ROBUR
caring for the environment

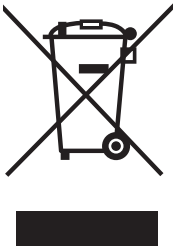
Installation, use and maintenance manual

GAHP-AR

Air-Water reversible absorption heat pumps for heating and cooling

powered by gas and renewable energies

DISPOSAL
The appliance and all its accessories must be disposed of separately in accordance with the regulations in force.



Use of the WEEE symbol (Waste Electrical and Electronic Equipment) indicates that this product cannot be disposed of as household waste. Proper disposal of this product helps to prevent potential negative consequences for the environment and human health.

Revision: W
Code: D-LBR270

INDEX OF CONTENTS

I INTRODUCTION

Installation, use and maintenance manual

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

RECIPIENTS

This Manual is intended for:

- End user, for appropriate and safe use of the appliance.
- Qualified installer, for correct appliance installation.
- Planner, for specific information on the appliance.

CONTROL DEVICE

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

II SYMBOLS AND DEFINITIONS

II.1 KEY TO SYMBOLS

DANGER

WARNING

NOTE

PROCEDURE

REFERENCE (to other document)

II.2 TERMS AND DEFINITIONS

GAHP appliance/unit = equivalent terms, both used to designate the GAHP gas powered absorption heat pump (Gas Absorption Heat Pump).
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 GAHP unit.
DDC Control (Direct Digital Controller) = optional Robur control device to manage one or more Robur appliances in ON/OFF mode (AY00-120 heat pumps, GA chillers) or in modulating mode (AY boilers).
RB100/RB200 Devices (Robur Box) = optional interface devices complementary to DDC, which may be used to broaden its functions (heating/cooling/DHW production service demands and control of system components such as third party generators, adjustment valves, circulators, probes).
Heat generator = equipment (e.g. boiler, heat pump, etc..) producing heating and/or DHW.
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.
S61/AR11 Boards = electronic boards on the GAHP 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.

Packing

Packing items (plastic bags, polystyrene foam, nails, etc.) must be kept out of the reach of children, as they are potentially dangerous.

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 appliance 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.

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.

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.
- Switch off the power supply via the external disconnect 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 tight and compliant with the regulations in force.
- Upon completing any procedure, ensure the tightness of the components.

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

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

Electrocution hazard

- Disconnect the electrical power supply before any operation 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.

- 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. 19*.

Aggressive substances in the air

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

Switching the appliance off

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

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

In the event of failure

Operations on internal components and repairs may exclusively be carried out by a TAC, using only original spare 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. 29*) 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.
- Use only 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 COMPLIANCE

EU directives and standards

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

- ► 2016/426/EU "Gas Appliances Regulation" 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.

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

- ► EN 378 Refrigerating systems and heat pumps.

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, heat pumps and chillers.
- ► 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 system or installation (mechanical stresses, pressure, vibrations, thermal expansion, electrical surges...).
- Accidental damages or due to force majeure.

1 FEATURES AND TECHNICAL DATA

1.1 FEATURES

1.1.1 Operation

Based on the thermodynamic water-ammonia absorption cycle (H_20–NH_3), the appliance alternatively produces hot water or chilled water with (seasonal) switching of the hot/cold cycle, using outdoor air as a renewable energy source and natural gas (or LPG) as primary energy.
The thermodynamic cycle takes place within a hermetically sealed circuit, in welded construction, perfectly tight, factory-tested, which does not require any maintenance or coolant top-ups.
The GAHP-AR unit, for heating and/or cooling systems, is able to alternatively (not simultaneously) provide:

- Hot water up to 60 °C.
- Chilled water up to +3 °C.

1.1.2 Mechanical and thermo-hydraulic components

- Steel sealed circuit, externally treated with epoxy paint.
- Sealed combustion chamber (type C) suitable for outdoor installations.
- Metal mesh radiant burner, equipped with ignition electrodes and flame detection, managed by an electronic flame control box.
- Titanium stainless steel shell-and-tube water heat exchanger, externally insulated.
- Air exchanger with finned coil, with steel pipe and aluminium fins.
- Inversion valve on the cooling circuit, for use of the appliance in heating or cooling mode.
- Automatic microprocessor-controlled finned coil defrosting valve.
- Low power consumption refrigerant fluid oil pump.
- Variable-flow (for summer operation) microprocessor-controlled helicoidal motor-fan.

1.1.3 Control and safety devices

- S61 electronic board with microprocessor, LCD display and knob.
- Auxiliary AR11 electronic board.
- Circuit water flow switch.
- Generator limit thermostat, with manual reset.
- Generator fins temperature probe.
- Differential air pressure switch on the combustion circuit.
- Sealed circuit safety relief valve.
- Bypass valve, between high and low-pressure circuits.
- Ionization flame control box.
- Double shutter electric gas valve.
- Antifreeze function for hydraulic system.

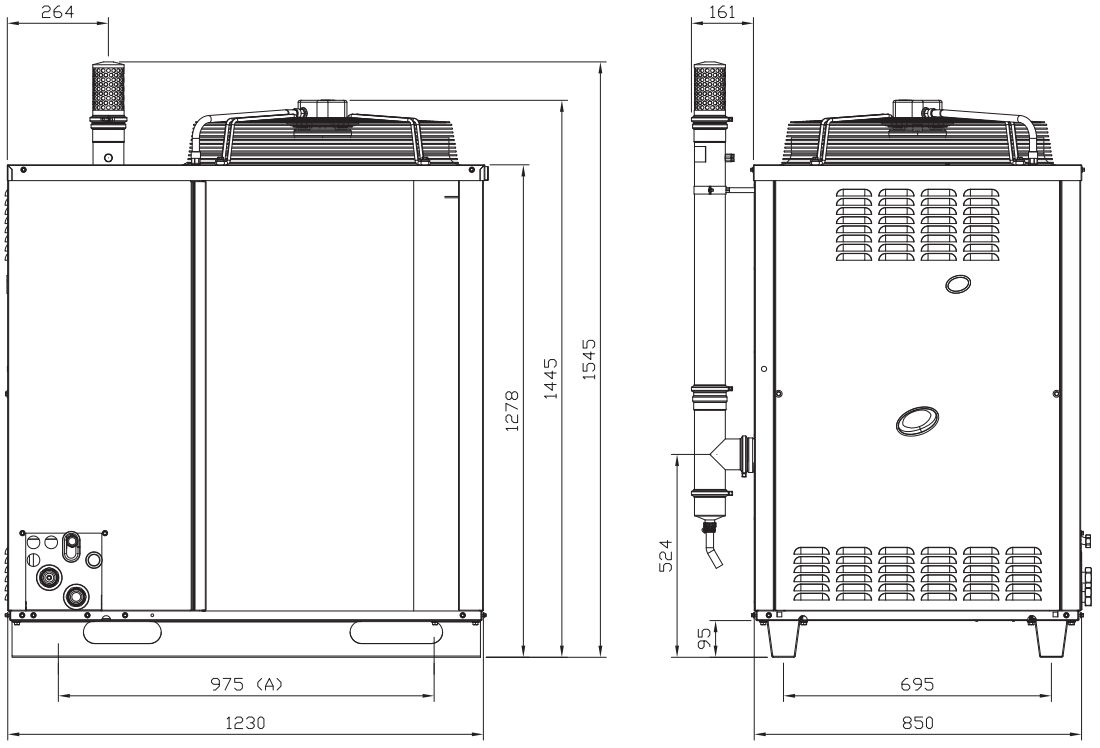
1.1.4 Standard or silenced fan

According to the type of fan the GAHP-AR unit is available in two versions:

- Standard fan, for applications that do not require a special degree of noiselessness.
- Silenced fan, for applications that require a high degree of noiselessness.

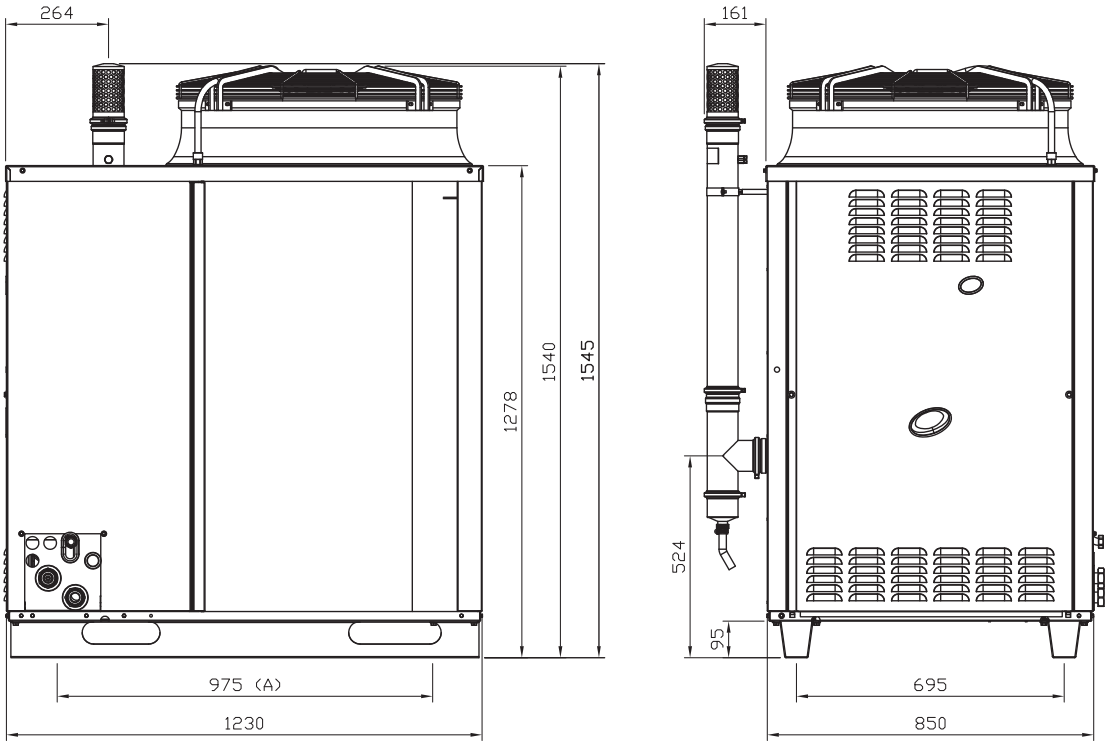
1.2 DIMENSIONS

Figure 1.1 *Dimensions (standard fan)*



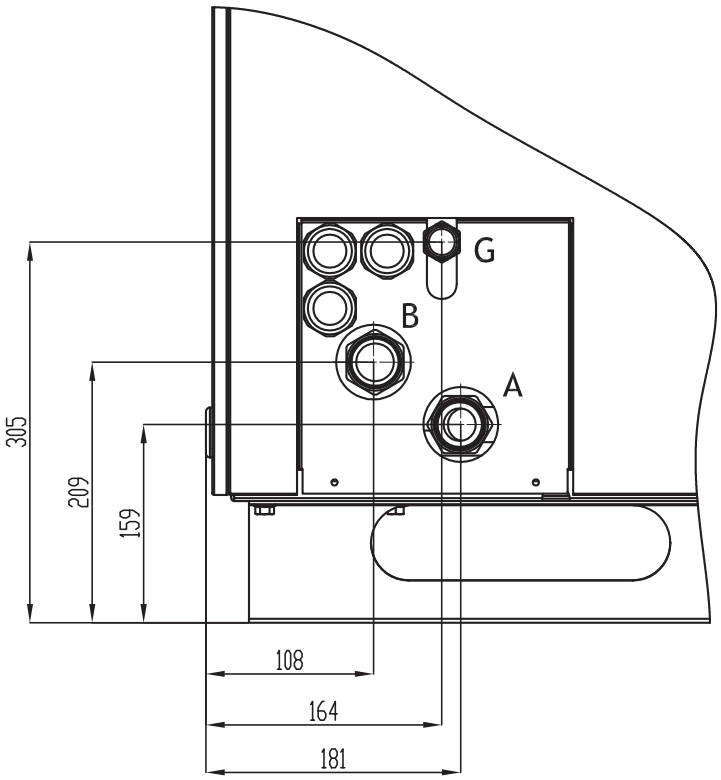
A Position of holes for fixing of anti-vibration joints

Figure 1.2 *Dimensions (silenced fan)*



A Position of holes for fixing of anti-vibration joints

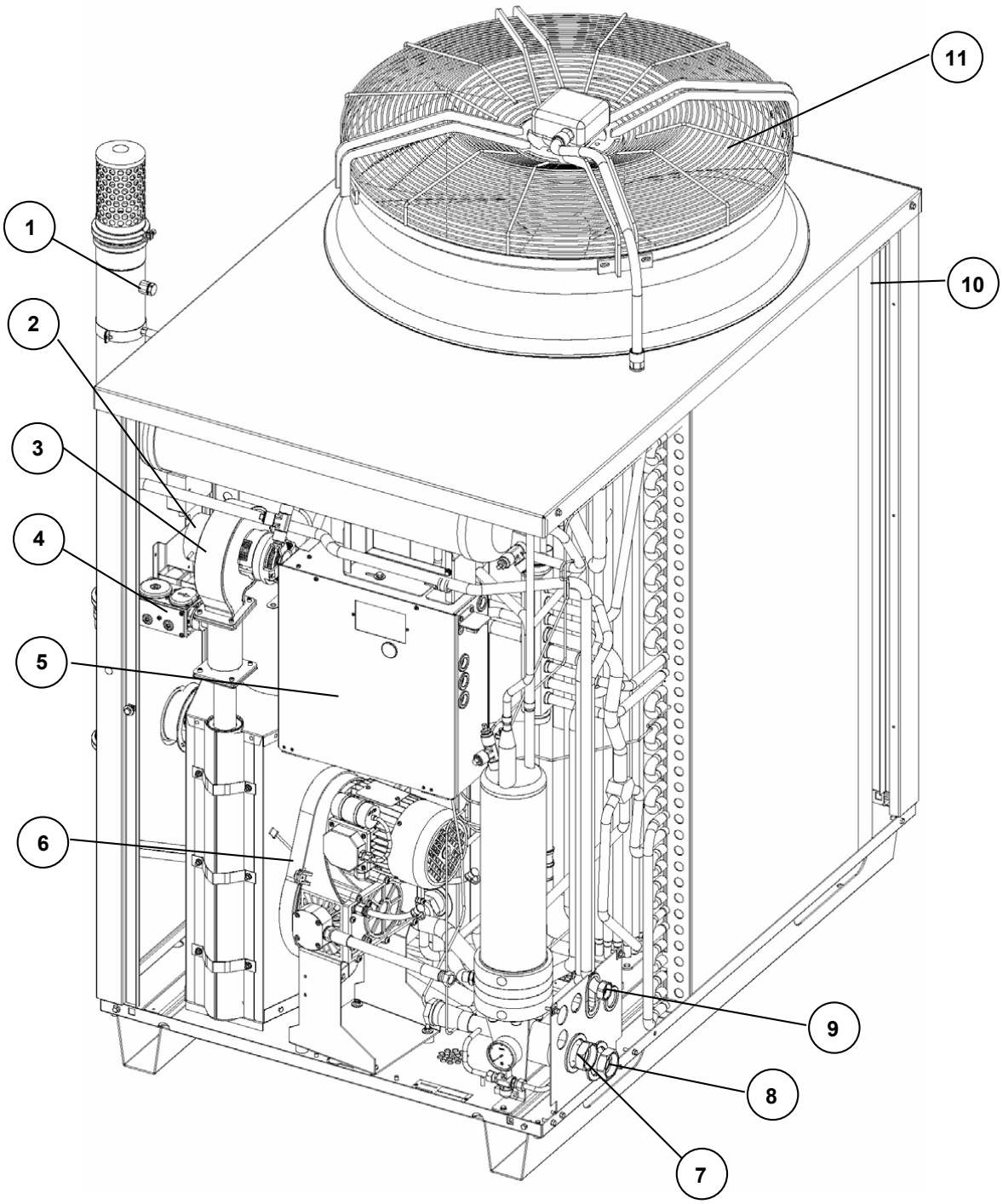
Figure 1.3 *Service plate - Hydraulic/gas connections detail*



G Gas connection Ø 3/4" F
A Water outlet connection Ø 1 1/4" F
B Water inlet connection Ø 1 1/4" F

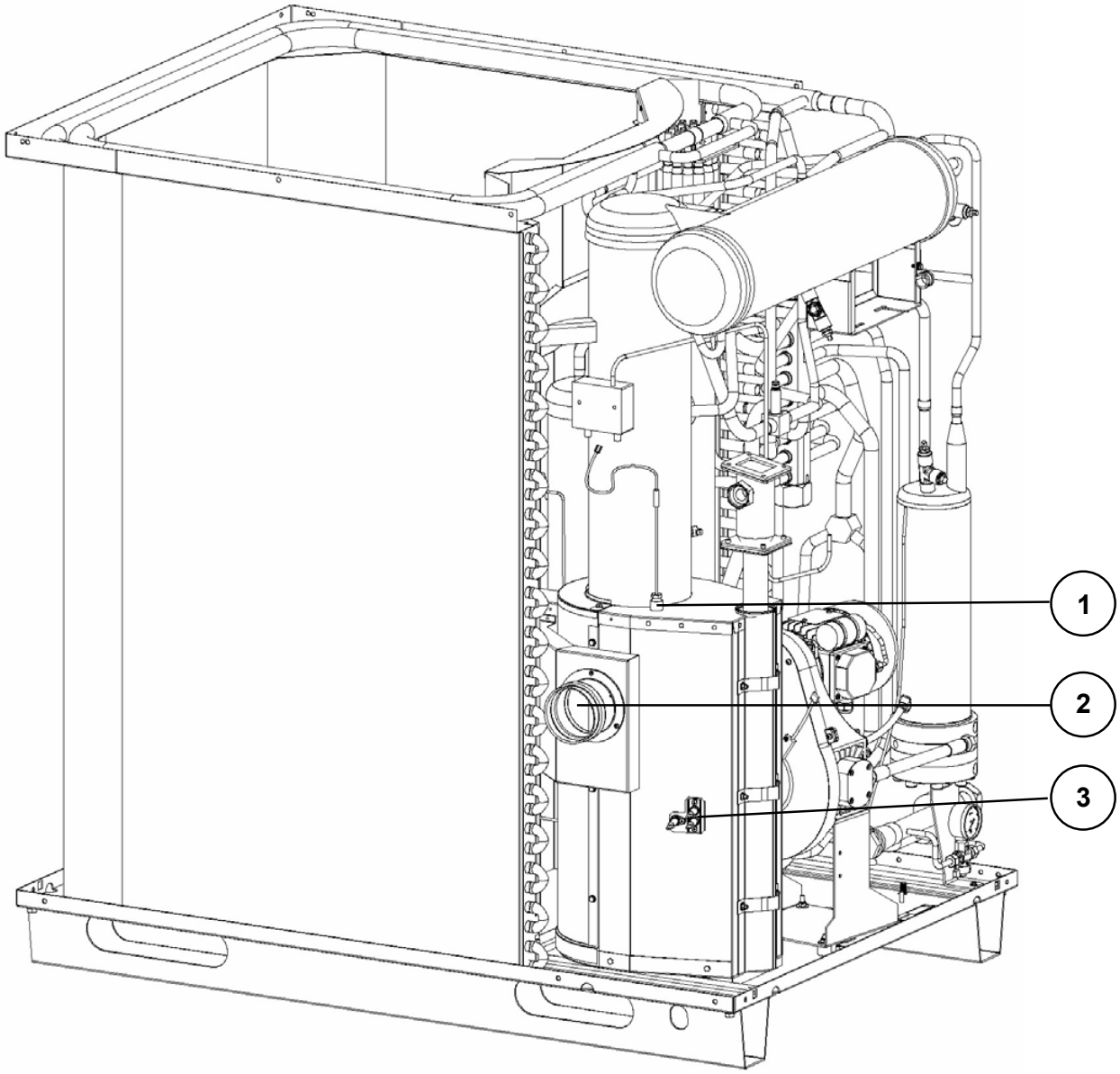
1.3 COMPONENTS

Figure 1.4 *Internal components - front view*



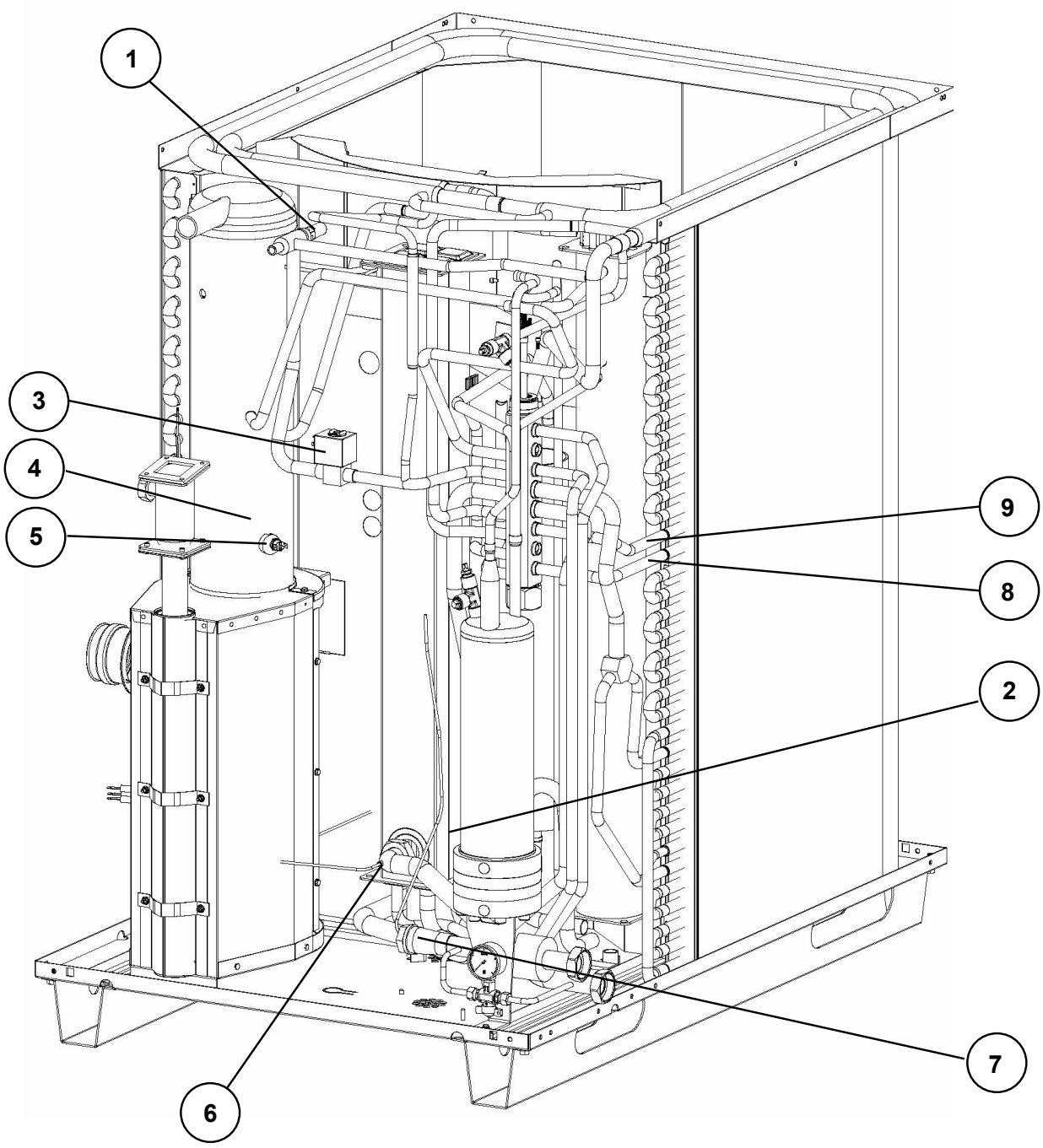
1 Tapping point for flue analisys
2 Combustion air intake
3 Combustion blower
4 Gas valve
5 Electrical panel
6 Oil pump
7 Water inlet connection Ø 1 1/4" F
8 Water outlet connection Ø 1 1/4" F
9 Gas connection Ø 3/4" F
10 TA outdoor temperature probe
11 Fan

Figure 1.5 *Internal components - left side view*



1 Generator fins temperature probe
2 Ø 80mm flue gas exhaust
3 Flame sensor / ignition electrodes

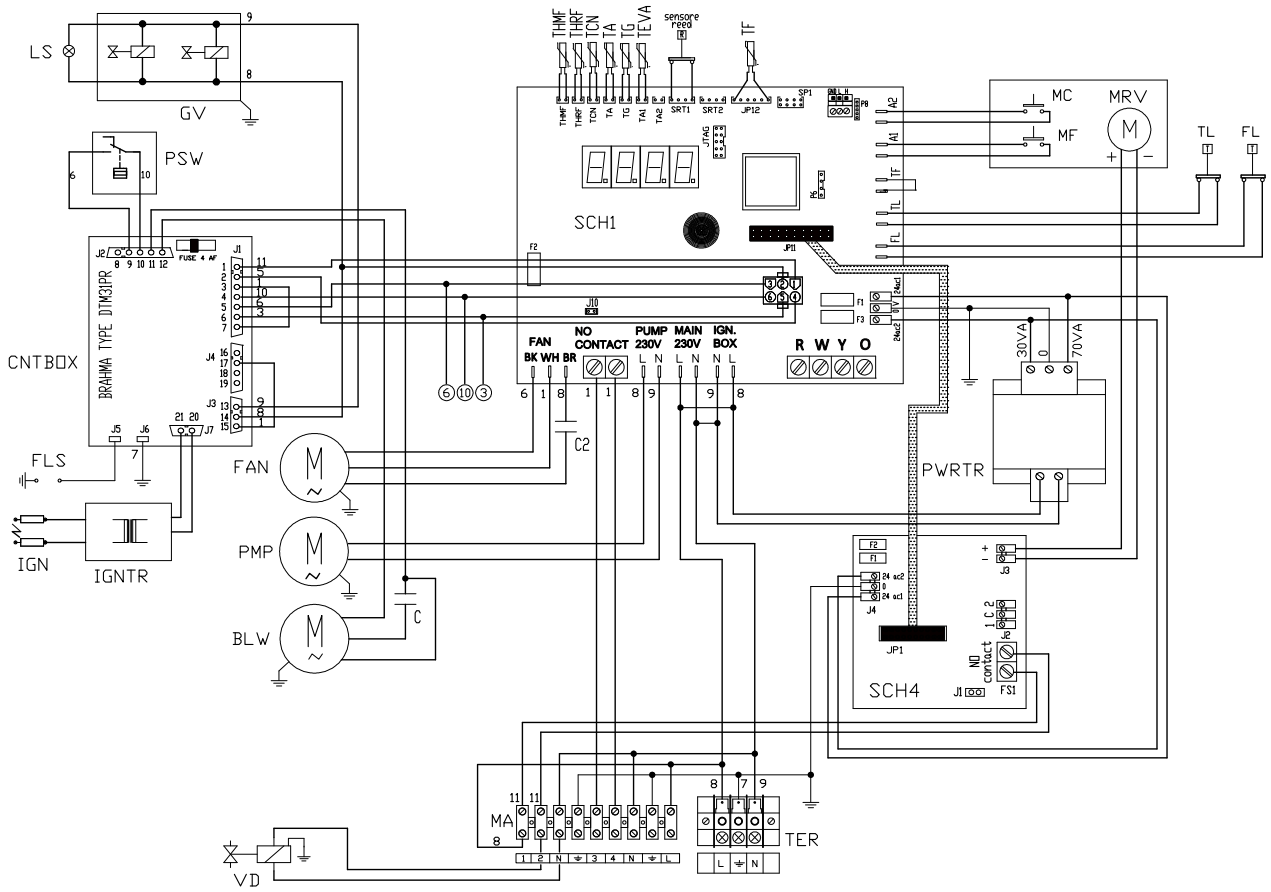
Figure 1.6 *Internal components - right side view*



1 Safety valve
2 Return temperature probe
3 Defrosting valve
4 TG generator temperature probe
5 Limit thermostat
6 Flow temperature probe
7 Flow switch
8 Teva evaporator temperature probe
9 TCN probe

1.4 ELECTRICAL WIRING DIAGRAM

Figure 1.7 *GAHP-AR wiring diagram*



SCH1	Controller S61	GV	Gas solenoid valve	TA	Ambient air temperature sensor
SCH4	AR11 electronic board	TL	Generator limit thermostat	TG	Generator temperature sensor
TER	Power supply terminal block	FL	Water flow switch	TEVA	Evaporator outlet temperature sensor
CNTBOX	Flame controller	VD	Defrosting valve	TF	Fumes temperature sensor or generator fin sensor
PWRTR	Board transformer	FAN	Fan	MRV	Valve inversion gear motor
BLW	Blower	C	Condenser	MC	Hot limit switch
PMP	Oil pump	C2	Fan condenser	MF	Cold limit switch
IGNTR	Ignition transformer	PSW	Air pressure switch	MA	Terminal block
IGN	Ignition electrodes	THMF	Outlet water temperature probe	REED	Oil pump rotation sensor
FLS	Flame sensor	THRF	Inlet water temperature probe		
LS	Gas valve ON indicator lamp	TCN	Condenser outlet temperature probe		

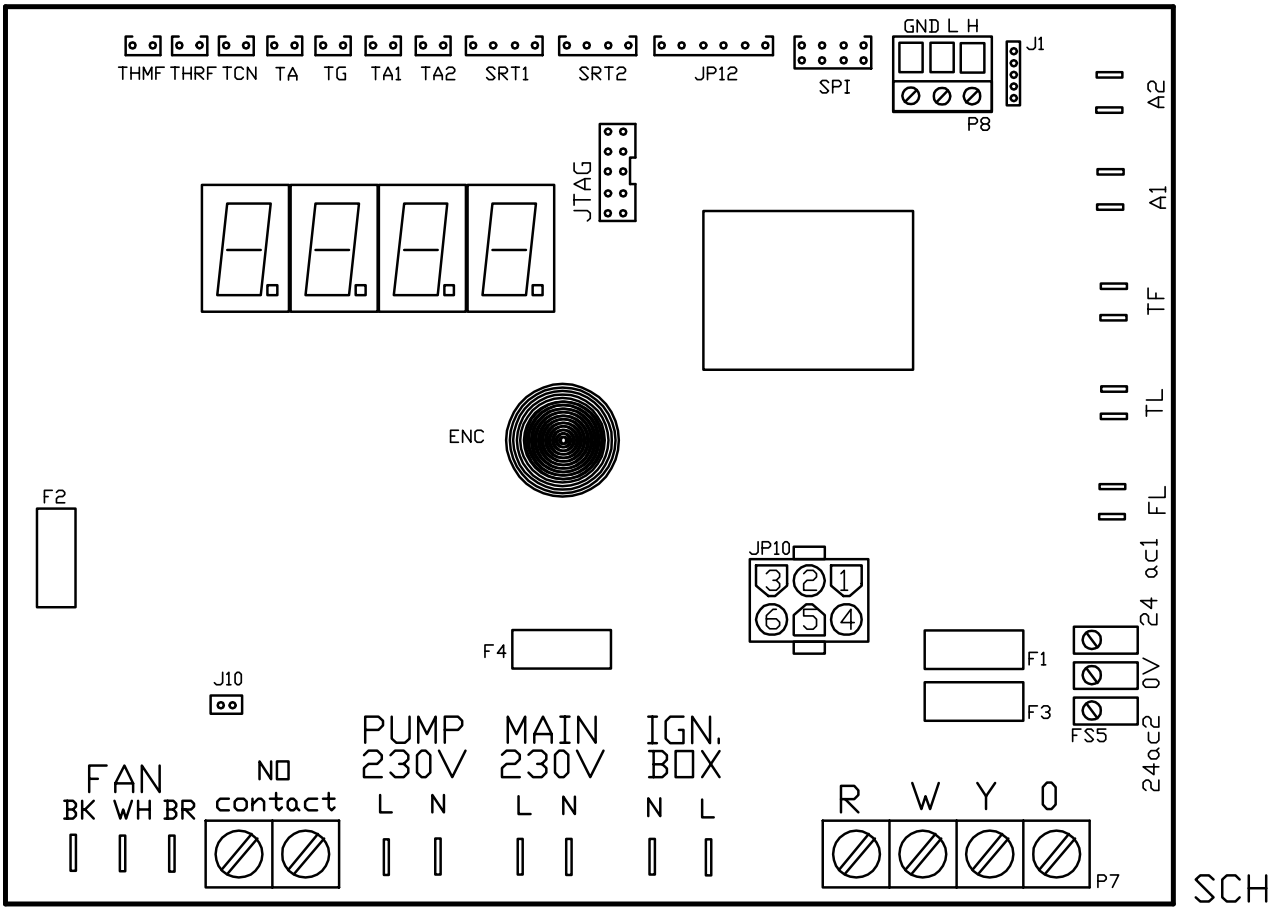
1.5 ELECTRONIC BOARDS

1.5.1 Electronic boards (S61+AR11)

The unit's electrical board contains:

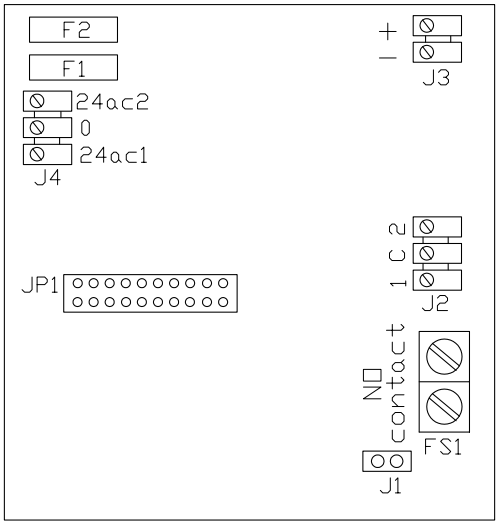
- ► **Electronic board S61** (Figure 1.8 *p. 13*), with microprocessor, it controls the appliance and displays data, messages and operative codes. The appliance is monitored and programmed by interacting with the display and the knob.
- ► **Satellite AR11 electronic board** (Figure 1.9 *p. 14*), interconnected to the S61 board and located next to it, used to control the cycle switching valve and to control defrosting operations of the GAHP-AR unit.

Figure 1.8 *Electronic board S61*



SCH	S61 electronic board	P8 (GND, L, H)	CAN bus connector	N.O. Contact	Circuit water circulation pump controller terminals
THMF	Water delivery temperature probe input	J1	CAN bus Jumper	J10	Circuit water circulation pump controller jumper
THRF	Water return temperature probe input	A1, A2	Connections for actuator's limit switches	FAN	(BK, WH, BR) Fan output
TCN	Condenser outlet temperature probe input	TF	Not used	JTAG	S61 board programming connector
TA	Ambient air temperature probe input	TL	Generator limit thermostat input	ENC	Knob
TG	Generator temperature probe input	FL	Water flow switch input	JP10	6-pole flame controller connector
TA1	Evaporator output temperature probe input	FS5	Board supply input 24 Vac	F1	T 2A fuse
TA2	Not used	P7 (R, W, Y, O)	Operation request inputs	F2	T 10A fuse
SRT1	Oil pump rotation sensor input	IGN.BOX (L, N)	Flame control unit supply input 230 Vac	F3	T 2A fuse
SRT2	Not used	MAIN 230V (L,N)	Board supply input 230 Vac	F4	T 3,15A fuse
JP12	Generator fins temperature probe input	PUMP 230V (L, N)	Oil hydraulic pump supply output		
SPI	Not used				

Figure 1.9 *AR11 eletronic board*



F1 T 2A fuse
F2 T 2A fuse
JP1 AR11 satellite board connector
J1 Jumper N.O. contact
J2 Appliance status display
J3 Reversible valve motor power supply
J4 Board power supply
FS1 Defrosting valve N.O. contact

1.6 CONTROLS

1.6.1 Control device

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

1. DDC control
2. external request

1.6.2 Control system (1) with DDC (GAHP unit ON/OFF)

The DDC controller is able to control appliances, a single GAHP unit, or even several Robur GAHP/GA/AY units in cascade, only in ON/OFF mode (non modulating). For more details refer to the DDC, RB100, RB200 Manuals and the Design Manual.

1.6.3 DDC Controller

The main functions are:

- ► Adjustment and control of one (or more) Robur units of the absorption line (GAHP, GA, AY).
- ► Data display and parameters setting.
- ► Time programming.
- ► Climatic curve control.
- ► Diagnostics.
- ► Errors reset.
- ► Possibility to interface with a BMS.

DDC functionality may be extended with auxiliary Robur devices RB100 and RB200 (e.g. service requests, DHW production, third party generator control, probe control, system valves or circulating pumps, ...).

1.6.4 Control system (2) with external request for heating or cooling (GAHP unit ON/OFF)

The appliance may also be controlled via generic enable devices (e.g. thermostat, timer, switch, contactor...) fitted with voltage-free NO contact. This system only provides elementary control (on/off, with fixed setpoint temperature), hence without the important functions of system (1). It is advisable to possibly limit its use to simple applications only and with a single appliance.

For connection of the selected device to the appliance's electronic board please refer to Paragraph 4.4 *p. 23*.

1.7 TECHNICAL DATA

Table 1.1 *GAHP-AR technical data*

				GAHP-AR Standard	GAHP-AR S
Heating mode					
Seasonal space heating energy efficiency class (ErP)	medium-temperature application (55 °C)		-	A+	
	low-temperature application (35 °C)		-	A	
Heat output for each unit	Outdoor temperature/Water outlet temperature	A7W35	kW	37,8	
		A7W50	kW	35,3	
GUE efficiency	Outdoor temperature/Water outlet temperature	A7W35	%	150	
		A7W50	%	140	
Heat input	nominal (1013 mbar - 15 °C) (1)		kW	25,7	
	real		kW	25,2	
Hot water outlet temperature	maximum		°C	60	
	nominal		°C	50	
Hot water inlet temperature	maximum		°C	50	
	minimum temperature in continuous operation		°C	30 (2)	
Thermal leap	nominal		°C	10	

(1) Relative to NCV (net calorific value).
(2) In transient operation, lower temperatures are allowed.
(3) For flows other than nominal see Design Manual, Pressure losses Paragraph.
(4) ±10% according to the power supply voltage and tolerance on electrical motors consumption. Measured at outdoor temperature of 30 °C.
(5) PCI (G20) 34,02 MJ/m^3 (15 °C - 1013 mbar).
(6) PCI (G25) 29,25 MJ/m^3 (15 °C - 1013 mbar).
(7) PCI (G27) 27,89 MJ/m^3 (15 °C - 1013 mbar).
(8) PCI (G30/G31) 46,34 MJ/kg (15 °C - 1013 mbar).
(9) All values measured with G20 (natural gas) as reference gas.
(10) Values measured with G20 (natural gas), as gas of reference. NOx and CO levels measured at 0% of O_2.
(11) Sound power values detected in compliance with the intensity measurement methodology set forth by standard EN ISO 9614.
(12) Maximum sound pressure levels in free field, with directionality factor 2, obtained from the sound power level in compliance with standard EN ISO 9614.
(13) Overall dimensions excluding flue gas exhaust.

				GAHP-AR Standard	GAHP-AR S
Heating water flow	nominal		l/h	3040	
	maximum		l/h	3500	
	minimum		l/h	2500	
Pressure drop heating mode	at nominal water flow		bar	0,29 (3)	
Outdoor temperature (dry bulb)	nominal		°C	7	
	maximum		°C	35	
	minimum		°C	-20	
Cooling mode					
Cooling output for each unit	Outdoor temperature/Water outlet temperature	A35W7	kW	16,9	
GUE efficiency	Outdoor temperature/Water outlet temperature	A35W7	%	67	
Cold water temperature (inlet)	maximum		°C	45	
	minimum		°C	8	
Cold water flow	nominal		l/h	2900	
	maximum		l/h	3500	
	minimum		l/h	2500	
Internal pressure drop	at nominal water flow		bar	0,31 (3)	
Outdoor temperature	nominal		°C	35	
	maximum		°C	45	
	minimum		°C	0	
Electrical specifications					
Power supply	voltage		V	230	
	type		-	single-phase	
	frequency		Hz	50	
Electrical power absorption	nominal		kW	0,84 (4)	0,87 (4)
Degree of protection	IP		-	X5D	
Installation data					
Gas consumption	G20 natural gas (nominal)		m^3/h	2,72 (5)	
	G25 (nominal)		m^3/h	3,16 (6)	
	G27 (nominal)		m^3/h	3,32 (7)	
	G30 (nominal)		kg/h	2,03 (8)	
	G31 (nominal)		kg/h	2,00 (8)	
NO_x emission class			-	5 (9)	
NO_x emission			ppm	30,0 (10)	
CO emission			ppm	23,0 (10)	
sound power L_w (max)			dB(A)	79,6 (11)	75,0 (11)
sound pressure L_p at 5 metres (max)			dB(A)	57,6 (12)	53,0 (12)
maximum water pressure in operation			bar	4,0	
water content inside the appliance			l	3	
Water fitting	type		-	F	
	thread		"	1 1/4	
Gas connection	type		-	F	
	thread		"	3/4	
Flue gas exhaust	diameter (Ø)		mm	80	
	residual head		Pa	12	
type of installation			-	B23, B53	
Dimensions	width		mm	850	
	depth		mm	1230	
	height		mm	1445 (13)	1540 (13)
Weight	in operation		kg	380	390
General information					
Refrigerating fluid	ammonia R717		kg	7,1	
	water H_2O		kg	10,0	
maximum pressure of the refrigerating circuit			bar	32	

(1) Relative to NCV (net calorific value).
(2) In transient operation, lower temperatures are allowed.
(3) For flows other than nominal see Design Manual, Pressure losses Paragraph.
(4) ±10% according to the power supply voltage and tolerance on electrical motors consumption. Measured at outdoor temperature of 30 °C.
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(12) Maximum sound pressure levels in free field, with directionality factor 2, obtained from the sound power level in compliance with standard EN ISO 9614.
(13) Overall dimensions excluding flue gas exhaust.

Table 1.2 *PED data*

			GAHP-AR Standard	GAHP-AR S
PED data				
Components under pressure	generator	l	18,6	
	leveling chamber	l	11,5	
	evaporator	l	3,7	
	refrigerant volume changer	l	4,5	
	solution refrigerant absorber	l	6,3	
	solution pump	l	3,3	
test pressure (in air)		bar g	55	
maximum pressure of the refrigerating circuit		bar g	32	
filling ratio		kg of NH_3/l	0,148	
fluid group		-	1°	

2 TRANSPORT AND POSITIONING

2.1 WARNINGS

Damage from transport or installation

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

On-site inspection

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

Packing

- Only remove the packing after placing the appliance on site.
- Do not leave parts of the packing within the reach of children (plastic, polystyrene, nails...) since they are potentially dangerous.

Weight

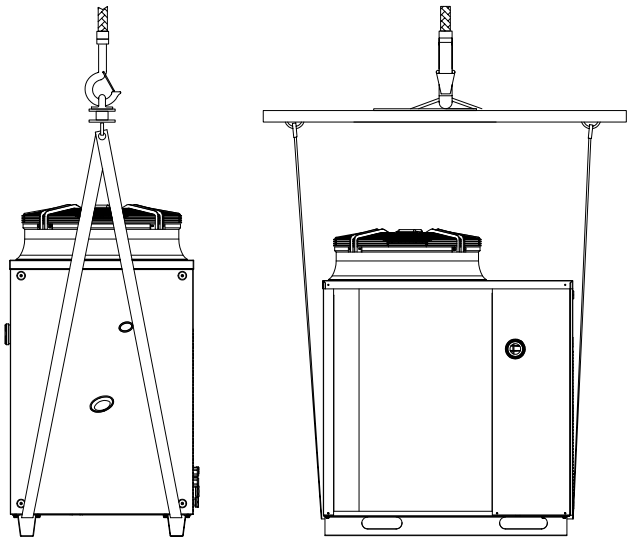
- The crane and lifting equipment must be suitable for the load.
- Do not stand under suspended loads.

2.2 HANDLING

2.2.1 Handling and lifting

- ► Always handle the appliance in its packing, as delivered by the factory.
- ► To lift the appliance use straps or slings inserted in the holes of the base (Figure 2.1 *p. 16*).
- ► Use lifting beams to avoid damaging the outer panels and finned coil (Figure 2.1 *p. 16*).
- ► 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.

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.

GAHP-AR unit ventilation

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

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) shall interfere either with the air flowing from the top of the appliance or with the exhaust flue gas.
- ► The appliance's flue gas exhaust must not be immediately close to openings or air intakes of buildings, and must comply with safety and environmental regulations.
- ► Do not install near the exhaust of flues, chimneys or hot polluted air. In order to work correctly, the appliance needs clean air.

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 damage provide for a drainage system.

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

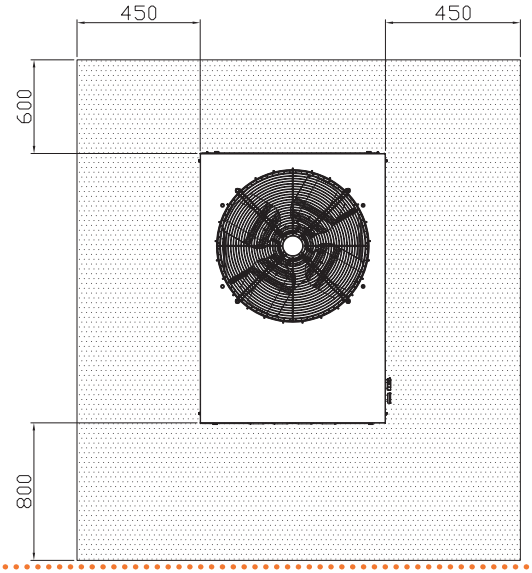
2.4.1 Distances from combustible or flammable materials

- ► 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 2.2 *p. 17* (bar any stricter regulations) are required for safety, operation and maintenance.

Figure 2.2 *Clearances*



2.5 MOUNTING BASE

2.5.1 Mounting base constructive features

- ► Place the appliance on a level flat surface made of fireproof material and able to withstand its weight.

2.5.2 (1) - installation at ground level

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

2.5.3 (2) - installation on terrace or roof

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

2.5.4 Anti vibration mountings

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

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

3 HEATING ENGINEER

3.1 WARNINGS

General warnings

Read the warnings in Chapter III.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 circuit

► In many cases it is advisable to divide the hydraulic system into two parts, primary and secondary circuit, uncoupled by a hydraulic separator, or possibly by a tank that also acts as inertial tank/buffer.

3.2.2 Water flow rate

The GAHP unit may work with costant water flow and ON/OFF operative mode.
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.

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

3.3 HYDRAULIC CONNECTIONS

3.3.1 Hydraulic connections

on the right, at the bottom, connection plate (Figure 1.3 *p. 8*).

► A (= out) 1 1/4" F - WATER OUTLET (m = outlet to the system)
► B (= in) 1 1/4" F - WATER INLET (r = return from the system)

3.3.2 Hydraulic pipes, materials and features

► Use pipes for heating/cooling installations, protected from weathering, insulated for thermal losses, with vapour barrier to prevent condensation.

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 primary plumbing circuit

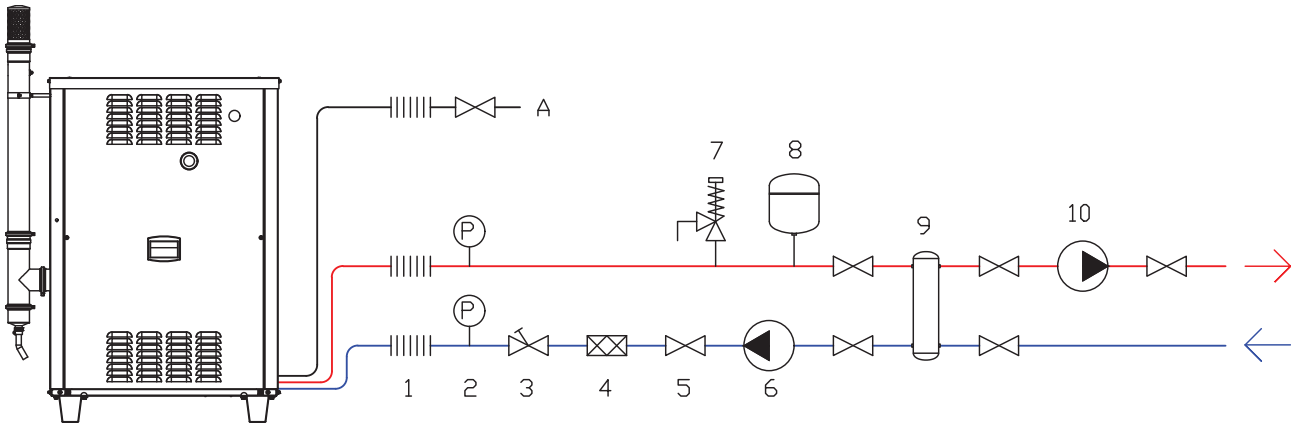
Always provide, near the appliance:

► on water piping, both output and input
- 2 antivibration joints on water fittings
- 2 pressure gauges
- 2 isolation ball valves

► on the inlet water piping
- 1 separator filter
- 1 flow regulation valve, if the circulation pump is with constant flow
- 1 water circulation pump, towards the appliance

► on the output water piping
- 1 safety valve (3 bar)
- 1 expansion tank of the individual unit

Figure 3.1 *Hydraulic plan*



The flow regulator valve must only be used when the primary circuit circulation pump is constant flow type
A Gas connection
1 Anti-vibration connection
2 Pressure gauge
3 Flow regulator valve
4 Water filter
5 Shut-off valves
6 Water pump (primary circuit)
7 Safety valve (3 bar)
8 Expansion tank
9 Hydraulic separator / inertial tank with 4 fittings
10 Water pump (secondary circuit)

3.4 WATER PUMP

The circulation pump (flow and head) must be selected and installed based on pressure drops of plumbing/primary circuit (piping + components + exchange terminals + appliance).
For the appliance pressure drops refer to Table 1.1 *p. 14* and Design Manual.

3.4.1 Constant flow circulation pump

The primary circulation pump must be obligatorily controlled by the appliance's electronic board (S61) (see Paragraph 1.5 *p. 12*).

3.5 ANTIFREEZE FUNCTION

3.5.1 Active antifreeze self-protection

The appliance is equipped with an active antifreeze self-protection system to prevent freezing during wintertime, therefore in heating mode. The antifreeze 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.

3.6 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.

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. 19* shows, indicatively, the effects of using a glycol depending on its %.

Table 3.1 *Glycol effects (GAHP/GA)*

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. 19*). 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. 19* 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	**Measurement unit**	**Required value**
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.

3.8 SYSTEM FILLING

How to fill up the system

After completing all water, electrical and gas connections:

1. Pressurise (at least 1,5 bar) and vent the hydraulic circuit.
2. Let water flow (with appliance off).
3. Check and clean the filter on the inlet pipe.
4. Repeat items 1, 2 and 3 until the pressure has stabilised (at least 1,5 bar).

3.9 FUEL GAS SUPPLY

3.9.1 Gas connection

► 3/4" F
on the right, at the bottom, connection plate (Figure 1.3 *p. 8*).
► Install an anti-vibration connection between the appliance and the gas piping.

3.9.2 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.

3.9.3 Gas pipes sizing

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

3.9.4 Supply gas pressure

This appliance is equipped for a maximum gas supply pressure of 50 mbar.

The appliance's gas supply pressure, both static and dynamic, must comply with Table 3.3 *p. 20*, with tolerance ± 15%.

Non compliant gas pressure (Table 3.3 *p. 20*) may damage the appliance and be hazardous.

Table 3.3 *Network gas pressure*

Product category	Country of destination	Gas supply pressure [mbar]							
		G20	G25	G25.1 (1) (2)	G25.3 (1) (2)	G2.350 (2)	G27 (2)	G30	G31
$II_{2H3B/P}$	AL, AT, BG, CH, CY, CZ, DK, EE, FI, GR, HR, IT, LT, LV, MK, NO, RO, SE, SI, SK, TR	20						30	30
	AT, CH	20						50	50
II_{2H3P}	BG, CH, CZ, ES, GB, GR, HR, IE, IT, LT, LV, MK, PT, SI, SK, TR	20							37
	RO	20							30
	AT	20							50
$II_{2ELL3B/P}$	DE	20	20					50	50
II_{2Esi3P}	FR	20	25						37
II_{2Er3P}		20	25						37
$II_{2HS3B/P}$	HU	25		25				30	30
II_{2E3P}	LU	20							50
$II_{2L3B/P}$	NL		25					30	30
$II_{2EK3B/P}$		20			25			30	30
$II_{2E3B/P}$	PL	20						37	37
$II_{2ELwLs3B/P}$		20				13	20	37	37
$II_{2ELwLs3P}$		20				13	20		37
I_{2EK}	NL	20			25				
$I_{2E(R)}$	BE	20	25						
$I_{2E(S)}$		20	25						
I_{3P}	BE								37
	IS								30
I_{2H}	LV	20							
$I_{3B/P}$	MT, CY							30	30
I_{3B}								30	

1 GAHP-AR not approved for G25.1, G25.3 gases.
2 GA ACF not approved for G25.1, G25.3, G2.350, G27 gases.

3.9.5 Vertical pipes and condensate

► If needed, vertical gas pipes must be fitted with siphon and discharge of the condensate that may form inside the pipe.
► If needed, insulate the piping.

3.9.6 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.

3.10 COMBUSTION PRODUCTS EXHAUST

Compliance with standards

The appliance is approved for connection to a combustion products exhaust duct for the types shown in Table 1.1 *p. 14*.

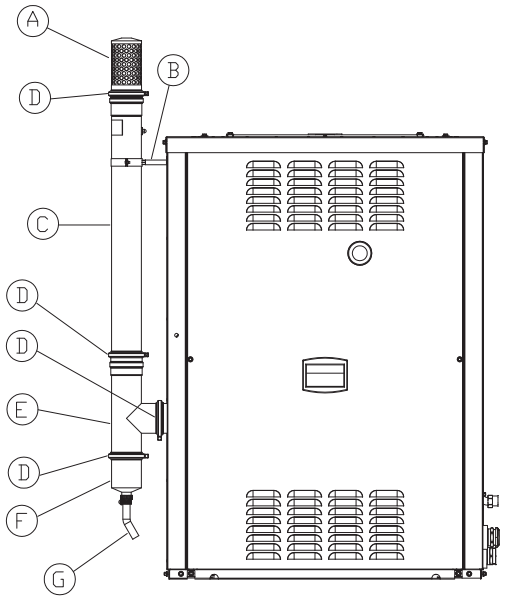
3.10.1 Flue gas exhaust connection

► Ø 80 mm (with gasket), on the left, at the bottom (Figure 3.2 *p. 21*).

3.10.2 Flue gas exhaust kit

The appliance is supplied with flue gas exhaust kit, to be fitted by the installer, including (Figure 3.2 *p. 21*):
► 1 Ø 80 mm flue gas exhaust pipe, length 750 mm (C)
► 1 T connector (E)
► 1 condensate trap (F)
► 1 terminal (A)
► 1 clamp for fixing pipe (B) to left side panel
► 4 pipe clamps (D)
► 1 condensate drain hose fitting and silicone hose (G)

Figure 3.2 *Components of flue gas exhaust kit*



A Terminal
B Pipe clamp
C Exhaust pipe L = 750 mm
D Pipe clamp
E T connector
F Condensate drain
G Hose adaptor + condensate drain pipe

How to install the flue gas kit

Figure 3.2 *p. 21*:

1. Remove the front panel.
2. Remove the protection cover.
3. Place the clamp with spacer (B) in the suitable hole on the left panel of the appliance.
4. Fasten the condensate trap (F) on the T connector (E).
5. Fasten the T connector (E) on the appliance's flue gas exhaust (Ø 80 mm).
6. Fasten the flue gas exhaust pipe (C) (L= 750 mm) onto the T connector (E).
7. Block the flue gas exhaust pipe (C) in the clamp with spacer (B).
8. Fit the terminal (A) on the flue gas exhaust pipe (C).
9. Fix the condensate drain pipe fitting and the relevant silicon tube (G).
10. Fit the front panel back on.

The cap prevents water and foreign bodies from entering the appliance before the fumes kit is installed. The cap should thus be removed only when the kit itself has been fully assembled and installed.

3.10.3 Possible flue

If required, the appliance may be connected to a flue of appropriate type for non-condensing appliances.

- ► To size the flue refer to Table 1.1 *p. 14* and design manual.
- ► The flue must be designed, sized, tested and constructed by a skilled firm, with materials and components complying with the regulations in force in the country of installation.
- ► Always provide a socket for flue gas analysis, in an accessible position.

If several GAHP-AR appliances are connected to a single flue, NO check valves must be installed.

To avoid corrosion, convey the acid condensate drain to the base of the flue gas exhaust duct.

3.11 FLUE GAS CONDENSATE DRAIN

The GAHP-AR unit produces condensation water from combustion flue gas only during the cold start-up transient.

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.

Do not use gutters to discharge the condensate

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

3.11.1 Flue gas condensate connection

The fitting for flue gas condensate drain is located on the base of the flue gas exhaust duct (Figure 3.2 *p. 21*).
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.

3.11.2 Flue gas condensate drain manifold

To make the condensate drain manifold:

- ► Size ducts with diameter no less than 15 mm.
- ► 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 freezing.
- ► Dilute, if possible, with domestic waste water (e.g. bathrooms, washing machines, dish washers...), basic and neutralising.

3.12 DEFROSTING WATER DRAINAGE

Defrosting

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

3.12.1 Collection basin and drainage system

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

4 ELECTRICAL INSTALLER

4.1 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 electrical systems.

Installation must also comply with the manufacturer's provisions.

Live components

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

Earthing

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

Cable segregation

Keep power cables physically separate from signal ones.

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

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

Control of water pump

The water circulation pump of the water/primary circuit must mandatorily be controlled by the appliance's electronic board (S61). It is not admissible to start/stop the circulation pump with no request from the appliance.

4.2 ELECTRICAL SYSTEMS

Electrical connections must provide:

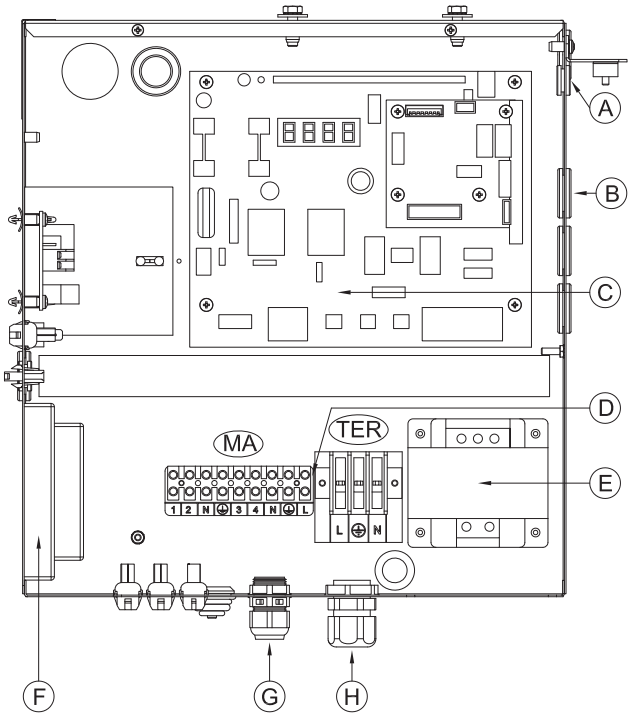
► power supply (Paragraph 4.3 *p. 22*)
► control system (Paragraph 4.4 *p. 23*)

How to make connections

All electrical connections must be made in the appliance's electrical panel (Figure 4.1 *p. 22*):

1. Ensure the appliance's electrical panel is not live.
2. Remove the front panel of the appliance and the cover of the electrical panel.
3. Run the cables through the suitable holes in the connection plate.
4. Run the cables through the suitable cable glands in the electrical panel.
5. Identify the appropriate connection terminals.
6. Make the connections.
7. Close the electrical panel and fit the front panel back on.

Figure 4.1 *GAHP-AR electrical panel*



A CAN bus cable gland
B Signal cable gland 0-10 V pump Wilo Stratos Para
C Electronic boards S61+Mod10+W10
D Terminal blocks
E Transformer 230/24 V AC
F Flame control box
G Pump power supply and control cable gland
H GAHP power supply cable gland

Terminals:
TER terminal block
L-(PE)-N Phase/earth/neutral GAHP power supply
MA terminal block
N-(PE)-L Neutral/earth/phase pump power supply
3-4 Pump enable

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 two-pole switch with two 5 A type T fuses, (GS) or one 10 A magnetothermic breaker

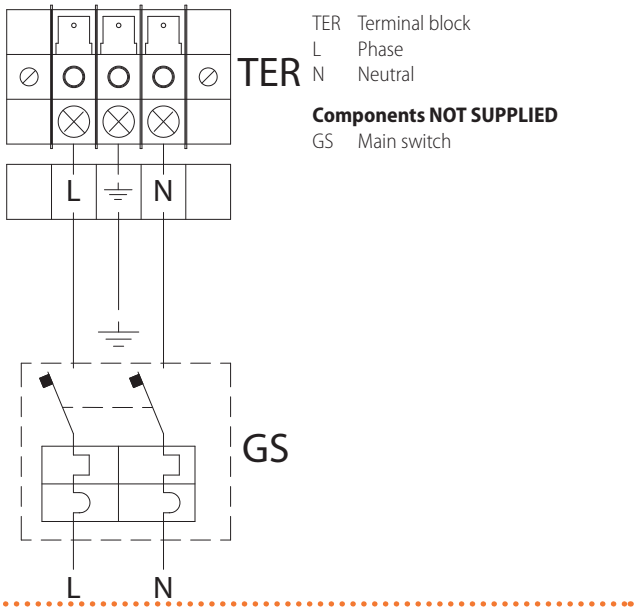
The switches must also provide disconnector capability, with min contact opening 4 mm.

How to connect the power supply

To connect the three-pole power supply cable (Figure 4.2 *p. 23*):

1. Access the electrical board of the appliance according to the Procedure 4.2 *p. 22*.
2. Connect the three lead-in wires to the terminal block (TER) in the electrical panel on the machine.
3. Provide the earth lead-in wire longer than live ones (last to be torn in the event of accidental pulling).

Figure 4.2 *Power supply connection*



4.4 ADJUSTMENT AND CONTROL

Switching for reversible units

Use that entails frequent switching between heating/cooling operation modes are to be avoided for reversible units

4.4.1 Control systems

Two separate control systems are provided, each with specific features, components and diagrams (Figures 4.4 *p. 24*, 4.7 *p. 26*):

- DDC control (with CAN bus connection).
- External request.

4.4.2 CAN bus communication network

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

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

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

Each component of the Robur system, appliance (GAHP, GA, AY, ...) or control device (DDC, RB100, RB200, ...), corresponds to a node, connected to two more elements (if it is an intermediate node) or to just one other element (if it is a terminal node) through two/one CAN bus cable section/s, forming an open linear communication network (never star- or loop-shaped).

4.4.3 CAN bus signal cable

The DDC controller is connected to the appliance through the CAN bus signal cable, shielded, compliant to Table 4.1 *p. 23* (admissible types and maximum distances).

For lengths ≤200 m and up to 4 nodes (e.g. 1 DDC + 3 GAHP), a simple 3x0,75 mm² shielded cable may be used.

Table 4.1 *CAN bus cables type*

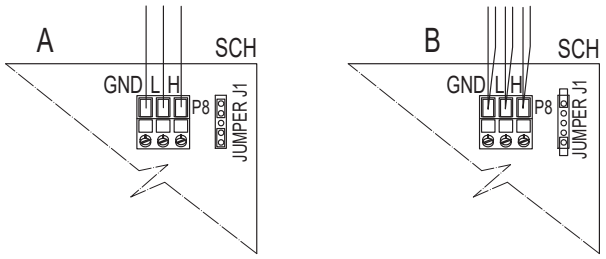
Cable name	Signals / Color			Maximum length	Note
Robur					Optional code OCVO008
ROBUR NETBUS	H = BLACK	L = WHITE	GND = BROWN	450 m	
Honeywell SDS 1620					In all cases the fourth conductor should not be used
BELDEN 3086A	H = BLACK	L = WHITE	GND = BROWN	450 m	
TURCK type 530					
DeviceNet Mid Cable					
TURCK type 5711	H = BLUE	L = WHITE	GND = BLACK	450 m	
Honeywell SDS 2022					
TURCK type 531	H = BLACK	L = WHITE	GND = BROWN	200 m	

How to connect the CAN bus cable to the appliance

To connect the CAN bus cable to the S61 electronic board (Paragraph 1.5 *p. 12*), located in the electrical panel inside the unit, (Figure 4.3 *p. 24* and 4.4 *p. 24*):

1. Access the electrical board of the appliance according to the Procedure 4.2 *p. 22*.
2. Connect the CAN bus cable to the GND (shielding/earthing) + L and H terminals (two signal wires).
3. Place the CLOSED J1 Jumpers (Detail A) if the node is terminal (one connected CAN bus cable section only), or OPEN (Detail B) if the node is intermediate (two connected CAN bus cable sections).
4. Connect the DDC to the CAN bus cable according to the instructions of the following Paragraphs and DDC Manual.

Figure 4.3 *Connection of the CAN bus cable to the electronic board of GAHP/GA units*

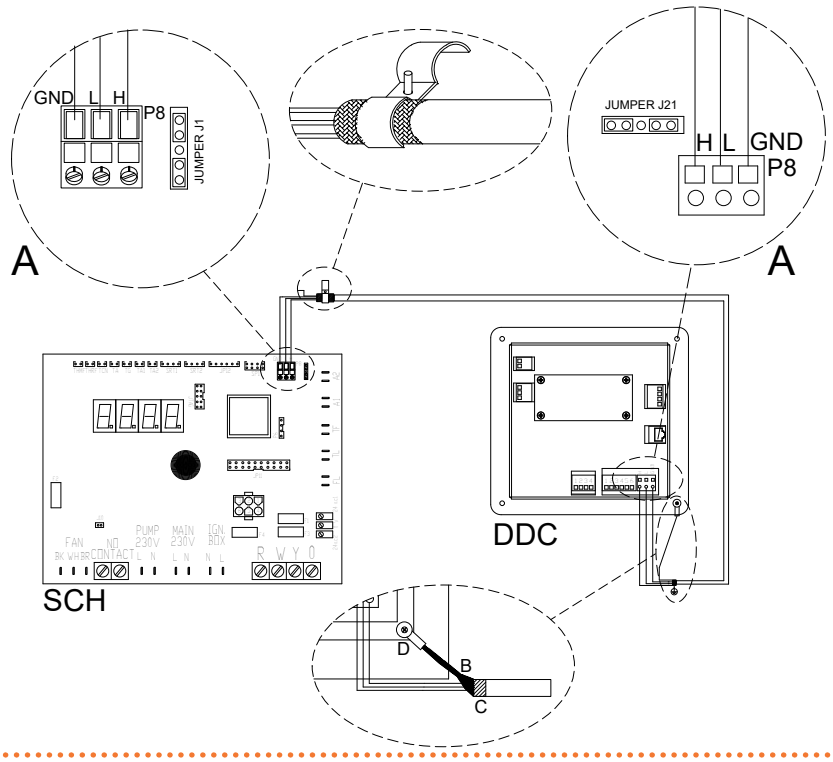


SCH Electronic board of GAHP/GA units
GND Common data
L Data signal LOW
H Data signal HIGH
J1 Onboard CAN bus jumper
A Detail of "terminal node" case (3 wires; J1 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J1 = jumper "open")
P8 CAN port/connector

4.4.4 GAHP (S61) + DDC configuration

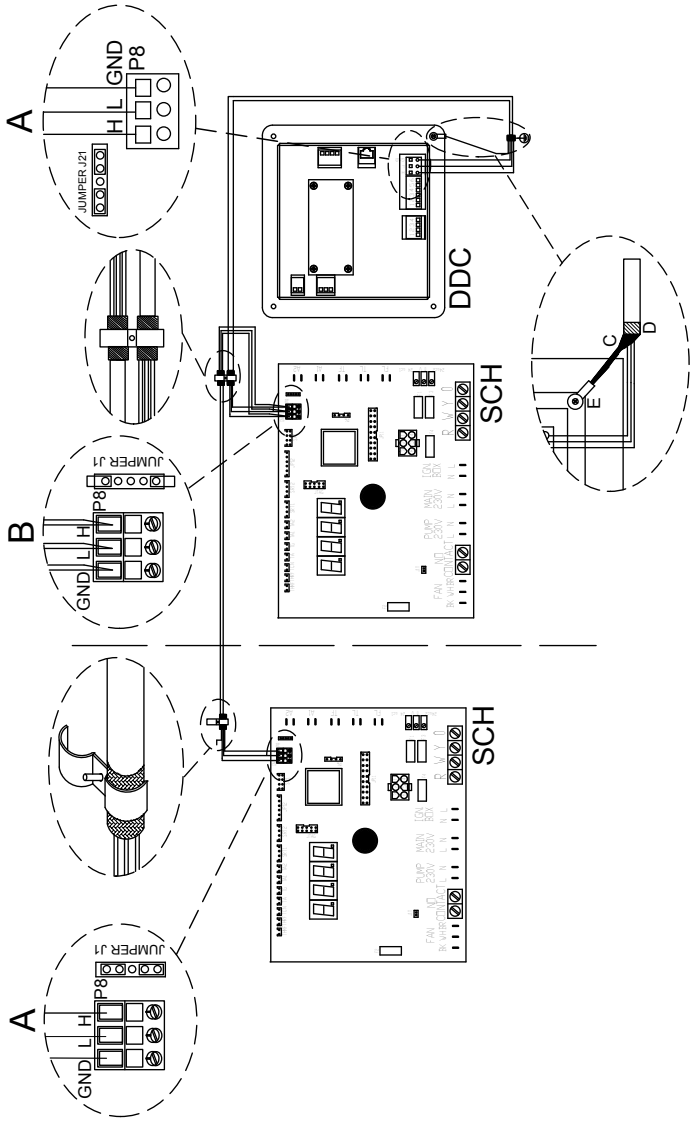
System (1) see also Paragraph 1.6 *p. 14.*

Figure 4.4 *CAN bus connection for systems with one unit*



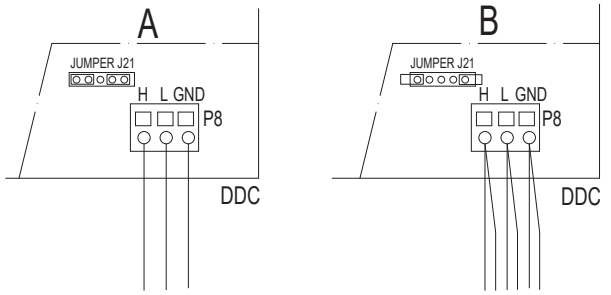
DDC Direct Digital Controller
SCH S61 electronic board
J1 CAN bus jumper onboard S61
J21 CAN bus jumper on DDC board
H,L,GND Data signal wires (ref. cables table)
A Terminal node connection - (3 wires; J1 and J21 = "closed")
B CAN bus cable shield
C Insulating tape to protect the shield of the CAN bus cable
D Eyelet terminal and fixing screw

Figure 4.5 *CAN bus connection for systems with multiple single units*



Place the CLOSED J21 Jumpers (Detail A) if the node is terminal (one connected CAN bus cable section only), or OPEN (Detail B) if the node is intermediate (two connected CAN bus cable sections).

Figure 4.6 *Connection of the CAN bus cable to the control panel*



DDC Direct Digital Controller
GND Common data
L Data signal LOW
H Data signal HIGH
J21 CAN bus jumper on DDC board
A Detail of "terminal node" case (3 wires; J21 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J21 = jumper "open")
P8 CAN port/connector

4.4.5 External request

System (2), see also Paragraph 1.6 *p. 14*.
It is required to arrange:

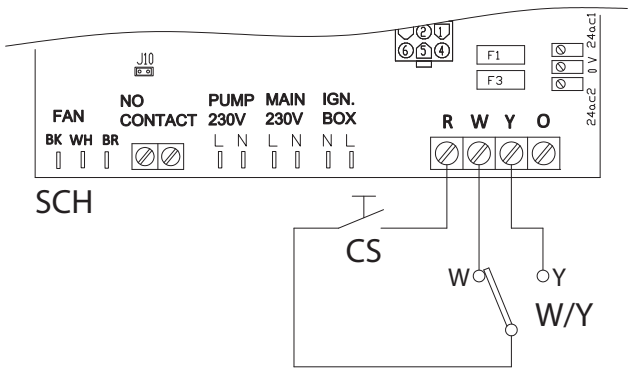
- ► Enable device (e.g. thermostat, timer, switch, ...) fitted with a voltage-free NO contact.
- ► Switching devicewinter/summer (heating/cooling, W and Y contacts on the S61 board).

How to connect the external request

Connection of external request is effected on the S61 board located in the electrical panel inside the unit (Figure 4.7 *p. 26*):

1. Access the electrical board of the appliance according to the Procedure 4.2 *p. 22*.
2. Connect the voltage-free contact of the external device (Detail CS), with winter/summer switching, through three wires, to **terminals R, W and Y** (respectively: common 24 V AC, heating request and cooling request) of S61 electronic board.

Figure 4.7 *External operation requests connection*



SCH Electronic board
R Common 24 V AC
W Heating request terminal
Y Cooling request terminal

Components NOT SUPPLIED
CS External request
W/Y Hot/cold switch (summer/winter)

4.5 WATER PUMP

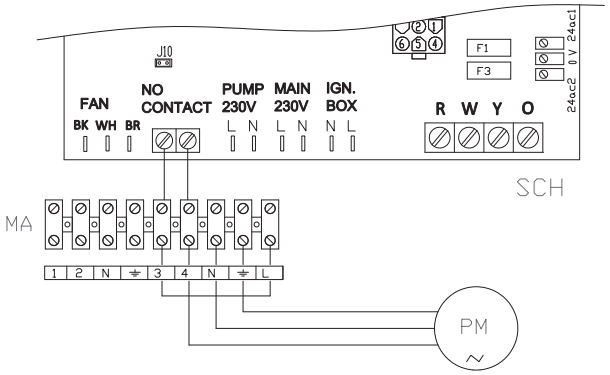
4.5.1 Constant flow pump

It must be mandatorily controlled from the S61 electronic board. The diagram in Figure 4.8 *p. 26* is for pumps < 700 W. For pumps > 700 W it is required to add a control relay and arrange Jumper J10 OPEN.

How to connect the constant flow circulating pump

1. Access the electrical board of the appliance according to the Procedure 4.2 *p. 22*.
2. Connect board S61, to terminals 3-4 of terminal block (MA).
3. Jumper J10 open if the pump is > 700 W or is a Wilo electronic pump, otherwise closed.

Figure 4.8 *Water pump connection (power absorption less than 700W) controlled directly by the appliance's board*



SCH Electronic board
J10 Jumper (1)
N.O. CONTACT N.O. voltage-free contacts
MA Appliance terminal block
L Phase
N Neutral

Components NOT SUPPLIED
PM Water pump < 700 W

Note
1 Jumper J10 must be closed if the installed pump is not a Wilo electronic pump.
Jumper J10 must be opened if the installed pump is a Wilo electronic pump.

5 FIRST START-UP

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.

5.1 PRELIMINARY CHECKS

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 or LPG).
- Supply gas pressure complying with the values of Table 3.3 *p. 20*, with max tolerance ±15%.
- Correct operation of the flue exhaust duct.
- Power supply mains complying with the appliance's rating plate data.
- Appliance correctly installed, according to the manufacturer's provisions.
- 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.
- 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 ELECTRONIC ADJUSTMENT ON THE MACHINE – MENUS AND PARAMETERS OF THE S61 BOARD

Firmware

The instructions on the use of the S61 electronic board concern the **firmware version 3.036**.

5.2.1 The appliance's electronic board (S61)

Figure 5.1 *Electronic board S61*

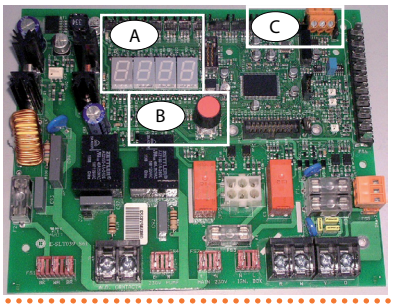


Figure 5.2 *AR11 eletronic board*

5.2.2 Display

The 4-digit display of the S61 board (Detail A Figure 5.1 *p. 27*) is as follows:

- The **first digit** (on the left, green) indicates the menu number (e.g. "0.", "1.", "2.", ... "8.").
- The **last three digits** (on the right, red) indicate a **code** or a **value** for a parameter, among those included in the selected menu (e.g. "__6" "_20", "161").

(e.g. menu+parameter "1.__6", "2._20", "3.161").

5.2.3 Knob

One of the following actions may be done with the S61 board knob (Detail B in Figure 5.1 *p. 27*):

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

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

5.2.4 Menus and Parameters

The menus may be display only (functional data or parameters), display and setting (parameters) or control (reset).
Menu for the user (but for the installer and TAC as well)

- The menu "0.", display only, for functional data detected in real time.
- The menu "1.", display only, for current values of appliance parameters.
- Menu "2.", control, to execute flame control unit reset operations, reset errors (Paragraph 7.5 *p. 30*).
- Menu "3.", display and setting, to set the value of some system parameters (e.g. water setpoint temperature); the values are initialised by the TAC at first start-up.

It is accessed without password.
Menu for the installer or TAC (not accessible to the user)

- Menu "4.", "5.", "6." and "9." are password-protected. These are specific sections, exclusively intended for qualified personnel (installer or TAC). For information see the Service manual.
- Menu "7." is display only and intended for the manufacturer.
- Menu "8." is empty, it may be selected but not used.

Special key for the knob

- To access the menus and parameters of the S61 board, use the special standard supplied key. The key allows the knob to be operated through the suitable hole in the electrical panel cover, operating safely away from live components.
- Always keep the key for future uses.

How to access the menus and parameters

Before Starting:
(1) Power supply switch on.
(2) Display of the S61 board showing in sequence the detected water temperature data (if the appliance is in normal operation), or the flashing malfunction and failure codes (if the appliance is in failure).
To access the menus and parameters of the S61 board, proceed as follows (see also Figure 5.1 *p. 27*):

1. Remove the front panel by removing the fixing screws.
2. Remove the cover of the electrical board to access the S61 board knob.
3. Act on the knob by means of the special key through the suitable hole.
4. Press the knob once to display the menus: the first menu is displayed, "0." (= menu 0).
5. Turn the knob clockwise to scroll down and display the other/subsequent menus; the menu numbers will be displayed in order, "1.", "2.", ... , "6." ... or "E" (= exit).
6. Select the menu of interest (e.g. display "2.___" = menu 2) by pressing the knob; the first parameter code will be displayed, in menu order (e.g. display "2._20" =

parameter 20 in menu 2).

7. Turn the knob clockwise to scroll down the other parameters in the menu; the codes will be displayed in order (e.g. display "2._20", "2._21", ... "2._25" = parameters 20, 21, ... 25 in menu 2), or letter "E" (= exit) at the end of the list.
8. Select the parameter of interest (e.g. with code 161 in menu 3) by pressing the knob; the figure previously assigned to the parameter will be displayed, read-only or to be set (e.g. the figure "45" for parameter 161 in menu 3 = water temperature setpoint at 45 °C); if instead of a figure/setting it is a command, a flashing code is displayed (e.g. "reS1" for the flame lock-out reset command).
9. Press the knob to reconfirm the figure; or rotate the knob to modify the figure, and press at the end to confirm or set the new figure; if however, it is a matter of controlling an appliance operation, press the knob to execute it.
10. To exit a parameter menu or the menu list and go back to the higher level, turn the knob to display the letter "E" for exit, then press the knob again.
11. Place the cover back on the electrical panel opening and fit the appliance's front panel back on.

5.3 MODIFYING SETTINGS

Modify settings via the DDC

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

5.3.1 How to raise/lower the water temperature 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.

If the appliance is not connected to a DDC control, to raise/lower the water temperature setpoint with the S61 board, proceed as follows:

1. Access menu 3 under parameter 161 or 075 (= hot or chilled water temperature setpoint) by rotating and pressing the knob; "3.161" must be displayed in heating mode or "3.075" in cooling mode (procedure Paragraph 5.2 *p. 27*).
2. Display the parameter value by pressing the knob; the previously set value is displayed (from 3 to 60 °C); to reconfirm the pre-existing value press the knob again, otherwise go to step 3.
3. Turn the knob to modify the value, increasing or decreasing it, and press it to set the new value.
4. Exit menu 3, and from the menu list, by selecting and pressing letter "E" twice, and go back to the normal display of detected temperature data.

Do not modify complex settings

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

6 NORMAL OPERATION

This section is for the end user.

The use of the device by the end user is only permitted after the Robur authorised TAC has completed the first start-up.

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 startup by TAC

First start-up may exclusively be carried out by a Robur TAC (Chapter 5 *p. 26*).

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 exclusively be switched on/off by means of the suitably provided control device (DDC 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.

Checks before switching on

Before switching on the appliance, ensue that:

- gas valve open
- appliance electrical power supply (main switch (GS) ON)
- DDC power supply (if any)
- water circuit ready

6.2.1 How to switch on/off

The appliance may be turned on/off, in heating or cooling mode by seasonal heating/cooling switching, to alternatively produce hot water or chilled water, according to climate control needs.

► If the appliance is controlled by a DDC, refer to the relevant manual.

► If the appliance is controlled by an external request (e.g. thermostat, timer, switch, ... with NO voltage-free contact), the appliance is switched on/off by the ON/OFF positions

of the external control device, with heating/cooling seasonal change through winter/summer switching (contacts R = common, W = winter, Y = summer, board S61, see Paragraph 4.4 *p. 23*).

After switching on with the control, in normal operating conditions, the appliance starts/stops automatically according to the user's heating/cooling needs, supplying hot or chilled 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 MODIFYING SETTINGS

Modify settings via the DDC

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

Do not modify complex settings

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

6.4 EFFICIENCY

For increased appliance efficiency:

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

7 MAINTENANCE

7.1 WARNINGS

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

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

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

Before performing any operation, switch off the appliance by means of the control device and wait for the end of the shutdown cycle, then disconnect power and gas supply, by acting on the electrical disconnector and gas valve.

The efficiency checks and every other "check and maintenance operation" (see Tables 7.1 *p. 30* and 7.2 *p. 30*) 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

For pre-emptive maintenance, comply with the recommendations in Table 7.1 *p. 30*.

Table 7.1

		GAHP A	GAHP GS/WS	AY00-120	GA ACF	GAHP-AR
Guidelines for the preventive maintenance operations						
Check of the unit	visually check of the general condition of the unit and of its finned coil	√ (1)	-	-	√ (1)	√ (1)
	check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
	check the % value of CO_2	√	√	√	-	-
	check gas pressure to the burners	-	-	-	√	√
	check that the condensate discharge is clean (If necessary, frequency of the maintenace operation must be increased)	√	√	√	-	-
	replace the belts after 6 years or 12000 hours of operation	√	√	-	√	√
	check/restore the pressure of the primary hydronic circuit	-	-	√	-	-
	check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit	-	-	√	-	-
	replace the oil pump motor condenser every 3 years or every 10000 operating hours or whenever the condenser capacity is less than 95% of the nominal value	√	√	-	√	√
Check for every DDC or CCI	check that the plant is able to achieve the setpoint temperature	√	√	√	√	√
	download the event history	√	√	√	√	√

(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).

7.3 SCHEDULED ROUTINE MAINTENANCE

For scheduled routine maintenance, perform the operations in Table 7.2 *p. 30*, at least once every 2 years.

Table 7.2

		GAHP A	GAHP GS/WS	AY00-120	GA ACF	GAHP-AR
Ordinary scheduled maintenance						
Check of the unit	clean the combustion chamber	√ (1)	√ (1)	√	√	√ (1)
	clean the burner	√ (1)	√ (1)	√	√	√ (1)
	clean the ignition and flame sensor electrodes	√	√	√	√	√
	check that the condensate discharge is clean	√	√	√	-	-
	replace the silicone gasket between the front plate and the exchanger	-	-	√	-	-

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

7.4 MESSAGES ON THE DISPLAY

7.4.1 4 digit display

The S61 board of the appliance (Paragraph 1.5 *p. 12*, Figure 5.1 *p. 27*) is fitted with a 4-digit display, visible through the sight glass of the front panel.

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

7.4.2 Signals in normal operation

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

7.4.3 Signals in the event of fault

In the event of fault the display blinks indicating an operational code (first letter on the display: "E" = error, or "U" = warning).
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.
(Table 8.1 *p. 31*).

7.5 RESTARTING A LOCKED-OUT UNIT

7.5.1 Fault signals on the display

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

► To restart the appliance you must know and perform the procedure concerning the issue signalled and identified by the code (Paragraph 8.1 *p. 31*).
► 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.

7.5.2 Locked-out 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 fault.
► For a fault or breakdown, alert the maintenance technician or TAC.

7.5.3 Reset

There are two options for resetting a fault:

1. If the appliance is connected to a DDC you may act through the control device, as described in the relevant manual.
2. You may act directly from the S61 board as described below

(if the appliance is controlled with external request, this is the only option).

How to perform reset from the S61 board

To perform the reset directly from the board:

1. Access Menu 2 under Parameter "__0", to reset flame lockout (Error E612), or Parameter "__1" for any other generic reset, turning and pressing the knob; "2.__0"/"2.__1" must be displayed (procedure Paragraph 5.2 *p. 27*).
2. Press the knob to display the flashing reset request (e.g. "reS1" to reset flame block).
3. Press the knob again (the second time) to perform the reset; the reset request stops blinking, then "2._XX" is displayed again (e.g. "2.__0"). The reset operation has been performed.
4. Exit menu 2 and the menu list, by selecting and pressing letter "E" twice, and go back to the normal display of detected temperature data.

7.6 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 3.5 *p. 18*)
2. sufficient antifreeze glycol (Paragraph 3.6 *p. 19*)

7.6.1 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. 28*).
2. Only when the appliance is completely off, power it off with the main switch/disconnector switch (Detail GS in Figure 4.2 *p. 23*).
3. Close the gas valve.
4. If necessary, add water with glycol (if the appliance is disconnected from the power and gas mains, the active antifreeze protection is missing, Paragraph 3.5 *p. 18*).

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. 29* and 7.3 *p. 30*).
- Check content and quality of the water in the system, and if necessary top it up (Paragraphs 3.8 *p. 19*, 3.7 *p. 19* and 3.6 *p. 19*).
- 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. 23*).
3. Switch on the appliance by means of the provided control device (Paragraph 4.4 *p. 23*).

8 DIAGNOSTICS

8.1 OPERATIVE CODES

Table 8.1 *Operative codes GAHP-AR*

Code	Description	Warning (u)	Error (E)
600	Flame controller reset circuit fault	NA	Power cycle the appliance. If the code persists, shows up again or in case of doubt, contact the TAC.
601	Limit thermostat trip	Contact authorised Technical Assistance	
602	Flue gas thermostat trip	Contact authorised Technical Assistance	
603	Chilled water antifreeze thermostat trip	Reset is automatic when the triggering condition ceases.	NA
604	Insufficient ventilation in cooling mode	Reset occurs automatically 20 minutes after the code is generated.	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
605	Outdoor temperature exceeding operational limits	NA	Reset is automatic when the triggering condition ceases.
606	Outdoor temperature below operational limits	Non-blocking Warning (informative code). The code is reset automatically when the triggering condition ceases.	NA
607	High generator temperature	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
608	Flame controller error	NA	Contact authorised Technical Assistance

610	Low water flow	Reset is automatic when the triggering condition ceases.	Check and clean water filters on the system. Check for air in the system. Check water flow pump. Power cycle the appliance. Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
611	Insufficient rotation of oil pump	Reset occurs automatically 20 minutes after the code is generated.	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
612	Flame controller lockout	Reset is automatic up to 4 attempts (in about 5 minutes).	Check gas supply. Reset may be performed from the DDC or from the S61 board (menu 2, parameter 0). If the code persists or in case of doubt, contact the TAC.
616	Chilled water delivery temperature probe fault	NA	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
617	Chilled water inlet temperature probe fault	NA	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
618	Condenser temperature probe fault	NA	Reset is automatic in case of switching from "cold" to "hot" mode. Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
620	Generator temperature probe fault	NA	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
626	Generator fins temperature probe fault	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
628	Flame controller error	NA	Power off the appliance. Contact the TAC.
629	Gas solenoid valve without electrical power	Reset occurs automatically if the gas solenoid valve switches on again within 10 minutes (with central flame control unit on).	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
630	High flue gas or generator fins temperature	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
631	Hot water temperature exceeding operational limits	Check configuration of other heat generators on the system. Check water flow. Check system thermal load. Reset is automatic when the triggering condition ceases.	NA
632	Chilled water temperature exceeding operational limits	Check configuration of other chillers on the system. Check water flow. Check system's chilling load. Reset is automatic when the triggering condition ceases.	NA
634	-	Contact the TAC.	NA
644	Evaporator temperature probe fault	NA	Reset is automatic in case of switching from "hot" to "cold" mode. Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
646	High hot water inlet temperature	Check configuration of other heat generators on the system. Reset is automatic and occurs if the generating condition ceases with circulating pump on or 20 minutes after the code is generated with circulating pump off.	NA

647	Hot water inlet temperature below operational limits	Reset occurs automatically when the generating cause resolves or 430 seconds after the code is generated.	Reset is automatic in case of switching from "hot" to "cold" mode. Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code shows up again or in case of doubt contact the TAC.
648	High hot water differential temperature	Check water flow. Reset occurs automatically 20 minutes after the code is generated.	Reset is automatic in case of switching from "hot" to "cold" mode. Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code shows up again or in case of doubt contact the TAC.
649	Missing auxiliary board	NA	Contact the TAC.
651	Cooling antifreeze function activated	Non-blocking Warning (informative code). The code clears automatically when antifreeze function execution ends.	NA
652	Defrosting cycle activated	Non-blocking Warning (informative code). The code clears automatically when execution of defrosting ends.	NA
654	Inversion valve in opposite position	NA	Reset is automatic in case of new switching and discontinuation of the generating cause. If the code shows up again or in case of doubt contact the TAC.
655	Inversion valve in unknown position	NA	Reset is automatic in case of new switching and discontinuation of the generating cause. If the code shows up again or in case of doubt contact the TAC.
656	Inversion valve in uncertain position	NA	Reset is automatic in case of new switching and discontinuation of the generating cause. If the code shows up again or in case of doubt contact the TAC.
660	Defrosting valve has failed to open	Non-blocking Warning (informative code). Reset is automatic, however, it is advisable to contact the TAC.	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code shows up again or in case of doubt contact the TAC.
661	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
678	High hot water delivery temperature	Reset is automatic in case of switching from "hot" to "cold" mode. Reset is automatic when the triggering condition ceases.	NA
679	Heating antifreeze function activated	Non-blocking Warning (informative code). The code clears automatically when antifreeze function execution ends.	NA
80/680	Incomplete functional parameters	Contact the TAC.	
681	Invalid bank 1 parameters	Reset is automatic when the triggering condition ceases.	Contact the TAC.
682	Invalid bank 2 parameters	Reset is automatic when the triggering condition ceases.	Contact the TAC.
683	RY and RW contacts simultaneously activated	Reset is automatic when the triggering condition ceases.	NA
684	Transformer or 24 Vac fuse fault	NA	Contact the TAC.
685	Invalid module type configuration parameters	NA	Contact the TAC.
686	ROM board fault	NA	Contact the TAC.
687	pRAM board fault	NA	Contact the TAC.
688	xRAM board fault	NA	Contact the TAC.
689	Registers board fault	NA	Contact the TAC.
690	Outdoor temperature probe fault	NA	Reset may be performed from the DDC or from the S61 board (menu 2, parameter 1). If the code persists, shows up again or in case of doubt, contact the TAC.
691	Electronic board fault	NA	Contact the TAC.

NA: Not Applicable

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):	GAHP-AR
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:	no
Heat pump combination heater:	no
Parameters shall be declared for medium-temperature application.	
Parameters shall be declared for average, colder and warmer climate conditions.	

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
AVERAGE CLIMATE CONDITIONS							
Rated heat output (*)	*Prated*	28,4	kW	**Seasonal space heating energy efficiency**	η_s	110	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = –7 °C	*Pdh*	25,0	kW	Tj = –7 °C	*PERd*	93	%
Tj = +2 °C	*Pdh*	15,3	kW	Tj = +2 °C	*PERd*	118	%
Tj = +7 °C	*Pdh*	9,9	kW	Tj = +7 °C	*PERd*	116	%
Tj = +12 °C	*Pdh*	4,3	kW	Tj = +12 °C	*PERd*	118	%
T_j = bivalent temperature	*Pdh*	-	kW	Tj = bivalent temperature	*PERd*	-	%
Annual energy consumption	Q_{HE}	207	GJ				
COLDER CLIMATE CONDITIONS							
Rated heat output (*)	*Prated*	26,7	kW	**Seasonal space heating energy efficiency**	η_s	105	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = –7 °C	*Pdh*	16,3	kW	Tj = –7 °C	*PERd*	103	%
Tj = +2 °C	*Pdh*	9,9	kW	Tj = +2 °C	*PERd*	116	%
Tj = +7 °C	*Pdh*	6,4	kW	Tj = +7 °C	*PERd*	114	%
Tj = +12 °C	*Pdh*	2,9	kW	Tj = +12 °C	*PERd*	112	%
Tj = bivalent temperature	*Pdh*	-	kW	Tj = bivalent temperature	*PERd*	-	%
T_j = operation limit temperature	*Pdh*	26,7	kW	Tj = operation limit temperature	*PERd*	89	%
For air-to-water heat pumps: T_j = –15 °C (if TOL < –20 °C)	*Pdh*	21,9	kW	For air-to-water heat pumps: Tj = –15 °C (if TOL < –20 °C)	*PERd*	92	%
Annual energy consumption	Q_{HE}	242	GJ				
WARMER CLIMATE CONDITIONS							
Rated heat output (*)	*Prated*	32,6	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 = +2 °C	*Pdh*	32,6	kW	Tj = +2 °C	*PERd*	121	%
Tj = +7 °C	*Pdh*	20,9	kW	Tj = +7 °C	*PERd*	128	%
Tj = +12 °C	*Pdh*	9,5	kW	Tj = +12 °C	*PERd*	111	%
Tj = bivalent temperature	*Pdh*	-	kW	Tj = bivalent temperature	*PERd*	-	%
Annual energy consumption	Q_{HE}	141	GJ				
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*	60	°C
Power consumption in modes other than active mode				Supplementary heater			
Off mode	P_{OFF}	0,000	kW	Rated heat output	*Psup*	-	kW
Thermostat-off mode	P_{TO}	0,023	kW	Type of energy input		monovalent	
Standby mode	P_{SB}	0,007	kW				
Crankcase heater mode	P_{CK}	-	kW				
Other items							
Capacity control		fixed		For air-to-water heat pumps: Rated air flow rate, outdoors	—	11000	m³/h
Sound power level, indoors/outdoors	L_{WA}	- / 80	dB	For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	—	-	m³/h
Contact details	Robur SPA, Via Parigi 4/6, I-24040 Zingonia (BG)						

(*) For heat pump space heaters and heat pump combination heaters, the rated heat output *Prated* is equal to the design load for heating *Pdesignh* , and the rated heat output of a supplementary heater *Psup* is equal to the supplementary capacity for heating *sup(Tj)* .

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

Emissions of nitrogen oxides:	NO_x	48	mg/kWh

Figure 9.2

Table 8
COMMISSION DELEGATED REGULATION (EU) No 811/2013
Technical parameters for heat pump space heaters and heat pump combination heaters

Model(s):	GAHP-AR S
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:	no
Heat pump combination heater:	no
Parameters shall be declared for medium-temperature application.	
Parameters shall be declared for average, colder and warmer climate conditions.	

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
AVERAGE CLIMATE CONDITIONS							
Rated heat output (*)	*Prated*	28,4	kW	**Seasonal space heating energy efficiency**	η_s	111	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = –7 °C	*Pdh*	25,0	kW	Tj = –7 °C	*PERd*	94	%
Tj = +2 °C	*Pdh*	15,3	kW	Tj = +2 °C	*PERd*	119	%
Tj = +7 °C	*Pdh*	9,9	kW	Tj = +7 °C	*PERd*	118	%
Tj = +12 °C	*Pdh*	4,3	kW	Tj = +12 °C	*PERd*	121	%
T_j = bivalent temperature	*Pdh*	-	kW	Tj = bivalent temperature	*PERd*	-	%
Annual energy consumption	Q_{HE}	207	GJ				
COLDER CLIMATE CONDITIONS							
Rated heat output (*)	*Prated*	26,7	kW	**Seasonal space heating energy efficiency**	η_s	105	%
Declared capacity for heating for part load at indoor temperature 20 °C and outdoor temperature Tj				Declared coefficient of performance or primary energy ratio for part load at indoor temperature 20 °C and outdoor temperature Tj			
Tj = –7 °C	*Pdh*	16,3	kW	Tj = –7 °C	*PERd*	103	%
Tj = +2 °C	*Pdh*	9,9	kW	Tj = +2 °C	*PERd*	116	%
Tj = +7 °C	*Pdh*	6,4	kW	Tj = +7 °C	*PERd*	114	%
Tj = +12 °C	*Pdh*	2,9	kW	Tj = +12 °C	*PERd*	112	%
Tj = bivalent temperature	*Pdh*	-	kW	Tj = bivalent temperature	*PERd*	-	%
T_j = operation limit temperature	*Pdh*	26,7	kW	Tj = operation limit temperature	*PERd*	89	%
For air-to-water heat pumps: T_j = –15 °C (if TOL < –20 °C)	*Pdh*	21,9	kW	For air-to-water heat pumps: Tj = –15 °C (if TOL < –20 °C)	*PERd*	92	%
Annual energy consumption	Q_{HE}	242	GJ				
WARMER CLIMATE CONDITIONS							
Rated heat output (*)	*Prated*	32,6	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 = +2 °C	*Pdh*	32,6	kW	Tj = +2 °C	*PERd*	121	%
Tj = +7 °C	*Pdh*	20,9	kW	Tj = +7 °C	*PERd*	120	%
Tj = +12 °C	*Pdh*	9,5	kW	Tj = +12 °C	*PERd*	113	%
Tj = bivalent temperature	*Pdh*	-	kW	Tj = bivalent temperature	*PERd*	-	%
Annual energy consumption	Q_{HE}	141	GJ				
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*	60	°C
Power consumption in modes other than active mode				Supplementary heater			
Off mode	P_{OFF}	0,000	kW	Rated heat output	*Psup*	-	kW
Thermostat-off mode	P_{TO}	0,023	kW	Type of energy input		monovalent	
Standby mode	P_{SB}	0,007	kW				
Crankcase heater mode	P_{CK}	-	kW				
Other items							
Capacity control		fixed		For air-to-water heat pumps: Rated air flow rate, outdoors	—	11000	m³/h
Sound power level, indoors/outdoors	L_{WA}	- / 75	dB	For water- or brine-to-water heat pumps: Rated brine or water flow rate, outdoor heat exchanger	—	-	m³/h
Contact details	Robur SPA, Via Parigi 4/6, I-24040 Zingonia (BG)						

(*) For heat pump space heaters and heat pump combination heaters, the rated heat output *Prated* is equal to the design load for heating *Pdesignh* , and the rated heat output of a supplementary heater *Psup* is equal to the supplementary capacity for heating *sup(Tj)* .

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

Emissions of nitrogen oxides:	NO_x	48	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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