIXTURE TEMPERATURE PROBE	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
424	FUMES TEMPERATURE SENSOR FAULT	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
425	CONDENSATE DISCHARGE CLOGGED	NA	Check and clean condensate discharge. Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
426	GENERATOR FIN TEMPERATURE SENSOR MALFUNCTION	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
428	GAS SOLENOID VALVE EXCITED DURING FLAME CONTROLLER ARREST	NA	Power off the appliance. Contact authorised Technical Assistance.
429	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Reset occurs automatically if the gas solenoid valve switches on again within 10 minutes (with central flame control unit on).	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
430	GENERATOR FINS TEMPERATURE HIGH	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
431	WATER TEMPERATURE EXCEEDING OPERATIVE LIMITS	Check configuration of other heat generators on the system. Check water flow. Check system thermal load. Reset is automatic when the triggering condition ceases.	NA
434	POSSIBLE SOURCE ANOMALY	Check if the fan is rotating freely. Contact the TAC.	NA
436	BLOWER FAULT	Reset occurs automatically 20 minutes after the code is generated.	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.

CODES	DESCRIPTION	Warning (u)	Error (E)
437	LOW AIR-GAS MIXTURE TEMPERATURE	NA	Reset is automatic when the triggering condition ceases.
444	FAULTY EVAPORATOR TEMPERATURE PROBE	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
446	HIGH HOT INLET WATER TEMPERATURE	Check configuration of other heat generators on the system. Reset is automatic and occurs if the generating condition ceases with circulating pump on or 20 minutes after the code is generated with circulating pump off.	NA
447	HOT INLET WATER TEMPERATURE LOWER THAN OPERATIVE LIMITS	Reset occurs automatically when the generating cause resolves or 430 seconds after the code is generated.	Reset occurs automatically when the condition that generated the code ceases. If the code shows up again or in case of doubt contact the TAC.
448	HIGH HOT WATER DIFFERENTIAL TEMPERATURE	Check water flow. Reset occurs automatically 20 minutes after the code is generated.	Reset occurs automatically when the condition that generated the code ceases. If the code shows up again or in case of doubt contact the TAC.
449	SATELLITE BOARD NOT PRESENT	NA	Contact authorised Technical Assistance.
452	DEFROSTING FUNCTION ACTIVATED	Non-blocking Warning (informative code). The code clears automatically when execution of defrosting ends.	NA
453	WATER FLOW IN THE PASSIVE HOT MODULE	Reset is automatic when the triggering condition ceases.	NA
478	HIGH HOT OUTLET WATER TEMPERATURE	Reset is automatic when the triggering condition ceases.	NA
479	DEFROST FUNCTION ACTIVATED	Non-blocking Warning (informative code). The code clears automatically when anti-icing function execution ends.	NA
80/480	INCOMPLETE OR INVALID PARAMETERS	Contact authorised Technical Assistance.	
481	INVALID P0 PARAMETERS	Reset is automatic when the triggering condition ceases.	Contact authorised Technical Assistance.
482	INVALID P1 PARAMETERS	Reset is automatic when the triggering condition ceases.	Contact authorised Technical Assistance.
484	FAULTY TRANSFORMER CONNECTION OR 24 V AC FUSES	NA	Contact authorised Technical Assistance.
485	INCORRECT MODULE TYPES	NA	Contact authorised Technical Assistance.
486	FAULTY BOARD, ROM	NA	Contact authorised Technical Assistance.
487	FAULTY BOARD, pRAM	NA	Contact authorised Technical Assistance.
488	FAULTY BOARD, xRAM	NA	Contact authorised Technical Assistance.
489	FAULTY BOARD, REG.	NA	Contact authorised Technical Assistance.
490	FAULTY AMBIENT TEMPERATURE PROBE	NA	Reset may be performed from the DDC/CCI or from the S61 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
491	CONTROLLER DEFECTIVE	NA	Contact authorised Technical Assistance.

NA: Not Applicable

Table 8.2 – Operative Codes AY00-120

CODES	DESCRIPTION	Warning (u)	Error (E)
100	FAULT ON RESET CIRCUIT OF FLAME CONTROL UNIT	NA	<ul style="list-style-type: none"> Power cycle the appliance. If the code persists, shows up again or in case of doubt, contact the TAC.
101	THERMOSTAT TRIP INTERNAL CIRCUIT LIMIT	Contact authorised Technical Assistance	
102	FLUE GAS THERMOSTAT AND/OR INTERNAL EXCHANGER THERMOSTAT TRIP	Contact authorised Technical Assistance	
103	HEATING BOARD (S70) ABSENT	NA	Contact authorised Technical Assistance
105	AMBIENT TEMPERATURE EXCEEDING OPERATIVE LIMITS	NA	Reset is automatic when the triggering condition ceases.
106	AMBIENT TEMPERATURE LOWER THAN OPERATIVE LIMITS	NA	The code is reset automatically when the triggering condition ceases.
107	SYSTEM CIRCUIT WATER PRESSURE SWITCH TRIP WITH SYSTEM IN COLD MODE	Reset is automatic when the triggering condition ceases.	NA
112	FLAME CONTROLLER UNIT ARREST	Reset is automatic up to 4 attempts (in about 5 minutes).	<ul style="list-style-type: none"> Gas supply check. Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 20). If the code persists or in case of doubt, contact the TAC.
127	FAULTY INTERNAL CIRCUIT WATER PRESSURE SWITCH OR INSUFFICIENT INTERNAL CIRCUIT WATER FLOW	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists or in case of doubt, contact the TAC.
128	GAS SOLENOID VALVE EXCITED DURING FLAME CONTROLLER ARREST	NA	<ul style="list-style-type: none"> Power off the appliance. Contact authorised Technical Assistance.
129	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Reset occurs automatically if the gas solenoid valve switches on again within 10 minutes (with central flame control unit on).	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
135	FAULTY INTERNAL CIRCUIT DELIVERY TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
136	BLOWER FAULT	Reset occurs automatically 20 minutes after the code is generated.	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
175	INSUFFICIENT SYSTEM CIRCUIT WATER FLOW	Reset is automatic when the triggering condition ceases.	<ul style="list-style-type: none"> Check and clean water filters on the system. Check for air in the system. Check water flow pump. Power cycle the appliance. Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
176	FAULTY SYSTEM CIRCUIT DELIVERY TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
177	FAULTY SYSTEM CIRCUIT RETURN TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
178	HIGH HOT OUTLET WATER TEMPERATURE	Reset is automatic when the triggering condition ceases.	NA
179	DEFROST FUNCTION ACTIVATED	Non-blocking Warning (informative code). The code clears automatically when anti-icing function execution ends.	NA
80	INCOMPLETE OR INVALID PARAMETERS	Contact authorised Technical Assistance.	
81	INVALID P0 PARAMETERS	Reset is automatic when the triggering condition ceases.	Contact authorised Technical Assistance.
82	INVALID P1 PARAMETERS	Reset is automatic when the triggering condition ceases.	Contact authorised Technical Assistance.
84	FAULTY TRANSFORMER CONNECTION OR 24 V AC FUSES	NA	Contact authorised Technical Assistance.
85	INCORRECT MODULE TYPES	NA	Contact authorised Technical Assistance.
86	FAULTY BOARD, ROM	NA	Contact authorised Technical Assistance.
87	FAULTY BOARD, pRAM	NA	Contact authorised Technical Assistance.
88	FAULTY BOARD, xRAM	NA	Contact authorised Technical Assistance.
89	FAULTY BOARD, REG.	NA	Contact authorised Technical Assistance.

CODES	DESCRIPTION	Warning (u)	Error (E)
90	FAULTY AMBIENT TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
91	CONTROLLER DEFECTIVE	NA	Contact authorised Technical Assistance.

NA: Not Applicable

APPENDICES

1 DECLARATION OF CONFORMITY

Figure 1



EC - DECLARATION OF CONFORMITY



Manufacturer : Robur S.p.A.
Address : Via Parigi 4/6
City, Country : Verdellino/Zingonia 24040 (Bg), Italy

This is to declare that the ROBUR Gas Absorption Heat Pump (GAHP) are in conformity with the following EC-Directives:

2006/42/EC Machinery Directive with subsequent amendments and integrations.

2004/108/EC Electromagnetic Compatibility with subsequent amendments and integrations.
Tested and examined according to the following norms: EN55014-1, EN55014-2, EN61000-3-2, EN61000-3-3, EN62233.

2006/95/EC Low Voltage Directive with subsequent amendments and integrations.
Tested and examined according to the following norms: EN50165, EN60335-2-102, EN60335-1.

2009/142/EC Gas Appliance Directive with subsequent amendments and integrations.
Tested and examined according to the following norms: EN 12309-1, EN 12309-2, EN 483.
As proved with EC certification number 0964, issued by KIWA Italia S.p.A Via G. Carducci,5 Milan-Italy

97/23/EC Pressure Equipment Directive with subsequent amendments and integrations.
As proved with EC Certification number 1370 of all the components under pressure of the III° category, issued by BUREAU VERITAS Italia S.p.A. Via Miramare, 15 Milan-Italy

Jvan Benzoni
R&D Director
Robur S.p.A.

coscienza ecologica caring for the environment

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Imprese di Bergamo n. 154968 codice fiscale/partita iva 00373210160 V.A.T. code IT 00373210160 società soggetta all'attività di direzione e
coordinamento di Fin Robur S.a.p.A. di Benito Guerra & C.

2 PRODUCT FICHE

Figure 2

Table 8
COMMISSION DELEGATED REGULATION (EU) No 811/2013

Technical parameters for heat pump space heaters and heat pump combination heaters							
Model(s):				Gitié AHAY S1			
Air-to-water heat pump:				yes			
Water-to-water heat pump:				no			
Brine-to-water heat pump:				no			
Low-temperature heat pump:				no			
Equipped with a supplementary heater:				yes			
Heat pump combination heater:				no			
Parameters shall be declared for medium-temperature application.							
Parameters shall be declared for average, colder and warmer climate conditions.							
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
AVERAGE CLIMATE CONDITIONS							
Rated heat output (*)		Prated	66,8	kW	Seasonal space heating energy efficiency		ηs126%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	Pdh	58,8	kW	Tj = -7 °C	PERd	107	%
Tj = +2 °C	Pdh	36,1	kW	Tj = +2 °C	PERd	136	%
Tj = +7 °C	Pdh	23,4	kW	Tj = +7 °C	PERd	134	%
Tj = +12 °C	Pdh	10,0	kW	Tj = +12 °C	PERd	127	%
Tj = bivalent temperature	Pdh	38,7	kW	Tj = bivalent temperature	PERd	134	%
Bivalent temperature	Tbiv	1,0	°C				
Annual energy consumption	QHE	394	GJ				
COLDER CLIMATE CONDITIONS							
Rated heat output (*)		Prated	66,0	kW	Seasonal space heating energy efficiency		ηs122%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = -7 °C	Pdh	40,3	kW	Tj = -7 °C	PERd	123	%
Tj = +2 °C	Pdh	24,4	kW	Tj = +2 °C	PERd	132	%
Tj = +7 °C	Pdh	15,8	kW	Tj = +7 °C	PERd	127	%
Tj = +12 °C	Pdh	7,3	kW	Tj = +12 °C	PERd	127	%
Tj = bivalent temperature	Pdh	36,3	kW	Tj = bivalent temperature	PERd	129	%
Tj = operation limit temperature	Pdh	66,0	kW	Tj = operation limit temperature	PERd	94	%
For air-to-water heat pumps: Tj = -15 °C (if TOL < -20 °C)	Pdh	54,1	kW	For air-to-water heat pumps: Tj = -15 °C (if TOL < -20 °C)	PERd	97	%
Bivalent temperature	Tbiv	-5,0	°C				
Annual energy consumption	QHE	480	GJ				
WARMER CLIMATE CONDITIONS							
Rated heat output (*)		Prated	72,1	kW	Seasonal space heating energy efficiency		ηs124%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = +2 °C	Pdh	72,1	kW	Tj = +2 °C	PERd	103	%
Tj = +7 °C	Pdh	46,1	kW	Tj = +7 °C	PERd	125	%
Tj = +12 °C	Pdh	20,9	kW	Tj = +12 °C	PERd	129	%
Tj = bivalent temperature	Pdh	36,1	kW	Tj = bivalent temperature	PERd	132	%
Bivalent temperature	Tbiv	9,0	°C				
Annual energy consumption	QHE	280	GJ				

Figure 3

				For air-to-water heat pumps: Operation limit temperature	<i>TOL</i>	-22	°C
				Heating water operating limit	<i>WTOL</i>	65	°C
Power consumption in modes other than active mode				Supplementary heater			
Off mode	P_{OFF}	0,000	kW	Rated heat output	P_{sup}	34,4	kW
Thermostat-off mode	P_{TO}	0,041	kW	Type of energy input	Natural gas		
Standby mode	P_{SB}	0,009	kW				
Crankcase heater mode	P_{CK}	-	kW				
Other items							
Capacity control	variable			For air-to-water heat pumps: Rated air flow rate, outdoors	—	10000	m³/h
Sound power level, indoors/ outdoors	L_{WA}	- / 74	dB	For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	—	-	m³/h

(*) For heat pump space heaters and heat pump combination heaters, the rated heat output P_{rated} is equal to the design load for heating $P_{designh}$, and the rated heat output of a supplementary heater P_{sup} is equal to the supplementary capacity for heating $sup(T_j)$.

Additional information required by COMMISSION REGULATION (EU) No 813/2013, Table 2:

Emissions of nitrogen oxides: NO_x 40 mg/kWh

Figure 4

Table 8
COMMISSION DELEGATED REGULATION (EU) No 811/2013

Technical parameters for heat pump space heaters and heat pump combination heaters

Model(s):				Gitié AHAY STD			
Air-to-water heat pump:				yes			
Water-to-water heat pump:				no			
Brine-to-water heat pump:				no			
Low-temperature heat pump:				no			
Equipped with a supplementary heater:				yes			
Heat pump combination heater:				no			
Parameters shall be declared for medium-temperature application.							
Parameters shall be declared for average, colder and warmer climate conditions.							
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
AVERAGE CLIMATE CONDITIONS							
Rated heat output (*)	<i>Prated</i>	66,8	kW	Seasonal space heating energy efficiency	η_s	125	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	<i>Pdh</i>	58,8	kW	$T_j = -7\text{ °C}$	<i>PERd</i>	107	%
$T_j = +2\text{ °C}$	<i>Pdh</i>	36,1	kW	$T_j = +2\text{ °C}$	<i>PERd</i>	135	%
$T_j = +7\text{ °C}$	<i>Pdh</i>	23,4	kW	$T_j = +7\text{ °C}$	<i>PERd</i>	133	%
$T_j = +12\text{ °C}$	<i>Pdh</i>	10,0	kW	$T_j = +12\text{ °C}$	<i>PERd</i>	126	%
T_j = bivalent temperature	<i>Pdh</i>	38,7	kW	T_j = bivalent temperature	<i>PERd</i>	133	%
Bivalent temperature	T_{biv}	1,0	°C				
Annual energy consumption	Q_{HE}	398	GJ				
COLDER CLIMATE CONDITIONS							
Rated heat output (*)	<i>Prated</i>	66,0	kW	Seasonal space heating energy efficiency	η_s	120	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	<i>Pdh</i>	40,3	kW	$T_j = -7\text{ °C}$	<i>PERd</i>	122	%
$T_j = +2\text{ °C}$	<i>Pdh</i>	24,4	kW	$T_j = +2\text{ °C}$	<i>PERd</i>	130	%
$T_j = +7\text{ °C}$	<i>Pdh</i>	15,8	kW	$T_j = +7\text{ °C}$	<i>PERd</i>	126	%
$T_j = +12\text{ °C}$	<i>Pdh</i>	7,3	kW	$T_j = +12\text{ °C}$	<i>PERd</i>	125	%
T_j = bivalent temperature	<i>Pdh</i>	36,3	kW	T_j = bivalent temperature	<i>PERd</i>	128	%
T_j = operation limit temperature	<i>Pdh</i>	66,0	kW	T_j = operation limit temperature	<i>PERd</i>	94	%
For air-to-water heat pumps: $T_j = -15\text{ °C}$ (if TOL < -20 °C)	<i>Pdh</i>	54,1	kW	For air-to-water heat pumps: $T_j = -15\text{ °C}$ (if TOL < -20 °C)	<i>PERd</i>	97	%
Bivalent temperature	T_{biv}	-5,0	°C				
Annual energy consumption	Q_{HE}	488	GJ				
WARMER CLIMATE CONDITIONS							
Rated heat output (*)	<i>Prated</i>	72,1	kW	Seasonal space heating energy efficiency	η_s	123	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = +2\text{ °C}$	<i>Pdh</i>	72,1	kW	$T_j = +2\text{ °C}$	<i>PERd</i>	103	%
$T_j = +7\text{ °C}$	<i>Pdh</i>	46,1	kW	$T_j = +7\text{ °C}$	<i>PERd</i>	125	%
$T_j = +12\text{ °C}$	<i>Pdh</i>	20,9	kW	$T_j = +12\text{ °C}$	<i>PERd</i>	128	%
T_j = bivalent temperature	<i>Pdh</i>	36,1	kW	T_j = bivalent temperature	<i>PERd</i>	131	%
Bivalent temperature	T_{biv}	9,0	°C				
Annual energy consumption	Q_{HE}	282	GJ				

Figure 5

				For air-to-water heat pumps: Operation limit temperature	<i>TOL</i>	-22	°C
				Heating water operating limit	<i>WTOL</i>	65	°C
Power consumption in modes other than active mode				Supplementary heater			
Off mode	P_{OFF}	0,000	kW	Rated heat output	P_{sup}	34,4	kW
Thermostat-off mode	P_{TO}	0,041	kW	Type of energy input	Natural gas		
Standby mode	P_{SB}	0,009	kW				
Crankcase heater mode	P_{CK}	-	kW				
Other items							
Capacity control	variable			For air-to-water heat pumps: Rated air flow rate, outdoors	—	10000	m³/h
Sound power level, indoors/ outdoors	L_{WA}	- / 74	dB	For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	—	-	m³/h

(*) For heat pump space heaters and heat pump combination heaters, the rated heat output P_{rated} is equal to the design load for heating $P_{designh}$, and the rated heat output of a supplementary heater P_{sup} is equal to the supplementary capacity for heating $sup(T_j)$.

Additional information required by COMMISSION REGULATION (EU) No 813/2013, Table 2:

Emissions of nitrogen oxides: NO_x 40 mg/kWh

Robur mission

Robur is dedicated to dynamic progression
in research, development and promotion
of safe, environmentally-friendly, energy-efficiency products,
through the commitment and caring
of its employees and partners.



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