

Installation, use and maintenance manual

K18 Hybrigas

Hybrid system with gas absorption heat pump and condensing boiler for heating and buffer tank domestic hot water production

nominal thermal power 37,9 kW

nominal thermal power for DHW 37,9 kW



Revision: B

Code: D-LBR827

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I INTRODUCTION



Manual

This Manual is an integral part of the K18 Hybrigas unit and must be handed to the end user together with the appliance.

I.1 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.

I.2 CONTROL DEVICE

In order to work, the K18 Hybrigas unit requires a control device to be connected by the installer (see Paragraph 1.8 p. 20).

II SYMBOLS AND DEFINITIONS

II.1 KEY TO SYMBOLS



DANGER



WARNING



NOTE



PROCEDURE



REFERENCE (to other document)

II.2 TERMS AND DEFINITIONS

Appliance / Unit = equivalent terms, both used to refer to the

hybrid gas absorption group.

TAC = Technical Assistance Centre authorised by Robur.

External request = generic control device (e.g. thermostat, timer or any other system) equipped with a voltage-free NO contact and used as control to start/stop the unit.

Ambient chronothermostat OCDS007 = control device to control a K18 Hybrigas appliance.

OQLT021 system controller = control system to control a K18 Hybrigas appliance, one or more heating circuits and DHW production.

GUE (Gas Utilization Efficiency) = efficiency index of gas 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 start-up = appliance commissioning operation which may only and exclusively be carried out by a TAC.

GHP10 Board = electronic board on the unit, to control all functions and to provide interface with other devices and with the user.

III WARNINGS

III.1 GENERAL AND SAFETY WARNINGS



Installer's qualifications

Installation must exclusively be performed by a qualified firm and by qualified 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.



Use of the appliance by children

The device can be used by children over 8 years old, and by people with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, only if they are under surveillance or after they have received instructions regarding safe use of the appliance and understanding the dangers inherent in it. Children should not play with the appliance. Cleaning and maintenance that must be performed by the user must not be performed by unsupervised children.



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 qualified 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 valve.
- 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 valve 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 qualified 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.
- Do not touch the flue gas exhaust before it 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 unit uses the ammonia-water absorption cycle. The water-ammonia solution is contained in the tightness 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).
- Ask for TAC intervention.



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 deposit flammable materials (paper, diluents, paints, etc.) near 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. 30).

- 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. 30.



Aggressive substances in air

Halogenated hydrocarbons containing chlorine and fluorine compounds cause corrosion. The air of the installation site must be free from aggressive substances.



Acid flue gas condensate

- Discharge the acid condensate of combustion flue gas, as indicated in Paragraph 3.12 p. 33, in compliance with current exhaust regulations.



Switching the appliance off

Disconnecting the power supply while the appliance is running may cause permanent damage to internal components.

- Except in the event of danger, do not disconnect the power supply to switch off the appliance, but always and exclusively act through the control device provided (OQLT021, OCDS007, or external request).



In the event of failure

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

- 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.



Routine maintenance

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

- Maintenance must be performed according to the

manufacturer's instructions (see Chapter 7 p. 50) 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.

III.2 CONFORMITY

EU Directives and standards

The absorption heat pumps of the K18 series are certified as conforming to standard EN 12309 and comply with the essential requirements of the following Directives:

- ▶ 2009/142/EC "Gas Appliances Directive" as amended and added.
- ▶ 2014/30/EC "Electromagnetic Compatibility Directive" as amended and added.
- ▶ 2014/35/EC "Low Voltage Directive" as amended and added.
- ▶ 2006/42/EC "Machine Directive" as amended and added.
- ▶ 2014/68/EU "Pressure Equipment Directive" as amended and added.
- ▶ 811/2013/EU "Energy-Related Products regulation" as amended and added.
- ▶ 813/2013/EU "Ecodesign requirements regulation" as amended and added.
- ▶ 92/42/EEC "Efficiency Directive" as amended and added.
- ▶ 2009/125/EC "Eco-design Directive" as amended and added.
- ▶ 2010/30/EC "Energy labelling" as amended and added.

Furthermore, they comply with the requirements of the following standards:

- ▶ EN 677 Specific requirements for condensing boilers with nominal heating capacity up to 70 kW.
- ▶ EN 378 Refrigerating systems and heat pumps.
- ▶ EN 483 Type C boilers of nominal heat input not exceeding 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.

III.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 to the appliance by the plant or installation (mechanical stresses, pressure, vibrations, thermal expansion, electrical surges...).
- Accidental damages or due to force majeure.

1 FEATURES AND TECHNICAL DATA

The K18 Hybrigas is composed by a K18 heat pump module and by a condensing boiler module.

1.1 FEATURES

1.1.1 Available range

A distinction must be made from the application perspective

based on the type of service provided:

- A.** Systems for space heating only.
- B.** Systems for space heating and DHW production (Domestic Hot Water).

Systems for space heating and DHW production correspond to the **EVO** version.

All K18 Hybrigas appliances are available both in the **outdoor installation** version and in the **indoor installation** version.

Figure 1.1 Available range for the family of K18 systems

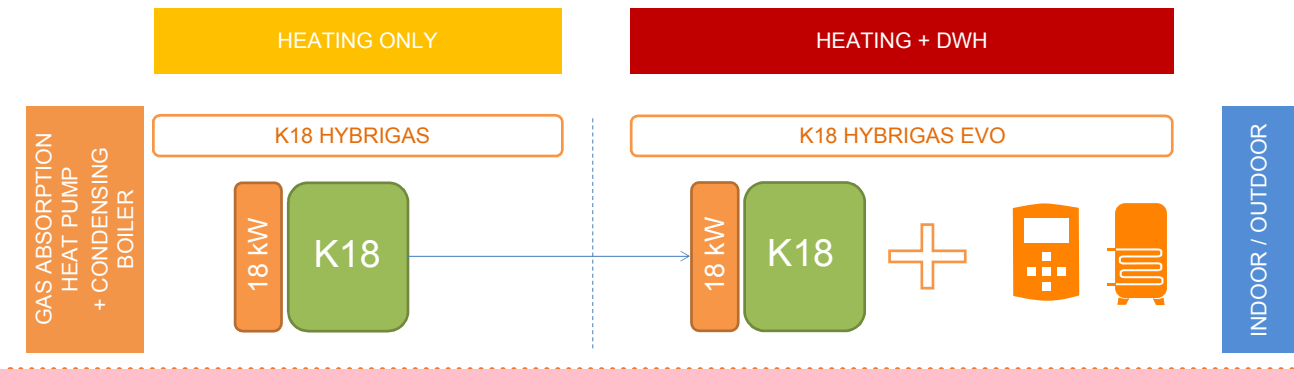


Table 1.1 Selection guide

Heating only	Heating + DHW
<p>K18 Hybrigas</p> <ul style="list-style-type: none"> - aerothermal gas heat pump + condensing boiler - built-in digital system, optimises the use of renewable energy; depending on outdoor temperature, it regulates the operation in the most cost-effective and ecological way possible - monobloc, makes installation easier and reduces costs - high peak thermal power with wide modulation - heating capacity (burned) 29,2 kW - delivered thermal power 37,9 kW - indoor or outdoor versions - use of aerothermal renewable energy for heating hot water production up to 65 °C 	<p>K18 Hybrigas EVO</p> <ul style="list-style-type: none"> - aerothermal gas heat pump + condensing boiler + system controller + 300-liter DHW buffer tank (optional) - built-in digital system, optimises the use of renewable energy; depending on outdoor temperature, it regulates the operation in the most cost-effective and ecological way possible - use of aerothermal renewable energy for heating hot water production up to 65 °C - use of aerothermal renewable energy also for buffer tank DHW production up to 80 °C - controlling secondary zone circuits (via the system controller) - high thermal power - heating capacity (burned) 29,2 kW - delivered thermal power 37,9 kW - indoor or outdoor versions

1.1.2 Characteristics of heat pump module

Operation

The K18 Hybrigas heat pump is based on the thermodynamic water-ammonia absorption cycle (H₂O–NH₃), and produces hot water using outdoor air as a renewable energy source (cold source) and natural gas 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 suitable for outdoor installations.
- ▶ Burner equipped with ignition and flame detection device, controlled by an electronic controller.
- ▶ Titanium stainless steel shell-and-tube water exchanger.
- ▶ Stainless steel, shell-and-tube recovery exchanger of flue gas latent heat.
- ▶ Air exchanger with finned coil, with steel pipe and aluminium fins.
- ▶ Automatic microprocessor-controlled finned coil defrosting

valve.

- ▶ Circulation pump.

Control and safety devices

- ▶ GHP10 electronic board with microprocessor, display and selection keys.
- ▶ Water flowmeter.
- ▶ Generator limit thermostat, with manual reset.
- ▶ Flue gas thermostat, with manual reset.
- ▶ Sealed circuit safety relief valve.
- ▶ Bypass valve, between high and low-pressure circuits.
- ▶ Flame control board.
- ▶ Double shutter electric gas valve.
- ▶ Antifreeze functions for hydraulic circuit.
- ▶ Condensate discharge sensor.

1.1.3 Characteristics of condensing boiler module

Operation

The K18 Hybrigas Boiler is the condensing boiler module integrating the K18 heat pump and it provides thermal power for space heating (and DHW in case of K18 Hybrigas EVO) integrating the heat pump when required.

Mechanical and thermo-hydraulic components

- ▶ Integrated spiral single tube stainless steel heat exchanger.
- ▶ Premix modulating burner with 1:9 ratio.
- ▶ Automatic air vent valve.
- ▶ High efficiency modulating water pump.
- ▶ System drain valve.
- ▶ Heat circuit temperature probe.
- ▶ Condensate drain siphon.

Control and safety devices

- ▶ Flue safety thermal fuse.
- ▶ 3 bar safety valve.
- ▶ Gas solenoid valve.
- ▶ Safety thermostat.
- ▶ Expansion tank.
- ▶ Water differential pressure switch.

1.1.4 Control of the two heat generators

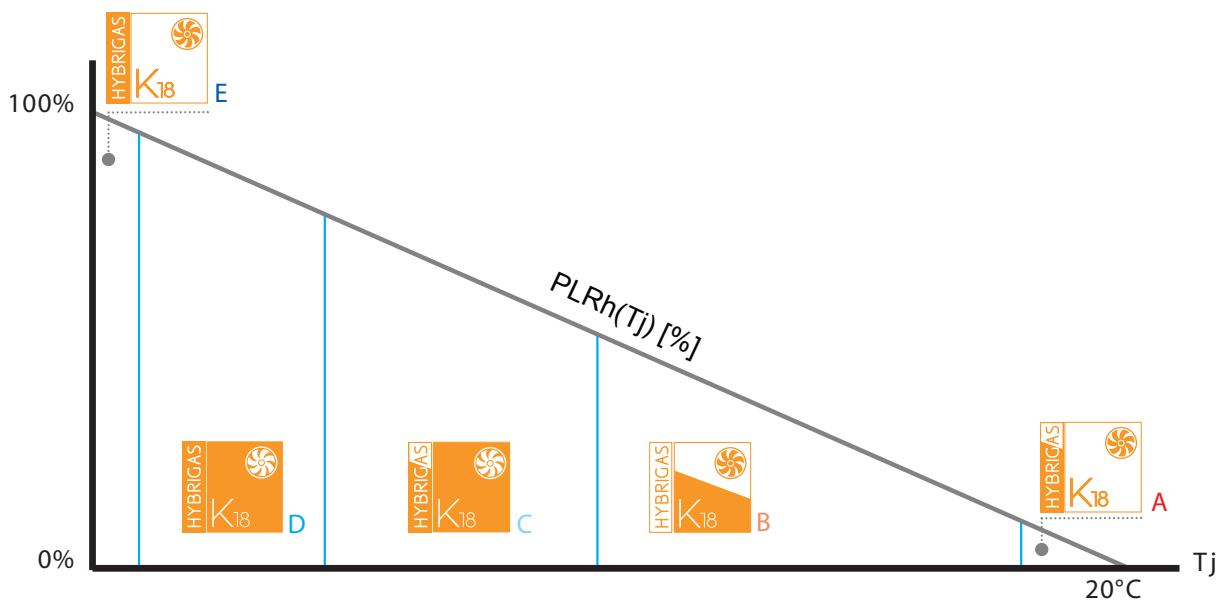
A control system has been designed for the K18 Hybrigas unit,

called Armonia, which allows integration between the heat pump module and the condensing boiler module (auxiliary boiler) that compose the K18 Hybrigas unit, to be managed as optimally as possible in order to provide the best performance in terms of comfort and energy efficiency.

Specifically, as shown in Figure 1.2 p. 8 below, various cases are possible:

- A.** Very low load: active auxiliary boiler in modulation and heat pump off (replacement at a particularly mild outdoor temperature).
- B.** Low load: active heat pump in modulation and auxiliary boiler off.
- C.** Average/high load: active heat pump at full power and active auxiliary boiler in modulation (integration).
- D.** High load: maximum power for the operating condition to be reached quicker (integration).
- E.** Very high load: heat pump out of the operating limits and auxiliary boiler that autonomously covers the design load (replacement at low ambient temperature).

Figure 1.2 Armonia control system diagram



Tj [°C] outdoor temperature

PLRh(Tj) [%] plant partial load ratio at outdoor temperature Tj

A Heat pump off. Active auxiliary boiler in modulation.

B Active heat pump in modulation. Auxiliary boiler off.

C Active heat pump at full power. Active auxiliary boiler in modulation.

D Active heat pump at full power. Active auxiliary boiler at full power.

E Heat pump off. Active auxiliary boiler at full power.

In the presence of a minimal thermal demand (scenario A), the minimum power of the heat pump could still be excessive in comparison to the demand. In this case it may be advantageous to use only the auxiliary boiler (replacement mode).

In the presence of low thermal demand (scenario B), only the heat pump will be active in modulation mode, whereas the auxiliary boiler will be off.

As the thermal demand increases (scenario C), the heat pump reaches full power and, if the thermal load still cannot be fulfilled, it will activate the auxiliary boiler, which will run in modulation mode. The heat pump will still remain active and at full power, and therefore the power of the auxiliary boiler will be added to that of the heat pump (integration mode).

When the thermal demand is high (scenario D), for example while the system reaches operating conditions, the heat pump and auxiliary boiler will run at maximum power, reducing the necessary time for the operating conditions to be reached and

ensuring the optimal comfort even in harsher environmental conditions.

i If the heating system design require the water temperature to be higher than the maximum that can be dispensed by the heat pump, in high thermal demand conditions (scenario E), the auxiliary boiler can be activated as its replacement. In this type of application the maximum thermal load of the building must be at most equal to the power of the auxiliary boiler and not to the sum of the power of the two appliances (replacement mode).

The auxiliary boiler can therefore be operated in four ways (see also Paragraph 5.5.5 p. 43):

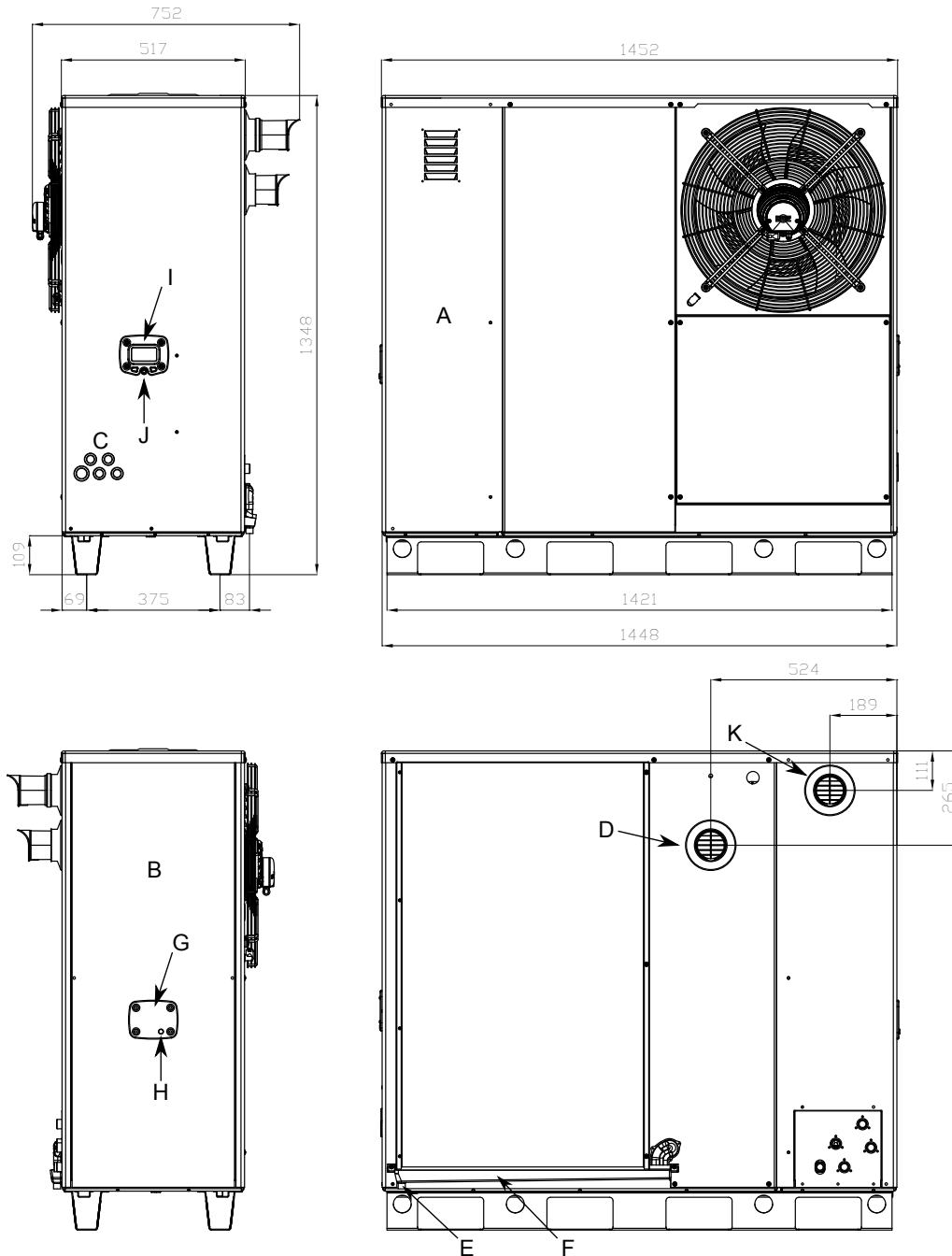
- ▶ Inactive (the auxiliary boiler does not intervene in any way).
- ▶ Emergency (the auxiliary boiler is only activated when there

is an alarm on the heat pump module).

- ▶ Integration (active auxiliary boiler as necessary for integration of the thermal power of the heat pump module, scenarios B, C, and D).
- ▶ Integration and replacement (just like in the integration mode, with the addition that in particular environmental conditions, the heat pump can be deactivated and only the auxiliary boiler operates, scenarios A and E).

1.2 DIMENSIONS

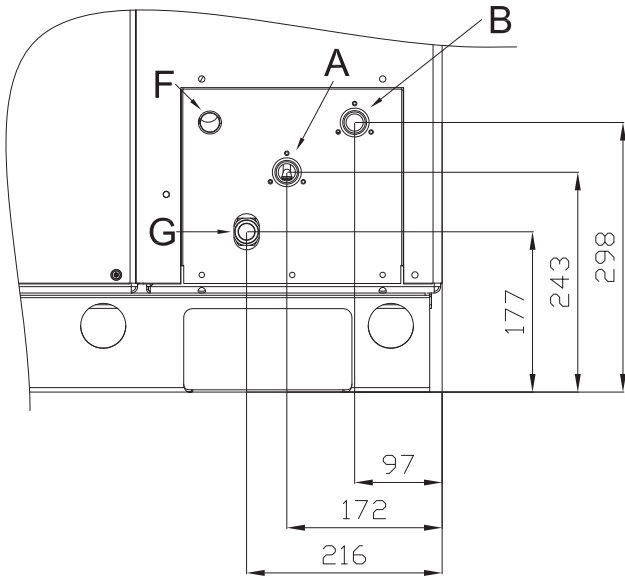
Figure 1.3 Dimensions K18 Hybrigas



- | | | | |
|---|---|---|--|
| A | Front panel | H | Boiler reset/unlock button |
| B | Left panel | I | Heat pump display transparent cover, which can be detached to access the user interface keys |
| C | Electrical connection input | J | Heat pump reset/unlock button |
| D | Heat pump flue gas exhaust outlet \varnothing 80 mm | K | Boiler flue gas exhaust outlet \varnothing 80 |
| E | Flue gas condensate and defrosting water drain \varnothing 20 mm | | |
| F | Flue gas condensate and defrosting water discharge conveyor | | |
| G | Boiler display transparent cover, which can be detached to access the user interface keys | | |

1.3 CONNECTION PLATE DETAIL

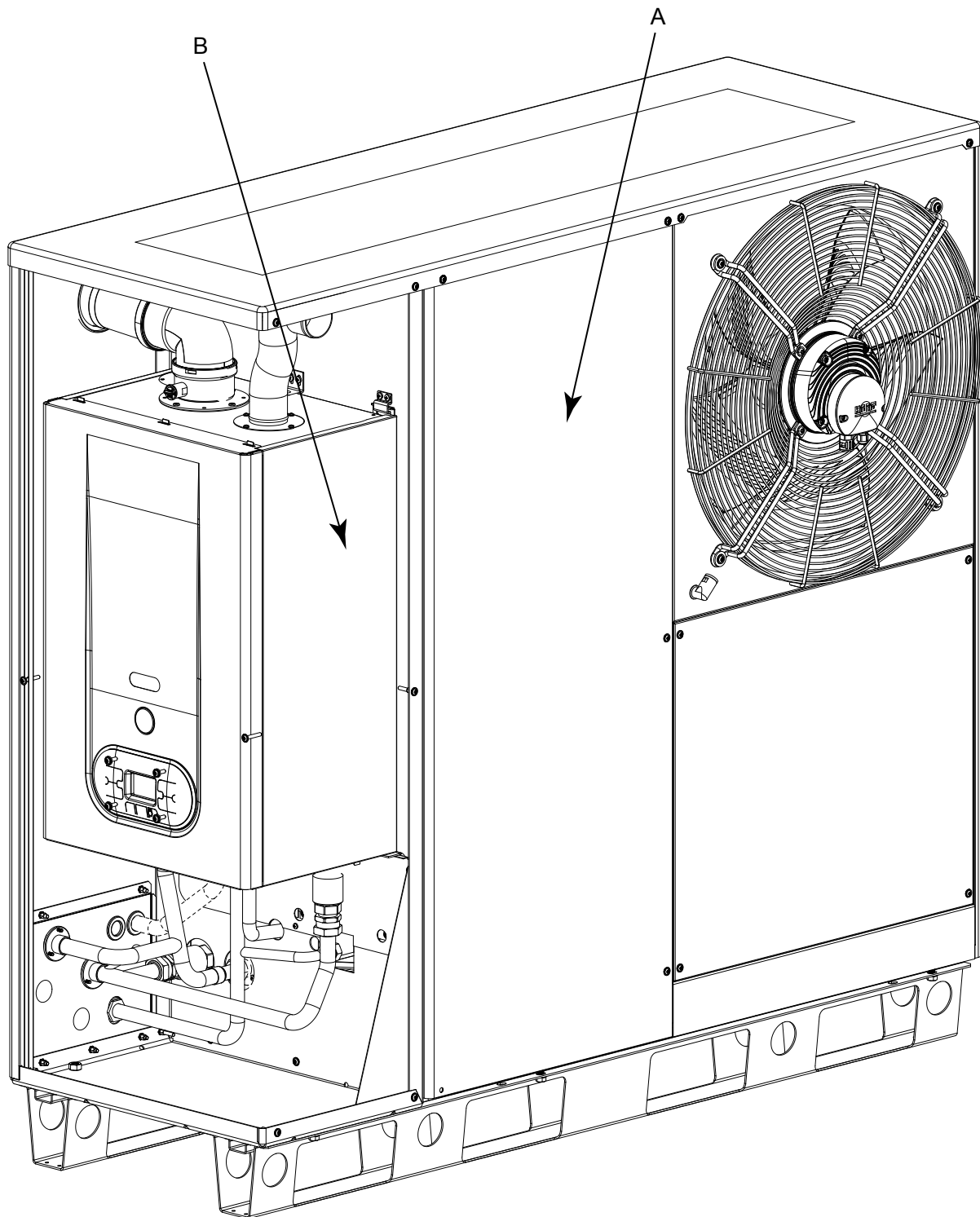
Figure 1.4 Connection plate detail



- A Water outlet connection Ø 3/4" M
- B Water inlet connection Ø 3/4" M
- F Boiler module safety valve discharge pipe passage
- G Gas connection Ø 3/4" M

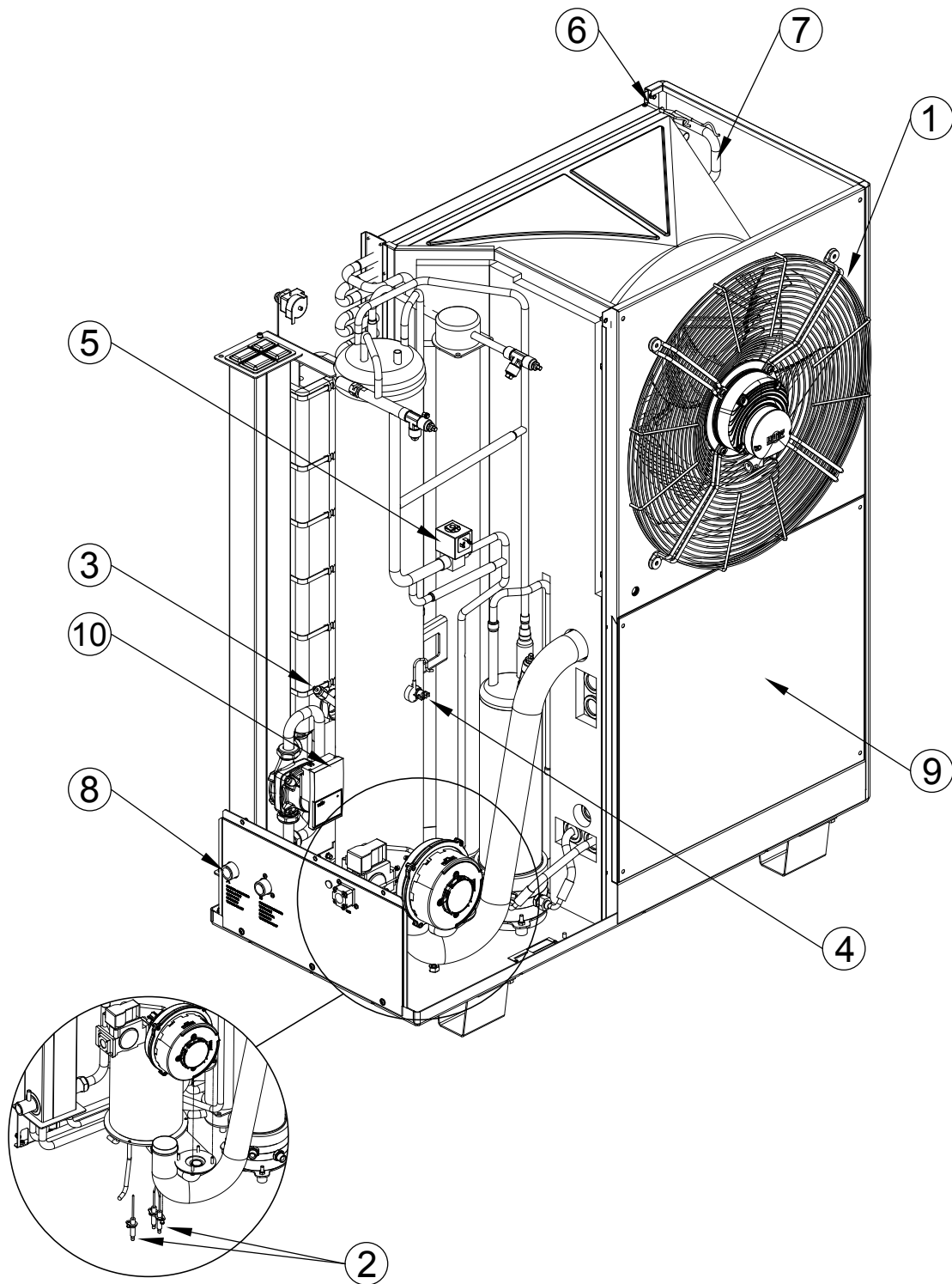
1.4 COMPONENTS

Figure 1.5 Left front view



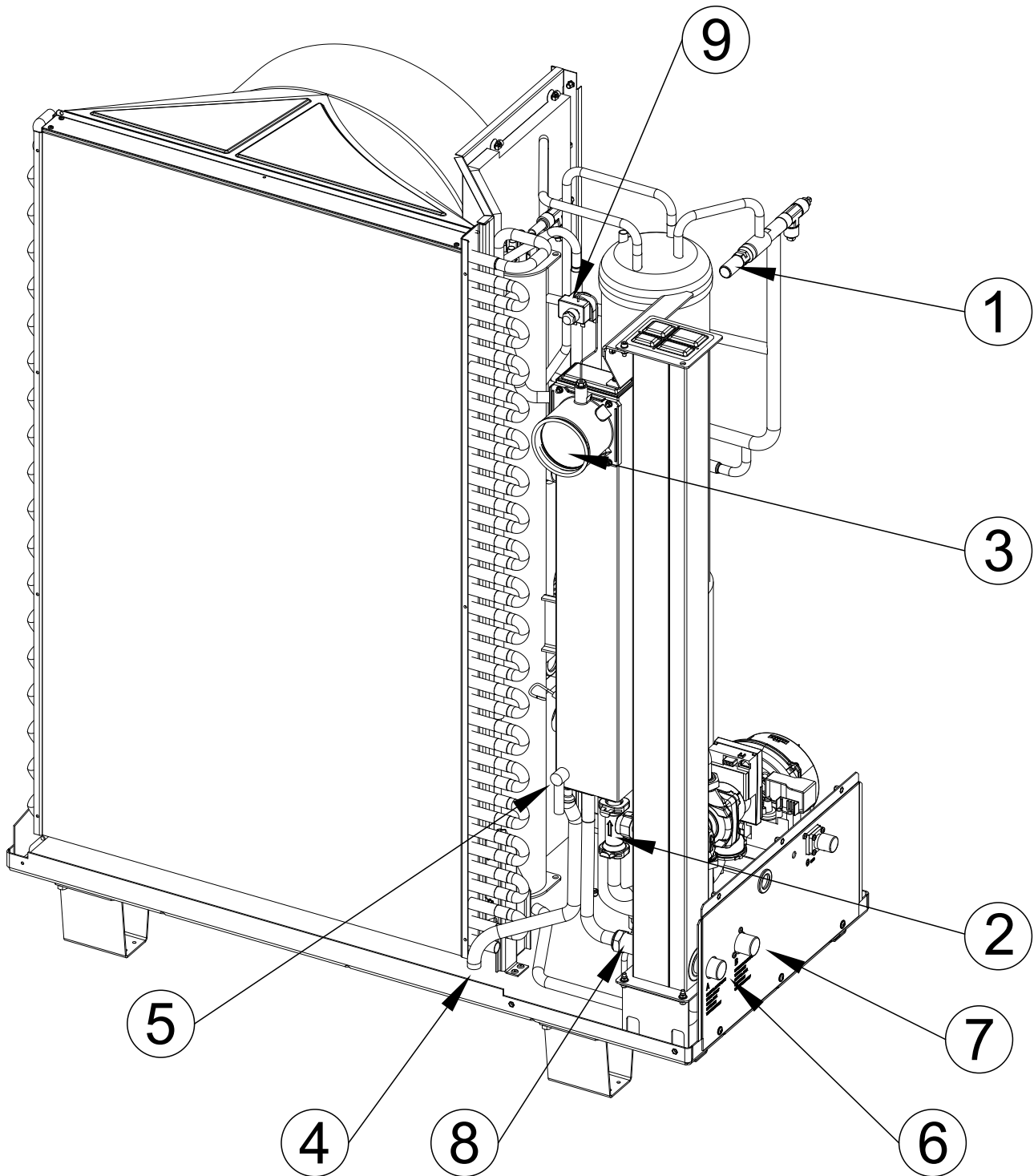
- A Heat pump module
- B Boiler module

Figure 1.6 Left front view heat pump module internal components



- | | | | |
|---|---------------------------------------|----|---|
| 1 | Fan | 6 | TA outdoor temperature probe |
| 2 | Flame sensing / ignition electrodes | 7 | Teva evaporator temperature probe |
| 3 | PT1000 flue exhaust temperature probe | 8 | Heat pump module delivery temperature probe |
| 4 | Limit thermostat | 9 | Components box |
| 5 | Defrosting valve | 10 | Circulation pump |

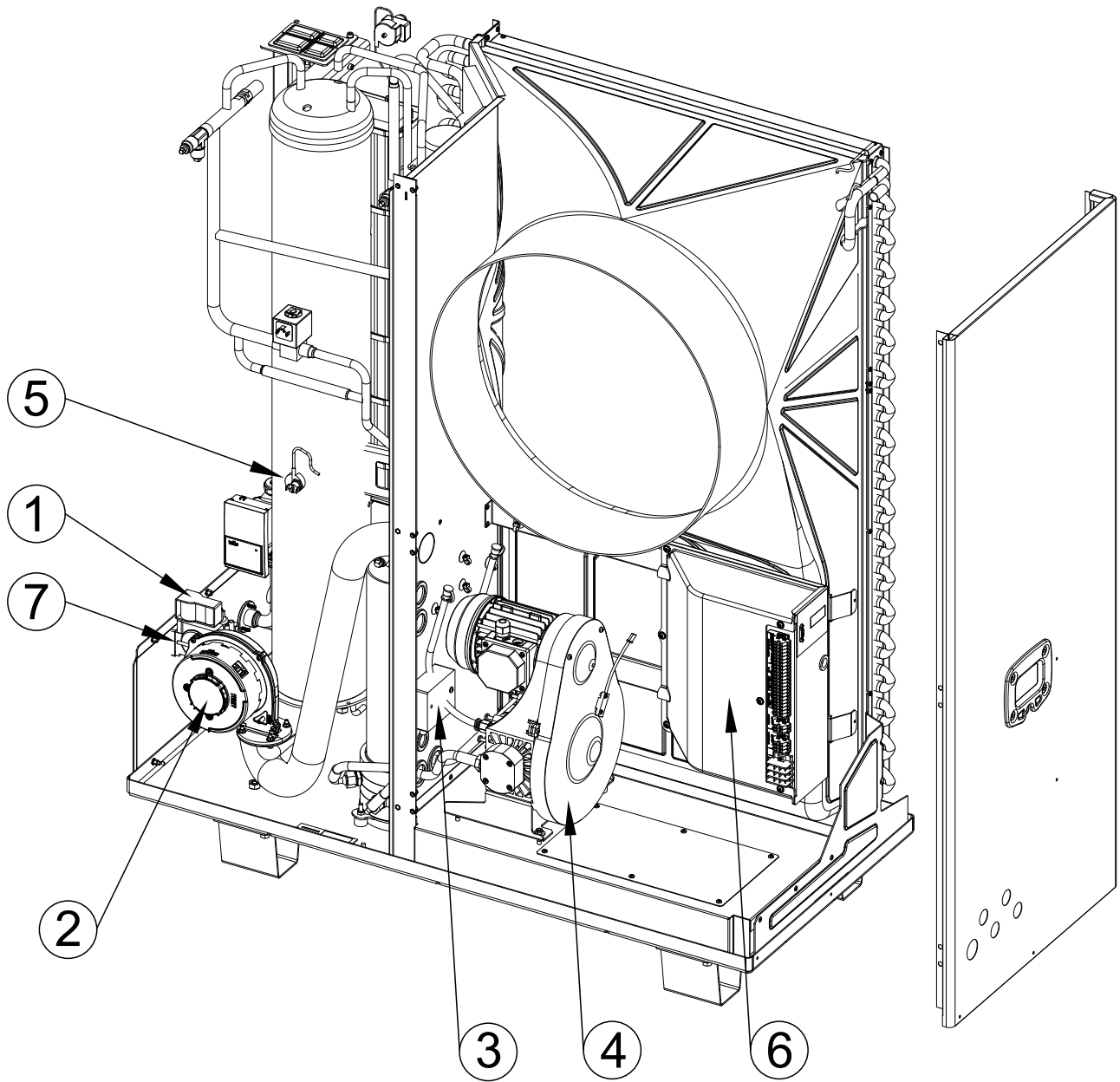
Figure 1.7 Heat pump module internal components rear view



- 1 Safety valve
- 2 Flowmeter
- 3 Heat pump module flue gas exhaust
- 4 Condensate discharge
- 5 Condensate level sensor

- 6 Water outlet connection Ø 3/4" M
- 7 Water inlet connection Ø 3/4" M
- 8 Return temperature probe
- 9 120 °C flue gas thermostat

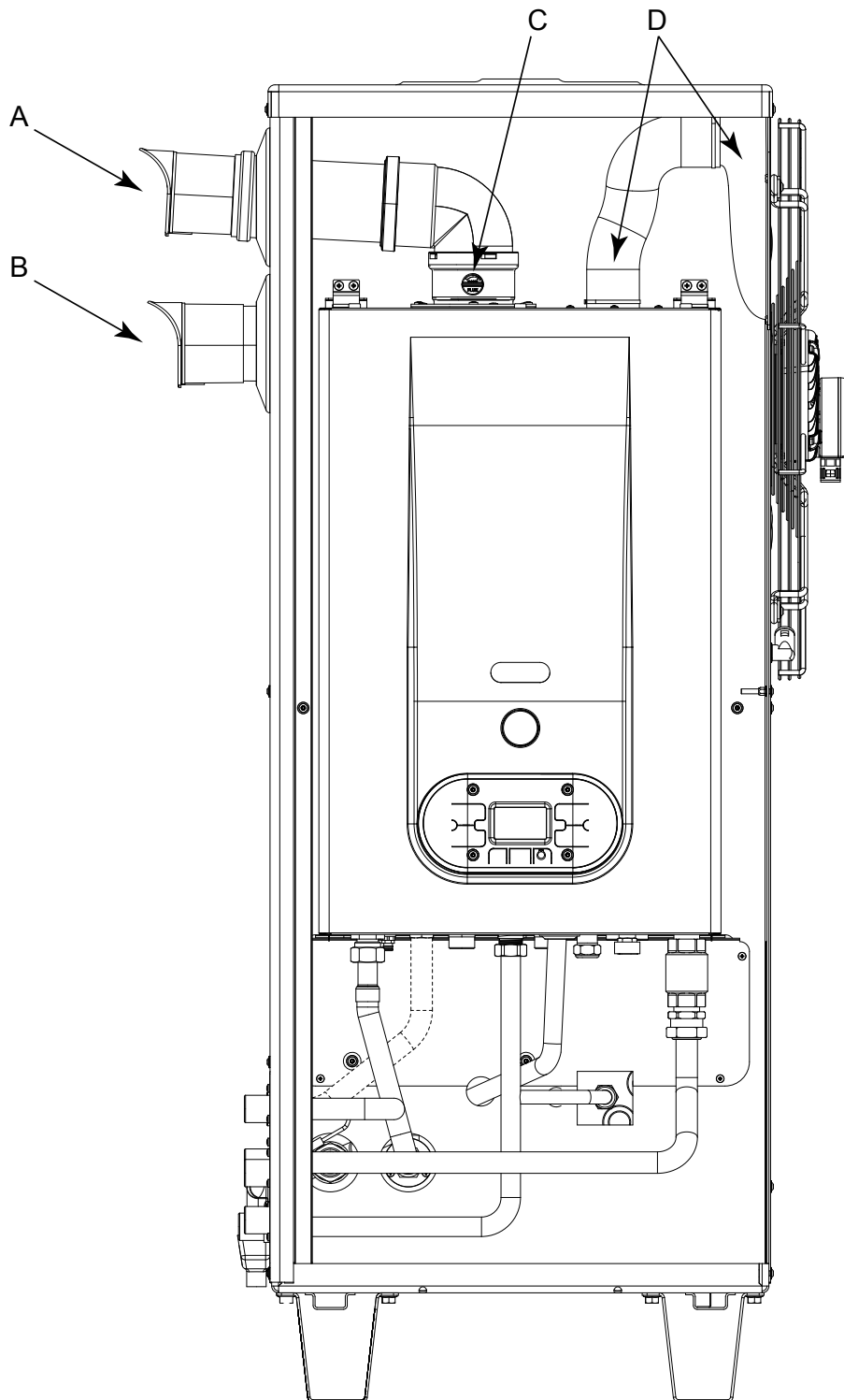
Figure 1.8 RH front view heat pump module internal components



- 1 Gas valve
- 2 Combustion blower
- 3 Ignition transformer
- 4 Oil pump

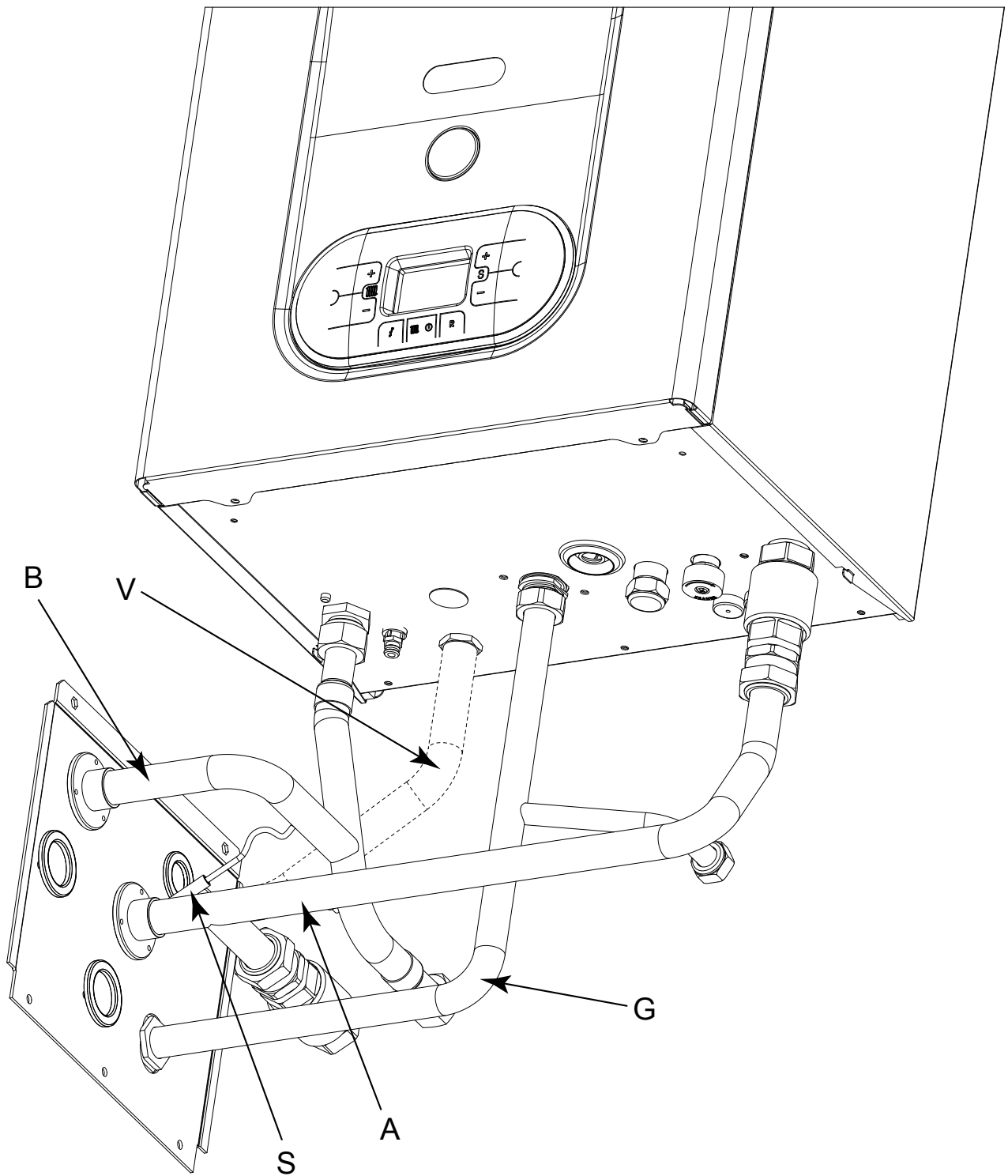
- 5 TG generator temperature probe
- 6 Electrical panel
- 7 TGV probe

Figure 1.9 Left side view



- A Boiler module flue gas exhaust outlet
- B Heat pump module flue gas exhaust outlet
- C Socket for boiler flue gas analysis
- D Boiler module combustion air inlet

Figure 1.10 Detail of water pipes connection between boiler module and connection plate



- A Heating water outlet pipe
- B Heating water inlet pipe
- G Gas pipe
- S Space heating water delivery temperature probe
- V Boiler module safety valve drain ducting pipe
(to be fitted by the installer)

1.5 ELECTRICAL WIRING DIAGRAM

Figure 1.11 Heat pump module wiring diagram

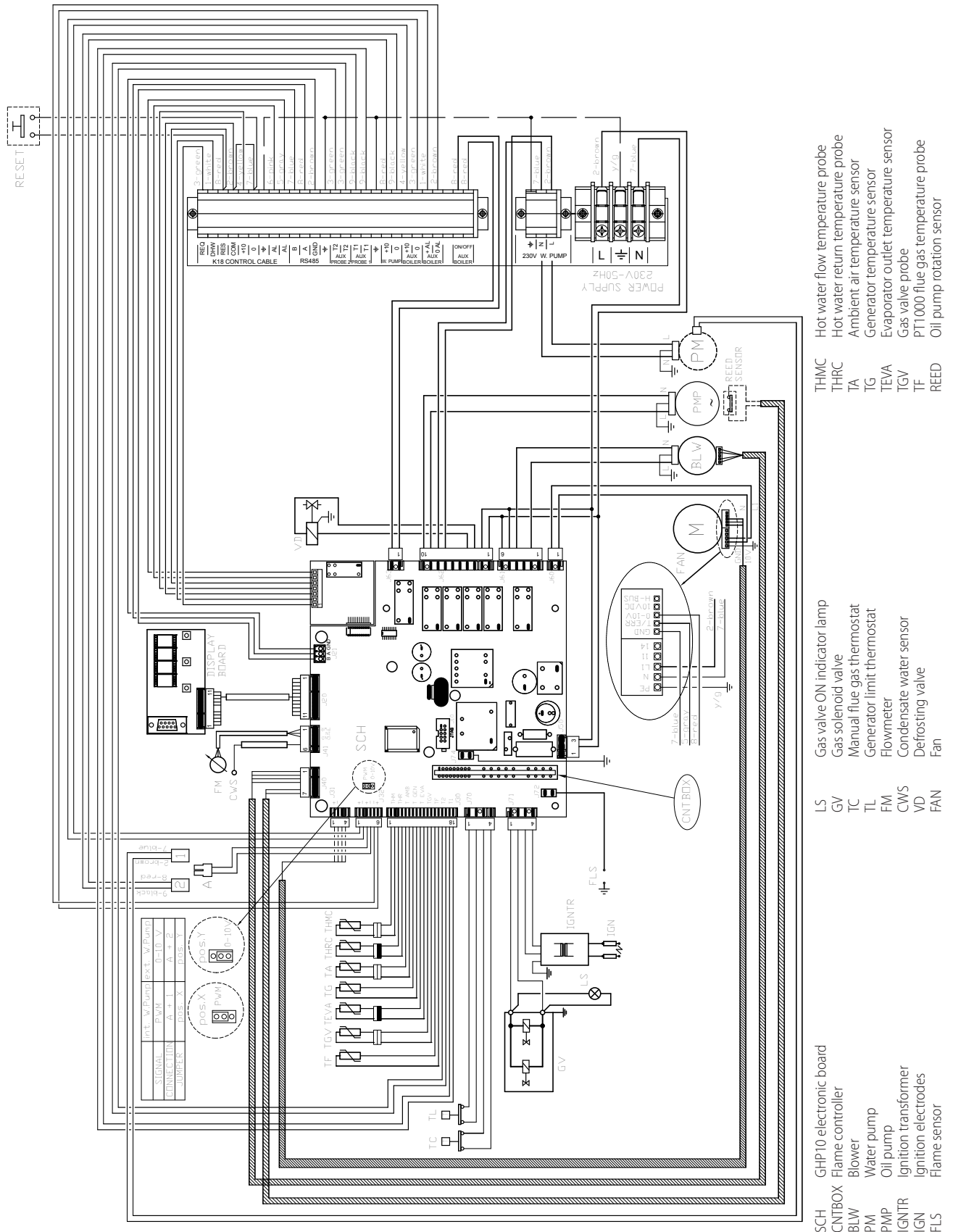
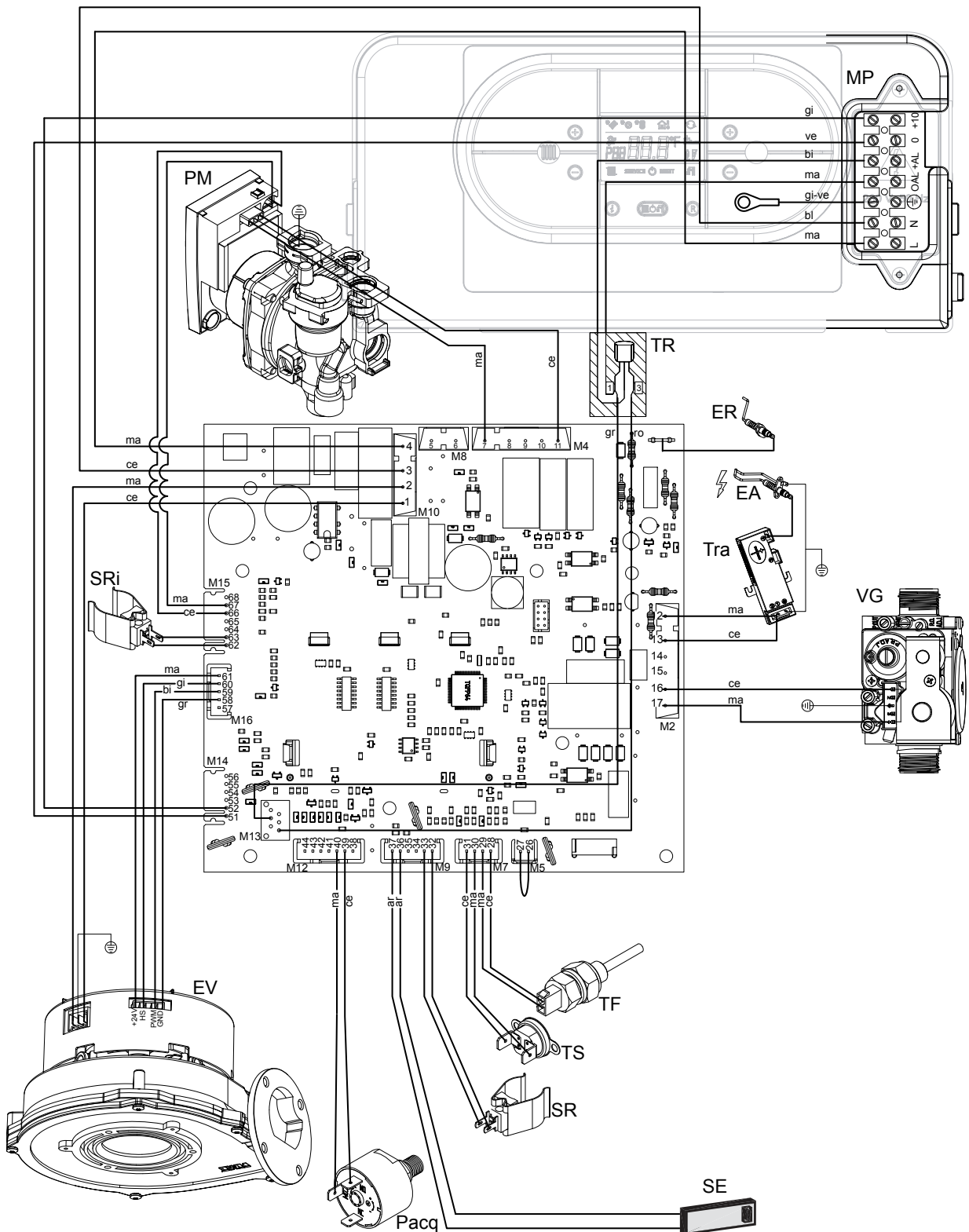
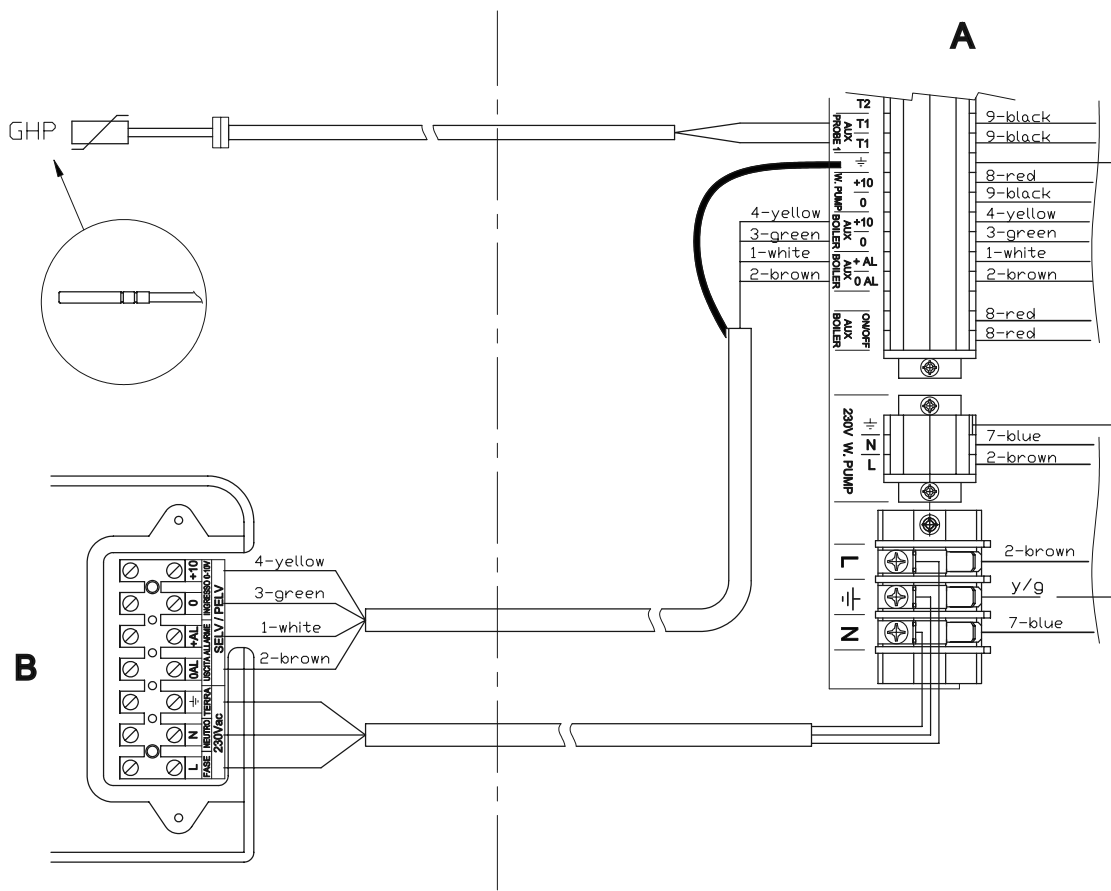


Figure 1.12 Boiler module wiring diagram



ER	Detection electrode	SR	Space heating probe	ro	Red
EA	Ignition electrode	TF	Flue gas thermofuse (102 °C)	ce	Light blue
PM	Modulating water pump	SE	Connector for optional outdoor temperature probe	ma	Brown
VG	Gas valve	MP	Control panel terminal block	ar	Orange
TRA	Ignition transformer	L	Line	gi	Yellow
TR	Transistor	N	Neutral	bi	White
SRi	System return probe	N	Neutral	gr	Grey
TS	Safety thermostat	ne	Black	ve	Green
Pacq	Water pressure switch	gi-ve	Green-yellow		
EV	Blower	bl	Blue		

Figure 1.13 Detail of connection between heat pump module electrical panel and boiler module electrical panel



- A Heat pump module electric panel
- B Boiler module electric panel

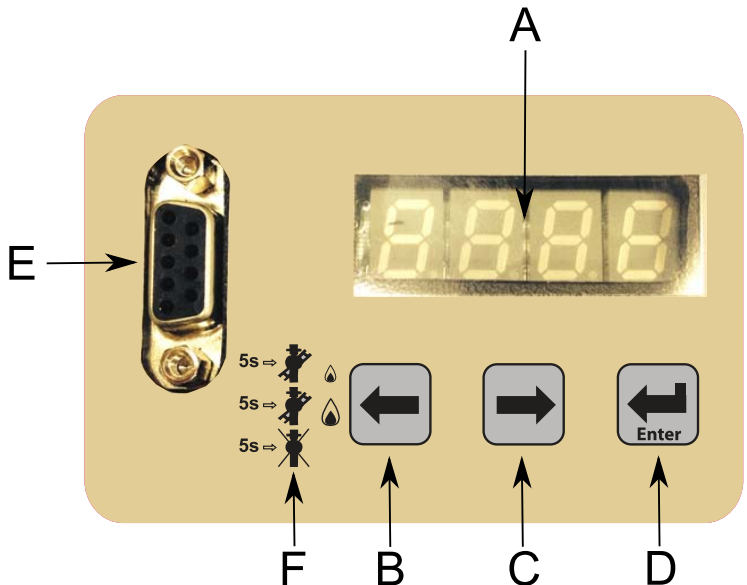
1.6 ELECTRONIC BOARD

The appliance's electrical panel contains:

- **GHP10 electronic board** 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 selection keys (Figure 1.14 p. 19). The display is accessible from the right side of the unit (detail I Figure 1.3 p. 9).

Figure 1.14 GHP10 board display

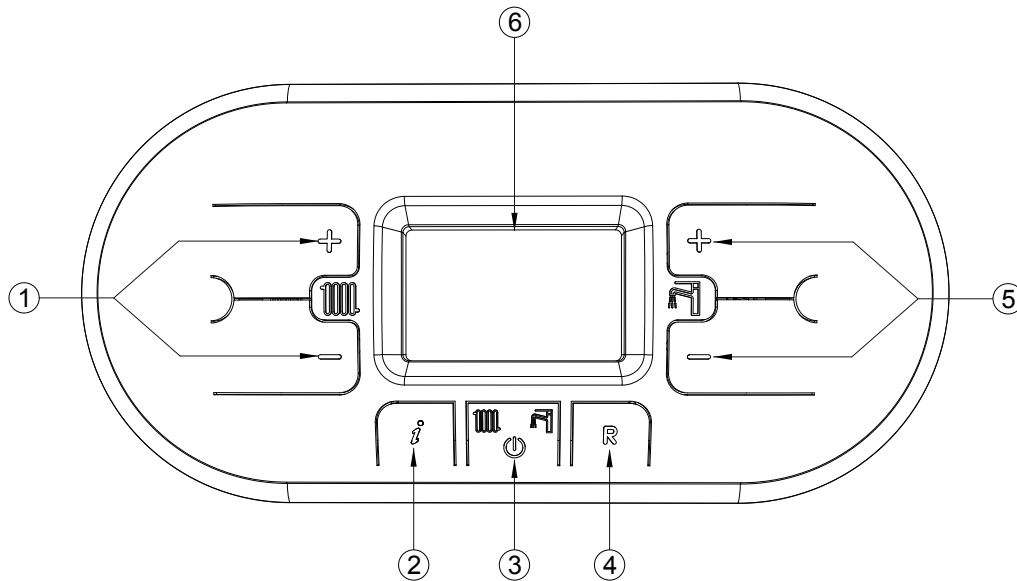


- A Display
- B Left selection key
- C Right selection key
- D Enter / Access menu key
- E RS232 connector
- F Chimney sweep function for heat pump module

► **Condensing boiler electronic board;** it controls the boiler and displays data, messages and operative codes related to

the boiler itself. The display is accessible from the left side of the unit (detail G Figure 1.3 p. 9).

Figure 1.15 Boiler control panel



- 1 Heating temperature adjustment keys
- 2 INFO key: press once to view the temperatures and other informations - hold for 5 seconds, in off operating mode, to view the last 5 faults
- 3 Operating mode selection key: summer only / winter only / summer-winter / OFF
- 4 RESET key: faults reset - boiler module chimney sweep function activation (hold for 7 seconds)
- 5 Domestic hot water temperature adjustment keys / hold the keys at the same time for 5 seconds to activate display backlighting for 10 minutes
- 6 Display

1.7 OPERATION MODE

The functioning mode of the appliance is set on modulating by default, that is the thermal power output is adapted to the thermal load.



For any modifications contact the installer or the TAC.

1.8 CONTROLS

1.8.1 Control device

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

1. **OQLT021 system controller (optional)**
2. **OCDS007 ambient chronothermostat (optional)**
3. **external request**

1.8.2 Control system (1) with OQLT021

The OQLT021 controller is able to control one K18 Hybrigas unit, one or more heating circuits and DHW production.

OQLT021 system controller

The main functions are:

- Control of one K18 Hybrigas unit with variable water setpoint according to heating curves and type of DHW function.
- Room comfort control by controlling two heating circuits, of which one optionally of mixed type, or zone valve control; control based on heating curves (one for each circuit) and optionally influence by the installed room unit/s.
- Buffer tank DHW production control (in dedicated preparation tank).
- Data display and parameters setting.
- Hourly programming on a weekly basis on two temperature

levels (comfort, reduced).

- Anti-icing protection function.
- Absence periods programming.
- Diagnostics.
- Errors reset.

For additional details and diagrams see OQLT021 controller manual.



Using the optional ODSP030 expansion kit it is possible manage up to three heating circuits, of which up to two optionally mixed.

1.8.3 Control system (2) with OCDS007

The OCDS007 chronothermostat is able to control a single K18 Hybrigas unit. In this case the water setpoint is either fixed or based on weather compensation, with a single heating curve which is directly controlled by the K18 Hybrigas unit; as such, it can not be modified from the OCDS007 device.

OCDS007 ambient chronothermostat

The main functions are:

- Room timer thermostat for hourly programming on a weekly basis on various levels of room temperature.
- Interfacing with the K18 Hybrigas unit through voltage-free request contact.
- Reporting on the display of the device of the possible alarm status of the K18 Hybrigas unit.

For further information refer to OCDS007 manual.

1.8.4 Control system (3) with external request

The appliance may also be controlled via generic enable devices (e.g. thermostats, timer, buttons, contactors...) fitted with voltage-free NO contact.

This system allows for a control similar or equivalent to that of the system (2), depending on the type of request device used; also, in this case a water setpoint can be used, fixed or calculated according to the climatic curve managed by the unit. Using a commercially available device it is generally not possible to obtain on the device a reporting of the unit alarm. In case,

refer to the Paragraph 4.5 p. 36 for the connection instructions of a alarm status indicator lamp.



For connection of the selected device to the appliance's electronic board please refer to Paragraph 4.4 p. 35.

1.9 TECHNICAL CHARACTERISTICS

Following K18 Hybrigas technical data apply also to K18 Hybrigas EVO, unless otherwise expressly specified.

Table 1.2 K18 Hybrigas 37/2 technical data

			K18 Hybrigas 37/2	
Heating mode				
Seasonal space heating energy efficiency class (ErP)	medium-temperature application (55 °C)	-	A++	
	low-temperature application (35 °C)	-	A+	
Unitary heating power	Outdoor temperature/Delivery temperature	A7W50	kW	36,6
		A7W35	kW	37,9
Heating capacity	nominal (1013 mbar - 15 °C) (1)		kW	29,4
	real		kW	29,2
	minimum (1)		kW	2,9
Hot water delivery temperature	maximum for heating		°C	65 (2)
Hot water return temperature	minimum temperature in continuous operation		°C	25 (3)
Heating water flow	nominal		l/h	2000
Ambient air temperature (dry bulb)	maximum		°C	40
	minimum		°C	-10 (4)
DHW mode				
DWH delivery temperature	maximum for DHW		°C	70 (5)
DHW inlet temperature	maximum for DHW		°C	60 (5)
nominal thermal power for DHW at 20 °C ambient			kW	37,9 (5)
specific capacity in continuous operation - Δt 30°C			l/min	30,0 (6)
Electrical specifications				
Power supply	voltage		V	230
	type		-	single-phase
	frequency		Hz	50
Electrical power absorption	nominal		kW	0,44
Degree of protection	IP		-	25
Installation data				
Gas consumption	G20 natural gas (nominal)		m ³ /h	3,10 (7)
	G30 (nominal)		kg/h	2,29 (8)
	G31 (nominal)		kg/h	2,27 (8)
Water fitting	type		-	M
	thread		"	3/4
Gas connection	type		-	M
	thread		"	3/4
Fume outlet	diameter (Ø)		mm	80
	residual head		Pa	70
Boiler fume outlet	diameter (Ø)		mm	80
	residual head		Pa	100
Type of installation (heat pump)	type of installation		-	B23P, B53P
Type of installation (boiler)	type of installation		-	B23P, B33
NO_x emission class			-	5
Dimensions	width		mm	1452
	depth		mm	752 (9)
	height		mm	1348
Weight	in operation		kg	295
sound pressure L_p at 5 metres (max)			dB(A)	43,0 (10)
sound pressure L_p at 5 metres (min)			dB(A)	40,0 (10)
maximum water pressure in operation			bar	4

(1) Relative to NCV (net calorific value).

(2) Value in combined operation. 80 °C for boiler only operation (half of the total available power).

(3) In transient operation, lower temperatures are allowed.

(4) As an option, a version for operation down to -25 °C is available.

(5) Only for EVO version.

(6) Only for EVO version. 10 minute peak collection of domestic hot water. The exact value depends on the performance of the DHW buffer tank.

(7) PCI (G20) 34,02 MJ/m³ (15 °C - 1013 mbar).

(8) PCI (G30/G31) 46,34 MJ/kg (15 °C - 1013 mbar).

(9) Dimensions including flue gas discharge.

(10) Sound pressure values in free field, with directionality factor 2, obtained from the sound power value in compliance with standard EN ISO 9614. Sound power L_w 65 dB(A) at maximum ventilation, 62 dB(A) at minimum ventilation; sound power values detected in compliance with the intensity measurement methodology set forth by standard EN ISO 9614.

		K18 Hybrigas 37/2	
maximum condensation and defrosting water flow rate		l/h	17,5
Water content inside the apparatus		l	9
Circulating pump data	maximum head	m w.c.	7,5
	residual pressure head at nominal flow rate	m w.c.	2,0
expansion tank volume		l	8

- (1) Relative to NCV (net calorific value).
- (2) Value in combined operation. 80 °C for boiler only operation (half of the total available power).
- (3) In transient operation, lower temperatures are allowed.
- (4) As an option, a version for operation down to -25 °C is available.
- (5) Only for EVO version.
- (6) Only for EVO version. 10 minute peak collection of domestic hot water. The exact value depends on the performance of the DHW buffer tank.
- (7) PCI (G20) 34,02 MJ/m³ (15 °C - 1013 mbar).
- (8) PCI (G30/G31) 46,34 MJ/kg (15 °C - 1013 mbar).
- (9) Dimensions including flue gas discharge.
- (10) Sound pressure values in free field, with directionality factor 2, obtained from the sound power value in compliance with standard EN ISO 9614. Sound power Lw 65 dB(A) at maximum ventilation, 62 dB(A) at minimum ventilation; sound power values detected in compliance with the intensity measurement methodology set forth by standard EN ISO 9614.

Table 1.3 Heat pump for K18 Hybrigas technical data

			K18 Simplygas C1	
Heating mode				
Heating capacity	nominal (1013 mbar - 15 °C) (1)	kW	11,4	
	real	kW	11,2	
Heating water flow	nominal	l/h	1000	
	maximum	l/h	2000	
	minimum	l/h	400	
Electrical specifications				
Electrical power absorption	nominal	kW	0,35	
Installation data				
Gas consumption	G20 natural gas (nominal)	m ³ /h	1,20 (2)	
	GPL G30/G31 (nominal)	kg/h	0,87 (3)	
General information				
Cooling fluid	ammonia R717	kg	4,3	
	water H ₂ O	kg	4,4	

- (1) Relative to NCV (net calorific value).
- (2) PCI (G20) 34,02 MJ/m³ (15 °C - 1013 mbar).
- (3) PCI (G30/G31) 46,34 MJ/kg (15 °C - 1013 mbar).

Table 1.4 PED data (referred to heat pump)

		K18 Hybrigas	K18 Hybrigas Easy	K18 Hybrigas Ready
PED data				
Components under pression	generator	l	14,5	14,5
	cooling volume transformer	l	3,0	3,0
	absorber/condenser	l	2,2	2,2
	cooling absorber solution	l	4,2	4,2
	solution pump	l	2,8	2,8
test pressure (in air)		bar g	55	55
maximum pressure of the cooling circuit		bar g	32	32
filling ratio		kg of NH ₃ /l	0,161	0,161
fluid group		-	group 1°	group 1°

Table 1.5 Boiler for K18 Hybrigas 37/2 technical data

			K18 Hybrigas Boiler	
Heating mode				
Heating capacity	nominal (1013 mbar - 15 °C) (1)	kW	18,0	
	minimum (1)	kW	2,9	
Operating point 80/60	Nominal thermal capacity	effective power	kW	17,6
		efficiency	%	98,0
Operating point 50/30	Nominal thermal capacity	efficiency	%	105,5
Operating point Tr = 30 °C	Thermal capacity 30%	efficiency	%	107,5
Operating point Tr = 47 °C	Thermal capacity 30%	efficiency	%	101,2
Heat loss	to jacket in operation		kW	0,02
	to jacket in operation		%	0,10
	to flue in operation		kW	0,38
	to flue in operation		%	2,10
	in off mode		kW	0,045
	in off mode		%	0,25

- (1) Relative to NCV (net calorific value).

			K18 Hybrigas Boiler		
efficiency class			****		
Installation data					
Gas consumption	G20 natural gas (nominal)		m ³ /h	1,90	
	G30 (nominal)		kg/h	1,42	
	G31 (nominal)		kg/h	1,40	
Percentage CO ₂ in fumes	Nominal thermal capacity	G20	%	9,4	
		G30	%	11,1	
		G31	%	10,2	
	Minimal thermal capacity	G20	%	9,0	
		G30	%	10,5	
		G31	%	10,0	
Flue temperature	Nominal thermal capacity	G20	°C	73,7	
FUMES FLOW RATE	Nominal thermal capacity		G20	kg/h	28
	Minimal thermal capacity		G20	kg/h	5
CO emission			ppm	41,0	

(1) Relative to NCV (net calorific value).

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

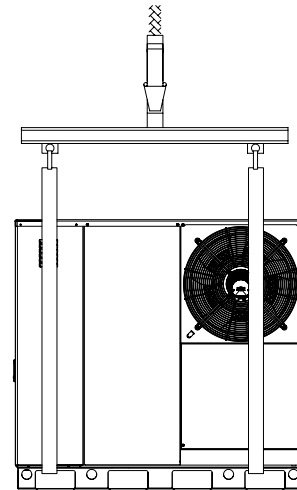
- The lifting equipment must be suitable for the load.
- Do not stand under suspended loads.

2.2 HANDLING

2.2.1 Handling and lifting

- ▶ Always handle the appliance in its packing, as delivered by the factory.
- ▶ Use slings to lift the appliance.
- ▶ Use lifting beams to avoid damaging the outer panels, finned coil and defrosting water discharge (Figure 2.1 p. 23).
- ▶ It is possible to remove defrosting water and flue gas condensate discharge conveyor during handling to avoid damages (reference F Figure 1.3 p. 9) using screws; reassemble the discharge conveyor when handling is ended.
- ▶ Comply with safety regulations at the installation site.

Figure 2.1 Instruction for lifting

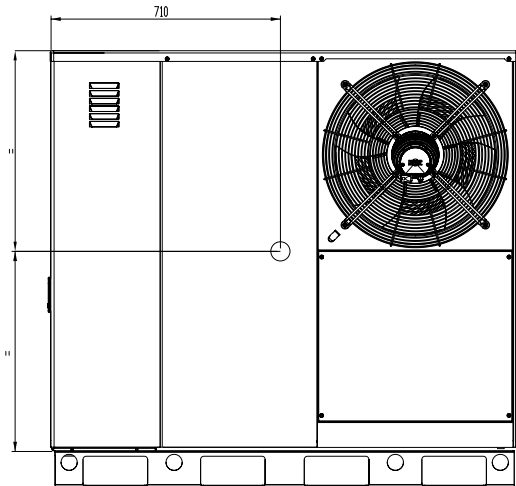


In the event of handling with forklift or pallet truck, comply with the handling instructions shown on the packing.



Pay attention to the unit centre of gravity position (Figure 2.2 p. 24).

Figure 2.2 Unit centre of gravity position



2.3 APPLIANCE POSITIONING



Do not install inside a room

- The appliance is type-approved for external installation.
- Do not install inside a room, not even if it has openings.
- In no event start the appliance inside a room.



K18 Hybrigas unit ventilation

- The athermal appliance requires a large space, ventilated and free from obstacles, to enable smooth flow of air to the finned coil and free air extraction from the fan outlet, 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.



Limiting heat loss

- It is advisable to place the unit near the inlet of the water pipes in the building, minimising the external sections (adequately insulated), in order to avoid unnecessary heat loss.

2.3.1 Where to install the appliance

- ▶ 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 (e.g. protruding roofs, canopies, balconies, ledges, trees, etc.) must interfere either with the air flow reaching the finned coil and leaving the front part of the appliance or with the fumes exhaust.
- ▶ The appliances flue gas exhaust must not be immediately close to openings or air intakes of buildings, and must comply with environmental and safety regulations.
- ▶ Do not install near the exhaust of flues, chimneys or hot polluted air. In order to work correctly, the appliance needs clean air.

2.3.2 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 damages provide for a drainage system connected to water discharge (reference E Figure 1.3 p. 9).

2.3.3 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

2.4.1 Distances from combustible or flammable materials

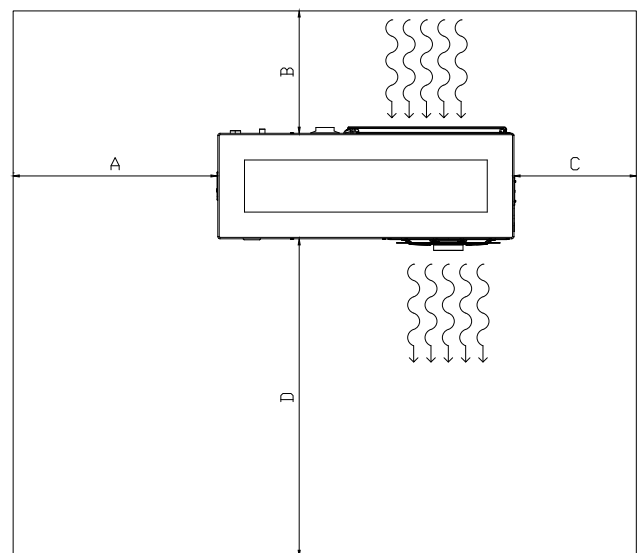
- ▶ Keep the appliance away from combustible or flammable materials or components, in compliance with applicable regulations.

2.4.2 Clearances around the appliance

The minimum clearance distances shown in Figure 2.3 p. 24 (bar any stricter regulations) are required for safety, operation and maintenance.

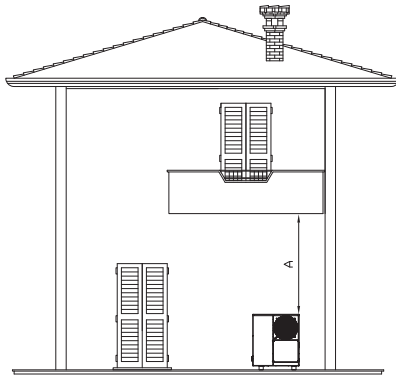
An open area of at least 2.5 m must be guaranteed above the appliance so as to allow free air circulation, as shown in Figure 2.4 p. 25.

Figure 2.3 K18 Hybrigas clearance distances



- A 1000 mm
- B 600 mm *
- C 600 mm
- D 1500 mm
- * This distance can be reduced to 400 mm if the flue gas exhaust is vertical.

Figure 2.4 Minimum open area above the outdoor units



A 2,5 m min

2.5 MOUNTING BASE

2.5.1 Mounting base constructive features

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



In order to simplify maintenance operations even in case of adverse weather conditions (snow, heavy rain ...) it is suggested to install the unit at a height of about 300 mm from the ground.

2.5.2 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 size per side.

2.5.3 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.

2.5.4 Anti vibration mountings

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

- ▶ Use vibration damper supports (available as optional features).
- ▶ 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.1 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 HYDRAULIC SYSTEM

3.2.1 Primary and secondary heating circuit

The K18 Hybrigas appliance can operate in plants with primary circuit only, or in plants with primary and secondary circuits with hydraulic separation: in the first case the water pump managed by the K18 Hybrigas unit ensures water circulation also for the

users; in the second case water circulation in heating circuits is ensured by dedicated water pumps.

With regard to the generation part, the layout must be set up as shown in Figure 3.1 p. 26 (refer to Figure 3.2 p. 26 for the corresponding K18 Hybrigas EVO version).

With regard to the heating distribution circuits, the solutions described in Figures 3.3 p. 27, 3.4 p. 27, 3.5 p. 28 and 3.6 p. 28 are possible.

3.2.2 Constant or variable water flow

The K18 Hybrigas unit may operate with constant or variable water flow, according to electronic board settings (Paragraph 5.7 p. 45).

System and components must be designed and installed consistently.

3.2.3 Minimum water content

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

A buffer tank (input on the top and output on the bottom) is not strictly required but suggested in systems with low water content in the primary circuit to ensure a minimum load during the periods of medium to low thermal demand. It is recommended in systems where the system water flow can be significantly reduced, and therefore, in the presence of:

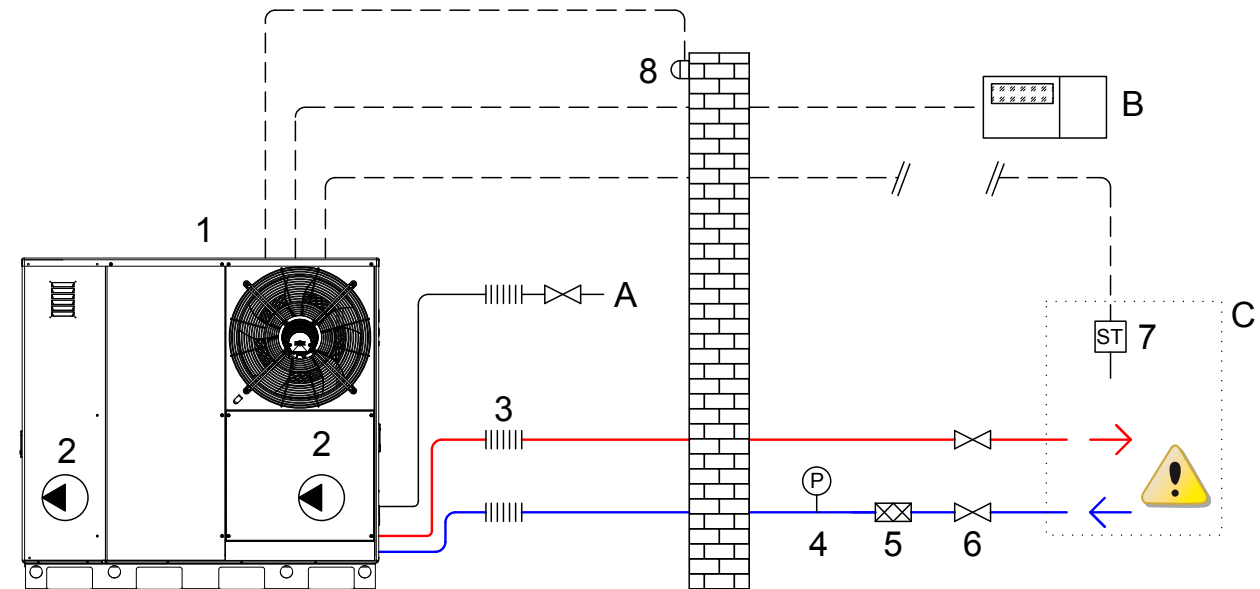
- ▶ 2-way zone valves
- ▶ thermostatic valves on radiators
- ▶ heating circuits with several zones

A capacity of 80/100 liters is usually adequate.

3.2.4 Hydraulic diagrams

3.2.4.1 K18 Hybrigas hydraulic diagram

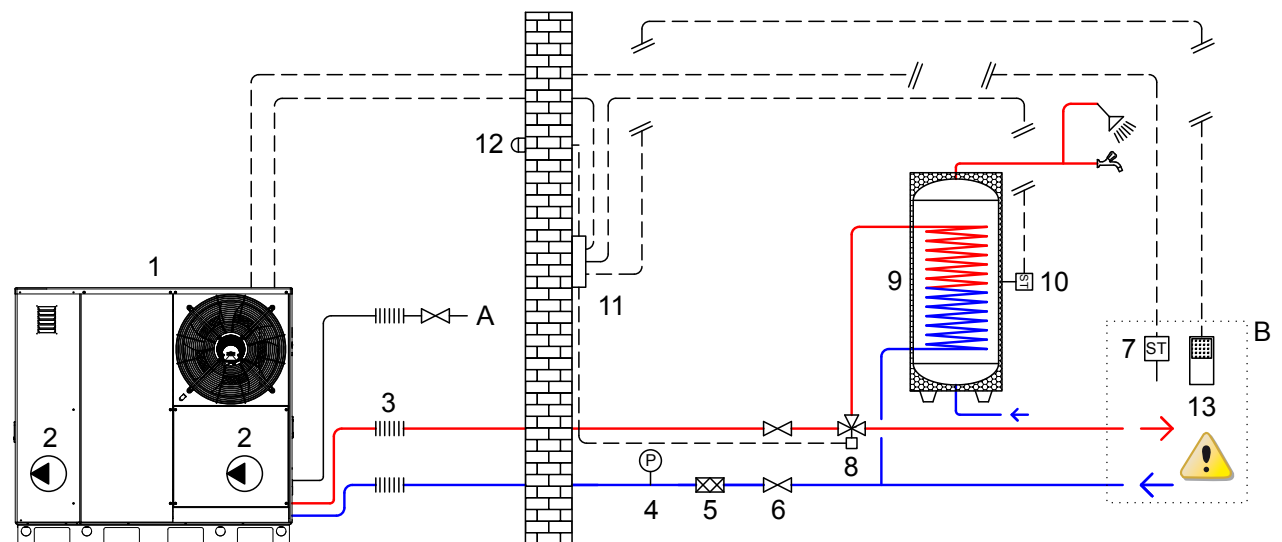
Figure 3.1 K18 Hybrigas



- | | | | |
|---|---|---|---|
| 1 | heat pump + condensing boiler K18 Hybrigas | 8 | outdoor temperature probe (available as OSND007 optional) |
| 2 | modulating internal water pumps with available head of 2,0 m w.c. | A | gas connection |
| 3 | anti-vibration connection | B | ambient chronothermostat (available as OCDS007 optional) |
| 4 | pressure gauge | C | heating distribution circuit, to be carried out as described in Paragraph 3.2.4.3 p. 27 |
| 5 | separator filter | | |
| 6 | shut-off valve | | |
| 7 | GHP immersion temperature probe (standard) to be installed on heating circuit (see Paragraph 3.2.4.3 p. 27) | | |

3.2.4.2 K18 Hybrigas EVO hydraulic diagram

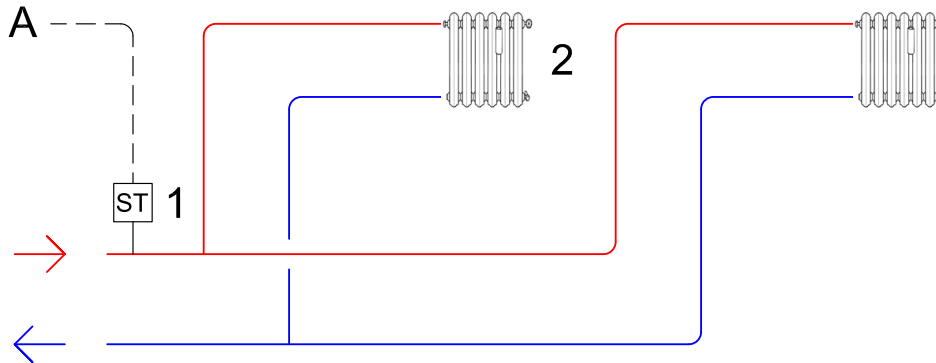
Figure 3.2 K18 Hybrigas EVO



- | | | | |
|---|---|----|---|
| 1 | heat pump + condensing boiler K18 Hybrigas | 9 | DHW buffer tank, 200 or 300 liter, 3 or 4 sqm coil (available as optional OSRB012 or OSRB004) |
| 2 | modulating internal water pumps with available head of 2,0 m w.c. | 10 | Immersion temperature probe (available as OSND004 optional) |
| 3 | anti-vibration connection | 11 | system controller (required optional OQLT021) |
| 4 | pressure gauge | 12 | outdoor temperature probe (standard with OQLT021) |
| 5 | separator filter | 13 | advanced room unit (optional supplied as per standard with OQLT021, to be placed, preferably, in a heated room) |
| 6 | shut-off valve | A | gas connection |
| 7 | GHP immersion temperature probe (standard) to be installed on heating circuit (see Paragraph 3.2.4.3 p. 27) | B | heating distribution circuit, to be carried out as described in Paragraph 3.2.4.3 p. 27 |
| 8 | 3-way diverting valve for heating/DHW management (available as OVLV007 optional) | | |

3.2.4.3 Heating distribution

Figure 3.3 Heating distribution 01 - direct

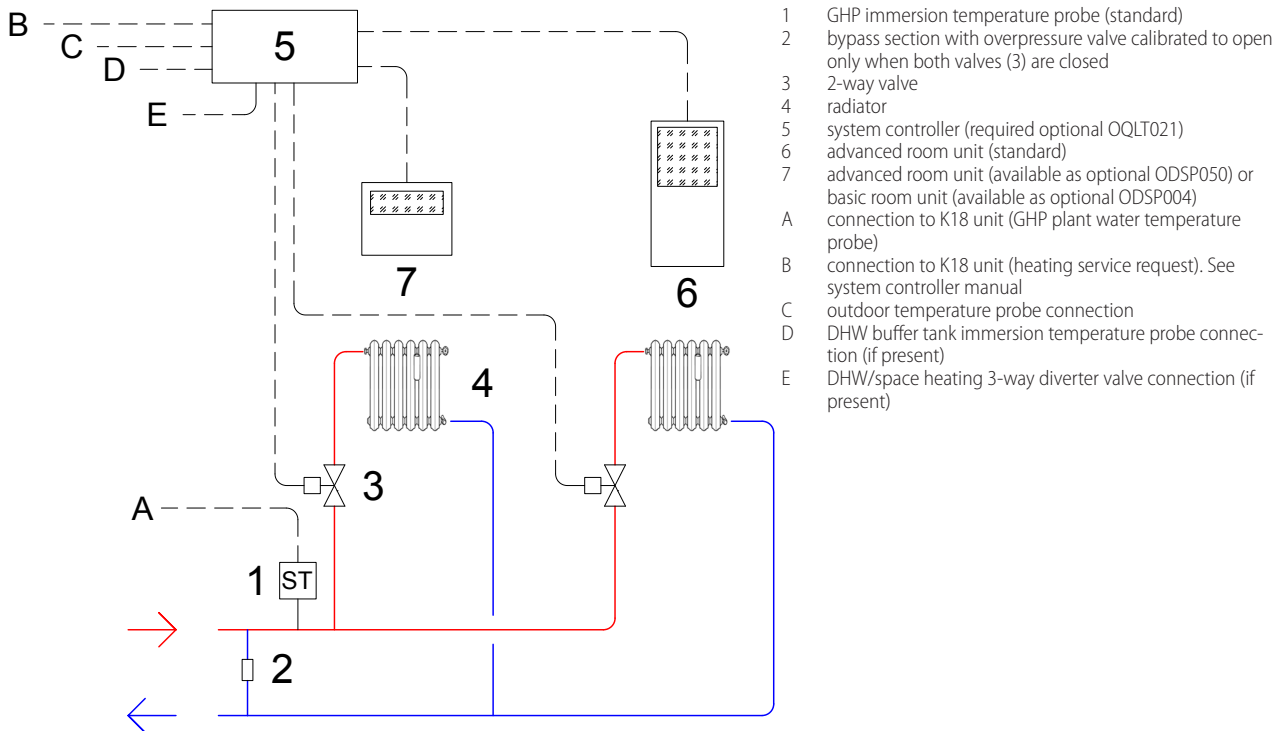


- 1 GHP immersion temperature probe (standard)
2 radiator

A connection to K18 unit (GHP plant water temperature probe)

Direct heating distribution with single zone (system with primary water circuit only).

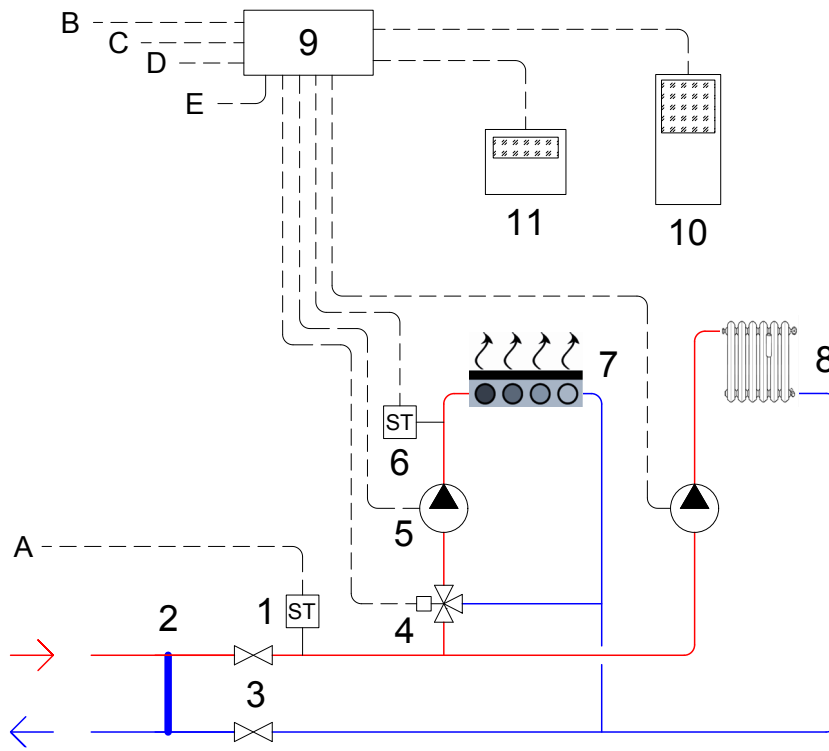
Figure 3.4 Heating distribution 02 - system controller with two 2-way zone valves



- 1 GHP immersion temperature probe (standard)
2 bypass section with overpressure valve calibrated to open only when both valves (3) are closed
3 2-way valve
4 radiator
5 system controller (required optional OQLT021)
6 advanced room unit (standard)
7 advanced room unit (available as optional ODSP050) or basic room unit (available as optional ODSP004)
A connection to K18 unit (GHP plant water temperature probe)
B connection to K18 unit (heating service request). See system controller manual
C outdoor temperature probe connection
D DHW buffer tank immersion temperature probe connection (if present)
E DHW/space heating 3-way diverter valve connection (if present)

Heating distribution with two zones controlled by 2-way valves (system with primary water circuit only).

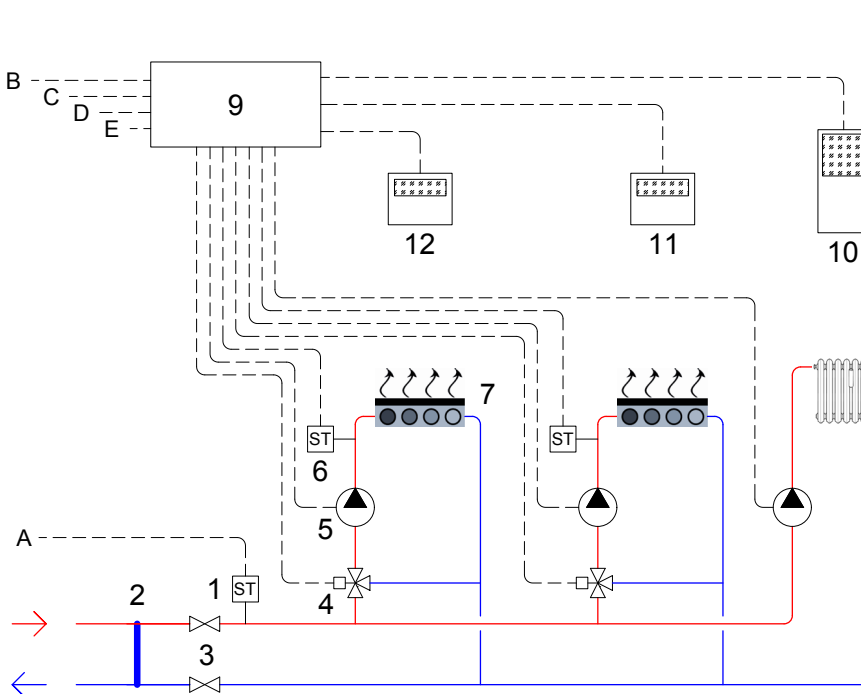
Figure 3.5 Heating distribution 03 - system controller with a mixed heating circuit and a direct one



- 1 GHP immersion temperature probe (standard)
- 2 decoupling of primary/secondary circuits (large cross-section pipe with T-connections or a hydraulic separator)
- 3 shut-off valve
- 4 zone mixing valve
- 5 zone circulating pump (available as OP-MP009/OPMP004 optional)
- 6 Immersion temperature probe (available as OSND004 optional)
- 7 radiant panel
- 8 radiator
- 9 system controller (required optional OQLT021)
- 10 advanced room unit (standard)
- 11 advanced room unit (available as optional ODSP050) or basic room unit (available as optional ODSP004)
- A connection to K18 unit (GHP plant water temperature probe)
- B connection to K18 unit (heating service request). See system controller manual
- C outdoor temperature probe connection
- D DHW buffer tank immersion temperature probe connection (if present)
- E DHW/space heating 3-way diverter valve connection (if present)

Heating distribution with up to two heating circuits, one of which is optionally mixed and one not mixed (system with primary and secondary water circuits).

Figure 3.6 Heating distribution 04 - system controller with two mixed heating circuits and a direct one



- 1 GHP immersion temperature probe (standard)
- 2 decoupling of primary/secondary circuits (large cross-section pipe with T-connections or a hydraulic separator)
- 3 shut-off valve
- 4 zone mixing valve
- 5 zone circulating pump (available as OPMP009/OPMP004 optional)
- 6 Immersion temperature probe (available as OSND004 optional)
- 7 radiant panel
- 8 radiator
- 9 system controller + expansion kit (required optional OQLT021 + ODSP030)
- 10 advanced room unit (standard)
- 11 advanced room unit (available as optional ODSP050) or basic room unit (available as optional ODSP004)
- 12 advanced room unit (available as optional ODSP050) or basic room unit (available as optional ODSP004)
- A connection to K18 unit (GHP plant water temperature probe)
- B connection to K18 unit (heating service request). See system controller manual
- C outdoor temperature probe connection
- D DHW buffer tank immersion temperature probe connection (if present)
- E DHW/space heating 3-way diverter valve connection (if present)

Heating distribution with up to three heating circuits, two of which are optionally mixed and one not mixed (system with primary and secondary water circuits).

3.3 HYDRAULIC CONNECTIONS

3.3.1 Plumbing fittings

on the rear, at the bottom, connection plate (Figure 1.4 p. 10).

- ▶ A (= out) 3/4" M - WATER OUTLET (m = outlet to the system)
- ▶ B (= in) 3/4" M - WATER INLET (r = return from the system)

3.3.2 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.

3.3.3 Minimum components of heating plumbing circuit

Always provide, near the appliance:

- ▶ on water piping, both output and input (m/r)
 - 2 antivibration joints on water fittings
 - 2 isolation ball valves
- ▶ on the input water piping (r)
 - 1 separator filter (preferably magnetic)
 - 1 pressure gauge



The K18 Hybrigas appliance is equipped with remote temperature probe (GHP), to be installed by the installer on the delivery pipe to the plant, after optional primary/secondary separation or buffer tank (reference 1 Figure 3.3 p. 27, 3.4 p. 27, 3.5 p. 28, 3.5 p. 28).



Water temperature probe

Insert GHP remote water temperature probe in dedicated thermowell immersed in water flow, using thermal paste to ensure proper heating transfer.



Refer to Paragraph 4.7.1 p. 37 for details concerning the electrical connection of the water temperature probe.

3.4 ANTIFREEZE FUNCTION

3.4.1 Active antifreeze self-protection

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



Electrical and gas continuity

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

3.5 WINTER KIT (OKBT013, OKBT014)

For very cold outdoor temperatures, it must be considered that the minimum allowed temperature for K18 Hybrigas unit is -10

°C.

If it is necessary to extend the operation also at lower temperatures, a winter kit is available as optional, which allows extending the operation down to -25 °C, which can only be used on outdoor units of the K18 Hybrigas family realized since October 2017, together with:

- ▶ Glycol at 40% minimum in space heating circuit (and in DHW circuit too, if any).
- ▶ K18 antifreeze function activated.

It consists of a heating cable, a heating element for the condensate siphon of the boiler module, an antifreeze thermostat, and the relative electrical wiring.

The two kits differ as follows:

- ▶ The OKBT013 kit is mounted on the K18 Hybrigas after it has already been placed on the system. It is then ordered after installation of the K18 Hybrigas unit.
- ▶ The OKBT014 kit is factory-mounted on the K18 Hybrigas and the unit is shipped with the kit. It must be then ordered at the same time as the K18 Hybrigas unit.

For installation (required only for the OKBT013 kit) follow the instructions on the instruction sheet enclosed with the kit.

3.6 ANTIFREEZE 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 antifreeze 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 pump 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.



When producing DHW by DHW buffer tank, use propylene glycol only.

3.6.1 Type of antifreeze glycol

Inhibited type glycol is recommended to prevent oxidation phenomena.

3.6.2 Glycol effects

The Table 3.1 p. 30 shows, indicatively, the effects of using a glycol depending on its %.

Table 3.1 Technical data for filling the hydraulic circuit

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

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. 30). Failure to comply with the manufacturer's guidelines may affect operation, integrity and life of the appliance, voiding the warranty.

3.7.1 System water characteristics

Free chlorine or water hardness may damage the appliance. Adhere to the chemical-physical parameters in Table 3.2 p. 30 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

3.7.2 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.

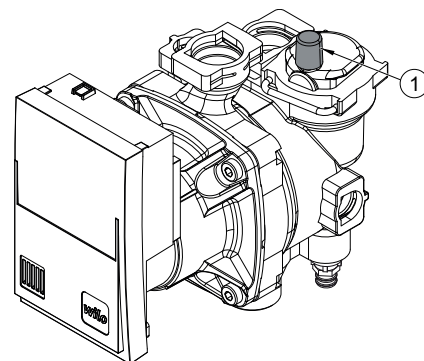
- Always refer to the requirements of the standards and existing regulations.

3.8 SYSTEM FILLING

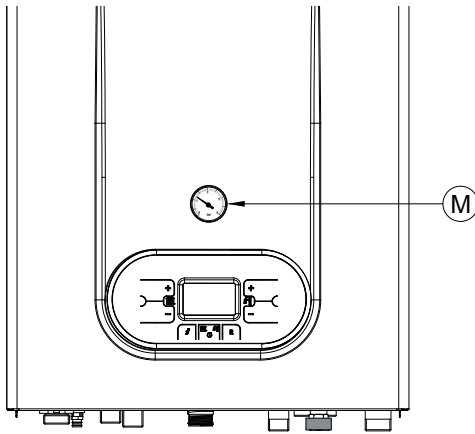
After completing all water, electrical and gas connections:

1. Slightly loosen the cap of the jolly valve on the water pump of the boiler module (at the bottom left inside the boiler module) to release the air (detail 1 Figure 3.7 p. 30).
2. Slightly loosen the cap of the jolly valve placed on the top right on the condensing block of the boiler module (Figure 3.9 p. 31) to release the air from the top.
3. Open the system filling valve and let out all the air.
4. Check with pressure gauge M (Figure 3.8 p. 31) that system pressure reaches 1,5 bar.
5. Open the automatic air purging valves on the system, if any, and check the air purging process.
6. Make sure that the unit is powered electrically.
7. Send an operating request to the unit for a few seconds. The circulating pump will be immediately activated.
8. Remove the request before the burner is activated. The circulating pump will continue to circulate the water for the post-circulation time.
9. Check and clean the filter on the inlet pipe.
10. If, after the above operations, a decrease in system water pressure is observed, open again the system filling valve until the system pressure reaches 1,5 bar.
11. Repeat items 7, 8, 9 and 10 until the pressure has stabilised (at least 1,5 bar).

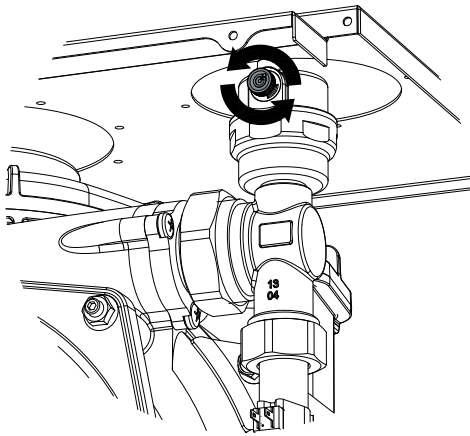
Figure 3.7 Jolly valve on boiler circulating pump position



1 Cap of the jolly valve

Figure 3.8 Boiler pressure gauge position

M Pressure gauge

Figure 3.9 Jolly valve on boiler condensing block position

3.9 BOILER SAFETY VALVE DRAIN DUCTING CONNECTION

The connection between the safety valve discharge and the connection plate of the boiler module is already provided inside the boiler module.

The installer must provide the discharge hose from the 1/2" M connection of the boiler module connection plate (detail V Figure 1.10 p. 16), which will cross the K18 Hybrigas unit connection plate through the appropriate free space (detail F Figure 1.4 p. 10).

3.10 FUEL GAS SUPPLY

3.10.1 Gas connection

- ▶ 3/4" M on the rear, at the bottom, connection plate (Figure 1.4 p. 10).
- ▶ Install an anti-vibration connection between the appliance and the gas piping.

3.10.2 Mandatory shut-off valve

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

3.10.3 Gas pipes sizing

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

3.10.4 Supply gas pressure

The appliance's gas supply pressure, both static and dynamic, must comply with Table 3.3 p. 31, with tolerance $\pm 15\%$.



Non compliant gas pressure (Table 3.3 p. 31) may damage the appliance and be hazardous.

Table 3.3 Gas network pressure

Product category	Countries of destination	Gas supply pressure			
		G20 [mbar]	G25 [mbar]	G30 [mbar]	G31 [mbar]
I ₂ H3B/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
I ₂ H3P	AL, BG, CZ, ES, GB, HR, IE, IT, LT, MK, PT, SI, SK, TR	20			37
	RO	20			30
I ₂ ELL3B/P	DE	20	20	50	50
I ₂ ESi3P	FR	20	25		37
I ₂ H53B/P	HU	25		30	30
I ₂ E3P	LU	20			50
I ₂ L3B/P	NL		25	50	50
I ₂ E3B/P	PL	20		37	37
I ₂ E(S)	BE	20	25		
	IS				37
I ₃ P	IS				30
I ₂ H	LV	20			
I ₃ B/P	MT			30	30
I ₃ B				30	

3.10.5 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.

3.10.6 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.

3.11 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.

3.11.1 Flue gas exhaust connection

Heat pump module:

- ▶ Ø 80 mm (with gasket), on the rear, at the top (detail D Figure 1.3 p. 9).

Boiler module:

- ▶ Ø 80 mm (with gasket), on the rear, at the top (detail K Figure 1.3 p. 9).

The appliance is supplied with 2 flue gas exhaust kits, to be fitted by the installer.



How to install the flue gas exhaust kit

1. Remove the cover applied to the flue gas exhaust.
2. Fit the terminal onto the collar on the flue gas exhaust.



The cover prevents water and/or foreign bodies entering the appliance before the exhaust kit is installed. The cover should thus be removed only when actually installing the exhaust kit on the appliance.

3.11.2 Possible flue

The fumes exhaust may be wall-mounted, but it can also be easily conveyed over the ridge of the roof because the residual head allows the ducts to be extended by some tens meters, if the local regulations require this.

The two distinct flue gas exhaust ducts can be conveyed separately or via a unified flue.

Table 3.4 p. 32 below shows the characteristics of the fume outlet of the K18 Hybrigas unit.

Table 3.4 Characteristics of K18 Hybrigas flue gas exhaust

			K18 Hybrigas 37/2
Installation data			
Type of installation (heat pump)	type of installation	-	B23P, B53P
Fume outlet	diameter (Ø)	mm	80
	residual head	Pa	70
Type of installation (boiler)	type of installation	-	B23P, B33
Boiler fume outlet	diameter (Ø)	mm	80
	residual head	Pa	100

Table 3.5 p. 32 below shows the characteristics of the combustion products of the heat pump module.

Table 3.5 Characteristics of K18 Simplygas combustion products

			K18 Simplygas
Percentage CO₂ in fumes			
Nominal thermal capacity	G20	%	9,0 (1)
	G30	%	10,5 (2)
	G31	%	10,0 (3)
Flue temperature			
Nominal thermal capacity	G20	°C	60,0
	G30	°C	60,0
	G31	°C	60,0
FUMES FLOW RATE			
Nominal thermal capacity	G20	kg/h	19
	G30	kg/h	19
	G31	kg/h	21
Installation data			
type of installation		-	B23P, B53P
Fume outlet	diameter (Ø)	mm	80
	residual head	Pa	70

(1) 8,8 ÷ 9,2.
(2) 10,3 ÷ 10,7.
(3) 9,8 ÷ 10,2.

Table 3.6 p. 32 below shows the characteristics of the combustion products of the condensing boiler module.

Table 3.6 Characteristics of K18 Hybrigas boiler combustion products

			K18 Hybrigas Boiler	
Installation data				
Percentage CO₂ in fumes	Nominal thermal capacity	G20	%	9,4
		G30	%	11,1
		G31	%	10,2
	Minimal thermal capacity	G20	%	9,0
		G30	%	10,5
		G31	%	10,0
Flue temperature	Nominal thermal capacity	G20	°C	73,7
FUMES FLOW RATE	Nominal thermal capacity	G20	kg/h	28
	Minimal thermal capacity	G20	kg/h	5

For each of the flue gas exhausts to be realized:

- ▶ 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.
- ▶ For the heat pump module, always provide a socket for flue gas analysis, in an accessible position. The condensing boiler module already has it (detail C Figure 1.9 p. 15).

For the design of any unified flue for the modules of K18 Hybrigas unit, in addition to what previously stated, you must consider that:

- ▶ It is mandatory to install a check valve on the exhaust of each module (heat pump and boiler).
- ▶ In case the check valves are installed outside, an appropriate UV ray protection must be assured (if the valve is constructed in plastic material) as well as protection from potential winter freezing of condensate backflow into the siphon.



In case of flue gas discharge to the roof, use a Tee at the base of the vertical pipe, with proper condensate drain, provided with siphon, to be connected to a suitable discharge manifold.

3.11.3 Unified flue (OTBO069)

The unified flue optional (OTBO009) can be used on all outdoor units of the K18 Hybrigas family, thus allowing to simplify the installation if there is the need to convey in a single flue,

wall-mounted or roof-mounted, the separate flues of the two modules that make up the unit.

It consists of a series of 80 mm ducts and is already equipped with two check valves, one for each module, and gaskets.

The unified flue is provided with a Tee coupling with a fitting for condensate drain.

For installation follow the instructions on the instruction sheet enclosed with the OTBO069 optional.

Figure 3.10 Unified flue for K18 Hybrigas (only for outdoor versions)

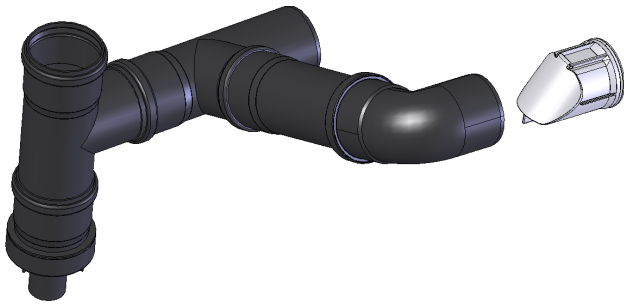


Table 3.7 OTBO069 unified flue technical data

Material	PP
Color	black
Flue gas exhaust diameter	80 mm
Condensate drain diameter	40 mm
Residual head	50 Pa

3.12 FLUE GAS CONDENSATE DISCHARGE

The K18 Hybrigas unit is a condensing appliance and therefore produces condensation water from combustion flue gases.

i Condensate acidity and exhaust regulations

The flue gas condensate contains aggressive acid substances. Refer to applicable regulations in force for condensate exhaust and disposal.

- If required, install an acidity neutraliser of adequate capacity.

i Do not use gutters to discharge the condensate

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

3.12.1 Flue gas condensate connection

The connection for flue gas condensate discharge is located on the rear of the appliance (reference E in Figure 1.3 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.
- ▶ If the condensate drain is routed indoor, a suitable siphon needs to be installed on the pipe.
- ▶ The connection of the discharge to the sewerage system must be made at atmospheric pressure, i.e. by dripping into a siphoned container connected to the sewerage system.

3.12.2 Flue gas condensate discharge manifold

To make the condensate drain manifolds:

- ▶ Size the ducts for maximum capacity (maximum condensation and defrosting water flow rate) (Table 1.2 p. 21).
- ▶ 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.
- ▶ Dilute, if possible, with domestic waste water (e.g. bathrooms, washing machines, dish washers...), basic and neutralising.

i In the first few minutes of unit operation, that is in conditions of low condensate production, imperceptible steam or combustion gas might escape the condensate exhaust, which are not harmful either for machine operation or for the materials used for condensate exhaust.

3.13 DEFROSTING WATER DRAINAGE

i Defrosting

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

The defrosting water drain is located below the finned coil itself (see reference E in Figure 1.3 p. 9).

Prevent freezing of defrosting water drain by using a heating wire (by the installer) to protect the discharge and the pipes.

4 ELECTRICAL INSTALLER

4.1 WARNINGS

i General warnings

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

i 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.

i 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.

4.2 ELECTRICAL SYSTEMS

Electrical connections must provide:

- A. Power supply (Paragraph 4.3 p. 34).
- B. Control system (Paragraph 4.4 p. 35)-
- C. Alarm indicator lamp (if there is no optional system controller, Paragraph 4.5 p. 36).
- D. Unit error reset remote (if there is no optional system controller, Paragraph 4.6 p. 36).
- E. Temperature probes (Paragraph 4.7 p. 37).
- F. Optional OKBT013 winter kit (Paragraph 4.8 p. 37).



How to perform connections

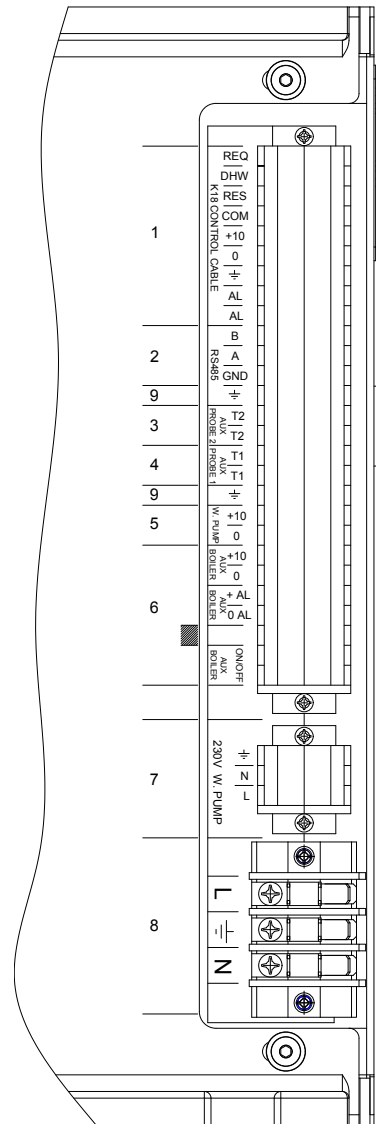
All electrical connections must be performed in the connecting terminal block located near the Electrical Panel:

1. Ensure the appliance is not live.
2. Remove the appliance's lower front panel (placed under the fan).
3. Remove the cap of the hole for electrical connection (see reference C Figure 1.3 p. 9) and fit a suitable cable gland in order to:
 - Properly protect the cable insulation from abrasion.
 - Properly protect cables against mechanical stresses on the wiring terminals and liquid penetration (at least the protection index IP 25 declared for the unit must be guaranteed).
4. Insert cables through cable gland.
5. Identify the appropriate connection terminals.
6. Perform the connections.
7. Replace the lower front panel.



The unused holes for cables passage must remain covered by caps.

Figure 4.1 Terminal block for electrical connections of K18 unit



- 1 Control system connection (see Paragraph 4.4 p. 35)
- 2 Modbus connection to RS485 port for optional monitoring
- 3 Outdoor temperature probe connection (Paragraph 4.7 p. 37)
- 4 GHP temperature sensor connection (see par. 4.7 p. 37)
- 5 Connection of 0-10 V signal on the internal water pump
- 6 Condensing boiler module connections
- 7 Supply connection on the internal water pump
- 8 Power supply connection (see Paragraph 4.3 p. 34)
- 9 Earth connections for signal cable shielding

4.3 ELECTRICAL POWER SUPPLY

4.3.1 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 4 A magnetothermic breaker with differential protection



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



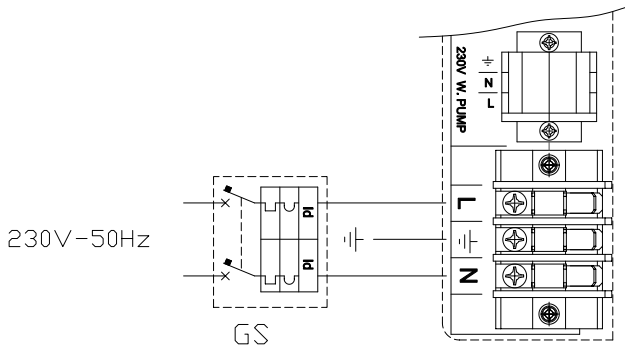
How to connect the power supply

To connect the three-pole power supply cable (Figure

4.2 p. 35):

1. Access the connection terminal block according to Procedure 4.2 p. 34.
2. Connect the three wires to terminal board (TER) as shown in Figure 4.2 p. 35.
3. Provide the earth lead-in wire longer than live ones (last to be torn in the event of accidental pulling).

Figure 4.2 Appliance power supply wiring diagram - Unit connection to power supply network (230V 1N - 50 Hz)



L phase
N neutral
Components NOT SUPPLIED:
GS 4A magnetothermic breaker with differential protection

4.4 CONTROL SYSTEM

4.4.1 Control systems, options (1) (2) (3)

Three separate control systems are provided, each with specific features, components and diagrams:

- ▶ System (1), with **OQLT021 controller**.
- ▶ System (2), with **chronothermostat OCDS007**.
- ▶ System (3), with an **external request**.

4.4.2 OQLT021 controller (optional)

(System (1) see also Paragraph 1.8.2 p. 20)



How to connect the OQLT021 controller

Connection of OQLT021 controller is made on the wiring terminal block located in the electrical panel inside the unit.

1. Access the Electrical Board of the appliance according to the Procedure 4.2 p. 34.
2. Refer to the OQLT021 controller Installation manual for the actual wiring instructions.

4.4.3 OCDS007 Ambient chronothermostat (optional)

(System (2) see also Paragraph 1.8.3 p. 20)



How to connect the OCDS007 chronothermostat

Connection of OCDS007 is made on the wiring terminal block located in the Electrical Panel inside the unit.

1. Access the Electrical Board of the appliance according to the Procedure 4.2 p. 34.
2. Perform connections as shown in the diagram in Figure 4.3 p. 35 and in Figure 4.4 p. 36.
3. Use shielded cable 2x0,75 mm² (or 4x0,75 mm² if the alarm indication signal is included), connecting the shield to one of the ground terminals provided on the

appliance electrical panel.

4. The connection cable must be kept separate from mains voltage cables.



The cable may not be longer than 30 metres.

4.4.4 External request

(System (3) see also Paragraph 1.8.4 p. 20)

It is required to arrange:

- ▶ **request device** (e.g. thermostat, clock, button, ...) fitted with a voltage-free NO contact.



How to connect the external request

Connection of external request is effected on the terminal board located in the Electrical Panel inside the unit.

1. Access the Electrical Board of the appliance according to the Procedure 4.2 p. 34.
2. Connect the voltage free contact of the external device, through two conductor wires, to terminals COM and REQ (respectively: common and heating request) of the internal terminal board (Figure 4.5 p. 36).
3. Use shielded cable 2x0,75 mm², connecting the shield to one of the ground terminals provided on the appliance electrical panel.
4. The connection cable must be kept separate from mains voltage cables.



The signal is SELV (Safety Extra Low Voltage). The voltage-free contact of the external device that gives the request must have double or reinforced insulation with respect to line voltage parts.



The cable may not be longer than 30 metres.

Figure 4.3 Connection diagram (Request signal) to OCDS007 chronothermostat

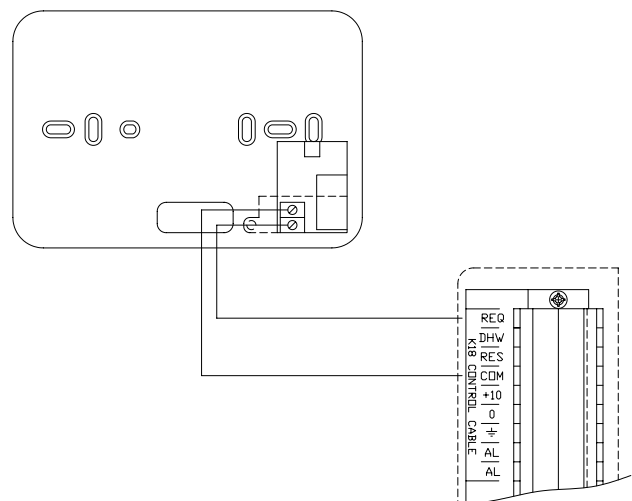


Figure 4.4 Connection diagram (alarm indication signal) to OCDS007 chronothermostat

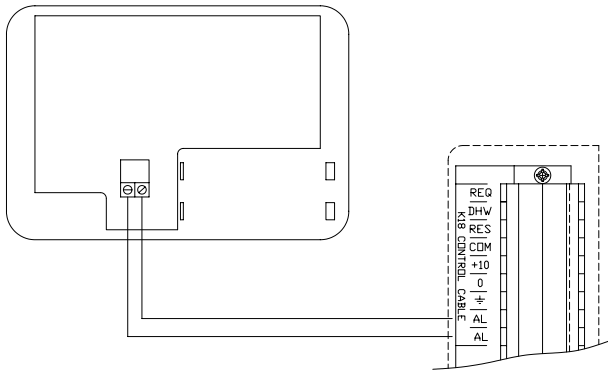
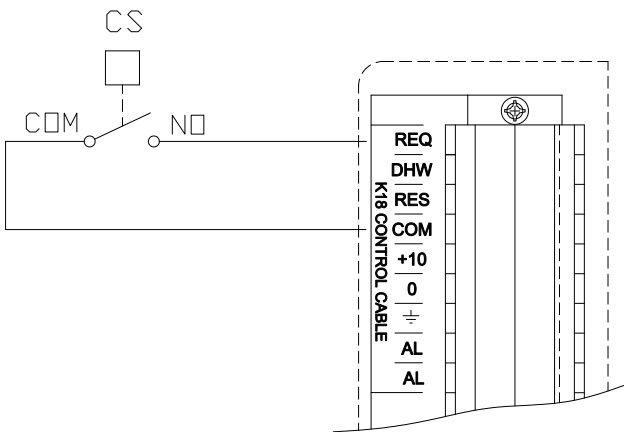


Figure 4.5 Wiring diagram, external enable connection



COM common
 REQ heating request
 Components NOT SUPPLIED:
 CS external request

4.5 ALARM INDICATOR LAMP

This paragraph is not applicable in case of use of system controller **OQLT021** or of chronothermostat **OCDS007**.

It is possible to connect a lamp indicating an appliance's alarm (for both the heat pump module and the boiler module) to the Electrical Panel inside the appliance.

To connect the alarm indicator lamp, follow the instructions below.



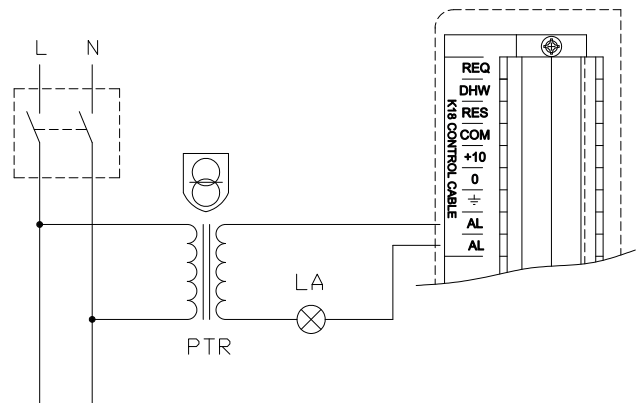
Figure 4.6 p. 36.

1. Access the connection terminal block according to Procedure 4.2 p. 34.
2. The cable required to connect the lamp must be shielded 2x0,75 mm².
3. Cut a suitable length of cable.
4. Connect the cable to terminals AL and AL.
5. The connection cable must be kept separate from mains voltage cables.



The cable may not be longer than 30 metres.

Figure 4.6 Alarm indicator lamp connection wiring diagram



L phase
 N neutral
 Components NOT SUPPLIED:
 LA general alarm indicator lamp
 PTR safety transformer with secondary voltage ≤ 24V (compliant with norms IEC EN 61558-2-6)



The AL lamp switched on indicates an appliance's alarm. To know the type of alarm, read through the sight glass (reference I Figure 1.3 p. 9), the operating code on the display of the electronic board and refer to Table 8.2 p. 52.

4.6 REMOTE THE BOARD ERROR RESET



This paragraph is not applicable in case of use of **OQLT021** system controller.

The error reset for the heat pump module of the K18 Hybrigas unit may be remoted by connecting a dedicated button to the terminal block in the Electrical Panel inside the appliance. Connect the button as instructed below.



Figure 4.7 p. 37

1. Access the connection terminal block according to Procedure 4.2 p. 34.
2. The cable required to connect the reset button must be shielded 2x0,75 mm².
3. Cut a suitable length of cable.
4. Connect the cable to terminals COM and RES.
5. The connection cable must be kept separate from mains voltage cables.

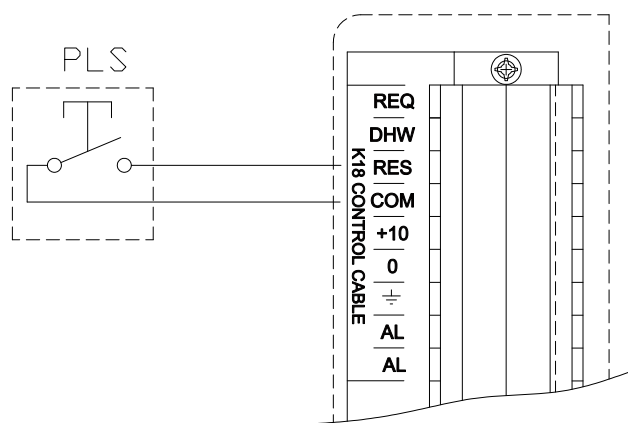


The cable may not be longer than 30 metres.



It is not possible to remote the boiler module alarm reset command. The reset command of this module must be given by pressing the appropriate button on the boiler panel (detail 4 Figure 1.15 p. 20).

Figure 4.7 Board error reset connection wiring diagram



COM common
 RES reset errors
 Components NOT SUPPLIED:
 PLS release button

4.7 TEMPERATURE PROBES

It is possible to connect one or two temperature probes, AUX PROBE 1 and/or AUX PROBE 2 to control specific functions described in Paragraph 5.5.4 p. 43.

The following instructions to electrical connection of temperature probes do not apply if the OQLT021 system controller is used (e.g. for the K18 Hybrigas EVO units).

In the presence of this controller, follow the connection instructions of the temperature probes provided in the relevant installation manual.

4.7.1 GHP immersion temperature probe

The probe connected to the AUX PROBE 1 input is factory installed inside the K18 Hybrigas unit on the delivery manifold downstream of the boiler coupling (see detail S Figure 1.10 p. 16).

The probe is only used in this position in case of distribution with only primary water circuit in the absence of the buffer tank (see Figures 3.3 p. 27 and 3.4 p. 27).

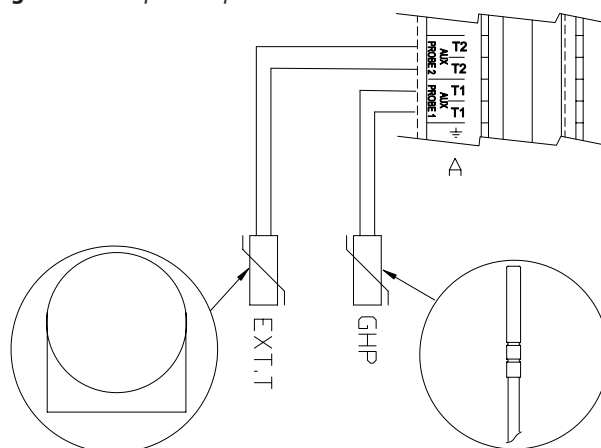
In all other cases, use the GHP probe supplied installing it downstream of the primary/secondary decoupling or the optional buffer tank (see detail 1 Figures 3.5 p. 28 and 3.6 p. 28). This probe must be connected to the AUX PROBE 1 input as shown in Figure 4.8 p. 37, after disconnecting the factory wired one.

4.7.2 Outdoor temperature probe

The outdoor temperature probe (available as OSND007 optional) must be connected to AUX PROBE 2 input, as shown in Figure 4.8 p. 37.

With reference to Paragraph 1.8 p. 20, this probe is recommended for applications in which control type (2) or (3) is used together with adjustment based on climatic curve.

Figure 4.8 Temperature probes connection to K18 unit



- A Unit terminal block detail
 - GHP Water delivery temperature probe NTC 10k Beta 3977 (supplied as standard with K18 Hybrigas unit)
 - EXT.T Air temperature probe NTC 10k Beta 3977 (optional OSND007)
- NOTES** Use shielded cable:
 2x0,5 mm² up to 40 m
 2x0,75 mm² up to 60 m
 2x1,0 mm² up to 80 m
 2x1,5 mm² up to 120 m
 Connect the shield to a ground terminal on the K18 unit's terminal block

4.8 WINTER KIT (OKBT013, OKBT014)

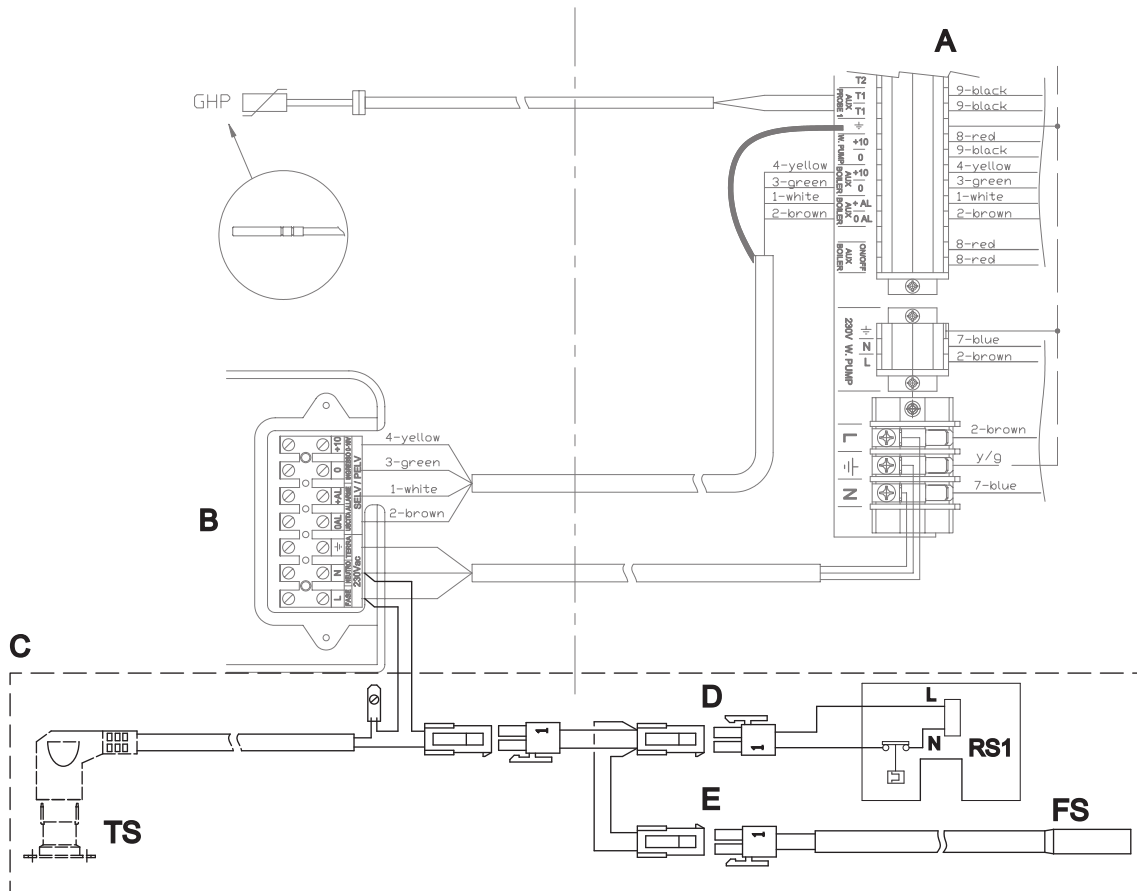
The two kits differ as follows:

- The OKBT013 kit is mounted on the K18 Hybrigas after it has already been placed on the system. It is then ordered after installation of the K18 Hybrigas unit.
- The OKBT014 kit is factory-mounted on the K18 Hybrigas and the unit is shipped with the kit. It must be then ordered at the same time as the K18 Hybrigas unit.

For installation (required only for the OKBT013 kit) follow the instructions on the instruction sheet enclosed with the kit.

Following Figure 4.9 p. 38 shows the winter kit wiring diagram.

Figure 4.9 K18 Hybrigas winter kit wiring diagram



- A Heat pump module electric panel
- B Boiler module electric panel
- C Winter kit (OKBT013, OKBT014)
- D 4-way Molex connectors
- E 2-way Molex connectors
- FS Condensate discharge hose heating element
- RS1 Condensate discharge heating element
- TS Condensate discharge heating element thermostat

5 FIRST START-UP

i First start-up entails checking/setting up the combustion parameters and may exclusively be carried out by a Robur TAC. NEITHER the user NOR the installation technician is authorised to perform such operations, under penalty of voiding the warranty.

The installer is obliged to carry out preliminary checks described in Paragraph 5.1 p. 38.

5.1 PRELIMINARY CHECKS



Paragraph dedicated to the installer.

5.1.1 Preliminary checks for first start-up

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

- ▶ Water, 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 (natural gas).
- ▶ Supply gas pressure complying with the values of Table

3.3 p. 31, 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.

5.1.2 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 provided control device (OQLT021, OCDS007, or external request).
- ▶ Appliance defects or faults caused during transport or installation.

- ▶ Gas smell.
- ▶ Non-compliant mains gas pressure.
- ▶ Non-compliant flue gas exhaust.
- ▶ All situations that may involve operation abnormalities or are potentially hazardous.

5.1.3 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.

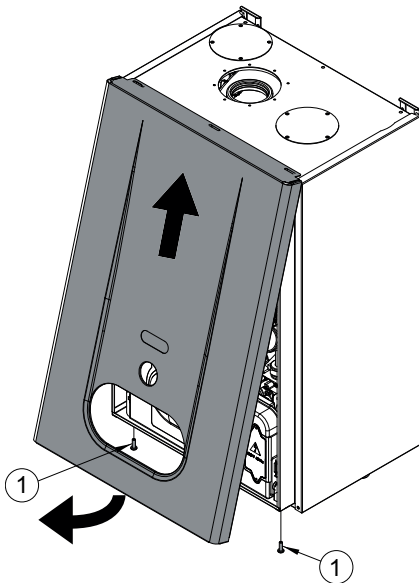
After performing the remedial actions (the installer's responsibility), if the TAC deems that safety and conformity conditions are in place, first start-up may be effected.

5.2 HOW TO ACCESS THE BOILER

To access the boiler proceed as follows:

1. Remove the K18 Hybrigas unit left panel (detail B Figure 1.3 p. 9) removing the 2 fastening screws.
2. Remove the fastening screws placed in the lower edge of the boiler front panel (detail 1 Figure 5.1 p. 39).
3. Grab the front panel from the bottom and remove it pulling to yourself and then upwards (Figure 5.1 p. 39).

Figure 5.1 Removal of the front panel of the boiler module



1 Boiler front panel fastening screws

5.3 HEAT PUMP COMBUSTION PARAMETERS CHECK








Paragraph reserved exclusively to TACs.



Figure 5.2 p. 40.

1. If the appliance is running, switch it off with the applicable control system (OQLT021, OCDS007, external request).
2. Remove the cap over the offset adjustment screw (C).
3. Screw in completely the throttle adjustment screw (D).
4. Screw in completely the offset adjustment screw (C).
5. Unscrew the throttle adjustment screw (D) as indicated in Table 5.1 p. 40.
6. Unscrew the offset adjustment screw (C) as indicated in

Table 5.1 p. 40.

7. Press the  key on the user interface of the heat pump module of the unit (detail B of Figure 1.14 p. 19) for 5 seconds to activate the chimney sweep function at minimum power.
 8. The display shows the letters "CS.LO" (chimney sweep low power), alternating with the flashing message "UAlt" (wait) which indicates that the machine is not yet ready for the reading.
 9. Once an approximate time ranging between 5 and 8 minutes elapses, the flashing message becomes "_GO_" to indicate that the combustion control can be implemented.
 10. Ensure the CO₂ value is between values indicated in column "Minimal thermal capacity" of Table 5.1 p. 40. Otherwise set CO₂ percentage reading by acting on the offset adjustment screw.
 11. Press the  key on the user interface again for 5 seconds to activate the chimney sweep function at maximum power.
 12. The display shows the letters "CS.HI" (chimney sweep high power), alternating once again with the flashing message "UAlt" (wait) which indicates that the machine is not yet ready for the reading.
 13. After a short while, the flashing message becomes "_GO_" again to indicate that the combustion control at maximum power can be implemented.
 14. Ensure the CO₂ value is between values indicated in column "Nominal thermal capacity" of Table 5.1 p. 40.
- If the check is successful:**
15. Press the  key on the user interface again for 5 seconds to deactivate the chimney sweep function and complete the procedure.
- If the check is not successful:**
16. Set CO₂ percentage reading by acting on the throttle adjustment screw.
 17. Press the  key on the user interface again for 5 seconds to deactivate the chimney sweep function.
 18. Repeat points 7 to 10 to reactivate the chimney sweep function at minimum capacity; verify once again and if necessary, correct the CO₂ value in these conditions by actuating the offset adjustment screw.
 19. Press the  key on the user interface again for 5 seconds to activate the chimney sweep function at maximum capacity, and then again for 5 seconds to deactivate it and complete the procedure.



To ensure the chimney sweep function is executed properly, there must be adequate thermal load, otherwise the appliance could reach the maximum limit of the delivery and/or return temperature and then stop.

The following may be necessary to provide adequate thermal load, depending on the system characteristics:

- Activate any pumps or zone valves of the water distribution circuit.
- Fully open the manual or thermostatic valves, mounted on the radiators.
- Activate the ventilation of the fan coils and increase the setting of any thermostat placed on them.

Table 5.2 p. 40 shows the messages that can appear on the display while the chimney sweep function is running, the relative meaning and the optional actions required.



Limit the time you use the chimney sweep function to the minimum actually required.



The system automatically interrupts chimney sweep function after 20 minutes from activation.



If the required CO₂ settings cannot be reached, contact Robur.

Table 5.1 Gas valve setting table for K18 heat pump module

Gas	Gas network pressure	Screw pre-adjustment		Offset pressure minimum	Percentage CO ₂ in fumes	
		Throttle	Offset		Minimal thermal capacity	Nominal thermal capacity
Type	mbar	turns	turns	Pa	%	%
G20	See Table 3.3 p. 31	-6 3/4	-3	-10	8,5 (1)	9,0 (2)

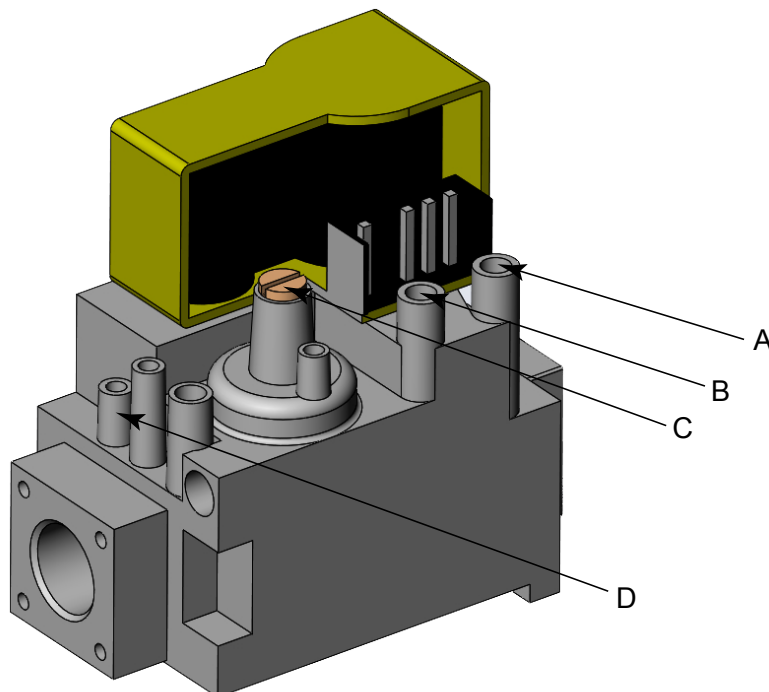
(1) 8,3 ÷ 8,7.

(2) 8,8 ÷ 9,2.

Table 5.2 Display messages for chimney sweep function

Message	Meaning	Action
CS.LO / UAlt	Chimney sweep function is active at minimum capacity and the flame is still not lit or lit at a different capacity than required.	Wait.
CS.LO / _GO_	Chimney sweep function is active at minimum capacity and the flame is lit at the required capacity.	Run CO ₂ reading (minimum capacity).
CS.HI / UAlt	Chimney sweep function is active at maximum capacity and the flame is still not lit or lit at a different capacity than required.	Wait.
CS.HI / _GO_	Chimney sweep function is active at maximum capacity and the flame is lit at the required capacity.	Run CO ₂ reading (maximum capacity).
HI.t	The appliance has switched off because the maximum operating temperature of the delivery and/or return water was exceeded.	Deactivate the function by pressing the key for 5 seconds and then increase the thermal load before reactivating the function.
Err.	The appliance switched off due to an anomaly (Warning or Error).	Deactivate the function by pressing the key for 5 seconds and then intervene according to the operating codes shown on the display, while referring to Section 8.1 p. 52. Once the problem is resolved, reactivate the function.
Cod.x (x = 0, 1, ..)	The appliance is temporarily running a special cycle that requires specific control of the power that is not compatible with the execution of the chimney sweep function.	In the rare event of one of these codes appearing, deactivate the function by pressing the key for 5 seconds and then contact Robur.

Figure 5.2 K18 heat pump module gas valve



- A Gas mains pressure intake
- B Offset pressure intake
- C Offset adjustment screw
- D Throttle adjustment screw

5.4 BOILER COMBUSTION PARAMETERS CHECK

casing open.



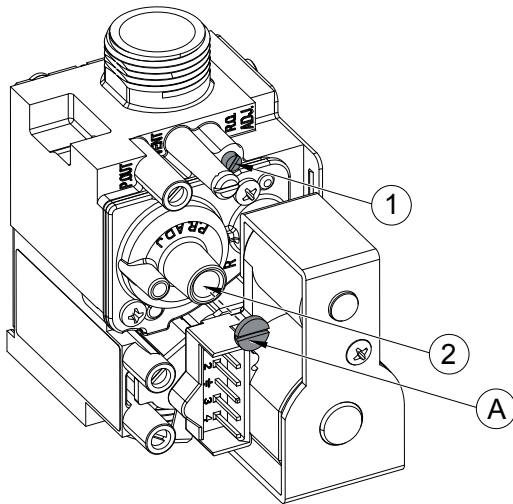
The CO₂ value should be checked with casing assembled, while the gas valve should be adjusted with the

To check and calibrate the CO₂ value of the boiler at minimum and maximum heating power proceed as follows.

5.4.1 Minimum power

1. Activate the chimney sweep function by pressing for 7 seconds the **R** key (detail 4 Figure 1.15 p. 20). The maximum time before being forced out of the function is 15 minutes.
2. Insert the fumes analyser probe in the suitable fumes inlet (detail C Figure 1.9 p. 15), then make sure that the CO₂ value is 9,0 %, otherwise unscrew the protection screw A (5.3 p. 41) and adjust using a 4 hex key the screw 2 (5.3 p. 41) of the offset adjuster. To increase the CO₂ value turn the screw clockwise and vice-versa if you want to decrease it.
3. Once completed the adjustment, tighten the protection screw A (5.3 p. 41) on the offset adjuster.

Figure 5.3 Boiler gas valve



- 1 Gas flow adjustment screw
2 Offset adjustment screw
A Protection screw

5.4.2 Maximum power

1. Press the **+** key of the space heating circuit **⏏** for calibration of the CO₂ value at maximum heating power.
2. Make sure that the CO₂ value is 9,4 %, otherwise adjust using the screw 1 of the gas flow adjuster (5.3 p. 41). To increase the CO₂ value turn the screw counterclockwise and vice-versa if you want to decrease it.
3. After each adjustment variation on screw 1 (5.3 p. 41) of the gas flow adjuster you have to wait for the boiler to stabilize itself to the set value (about 30 seconds).
4. Press then **-** key of the space heating circuit **⏏** and check that CO₂ value at minimum power has not changed. If so, repeat the calibration described in Paragraph 5.4.1 p. 41.
5. Press the **⏏** key to deactivate the chimney sweep function.

5.5 SETTING PARAMETERS FOR HEAT PUMP FIRST START-UP



Paragraph reserved exclusively to TACs.



The instructions on the use of the GHP10 electronic board concern the firmware version 1.013.



For the use of GHP 10 electronic board and related menu, see Chapter 6 p. 46.

Table 5.3 Menu 4 GHP10 board parameters for startup

Parameter	Do not modify	Description	Setting	Default
44		Temperature measurement unit	0. °C 1. °F	0
47		IF20 electronic board usage	1. generic controller 2. Siemens controller (OQLT021 or OQLT019)	1
48		Building time constant	from 0 to 50 hours	10
49	Do not modify	Auxiliary boiler installation type		1
50		Auxiliary boiler purpose for space heating	0. none (not active) 1. emergency (active only if K18 in alarm) 2. integration 3. integration and replacement	3
51		Auxiliary boiler purpose in DHW mode	0. none (not active) 1. emergency (active only if K18 in alarm) 2. integration 3. replacement (K18 does not produce DHW) 4. integration and replacement	4
52	Do not modify	Auxiliary boiler 0-10V output temperature setpoint corresponding to 0V		0
53	Do not modify	Auxiliary boiler 0-10V output temperature setpoint corresponding to 10V		80
54	Do not modify	Min auxiliary boiler 0-10V output temperature setpoint for min ON		27
55	Do not modify	Auxiliary boiler alarm input management		1
56		Idle time for automatic oil pump priming cycle activation	from 0 to 99 days 0. function disabled	10
156		Auxiliary boiler locking time for space heating	from 0 to 600 minutes	40
157		Auxiliary boiler locking time in DHW mode	from 0 to 600 minutes	20


Parameter	Do not modify	Description	Setting	Default
163		Heating antifreeze function activated	0. not active 1. active	1
174		Modulation of circulation pump in space heating mode activated	0. not active 1. active	1
175	Do not modify	OFF drive voltage for heating circulation pump		0,7
176 (1)		ON drive voltage for circulation pump in space heating mode	from 0 V to 10 V	10
177 (2)		ON drive voltage for circulation pump in DHW mode	from 0 V to 10 V	10
178		Space heating mode water deltaT setpoint	from +1 K to +20 K	10
181		Power modulation enable for space heating	0. not active 1. active	1
182		Glycol in heating water loop	0. absent 1. present	0
183		Modulation of circulation pump in DHW mode activated	0. not active 1. active	1
184		DHW mode water deltaT setpoint	from +1 K to +20 K	10
185 (3)		Outdoor temperature threshold to enable auxiliary boiler in space heating	from -30 °C to 40 °C	10
187		Temperature differential for GAHP recovery after replacement with auxiliary boiler due to exceeding operational limits	0,0 replacement function disabled from 0.1 to 10.0 K return differential	3,0
198		Fan noise reduction	0. not active 1. active	0
200		Min flow rate for heating circulation pump	from 4 to 20 hundreds of liters/hour	4
203		Auxiliary boiler 0-10V output temperature setpoint boost	from 0 K to 20 K	0
209		AUX 2 temperature probe usage	0. none (probe not installed) 2. outdoor temperature probe	0
210	Do not modify	AUX 1 temperature probe usage		1
211 (4)		Max delivery water setpoint for space heating	from 35 °C to 80 °C	40
212 (4)		Max inlet water setpoint for space heating	from 25 °C to 70 °C	30
213 (4)		Min delivery water setpoint for space heating	from 30 °C to 60 °C	30
214 (4)		Min inlet water setpoint for space heating	from 20 °C to 50 °C	20
215		Auxiliary boiler release integral	from 0 to 500 °C * minutes	30
216		Auxiliary boiler reset integral	from 0 to 500 °C * minutes	5
217 (5)		Low outdoor temperature threshold for replacing GAHP with auxiliary boiler	from -30 °C to 10 °C	-30
218 (6)		High outdoor temperature threshold for replacing GAHP with auxiliary boiler	from 10 °C to 40 °C	14
219 (7)		Delivery water temperature control for space heating	0. return 1. delivery	1
225 (8)		Setpoint management	0. Fixed setpoint 1. heating curve	1
226 (8) (9)		Fixed water setpoint for space heating	The minimum and maximum values depend on what has been set in the installation stage	40
228 (8)		Heating curve slope for space heating	from 10 to 400	75
229 (8)		Heating curve offset for space heating	from -5 K to +5 K	0
230 (8)		Room temperature setpoint with heating curve for space heating	from 0 °C to 40 °C	20

- (1) If modulation of circulation pump in space heating mode is not active, i.e. parameter 174 set to 0.
- (2) If modulation of circulation pump in DHW mode is not active, i.e. parameter 183 set to 0.
- (3) Auxiliary boiler enabled if outdoor temperature < parameter 185.
- (4) Parameters 211 and 213 are used if parameter 219 has value 1 and parameters 212 and 214 are used if parameter 219 has value 0. If the unit is connected to OQLT021 or OQLT019 controller (parameter 47 set to 2) this parameter is ignored; in this case maximum (or minimum) setpoint is fixed and corresponds to maximum (or minimum) value set with the parameter.
- (5) Replacement if outdoor temperature < parameter 217.
- (6) Replacement if outdoor temperature > parameter 218.
- (7) If the system is set for regulation of space heating service using GHP probe (AUX PROBE 1, see parameter 210), regulation of course occurs on the pipe on which the probe is physically installed. However, it is still important to set this parameter correctly in order to allow the system to apply correct maximum and minimum setpoint limits.
- (8) If the unit is connected to OQLT021 or OQLT019 controller this parameter is ignored.
- (9) This parameter is ignored if parameter 225 is set to 1.

5.5.1 Settings depending on the control system type

- ▶ If the OQLT021 or OQLT019 system controller is used, set parameter 47 to 2.
- ▶ For other control systems, set parameter 47 to 1 (default).

5.5.2 Settings depending on glycol presence


 Before doing these settings, read warnings in Paragraphs 3.4 p. 29 and 3.6 p. 29.

- ▶ If has been added in the primary water circuit glycol, set parameter 182 to 1; additionally, the anti-icing function can be

disabled by setting parameter 163 to 0.

- ▶ If glycol has not been added, set parameter 182 to 0 and make sure that parameter 163 is set to 1; also, keep the unit connected to power supply and to gas network, in order to allow anti-icing function activation.

5.5.3 Operating mode setting (ON/OFF or modulating)

 Before doing this setting, it is strongly suggested to contact Robur technical support.

The operating mode is MODULATING by default. To set the unit in ON/OFF mode, set parameter 181 to 0

5.5.4 Settings depending on the installed temperature probes

With OQLT021 or OQLT019 system controller

Follow the instructions provided in the system controller installation manual.

With other control systems (OCDS007 chronothermostat or generic external request)

- ▶ Referring to Figure 3.1 p. 26 and 3.2 p. 26, connect the GHP probe to AUX PROBE 1 clamp (see Paragraph 4.7 p. 37) and set parameter 210 to 1 (probe for space heating regulation).
- ▶ If weather compensation is activated (see Paragraph 6.5.1 p. 47), the installation of an outdoor temperature probe EXT.T (Optional OSND007) is recommended; install this probe in North facing, protected by direct sunlight and far from heat sources (windows, discharges, ecc.) and connect it to clamp AUX PROBE 2 (see Paragraph 4.7 p. 37); set parameter 209 to 2 (outdoor temperature probe). If this probe is not installed weather compensation will be based on the value provided by outdoor temperature probe on-board unit, significantly less accurate.

5.5.5 Auxiliary boiler (boiler module) management settings

- ▶ Make sure that parameters 49, 52, 53, 54 and 55 are set to their default value as shown in Table 5.3 p. 41.
- ▶ With reference to the possible functions of the auxiliary boiler (condensing boiler module) for the space heating service (see Paragraph 1.1.4 p. 8 and further on in this Paragraph), set parameter 50 to:
 1. for emergency mode
 2. for integration mode
 3. (default value) for integration and replacement mode
- ▶ In the presence of the DHW service (only with the OQLT021 or OQLT019 system controller), with reference to the possible functions of the auxiliary boiler for this service (see also further on in this Paragraph), set parameter 51 to:
 0. to exclude the auxiliary boiler from operating on the DHW service (DHW produced exclusively with the K18 unit)
 1. for the emergency mode (activation of the auxiliary boiler only in case of an alarm on K18 unit)
 2. for the integration mode (activation of the auxiliary boiler in addition to the K18 unit, when necessary)
 3. for replacement mode (DHW produced only with auxiliary boiler)
 4. (default value) for the integration and replacement mode (activation of the auxiliary boiler in addition and, in certain conditions, in replacement of the K18 unit)
- ▶ The setpoint value communicated by 0-10 V signal to the auxiliary boiler can be increased by a constant boost value with respect to the actual system setpoint. This is sometimes useful to guarantee that the outlet manifold can actually reach the setpoint, even despite water mixing occurring on the secondary circuit. If required, set parameter 203 to the desired boost value. It is recommended to limit the boost value to that which is strictly needed.
- ▶ It is possible to inhibit auxiliary boiler operation in integration mode for space heating service (not for DHW service) above a set outdoor temperature threshold.
 - To use this function, set parameter 185 to the desired outdoor temperature threshold value.

- To disable this function, set parameter 185 to maximum value (40 °C).



Even when inhibited by the above function, the auxiliary boiler remains active for the emergency function.



The function uses the filtered value with a constant time of 30' with respect to the instantaneous value as the outdoor temperature.

Integration and replacement mode on space heating service

If the control mode of the boiler module is integration and replacement (parameter 50 set to 3 by default), the system uses certain replacement criteria of the heat pump module for the space heating service, using only the boiler module. The replacement criteria can be modified or inhibited by using certain parameters.

1. Replacement at low outdoor temperature: the heat pump module of the unit is replaced with the boiler module if the outdoor temperature drops **below** a given value. This criterion is particularly useful when the system requires a particularly high delivery temperature (which exceeds also the operating limits of the heat pump) when the outdoor temperature is very low.
 - To use this feature, set the threshold value of the outdoor temperature in parameter 217.
 - To deactivate the replacement function, set parameter 217 to the minimum value allowed (-30 °C, default value).
2. Replacement at high outdoor temperature: the heat pump module of the unit is replaced with the boiler module if the outdoor temperature rises **above** a given value. This criterion is particularly useful in systems with low water content and low energy demand with respect to the power of the heat pump module.
 - To use this feature, set the threshold value of the outdoor temperature in parameter 218.
 - To deactivate the replacement function, set parameter 218 to the maximum value allowed (40 °C).
 - The function is active by default and the value is set to 14 °C.



Even these two replacement functions use the filtered value of the outdoor temperature.

3. Replacement on heat pump module limit thermostating condition: the heat pump module of the unit is replaced with the boiler module if the delivery and/or return temperature of the heat pump module exceeds the permissible operating limits (see Table 1.5 p. 22). Every 25' the system verifies whether the heat pump module can be reactivated. This function can be modified or deactivated from parameter 187.
 - To use this function, set parameter 187 to a value other than 0.0; a high value makes it less likely for the heat pump module to be reactivated, thereby ensuring more stable system operation; a low value favours the reactivation of the heat pump module but makes it more likely for the limit thermostating condition to reoccur.
 - To deactivate the replacement function, set parameter 187 to the minimum value allowed (0.0 K).
 - The function is active by default and the value is set to 3.0 K.

Integration and replacement mode on DHW service

If the control mode of the auxiliary boiler is integration and replacement (parameter 51 set to 4 by default), the system uses certain replacement criteria of the heat pump module for the DHW service, similarly to that for the space heating service. The criteria used are those described in points 1 and 3 for the space heating service and therefore, replacement at low outdoor temperature (depending on parameter 217) and replacement on limit thermostating condition (depending on parameter 187). On the other hand, no criterion of replacement at high outdoor temperature is used.

5.5.6 Settings depending on water setpoint mode for the space heating service



With OQLT021 or OQLT019 system controller

Follow the instructions provided in the OQLT017 system controller installation manual (for example, to set the heating curves, which are directly managed by such controller).

With other control systems (OCDS007 chronothermostat or generic external request)

It is possible to set the K18 Hybrigas appliance to provide the space heating service using a fixed water setpoint, or a variable setpoint which depends on the outdoor temperature (weather compensated control; this option is strongly recommended).

- ▶ To set fixed water setpoint mode, set parameter 225 to 0; then set parameter 226 to the desired setpoint value (Paragraph 6.5.2 p. 48).
- ▶ To set variable setpoint mode depending on outdoor temperature:
 1. Set parameter 225 to 1.

2. Access menu 2 and select Parameter "_26", display must show "2._26" (refer to procedure Paragraph 6.4 p. 46).
3. Press button : display shows the blinking code "rPF1".
4. Press again button .
5. Then follow the instructions in Paragraph 6.5.1 p. 47.



To restart a locked-down unit, refer to Paragraph 6.6 p. 49.

5.6 SETTING PARAMETERS FOR BOILER FIRST START-UP

To access the parameters menu and set their values, follow the procedure below (refer to Figure 5.4 p. 44):














1. Press  key to select the OFF mode, displayed with the  symbol.
2. Hold at the same time the  and  keys and wait until on the display appears the  symbol with the message 'P00', and release the  and  keys.
3. Use the keys  to select the parameter to be edited.
4. Use the keys  to change the value of the parameter.
5. Press the  key to confirm and wait for the display to stop blinking, to make the adjustment effective.
6. To exit the parameters menu, hold at the same time the  and  keys and wait for the symbol  to appear on the display.

Figure 5.4 Access and setting to boiler module parameters

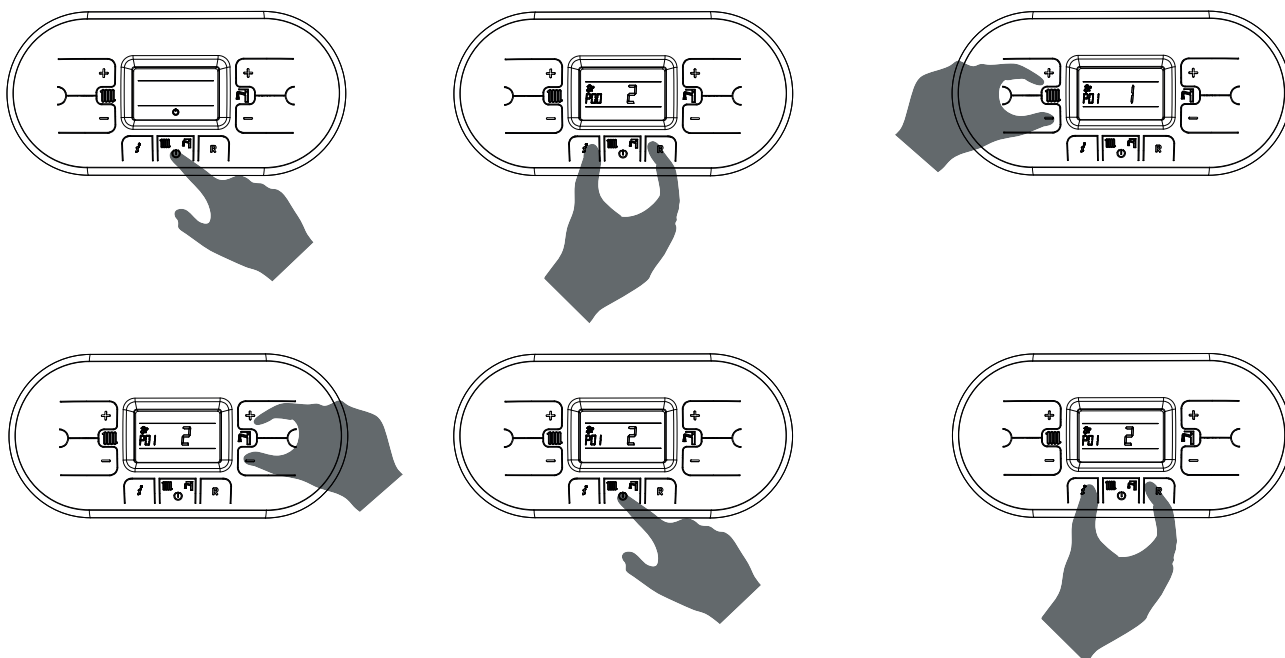


Table 5.4 Boiler electronic board parameters

Parameter	Do not modify	Description	Setting	Default
P00	Do not modify	Boiler model selection		7
P01	Do not modify	Boiler type selection		5
P02		Gas type selection WARNING: before changing parameter value you must refer to the instructions supplied with the gas change kit	0. natural gas 1. LPG	0






Parameter	Do not modify	Description	Setting	Default
P03	Do not modify	Heating temperature range setting		0
P04	Do not modify	Heating run-up		3
P05	Do not modify	Anti-water hammer selection		2
P06	Do not modify	Domestic hot water circuit preservation function (only for instantaneous boilers)		1
P07	Do not modify	Heating timing		0
P08	Do not modify	Post-circulation heating timing		36
P09	Do not modify	Post-circulation domestic hot water/boiler timing		24
P10 (1)	Do not modify	Domestic hot water blower minimum speed adjustment		
P11 (1)	Do not modify	Domestic hot water blower maximum speed adjustment		
P12 (1)	Do not modify	Heating blower minimum speed adjustment		
P13 (1)	Do not modify	Heating blower maximum speed adjustment		
P14 (1)	Do not modify	Starting step adjustment		
P15	Do not modify	Legionella function		0
P16	Do not modify	Heating curve setting		15
P17	Do not modify	Disabling of domestic hot water request by means of a switch		0
P18	Do not modify	Enabling 0-10V drive		1
P19	Do not modify	Min heating setpoint		24
P20	Do not modify	Max heating setpoint		80
P21	Do not modify	Max domestic hot water setpoint		65
P22	Do not modify	DeltaT (delivery-return) setpoint		15
P23	Do not modify	Heating modulating pump minimum speed		50
P24	Do not modify	Heating modulating pump maximum speed		100
P25	Do not modify	DWH buffer tank setpoint differential		9

(1) Do not change from the default value. In case of doubt:
 • Verify the correct setting of parameter P02.

• Set the parameter P00 to a value different than the current one, and then restore the default value 7.

5.6.1 Notes to boiler parameters setting

After setting the boiler parameters, you must:

- ▶ Set the user setpoint for space heating service to value 80 °C by using the keys  and  of the space heating circuit  (left side of the boiler control panel Figure 1.15 p. 20).
- ▶ Make sure that the boiler is ON on space heating service. To do this, proceed as follows:
 1. Press  key to select desired operating mode (summer mode / **space heating only mode** / winter mode / OFF).
 2. Make sure that on the boiler display the  symbol appears (on the left), fixed.

5.7 SETTINGS DEPENDING ON THE PRIMARY CIRCUIT WATER PUMP TYPE

The water pumps are controlled by the unit in variable flow rate mode, both in space heating and DHW service, with the objective to keep constant temperature differential (10 K default for the heat pump module, 15 K default for the condensing boiler module) between water return and delivery in the whole range of the unit thermal output power; this regulation mode is appropriate for most of applications.

However it is possible:

- ▶ To modify temperature differential value required for space heating and/or DHW service, by setting respectively parameters 178 (heat pump module) and P22 (boiler module). Before doing this, it is strongly suggested to contact Robur technical support.
- ▶ To modify the lower limit of water pump flow rate, by setting parameter 200 (heat pump module) and P23 (boiler module). This can be necessary to problems correct low or

nothing water circulation (possibly, only in some parts of the plant) when the pump is controlled by the system at a low flow rate.

- ▶ To set fixed flow rate pump operation, for space heating (heat pump module only), set parameter 174 to value 0, then set parameter 176 to a value between 3 (minimum flow rate) and 10 (maximum flow rate).
- ▶ To set fixed flow rate pump operation, for DHW service (heat pump module only), set parameter 183 to 0, then set parameter 177 to a value between 3 (minimum flow rate) and 10 (maximum flow rate).



For the heat pump module, it is always possible to show the actual flow rate value measured by the appliance flowmeter. To do this, enter menu 0 and select parameter 24: the value shown is expressed in liters/hour.

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.1 p. 4, providing important information on regulations and on safety.



First start-up by TAC

First start-up may exclusively be carried out by a Robur TAC (Chapter 5 p. 38).



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 III.1 p. 4), since the appliance or system might be damaged.

6.2 SWITCH ON AND OFF



Routine switching on/off

The appliance may be exclusively switched on/off using proper control device (OQLT021, OCDS007 or external request).



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 valve open
- appliance electrical power supply (main switch GS ON, Figure 4.2 p. 35)
- OQLT021 or OCDS007 power supply (if present)
- K18 Hybrigas on, that is the boiler module display on (detail G Figure 1.3 p. 9) and heat pump module display on (detail I Figure 1.3 p. 9)
- water circuit ready and filled

6.2.1 How to switch on/off

- ▶ If the appliance is controlled by the OQLT021 controller (system 1, see Paragraph 1.8 p. 20), refer to the relevant manual.
- ▶ If the appliance is controlled by OCDS007 programmable thermostat or by external request (e.g. thermostat, clock, button, ... with voltage-free NO contact), (systems (2) and (3) see Paragraph 1.8 p. 20), the appliance is switched on/off by the ON/OFF positions of the external control device.

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



Although the external request 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 HEAT PUMP DISPLAY

6.3.1 4 digit display

The GHP10 board of the appliance (Paragraph 1.6 p. 19) is equipped with a 4-digit display (detail A Figure 1.14 p. 19), visible through the sight glass (reference I Figure 1.3 p. 9).

- ▶ When the appliance is powered, all the LEDs switch on for 3 sec, then the central hyphens of the four digits are switched on, and lastly the GHP10 board name is displayed in two subsequent stages (GHP during the first stage and 10 during the second).
- ▶ After 5 sec, the appliance is ready to operate.

6.3.2 Signals in normal operation

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

6.3.3 Events reporting

In case one or more events occur, the display shows up the three event types, indicated by first green character:

- ▶ "I" for information
- ▶ "u" for warning
- ▶ "E" for errors

The other three red digits represent a numeric event code.

Info events are shown steadily while warnings and errors blink.

The display rotates after the values of the outlet water temperature, the inlet and the difference between them.

If multiple events are active, they are shown in sequence, ordered by increasing code number.

If warning or error events are active, the left green symbol, shown together with water temperature data, blinks.

If it is a permanent error or warning the appliance stops.

For details about information, errors and warnings codes see Tables 8.1 p. 52 and 8.2 p. 52.

6.3.4 Menu navigation

Once the menu list has been accessed (see Paragraph 6.4 p. 46), the display shows:




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






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


6.4 ON-BOARD ELECTRONIC CONTROLS – MENUS AND PARAMETERS OF THE GHP10 BOARD

6.4.1 Selection keys

One of the following actions may be done with the GHP10 board selection keys (references B, C and D in Figure 1.14 p. 19):

- ▶ Enter the menu list (by pressing the  key the first time).
- ▶ Scroll the menu list, or a series of parameters in a menu (by pressing keys  and .

- ▶ Select a menu or a parameter (pressing the key .
- ▶ Edit and confirm the setting of a parameter (pressing keys  and  and confirming with key .
- ▶ Execute a command (pressing key .
- ▶ 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 a menu parameters list, and indicates the exit to go back to the higher level by pressing .

6.4.2 Menus and Parameters

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

- ▶ Display menus: menu "0" and menu "1".
- ▶ Command menu: menu "2" to execute error reset command (Paragraph 6.6 p. 49).
- ▶ Visualization and setting menu (for the user): menu "3" to display or set certain system parameters (eg. water temperature setpoint); the settings are initialised by the TAC upon first start-up; the Table 6.1 p. 47 shows parameters in menu 3.
- ▶ Visualization and setting menu (to be exclusively used by the installer and TAC): menu "4." (for the installer) "5." and "6." (for the TAC). They are password protected. These are specific sections, exclusively intended for qualified personnel (installer or TAC). For information see the Service manual.



How to access the Menus and Parameters

Before Starting:

1. Power supply switch "ON".
2. Display of the GHP10 board showing in sequence the detected water temperature data (if the appliance is in normal operation), and eventually the flashing warning

and error codes (if the appliance is in failure).

To access the menus and parameters of the GHP10 board, proceed as follows (see also Figure 1.14 p. 19):













1. Remove the display transparent cover (detail I Figure 1.3 p. 9) by removing the four fixing screws.
2. Press the  key once to display the menus: the first menu is displayed, "0." (= menu 0).
3. Press the  to scroll down and display the other/subsequent menus; the menu numbers will be displayed in order, "1.", "2.", ..., "6." ... or "E" (= exit).
4. Select the menu of interest (e.g. display "2. ___" = menu 2) by pressing the  key; the first parameter code will be displayed, in order in the menu (e.g. display "2._21" = parameter 21 in menu 2).
5. Press the  to scroll down the other parameters in the menu; the codes will be displayed in order (e.g. display "2._21", ... "2._26" = parameters 21, ... 26 in menu 2), or letter "E" (= exit) at the end of the list.
6. Edit the parameter of interest by pressing key  the display will show the current parameter value (blinking) or, for a command menu, a blinking code (eg. "rEr1" for the board error reset command).
7. Press the  key to reconfirm the figure; or use  and  keys 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  key to execute it.
8. To exit a parameter menu or the menu list and go back to the higher level, press the  until displaying the letter "E" for exit, then press the  key again.
9. The water temperature values alternate again on the display: output, input and the difference between them.
10. Fit the display transparent cover.

Table 6.1 Menu 3 parameters (for the user) of GHP10 board

Parameter	Description	Setting	Default
44	Temperature display format	0. °C 1. °F	0
48	Building time constant	from 0 to 50 hours	10
163	Antifreeze function	0. not active 1. active	1
198	Fan noise reduction	0. not active 1. active	0
225 (1)	Setpoint source	0. Fixed setpoint 1. Heating curve	1
226 (1) (2)	Fixed setpoint in heating operation	The minimum and maximum values depend on what has been set in the installation stage.	
228 (1) (3)	Heating curve slope	from 10 to 400	75
229 (1) (3)	Heating curve offset	from -5 K to +5 K	0
230 (1) (3)	Internal ambient setpoint with heating curve	from 0 °C to 40 °C	20

(1) If the unit is connected to the system controller (optional) this parameter is ignored.

(2) This parameter is ignored if parameter 225 is set to 1.

(3) This parameter is ignored if parameter 225 is set to 0.

6.5 MODIFYING HEAT PUMP SETTINGS



Do not modify complex settings

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



The settings described in this section does not apply when using the OQLT021 or OQLT019 system controller. Refer to the system controller installation manual for detailed instructions about its settings.

6.5.1 How to modify the heating curve



This kind of regulation is active if parameter 225 (menu 3) is set to value 1 (default).

The heating curve makes it possible to change the system's outlet water temperature according to the measured external temperature and to the internal ambient set point temperature. Depending on the type of installation, especially on the type of exchangers (radiators, fan coils, floor radiators etc.) and the features of the building, a specific curve will be used, selected from the family of heating curves. Furthermore, upon changing the

internal room set point temperature, the curve actually used will be automatically modified.

The family of heating curves is shown in Figure 6.1 p. 48 and the curve to be used is chosen by specifying the value of parameter 228 in menu 3 which indicates the curve slope. The curve defined in this way refers to an internal ambient set-point temperature of 20 °C (68 °F) . If the set-point temperature is different, the system automatically adapts the curve used.



To set the adequate heating curve operate as specified below:

1. Set the flow water temperature according to the expected minimum outdoor temperature (for instance: $T_{water} = 60\text{ °C}$ when $T_{outside} = -10\text{ °C}$).
2. Using the chart in Figure 6.1 p. 48, select the curve that meets the above requirement (in the specific case curve with slope 1.5).
3. **Multiply the slope of the selected curve by 100** and set the figure thus obtained in menu 3 parameter 228 (in the example set parameter 228 to value 150).



If no curve passes through the established point, select an intermediate figure between those of the curves immediately above or immediately below this point. Indicatively, a system that uses floor radiant heat exchangers will use "low" slope figures, a fan coil system will use "medium" figures and a system with radiators "high" figures.

4. Ensure parameter 229 (heating curve offset) of menu 3 is set at 0.
5. Set parameter 230 (room temperature setpoint with climatic

curve) of menu 3 to the desired value (default setting 20 °C).



Unit operation is based on the heating curve ONLY if the setting of parameter 225 (menu 3) is at 1 (default setting - see Table 5.3 p. 41).

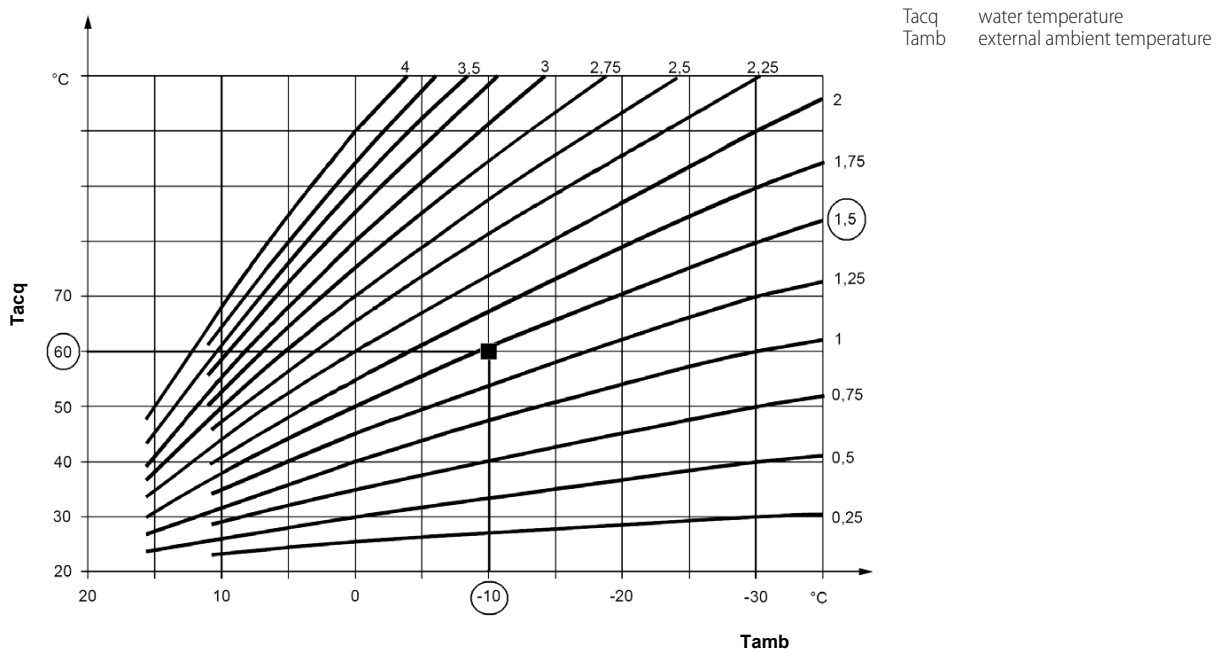
If the slope of the selected curve is not correct the following cases may occur, to be assessed during early operation of the system:

- ▶ Ambient temperature lower when outdoor temperature is lower: in this case, the slope of the curve is not sufficient, it is needed to set a higher value for parameter 228, indicating the slope of the curve.
- ▶ Internal ambient temperature is higher when the external temperature is lower: in this case the curve slope is excessive, a lower figure must be set for parameter 228 indicating curve slope.

If however the slope is correct (stable internal ambient temperature when the outside temperature changes), but the internal temperature does not match the set point one, the following cases may occur:

- ▶ Internal ambient temperature is always higher than the set-point: in this case one must act on the Offset parameter of the heating curve, setting a negative figure equal to the internal temperature deviation from the setpoint; for instance, if the setpoint is 22 °C and the actual internal temperature is 24 °C, set the Offset parameter (parameter 229) to -2 °C.
- ▶ Internal ambient temperature is always lower than the set-point: in this case a positive figure must be set for the Offset parameter of the heating curve; for instance, if the setpoint is 20 °C and the actual internal temperature is 19 °C, set the Offset parameter (parameter 229) to 1 °C.

Figure 6.1 Heating curves for internal ambient temperature = 20 °C



6.5.2 How to raise/lower the water temperature set-point (fixed setpoint)

The water temperature set-point establishes the outlet temperature to the system (water output from the appliance), or inlet from the system (water input in the appliance). The temperature is pre-set by the TAC upon first start-up. The water set point is set on outlet by default.



Fixed setpoint regulation is used if parameter 225 is set to 0.

In general, regulation based on heating curve, described in Paragraph 6.5.1 p. 47, provides better results in terms of comfort and efficiency. Contact Robur technical Support before changing the regulation mode.



To raise/lower the water temperature set-point, proceed as follows (also see Paragraph 6.4 p. 46):

1. Access menu 3 parameter 225 (= setpoint origin) with keys and ; set parameter 225 to 0 (fixed setpoint - see Table 6.1 p. 47).
2. Set parameter 226 (fixed setpoint in heating operation) to the desired temperature setting.
3. Exit menu 3 by pressing the key until displaying the letter "E" for exit, then press the key.
4. The water temperature values alternate again on the display: output, input and the difference between them.

6.6 RESTARTING A LOCKED-DOWN UNIT

6.6.1 Fault signals on the display

In the event of heat pump module or boiler module locked-down, an operational code flashes on the corresponding display of the involved module.

- To restart the appliance you must know and perform the procedure concerning the issue signalled and identified by the code of the module involved (Paragraph 8.1 p. 52 for the heat pump module and Paragraph 8.2 p. 55 for the boiler module).
- 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.

6.6.2 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.

6.6.3 Reset heat pump module

There are three options for resetting a fault:

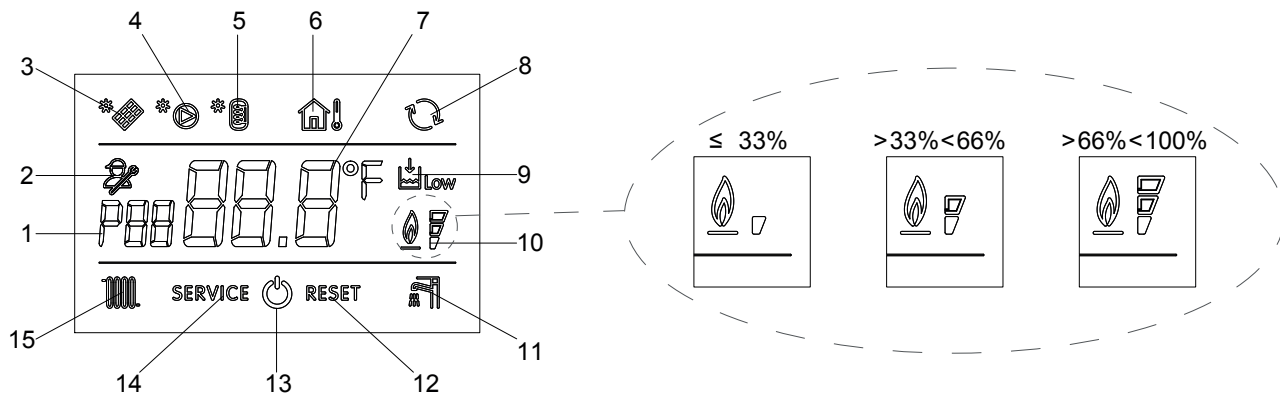
1. If the appliance is connected to the OQLT021 controller, you may act through the control device, as described in the relevant manual.
2. If a remote reset button has been provided (Paragraph 4.6 p. 36) act directly on the button.
3. Act on unlock/reset button under unit display (reference J Figure 1.3 p. 9).

6.6.4 Reset boiler module

To reset a fault, act on unlock/reset button (Figure 1.3 p. 9 - detail H).

6.7 MESSAGES ON THE BOILER DISPLAY

Figure 6.2 Boiler display icons



- 1 Parameter number indication or displayed info code
- 2 Parameter programming function active
- 3 Not used
- 4 Not used
- 5 Not used
- 6 Not used
- 7 Temperature display / setpoint / parameter value
- 8 OpenTherm communication present (remote control / area control unit)

- 9 Insufficient system water pressure signal
- 10 Flame presence signal / it also indicates, on 3 percentage levels, the modulating power level of the boiler
- 11 Operation in domestic hot water mode enabled
- 12 Resettable error signal
- 13 Off operating mode
- 14 Non resettable error signal
- 15 Operation in heating mode enabled

6.7.1 Info menu display

To view the boiler data from Info menu you have to:

1. Remove the transparent cover (detail G Figure 1.3 p. 9) by removing the fixing screws.
2. Press the key (detail 2 Figure 1.15 p. 20). The info code will be displayed on the left side of the screen and its relative value will be displayed on the centre of the screen.
3. Use and keys of the space heating circuit (detail 1 Figure 1.15 p. 20) to scroll through the list of displayable

data.

4. To exit the Info menu press key (detail 2 Figure 1.15 p. 20).
 5. Fit the transparent cover (detail G Figure 1.3 p. 9) by screwing in the fixing screws.
- Table 6.2 p. 50 shows the list of Info menu displayable data.

Table 6.2 List of displayable data from menu Info

Info code	Description
d0	Domestic hot water probe temperature
d1	Outdoor probe temperature
d2	Blower speed
d3	Not used temperature
d5 - d9	Not used temperatures

6.8 BOILER MODULE HEATING TEMPERATURE SETTING

Do not change space heating setpoint set on the boiler during

first startup.


6.9 EFFICIENCY


For increased appliance efficiency:


- ▶ Keep the finned coil clean.
- ▶ Set the maximum water temperature and climatic curve at the actual installation 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 and wait for the end of the switching off cycle, then disconnect power and gas supply, by acting on the electrical disconnecter and gas valve.

 The efficiency checks and every other "check and maintenance operation" (see Tables 7.1 p. 50 and 7.3 p. 51) must be performed with a frequency according 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.

 **Environmental or operational heavy conditions**
In environmental or operational conditions particularly heavy (for example: heavy-duty use of the appliance, salty environment, etc.), maintenance and cleaning operations must be more frequent.

7.2 PRE-EMPTIVE MAINTENANCE

7.2.1 Heat pump module

For pre-emptive maintenance, comply with the recommendations in Table 7.1 p. 50.

Table 7.1 Guidelines for the preventive maintenance operations

Guidelines for the preventive maintenance operations		K18 Simplygas
Check of the unit	visually check of the general condition of the unit and of its finned coil	√ (1)
	check the correct operation of the device used for monitoring the water flow	√
	check the % value of CO ₂	√
	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	√

(1) It is suggested to clean the finned coil once every 4 years (optimal frequency of the cleaning operation is in any case strongly affected by the installation site). Avoid excessively aggressive cleaning of the finned coil (e.g. high-pressure washer).

7.2.2 Condensing boiler module

For pre-emptive maintenance, comply with the recommendations in Table 7.2 p. 51.

Table 7.2 Guidelines for the preventive maintenance operations

Guidelines for the preventive maintenance operations		Boiler for K18 Hybrigas
Check of the unit	check the % value of CO ₂	√
	check that the condensate discharge is clean (If necessary, frequency of the maintenance operation must be increased)	√
	check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit	√

7.3 SCHEDULED ROUTINE MAINTENANCE

7.3.1 Heat pump module

For scheduled routine maintenance, perform the operations in Table 7.3 p. 51, at least once every 2 years.

Table 7.3 Scheduled routine maintenance

Ordinary scheduled maintenance		K18 Simplygas
Check of the unit	clean the combustion chamber	√ (1)
	clean the burner	√ (1)
	clean the electrodes of ignition and flame sensing	√
	check that the condensate discharge is clean	√

(1) Only in case the analysis of combustion products is non-compliant.

7.3.2 Condensing boiler module

For scheduled routine maintenance, perform the operations in Table 7.4 p. 51, at least once every 2 years.

Table 7.4 Scheduled routine maintenance

Ordinary scheduled maintenance		Boiler for K18 Hybrigas
Check of the unit	clean the burner	√
	clean the electrodes of ignition and flame sensing	√
	check that the condensate discharge is clean	√
	check integrity and positioning of the sealed chamber gasket	√
	check/clean the primary heat exchanger	√

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. antifreeze function active (Paragraph 3.4 p. 29)
2. sufficient anti-icing glycol (Paragraph 3.6 p. 29)

7.4.1 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. 46).
2. Only when the appliance is completely off, power it off with the main switch/disconnector switch (Detail GS in Figure 4.2 p. 35).

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 anti-icing protection is missing, Paragraph 3.4 p. 29).



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. 50 and 7.3 p. 51).
 - Check content and quality of the water in the system, and if necessary top it up (Paragraphs 3.8 p. 30, 3.7 p. 30 and 3.6 p. 29).
 - 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 valve and ensure there are no leaks; should gas smell be noticed, close the gas valve again, do not switch any electrical devices on and request intervention by qualified personnel.
 2. Power on with the main power supply switch (GS, Figure 4.2 p. 35).
 3. Switch on the appliance using the provided control device (OQLT021, OCDS007 or external request, Paragraph 4.4 p. 35).







7.5 TEMPORARY STOP COMMAND OF THE FAN

During some maintenance operations the air flow from the fan may be annoying for the operator.



It is possible to stop temporarily the fan by acting on the GHP10 board as follows:

1. Access menu 2 in Parameter "_27", display must show "2._27" (procedure Paragraph 6.4 p. 46).
2. Press button : display shows the blinking code "OFan".
3. To stop the fan press again button .
To enable the fan operation again:

1. Access menu 2 and select Parameter "_28", display must show "2._28" (refer to procedure Paragraph 6.4 p. 46).
2. Press button : display shows the blinking code "IFan".
3. Press again button .
To exit the menu 2 and return to the main screen:
 1. Press button  until the rightmost digit shows letter "E" (Exit), then press button .
 2. Press again button  until the leftmost shows letter "E" (Exit), then press button .



Limit the time you use this function to the minimum effectively needed. The system cancels the fan stop automatically after 15 minutes.

8 DIAGNOSTICS

8.1 HEAT PUMP BOARD CODES

Table 8.1 Informative codes

CODES	DESCRIPTION	Info (I)
405	Outdoor temperature exceeding operational limits	The code is reset automatically when the triggering condition ceases.
406	Outdoor temperature below operational limits	The code is reset automatically when the triggering condition ceases.
430	Generator protection cycle activated	The event indicates the activation of the protection cycle in case of high flue temperature.
435	Gas valve antifreeze function activated	It is activated when the anti icing cycle starts and it is stopped when the anti icing cycle ends.
452	Defrosting cycle activated	The code clears automatically when execution of defrosting ends.
457	Generator anti condensation cycle activated	The anti-condensation cycle ensures that once the flame is turned on, it stays on until the conditions that guarantee the absence of condensation occur.
458	Service request filtering activation	The message appears when there are too frequent requests for activation, and so the appliance establishes a minimum turn-on and turn-off time before switching off or on again.
459	Possible flue obstruction	The control informs that, after flame ignition, the temperature measured by the flue probe is not the expected one; this could be due to a possible flue discharge duct obstruction.
462	Pre-ignition phase	The event indicates that the unit is performing the pre-ignition cycle.
479	Heating antifreeze function activated	The code clears automatically when antifreeze function execution ends.

Table 8.2 Operative codes

CODES	DESCRIPTION	Warning (u)	Error (E)
401	Limit thermostat trip	NA	Contact the TAC.
402	Flue gas thermostat trip	Contact authorised Technical Assistance	
407	High generator temperature	Reset is automatic when the triggering condition ceases.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
408	Flame controller error	NA	Contact the TAC.
410	Low hot 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. The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. 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.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
412	Flame controller lockout	Reset is automatic up to 4 attempts (in about 5 minutes).	Gas supply check. If the code persists or in case of doubt, contact the TAC. The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49.
413	Flame controller communication error	Reset is automatic when the triggering condition ceases.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.

CODES	DESCRIPTION	Warning (u)	Error (E)
414	Flame controller not compatible	NA	Contact the TAC.
415	Flame controller parameters error	NA	Contact the TAC.
416	Hot water delivery temperature probe fault	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
417	Hot water inlet temperature probe fault	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
420	Generator temperature probe fault	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
424	Flue gas temperature probe fault	Reset is automatic up to 5 attempts.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
425	Clogged condensate drain	NA	Check and clean condensate discharge. Reset occurs automatically when the condition that has generated the code ends. It is also possible to make the reset following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
426	Generator fins temperature probe fault	Reset is automatic up to 5 attempts.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
430	High flue gas or generator fins temperature	Reset is automatic when the triggering condition ceases.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
435	Gas valve temperature probe fault	Reset is automatic when the the functioning probe is restored.	NA
436	Blower fault	Reset occurs automatically 20 minutes after the code is generated.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
438	Internal flame controller error	Reset occurs automatically 10 seconds after the code is generated.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
439	Fan fault	The system tries to resolve the anomaly once; if not successful, warning 461 is generated.	NA
441	Parasitic flame lockout	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
442	Flame loss	Reset occurs automatically 10 seconds after the code is generated.	NA
443	Flame controller communication error	Reset is automatic when the triggering condition ceases.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
444	Evaporator temperature probe fault	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
446	High hot water inlet temperature	Check configuration of other heat generators on the system. Ensure the secondary circuit pump is working. Ensure the exchange terminals are active. Check any bypasses between outlet and inlet. 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 water inlet temperature below operational 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 cleanliness of water filters. Check water flow. Reset occurs automatically 20 minutes after the code is generated.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code shows up again or in case of doubt contact the TAC.
460	Defrosting valve has failed to open	Non-blocking event. Reset is automatic, however, it is advisable to contact the TAC.	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. Contact the TAC.

CODES	DESCRIPTION	Warning (u)	Error (E)
461	Fan fault	Generated as a result of a failed attempt are restoring warning 439; it is resumed once the generating cause is resolved. If the code persists, contact the authorized TAC.	NA
463	Oil pump priming cycle activated	The priming cycle lasts 30' if activated manually or 10 minutes if activated automatically. Reset is automatic when the triggering condition ceases.	NA
473	Manifold probe fault (connected to AUX 2)	Reset is automatic when the triggering condition ceases.	NA
474	Manifold probe fault (connected to AUX 1)	Reset is automatic when the triggering condition ceases.	NA
478	High hot water delivery temperature	Check cleanliness of water filters. Check water flow. Reset is automatic when the triggering condition ceases.	NA
480 80	Incomplete functional parameters Invalid configuration parameters	Contact the TAC.	
481	Invalid bank 1 parameters	Reset is automatic when the triggering condition ceases.	Contact the TAC.
482	Invalid bank 2 parameters	Reset is automatic when the triggering condition ceases.	Contact the TAC.
485	Invalid module type configuration parameters	NA	Contact the TAC.
486	ROM board fault	NA	Contact the TAC.
487	pRAM board fault	NA	Contact the TAC.
488	xRAM board fault	NA	Contact the TAC.
489	Registers board fault	NA	Contact the TAC.
490	Outdoor temperature probe fault	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.
491	Electronic board fault	NA	Contact the TAC.
492	Weather probe fault (connected to AUX 1)	Reset is automatic when the triggering condition ceases.	NA
493	Weather probe fault (connected to AUX 2)	Reset is automatic when the triggering condition ceases.	NA
495	Auxiliary boiler fault	NA	The reset may be done following one of procedures shown in Paragraph 6.6.3 p. 49. If the code persists, shows up again or in case of doubt, contact the TAC.

NA: Not Applicable

8.2 BOILER BOARD CODES

Table 8.3 Operative codes

Code	Icon	Fault	Intervention
E01	RESET	Flame lockout	Make sure that the boiler and gas meter gas valves are open. Press the reset button (detail H Figure 1.3 p. 9). As soon as the error code disappears from the display, the boiler will restart automatically. If the code persists, shows up again or in case of doubt, contact the TAC.
E02	RESET	Safety thermostat (95 °C)	Press the reset button (detail H Figure 1.3 p. 9). As soon as the error code disappears from the display, the boiler will restart automatically. If the code persists, shows up again or in case of doubt, contact the TAC.
E03	RESET	Flue safety thermal fuse (102 °C)	Contact the TAC.
E04		Low system water pressure	If the system pressure is below 1,5 bar fill the system as described in Paragraph 3.8 p. 30. If the code persists, shows up again or in case of doubt, contact the TAC.
E05	SERVICE	Heating probe	Contact the TAC.
E06	SERVICE	DHW probe	Contact the TAC.
E15	SERVICE	Return probe	Contact the TAC.
E16	SERVICE	Blower	Contact the TAC.
E18	SERVICE	Low water flow	Contact the TAC.
E21	SERVICE	Generic internal electronic board error	Cut off power supply from the main switch and then restore it. As soon as the error code disappears from the display, the boiler will restart automatically. If the code persists, shows up again or in case of doubt, contact the TAC.
E22	SERVICE	Parameter programming request	Cut off power supply from the main switch and then restore it. As soon as the error code disappears from the display, the boiler will restart automatically. If the code persists, shows up again or in case of doubt, contact the TAC.
E35	RESET	Parasitic flame	Press the reset button (detail H Figure 1.3 p. 9). As soon as the error code disappears from the display, the boiler will restart automatically.
E40	SERVICE	Supply voltage	Contact the TAC.

Table 8.4 Active functions signaling codes

Code	Function	Intervention
F07	Chimney sweep function active	Activates by pressing the key for 7 seconds and deactivates by switching off the boiler with the key. Used to check the combustion parameters of the boiler.
F08	Heating antifreeze function activated	Wait until the operation is completed.
F09	DHW antifreeze function activated	Wait until the operation is completed.
F28	Anti-legionella	Wait until the operation is completed.
F33	System air purge cycle in progress	Wait until the operation is completed.

8.3 WATER PUMP ALARM CODES OF HEAT PUMP MODULE

Table 8.5 Water pump alarm codes

LED	Meaning	Operational status	Cause	Remedial action
Steady green light	Pump ON	Pump runs according to setup	Normal operation	---
Fast blinking green light	---	Pump in stand-by	Normal operation	---
Alternately blinking between green and red light	Pump ready but not running	Pump will start as soon as the error is cleared	Undervoltage $U < 160\text{ V}$ or overvoltage $U > 253\text{ V}$	Check power supply voltage $195\text{ V} < U < 253\text{ V}$
			Air bubbles in water circuit	Disconnect PWM connector until LED turns into permanent green light, then reconnect PWM connector
			Module overtemperature Motor temperature too high	Check fluid temperature and ambient temperature
Blinking red light	Pump out of order	Pump blocked	Pump does not restart autonomously	Replace the pump
OFF	No power supply	No voltage on electronics	The unit has never received a service request since it has been powered electrically, or more than one hour has elapsed since the last service request was completed; in these cases the control electronics of the appliance do not power the pump. It is a normal operating mode	---
			The pump is not connected to the power output supplied by the control electronics of the appliance	Check cable connection
			LED failure	Check if pump is actually running
			Failure of electronics	Replace the pump
			The control electronics of the appliance do not activate the power output of the pump although there is a service request	If the power output of the pump does not supply voltage, check the cabling of the electrical panel; if no anomaly is found, try replacing the GHP10 board

9 APPENDICES

9.1 PRODUCT FICHE

Figure 9.1

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

Technical parameters for heat pump space heaters and heat pump combination heaters							
Model(s):		K18 Hybrigas					
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>	33,3	kW	Seasonal space heating energy efficiency	η_s	126	%
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 = -3 °C	<i>Pdh</i>	24,3	kW	Tj = -3 °C	<i>PERd</i>	111	%
Tj = +1 °C	<i>Pdh</i>	19,3	kW	Tj = +1 °C	<i>PERd</i>	127	%
Tj = +4 °C	<i>Pdh</i>	15,3	kW	Tj = +4 °C	<i>PERd</i>	140	%
Tj = +8 °C	<i>Pdh</i>	10,3	kW	Tj = +8 °C	<i>PERd</i>	141	%
Tj = +12 °C	<i>Pdh</i>	5,0	kW	Tj = +12 °C	<i>PERd</i>	143	%
Annual energy consumption	<i>Q_{HE}</i>	197	GJ				
COLDER CLIMATE CONDITIONS							
Rated heat output (*)	<i>Prated</i>	32,4	kW	Seasonal space heating energy efficiency	η_s	120	%
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 = -12 °C	<i>Pdh</i>	24,0	kW	Tj = -12 °C	<i>PERd</i>	97	%
Tj = -7 °C	<i>Pdh</i>	19,8	kW	Tj = -7 °C	<i>PERd</i>	113	%
Tj = -1 °C	<i>Pdh</i>	14,6	kW	Tj = -1 °C	<i>PERd</i>	127	%
Tj = +5 °C	<i>Pdh</i>	9,4	kW	Tj = +5 °C	<i>PERd</i>	141	%
Tj = +10 °C	<i>Pdh</i>	5,2	kW	Tj = +10 °C	<i>PERd</i>	143	%
Tj = operation limit temperature	<i>Pdh</i>	32,4	kW	Tj = operation limit temperature	<i>PERd</i>	92	%
For air-to-water heat pumps: Tj = -15 °C (if TOL < -20 °C)	<i>Pdh</i>	26,6	kW	For air-to-water heat pumps: Tj = -15 °C (if TOL < -20 °C)	<i>PERd</i>	95	%
Annual energy consumption	<i>Q_{HE}</i>	240	GJ				
WARMER CLIMATE CONDITIONS							
Rated heat output (*)	<i>Prated</i>	37,2	kW	Seasonal space heating energy efficiency	η_s	131	%
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 = +6 °C	<i>Pdh</i>	26,4	kW	Tj = +6 °C	<i>PERd</i>	120	%
Tj = +8 °C	<i>Pdh</i>	21,2	kW	Tj = +8 °C	<i>PERd</i>	136	%
Tj = +10 °C	<i>Pdh</i>	16,0	kW	Tj = +10 °C	<i>PERd</i>	140	%
Tj = +12 °C	<i>Pdh</i>	10,8	kW	Tj = +12 °C	<i>PERd</i>	141	%
Tj = +14 °C	<i>Pdh</i>	5,2	kW	Tj = +14 °C	<i>PERd</i>	143	%
Annual energy consumption	<i>Q_{HE}</i>	137	GJ				

Figure 9.2

Bivalent temperature	T_{biv}	TOL < T _{designh}	°C	For air-to-water heat pumps: Operation limit temperature	TOL	-22	°C
				Heating water operating limit temperature	WTOL	65	°C
Power consumption in modes other than active mode				Supplementary heater			
Off mode	P_{OFF}	0,000	kW	Rated heat output	P_{sup}	17,6	kW
Thermostat-off mode	P_{TO}	0,021	kW				
Standby mode	P_{SB}	0,005	kW	Type of energy input	monovalent		
Crankcase heater mode	P_{CK}	-	kW				
Other items				For air-to-water heat pumps:			
Capacity control	variable			Rated air flow rate, outdoors	—	4000	m ³ /h
Sound power level, indoors/ outdoors	L_{WA}	- / 65	dB	For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	—	-	m ³ /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 32 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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