ROBUR
caring for the environment

Installation, user and maintenance manual

GAHP-A

air-water gas absorption heat pump
PRO platform

powered by gas and renewable energy

Revision: B
Code: D-LBR548

INDEX OF CONTENTS

1 PREFACE

This Installation, user and maintenance manual is a guide to the installation and operation of the Air-Water gas absorption heat pump "GAHP-A".
This manual is specifically intended for:

- final users for the use of the appliance according to their own requirements;
- Installation technicians (hydraulic and electrical) for the carrying out of a correct installation of the appliance.

The manual also contains:

- a section that describes all the operations necessary for the "first start-up" and for the "gas change" of the appliance, as well as the main maintenance operations;
- an "ACCESSORIES" section with a description of accessories available and their respective reference codes.

Summary

The manual has 8 sections:
SECTION 1 is a brief introduction to the use of the manual itself.
SECTION 2 is intended for use by the final user, hydraulic and electrical installation technicians and the Robur TAC; it gives general warnings, operating instructions and constructional specifications. This section also contains technical data and dimensional drawings of the appliance.
SECTION 3 is intended for use by the final user; it provides the information necessary to use the appliance correctly according to the user's own requirements.
SECTION 4 is intended for use by the hydraulic installation technician; it provides the indications necessary for the technician for the creation of the hydraulic plant, fumes discharge and gas supply system.
SECTION 5 is intended for use by the electrical installation technician; it provides the information required to hook up the appliance electrically.
SECTION 6 is intended for use by the Robur TAC; it provides the indications necessary to carry out the entire *initial activation procedure* (preliminary verification of plant compliance, initial activation, and regulation of gas flow to the burners) and the operations for change of gas type, if required. This section includes a summary of the main maintenance operations (checks, controls and cleaning operations to perform) to which the appliance is subject.
SECTION 7 is intended for use by the final user, hydraulic and electrical installation technicians and the Robur TAC. it contains information about accessories available for the appliance.
SECTION 8 is an appendix which lists the appliance's operating codes and associated instructions in tabular form.

References

If the appliance is to be connected to a Direct Digital Controller (DDC), refer to the following documentation with which it is supplied:

INSTALLATION TECHNICIAN MANUAL - book 1: for installation/service technicians

FINAL USER MANUAL - book 2: for the final user of the DDC

Definitions, terms and icons

APPLIANCE: this term refers to the Air-Water gas absorption heat pump "GAHP-A".
CCP: "Comfort Control Panel".
CCI: "Comfort Control Interface" device.

DDC: digital control panel (Direct Digital Controller).
TAC: Technical Assistance Centre (authorised by Robur S.p.A.).
The **icons** present in the margin of the manual have the following meanings:

 = DANGER

 = WARNING

 = NOTE

 = START OF OPERATING PROCEDURE

 = REFERENCE to another part of the manual or other document

2 OVERVIEW AND TECHNICAL CHARACTERISTICS

In this section, for all users, you will find general warnings, the operating principle of the appliance and its manufacturing characteristics. This section also contains technical data and dimensional drawings of the appliance.

2.1 WARNINGS

This manual constitutes an integral and essential part of the product and must be delivered to the user together with the appliance.

Conformity to CE standards

The absorption heat pumps of the GAHP series are certified as conforming to standard EN 12309-1 and -2 and comply with the essential requirements of the following Directives:

- Gas Directive 90/396/EEC and subsequent modifications and additions.
- Efficiency Directive 92/42/EEC and subsequent modifications and additions.
- Electromagnetic Compatibility Directive 89/336/EEC and subsequent modifications and additions.
- Low Voltage Directive 89/336/EEC and subsequent modifications and additions.
- "Machinery Directive" 2006/42/EC.
- Pressurised Equipment Directive 97/23/EEC and subsequent modifications and additions.
- UNI EN 677 Specific requisites for condensation boilers with nominal thermal capacity no greater than 70 kW.

The absorption heat pumps of the GAHP series emit values of nitrogen oxide (NOx) less than 60 mg/kWh in line with the prescriptions of the RAL UZ 118 "Blauer Engel".

Information regarding the above EC certifications is given in Paragraph 2.4 TECHNICAL DATA → 11, as well as on the Nameplate of the appliance itself.

Safety

The appliance must only be used for the purposes for which it has been designed. Any other use is considered inappropriate and therefore dangerous. The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by improper use of the appliance.

Do not operate the appliance if, at the moment it is to be used, dangerous conditions arise: odour of gas in the circuit or near to the appliance; problems with the electrical/gas mains or hydraulic circuit; parts of the appliance submerged in water or otherwise damaged; control and safety components bypassed or defective. Ask professionally qualified personnel for assistance.

If you smell gas:

- do not operate electrical devices in the vicinity of the appliance, such as telephones, multimeters or other equipment that can cause sparks;
- shut off the gas supply by means of the appropriate gas tap;
- cut off electrical power to the appliance by means of the external disconnecting switch that the electrical system installation technician has provided in the appropriate panel;

- request the assistance of professionally qualified personnel from a telephone far from the appliance.

The appliance has a sealed circuit that may be classified as a pressurised container, i.e. with internal pressure higher than atmospheric pressure. The fluids contained in its sealed circuits are harmful if swallowed or inhaled, or if they come into contact with the skin. Do not carry out any operation on the sealed circuits of the appliance or on the valves present.

Packing items (plastic bags, polystyrene foam, nails, etc.) must be kept out of the reach of children, as they represent potential sources of danger.
The electrical safety of this appliance is assured only when it is correctly connected to an effective grounding system, as detailed in current electrical safety norms.

Installation and regulatory references

When the appliance arrives at the installation site, before beginning the stages required to move it in order to position it on the site, perform a visual check to ascertain that there are no evident signs of breakage or damage to the packaging or to the external panels, which would be signs that damage occurred during transport.

Packing materials must be removed only after the appliance has been positioned on site. After removing the packing materials, ensure that the appliance is intact and complete.

Installation of the appliance may only be carried out by firms that are qualified in accordance with current legislation in the country of installation, i.e. by professionally qualified personnel.

"Professionally qualified personnel" means personnel with specific technical competence in the sector of heating/cooling plants and gas appliances.

Installation of the appliance must be carried out in compliance with current local and national regulations regarding the design, installation and maintenance of heating and cooling plants in accordance with the manufacturer's instructions.
In particular, current regulations regarding the following must be observed:

- Gas equipment.
- Electrical equipment.
- Heating installations and heat pumps
- Every other standard and regulation that concerns the installation of equipment for summer and winter air conditioning using gas fuel.

The manufacturer does not accept any contractual or extra-contractual liability for any damage caused by errors in installation and/or failure to observe the abovementioned regulations and the instructions supplied by the manufacturer itself.

Once the appliance is installed

The firm that has undertaken the installation must provide the owner with a declaration that the installation has been carried out in compliance with proper workmanship practices, current national and local regulations, and the instructions supplied by Robur S.p.A.

Before contacting your authorised Robur Technical Assistance Centre (TAC) for the initial activation, the firm must ensure that:

- the electricity and gas mains specifications correspond to the specifications on the nameplate;
- the mains gas pressure falls within the range of values specified in Table 6.1 Network gas pressure → 61;
- the gas supplied to the appliance is of the type for which it is designed;
- the gas supply system and water distribution system are sealed;
- the gas and electricity supply systems are correctly rated for the capacity required by the appliance and that they are equipped with all safety and control devices prescribed by current regulations

Check that no safety and control devices are excluded, by-passed or not working correctly.

Initial activation procedure

The entire procedure for the first activation of the appliance must be carried out exclusively by an authorized Robur Technical Assistance Centre (TAC) and according to the instructions supplied by the manufacturer.
To carry out entire procedure correctly, follow the instructions in Paragraph 6.1 PROCEDURE FOR INITIAL ACTIVATION → 59.

Contact your local Authorised Robur Technical Assistance Centre (TAC). To find out who your local TAC is, contact Robur S.p.A. (tel. +39 035 888.111). **The guarantee could be voided if the initial activation is not carried out (and validated) by a Robur TAC.**

Operation and maintenance of the appliance

To ensure the correct operation of the appliance and to avoid failures, control of the switching on and off of the appliance must be done in line with the requirements of the various types of installation.

- If the appliance is connected to the DDC (see Figure 5.3 Direct Digital Control (DDC) → 41), the appliance may be switched on and off exclusively by the DDC itself.
- If the appliance is NOT connected to a Direct Digital Control (DDC) the appliance may be switched on and off exclusively by a switch on the consent circuit.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the Controle Device (CCP, DDC or consent switch) before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can irreparably damage its internal components!

If the appliance fails to operate correctly, with the consequent indication of the Machine code, follow the instructions of Paragraph 8.1 MACHINE OPERATING CODES → 69.

In the event of failure of the appliance and/or breakage of any of its parts, refrain from any attempt to repair and/or restore operation of the appliance through direct action.

- deactivate the appliance immediately (if permitted and if no condition of danger exists) by starting the shutdown cycle via the CCP (or DDC or consent switch) and waiting for it to terminate (approximately 7 minutes);
- disconnect the appliance from the gas and electricity mains, cutting off gas supply by means of the appropriate valve and the power supply by means of the external circuit breaker provided by the electrical system installation technician on the appropriate panel.

Correct **routine maintenance** ensures the efficiency and good operation of the appliance over time.
Carry out maintenance operations according to the instructions supplied by the manufacturer.
For maintenance of the appliance's internal components, contact a Robur TAC or qualified technician; for other maintenance requirements, see Paragraph 6.2 MAINTENANCE → 63.
Any repair of the appliance must be carried out by an authorised Robur Technical Assistance Centre (TAC), using only original parts.

Failure to observe the indications given above may compromise the operation and safety of the appliance, and may invalidate its guarantee, if active.

If the appliance is to be disposed of, contact Robur S.p.A. for its correct disposal.

If the appliance is to be sold or transferred to another owner, ensure that this "Installation, user and maintenance manual" is handed over to the new owner and installation technician.

2.2 NOTES ON OPERATION OF THE APPLIANCE

The appliance uses the water/ammoniac absorption thermodynamic cycle ($H_20 – NH_3$) to produce hot water, using atmospheric air as renewable energetic source.
The water/ammoniac thermodynamic cycle used on the unite GAHP-A, is implemented in a hermitically sealed circuit which has no mechanical unions and is checked directly by manufacturer to ensure the perfect seal of all joints, thus making refrigerant top ups completely unnecessary.

Description and general characteristics

The air-water gas absorption heat pump GAHP-A is available in the following versions:

- Version **HT**: optimised for high temperature heating systems (radiators, fan coils); it produces hot water to +65°C for heating purposes and up to +70°C for sanitary hot water.
- Version **LT:** optimised for low temperature floor heating systems; it produces hot water to +55°C for heating purposes and up to +70°C for sanitary hot water.

The GAHP heat pump can be controlled with the Direct Digital Control (vedere Figura 5.3 Direct Digital Control (DDC) → 41) or with a switch on the consent circuit.
During operation, combustion products are exhausted via the discharge terminal at the left side of the appliance (see Figure 2.1 Size (Standard ventilation) → 14 or Figure 2.2 Size → 15). The fumes outlet must be connected to a flue (for further details, see Paragraph 4.7 EXHAUSTING THE COMBUSTION PRODUCTS → 35).
The appliance is powered with 230 Vac 1N - 50 Hz.

2.3 TECHNICAL MANUFACTURING CHARACTERISTICS

The appliance is supplied with the following technical manufacturing characteristics, control and safety components:

- Steel sealed circuit, treated on the outside with epoxy paint.
- Sealed combustion chamber suited for type C installation.
- Metal mesh irradiation burner equipped with ignition and flame detection managed by an electronic control unit.
- Tube coil heat recovery (AISI 304L).
- Air-based heat exchanger with single-position finned coil, manufactured in steel tubing and aluminium fins.
- Titanium stainless steel tube bundle water exchanger, with external insulation.
- Automatic two-way microprocessor-controlled defrosting valve, allowing the finned coil to be defrosted.

Control and safety components

- S61 controller with integrated microprocessor and LCD display and control knob, complete with "Mod10" supplementary combustion modulation controller (see Figure 5.1 Electronic board S61 → 39 and Figure 5.2 Mod10 controller → 41).
- Plant water flowmeter.
- Sealed circuit high temperature limit thermostat, manual reset.
- Flue temperature limit switch, automatic reset.
- Flue temperature thermostat 120 °C, manual reset.
- Sealed circuit safety relief valve.
- Safety by-pass valve, between high and low pressure sealed circuit.
- Antifreeze function for hydronic system.
- Ionization flame control box.
- Double shutter electric gas valve.
- Condensate siphon icing sensor.

2.4 TECHNICAL DATA

Table 2.1 – GAHP-A LT technical data

			GAHP-A LT	GAHP-A LT S
OPERATION WHEN HEATING				
OPERATING POINT A7W50	G.U.E. gas usage efficiency	%	151 (1)	
	Thermal power	kW	34,9 (1)	
OPERATING POINT A7W35	G.U.E. gas usage efficiency	%	165	
	Thermal power	kW	38,4	
Thermal capacity	Nominal (1013 mbar - 15°C)	kW	25,7	
	true peak	kW	25,2	
NOx emission class			5	
NOx emission		ppm	25	
CO emission		ppm	36	
Hot water delivery temperature	maximum for heating	°C	55	
	maximum for ACS	°C	70	
Hot water return temperature	maximum heating	°C	45	
	maximum for ACS	°C	60	
	minimum	°C	2	
Hot water flow rate	nominal	l/h	3000	
	maximum	l/h	4000	
	minimum	l/h	1000	
Hot water pressure drop	nominal water pressure (A7W50)	bar	0,43 (2)	
Ambient air temperature (dry bulb)	maximum	°C	45	
	minimum	°C	-20 (7)	
Thermal differential	nominal	°C	10	

			GAHP-A LT	GAHP-A LT S
gas consumption	methane G20 (nominal)	m3/h	2,72 (3)	
	G30 (nominal)	kg/h	2,03 (4)	
	G31 (nominal)	kg/h	2,00 (4)	
ELECTRICAL SPECIFICATIONS				
Power supply	Voltage	V	230	
	TYPE		SINGLE PHASE	
	Frequency	50 Hz supply	50	
Electrical power absorption	nominal	kW	0,90 (5)	1,09 (5)
Degree of protection	IP		X5D	
INSTALLATION DATA				
Level of acoustic pressure at 10 meters (maximum)		dB(A)	54 (8)	48 (8)
Minimum storage temperature		°C	-30	
Maximum operating pressure		bar	4	
Water content inside the apparatus		l	4	
Water fitting	TYPE		F	
	thread	" G	1 1/4	
Gas fitting	TYPE		F	
	thread	" G	3/4	
Fume outlet	Size	mm	80	
	Residual head	Pa	80	
Maximum condensation water flow rate		l/h	4	
Size	width	mm	848 (6)	
	height	mm	1281 (6)	1537 (6)
	depth	mm	1258	
Weight	In operation	kg	390	400
GENERAL INFORMATION				
INSTALLATION MODE			B23P, B33, B53P	
COOLING FLUID	AMMONIA R717	kg	7	
	WATER H2O	kg	10	
MAXIMUM PRESSURE OF THE COOLING CIRCUIT		bar	35	

Notes:

1. In compliance with EN12309-2 Standard evaluated on real lower heating capacity weakened with respect to the nominal value. For functioning conditions different to the nominal ones, refer to the PRO platform design manual.
2. For flow rates different to the nominal refer to the PRO platform Design Manual.
3. PCI 34.02 MJ/m3 (1013 mbar – 15 ° C).
4. PCI 46.34 MJ/kg (1013 mbar – 15 ° C).
5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 2.1 Size (Standard ventilation) ⟶ 14 and Figure 2.2 Size ⟶ 15).
7. It's possible to have a special configuration for operation to -30 °C (as an optional).
8. Free field, frontal, directionality factor 2.

Table 2.2 – GAHP-A HT technical data

			GAHP-A HT	GAHP-A HT S
OPERATION WHEN HEATING				
OPERATING POINT A7W50	G.U.E. gas usage efficiency	%	152 (1)	
	Thermal power	kW	35,4 (1)	
OPERATING POINT A7W65	G.U.E. gas usage efficiency	%	119	
	Thermal power	kW	27,5	
OPERATING POINT A-7W50	G.U.E. gas usage efficiency	%	125	
	Thermal power	kW	31,5	
Thermal capacity	Nominal (1013 mbar - 15°C)	kW	25,7	
	true peak	kW	25,2	
NOx emission class			5	
NOx emission		ppm	25	
CO emission		ppm	36	

			GAHP-A HT	GAHP-A HT S
Hot water delivery temperature	maximum for heating	°C	65	
	maximum for ACS	°C	70	
Hot water return temperature	maximum heating	°C	55	
	maximum for ACS	°C	60	
	minimum	°C	2	
Hot water flow rate	nominal	l/h	3000	
	maximum	l/h	4000	
	minimum	l/h	1000	
Hot water pressure drop	nominal water pressure (A7W50)	bar	0,43 (2)	
Ambient air temperature (dry bulb)	maximum	°C	45	
	minimum	°C	-20 (7)	
Thermal differential	nominal	°C	10	
gas consumption	methane G20 (nominal)	m3/h	2,72 (3)	
	G30 (nominal)	kg/h	2,03 (4)	
	G31 (nominal)	kg/h	2,00 (4)	
ELECTRICAL SPECIFICATIONS				
Power supply	Voltage	V	230	
	TYPE		SINGLE PHASE	
	Frequency	50 Hz supply	50	
Electrical power absorption	nominal	kW	0,90 (5)	1,09 (5)
Degree of protection	IP		X5D	
INSTALLATION DATA				
Level of acoustic pressure at 10 meters (maximum)		dB(A)	54 (8)	48 (8)
Minimum storage temperature		°C	-30	
Maximum operating pressure		bar	4	
Water content inside the apparatus		l	4	
Water fitting	TYPE		F	
	thread	" G	1 1/4	
Gas fitting	TYPE		F	
	thread	" G	3/4	
Fume outlet	Size	mm	80	
	Residual head	Pa	80	
Maximum condensation water flow rate		l/h	4	
Size	width	mm	848 (6)	
	height	mm	1281 (6)	1537 (6)
	depth	mm	1258	
Weight	In operation	kg	390	400
GENERAL INFORMATION				
INSTALLATION MODE			B23P, B33, B53P	
COOLING FLUID	AMMONIA R717	kg	7	
	WATER H2O	kg	10	
MAXIMUM PRESSURE OF THE COOLING CIRCUIT		bar	35	

Notes:

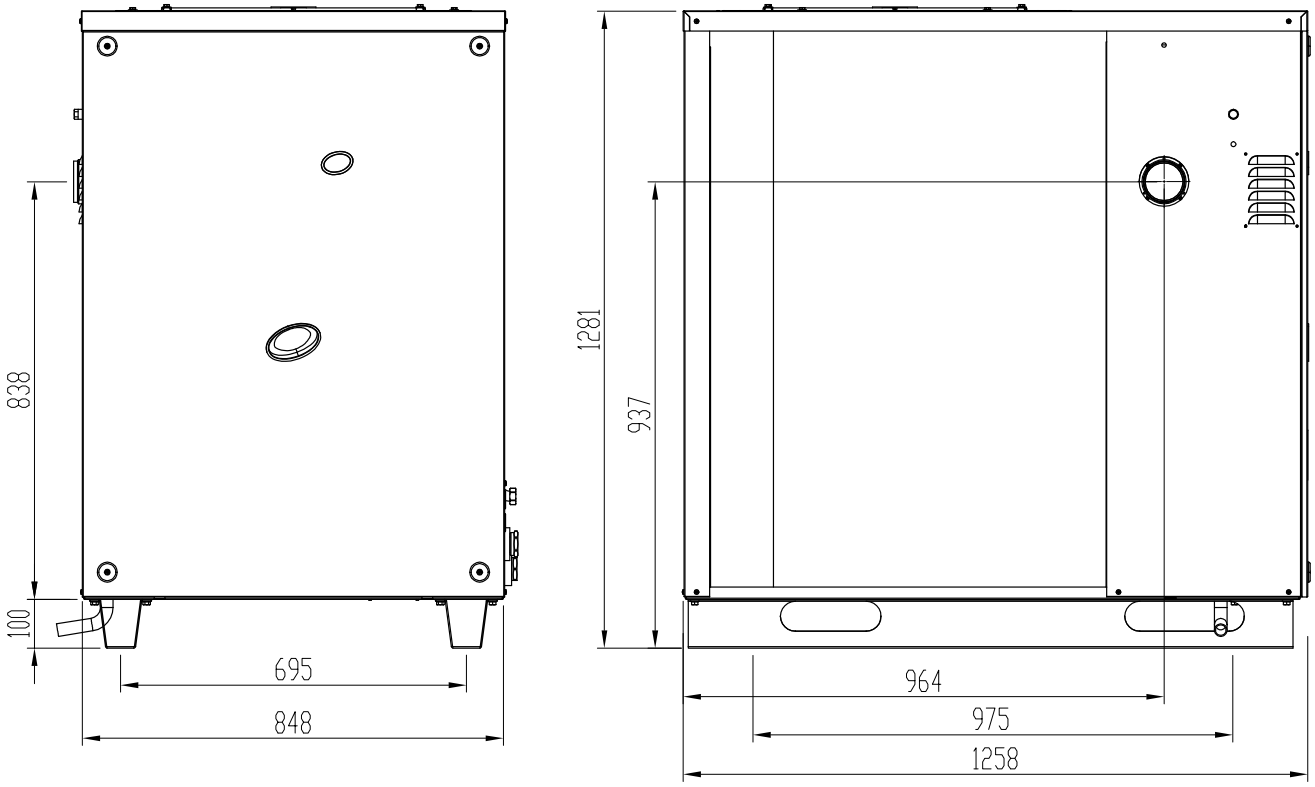
1. In compliance with EN12309-2 Standard evaluated on real lower heating capacity weakened with respect to the nominal value. For functioning conditions different to the nominal ones, refer to the PRO platform design manual.
2. For flow rates different to the nominal refer to the PRO platform Design Manual.
3. PCI 34.02 MJ/m3 (1013 mbar – 15 ° C).
4. PCI 46.34 MJ/kg (1013 mbar – 15 ° C).
5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 2.1 Size (Standard ventilation) → 14 and Figure 2.2 Size → 15).
7. It's possible to have a special configuration for operation to -30 °C (as an optional).
8. Free field, frontal, directionality factor 2.

Table 2.3 – PED data

			GAHP-A LT	GAHP-A HT	GAHP-A LT S	GAHP-A HT S
PED data						
COMPONENTS UNDER PRESSURE	Generator	l	18,6			
	Leveling chamber	l	11,5			
	Evaporator	l	3,7			
	Cooling volume transformer	l	4,5			
	Cooling absorber solution	l	6,3			
	Solution pump	l	3,3			
TEST PRESSURE (IN AIR)		bar g	55			
SAFETY VALVE PRESSURE CALIBRATION		bar g	35			
FILLING RATIO		kg of NH3/l	0,146			
FLUID GROUP			GROUP 1°			

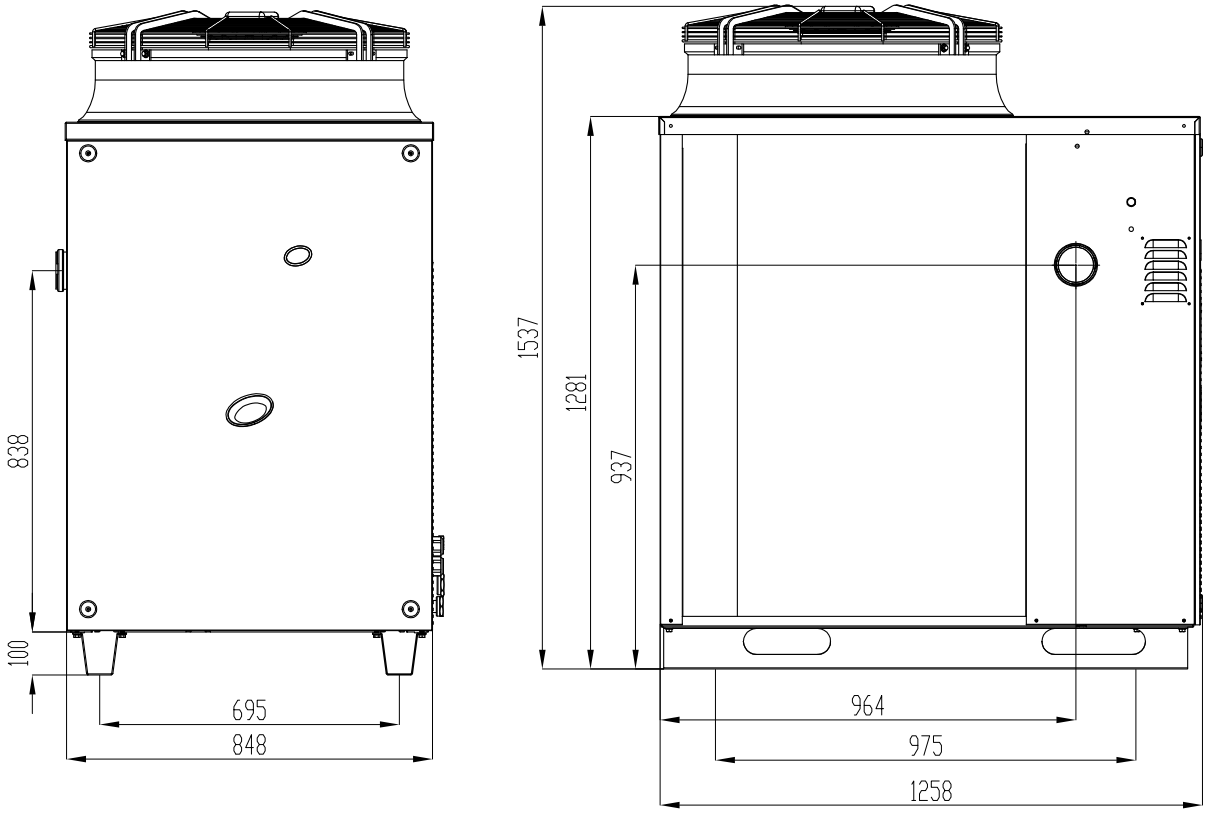
2.5 DIMENSIONS AND SERVICE PANEL

Figure 2.1 – Size (Standard ventilation)



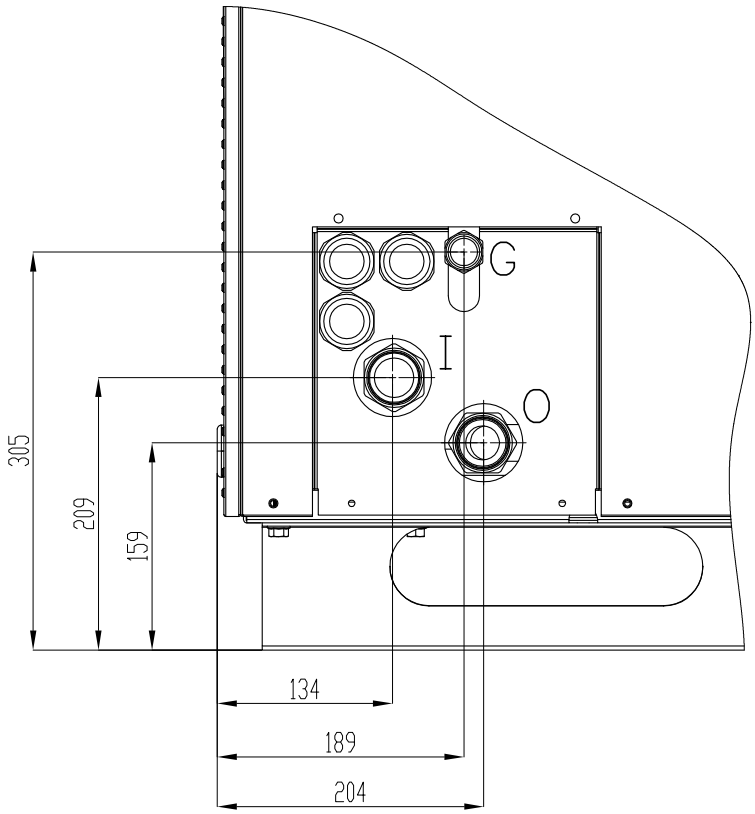
Front and side views (dimensions in mm).

Figure 2.2 – Size



Front and side views (dimensions in mm).

Figure 2.3 – Service plate



LEGEND

G	Gas fitting Ø ¾" F
I	Inlet water fitting Ø 1¼" F
O	Outlet water fitting Ø 1¼" F

Hydraulic/gas unions detail

3 NORMAL OPERATION

In this section you will find all the indications necessary for the activation, regulation and control of operation of the appliance depending on the type of installation and control setup.

- **TYPE A (NOT APPLICABLE at PRO Platform)**: controlled by Comfort Control Panel.
- **TYPE B**: controlled by DDC (see Figure 5.3 Direct Digital Control (DDC) → 41).
- **TYPE C**: controlled by consent switch (e.g. on-off switch, ambient thermostat, timer, etc.).

3.1 START UP (AND SHUT DOWN)

Efficient operation and long life of the appliance depend largely on its correct use!

Before activating the appliance, check that:

- the gas valve is open;
- the appliance is powered electrically;
- the CCP/DDC are electrically powered;
- the installation technician has ensured that the hydraulic circuit is supplied in the correct conditions.

If these conditions are satisfied, it is possible to proceed with activation.

Type A: appliance connected to Comfort Control Panel (CCP)

Type NOT APPLICABLE at PRO platform.

Type B: appliance connected to a Direct Digital Controller (DDC)

If the appliance is connected to a Direct Digital Controller (see Figure 5.3 Direct Digital Control (DDC) → 41) and the DDC is in controller mode, activation and control of the appliance will occur exclusively by operating the DDC. In this case, refer to the manual supplied with it.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the DDC before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can irreparably damage its internal components!

Type C: standalone appliance

Standalone appliances must be activated and deactivated only by means of the consent switch provided by the electrical installation technician.
According to requirements, this consent switch may be an on/off button, an ambient thermostat, a programmable timer, or one or more voltage free contacts controlled by another process. For details about the type of on/off command installed, contact the plant's electrical installation technician.

The appliance must never normally be switched on and off by shutting off the power supply upstream of the Controle Device (CCP, DDC or consent switch) before having used the latter first and waited for the shutdown cycle to end (approximately 7 minutes). The shutdown cycle terminates when the hydraulic pump switches off (no parts in motion).

Shutting off the power supply while the appliance is running can irreparably damage its internal components!

Start up

Switch on the appliance by means of the on/off command (placing it in the "ON" position).

When activation is successful, the appliance is managed by the S61 controller in its electrical panel (see paragraph 3.2 ON-BOARD ELECTRONICS → 19). The controller's display may be viewed through the viewing hole on the front panel of the unit itself.

During operation, the S61 controller displays operating codes.

If the appliance remains inactive for a prolonged period, it is possible that air is present in the gas pipes. In this case, activation fails and the appliance reports the operating code: "u412" - flame controller arrest (temporary) (see Paragraph 8.1 MACHINE OPERATING CODES → 69) and after a brief interval the appliance automatically launches the start up procedure again. If code u 412 is signalled 4 times on successive activation attempts, the code persists, the appliance locks out the flame controller and displays the following operating code: "E412" – flame controller arrest (see Paragraph 8.1 MACHINE OPERATING CODES → 69). In this case reset is not automatic.

To restore operation of the appliance, carry out a reset of the flame control unit via menu 2 of the controller: the procedure is illustrated in Paragraph 3.3 RESET OPERATIONS AND MANUAL DEFROSTING → 21. After it is reset, the appliance will make a new attempt to activate.

If the appliance locks out several times, contact a Robur TAC by calling the Technical Service Department of Robur S.p.A. (tel. 035 888.111).

Shut down

Switch off the appliance via the on/off command (placing it in the "OFF" position).

The shutdown cycle takes approximately 7 minutes to complete.

VISUALISING AND RESETTING OPERATING CODES

Operating codes can be generated:

- by the S61 on-board controller;
- by the CCP/DDC (if present).

The operating codes generated by the S61 controller are displayed on its screen and can also be viewed on the CCI (if present) or DDC (if present).

Operating codes generated by the controller can be cleared through the board itself or from the CCI/DDC (if fitted and allowed).

For a description of operating codes generated by the controller and how to clear them, refer to the list of operating codes contained in Paragraph 8.1 MACHINE OPERATING CODES → 69.

The controller (see Figure 5.1 Electronic board S61 → 39) is located inside the electrical panel of the appliance and the display may be viewed through the viewing hole on the front panel of the unit itself.

The Machine Codes generated by the CCI/DDC may only be viewed on the display of the CCI/DDC and may be cleared only through the CCI/DDC.

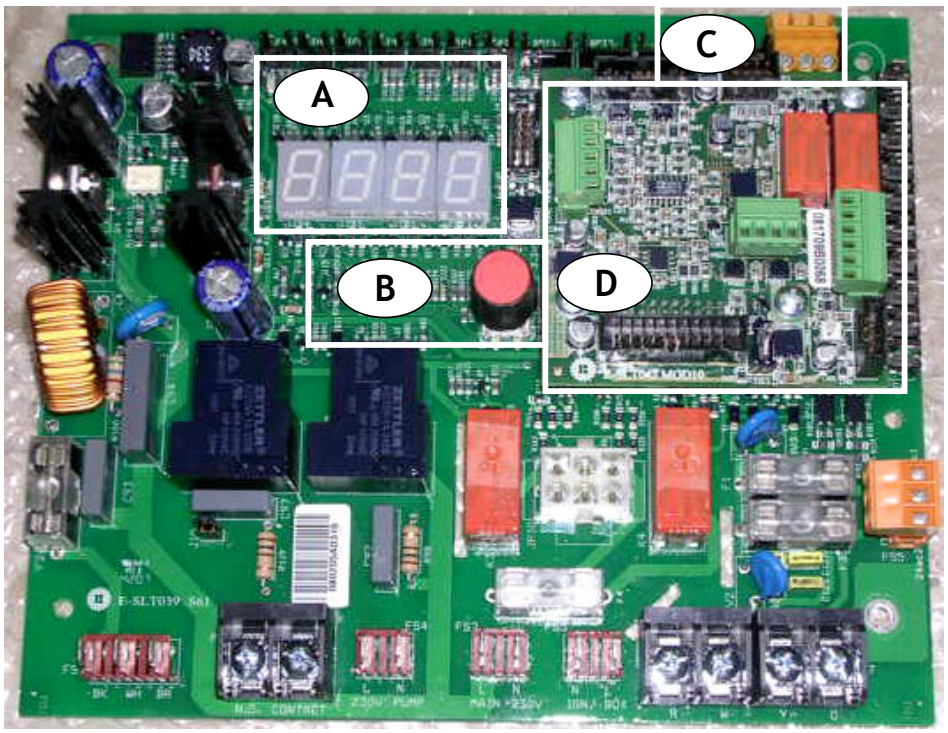
For the operating codes generated by the CCP/DDC, refer to the manuals supplied with the unit.

3.2 ON-BOARD ELECTRONICS

The following descriptions refer to the S61 controller with firmware version 3.015.

The appliance is fitted with an S61 microprocessor controller with Mod10 combustion modulation controller mounted above it (see Figure 3.1 On-board controller → 19).
The S61 controller, in the electrical panel, controls the appliance and displays data, messages and operating codes.
Programming, control and monitoring of the appliance take place by interacting with the display A and knob B shown in Figure 3.1 On-board controller → 19. La porta CAN The CAN BUS port connects one or several appliances to the CCP (if present) or a DDC (if present).
The Mod10 controller (see detail D in Figure 3.1 On-board controller → 19) is used for combustion modulation.

Figure 3.1 – On-board controller



LEGEND

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

S61 + Mod10

Description of menu of S61 controller

The parameters and settings of the appliance are grouped in the menus shown on the controller's display:

Table 3.1 – Menu of electronic board

MENU	MENU DESCRIPTION	THE DISPLAY SHOWS
Menu 0	VIEW DATA (TEMPERATURE, VOLTAGE, PUMP SPEED, ECC...)	0.
Menu 1	VIEW ALL PARAMETERS	1.
Menu 2	ENTER ACTIONS	2.
Menu 3	USER SETTINGS (THERMOSTATING, SET-POINT, T. DIFFERENTIAL)	3.
Menu 4	INSTALLATION TECHNICIAN SETTINGS	4.

MENU	MENU DESCRIPTION	THE DISPLAY SHOWS
Menu 5	TECHNICAL ASSISTANCE CENTRE SETTINGS	5.
Menu 6	TECHNICAL ASSISTANCE CENTRE SETTINGS (MACHINE TYPE)	6.
Menu 7	VIEW DIGITAL IMPUTS	7.
Menu 8	(MENU NOT USED)	8.
E	(EXIT MENU)	E.

Menu list of electronic board

Menus 0, 1 and 7 are Viewing Menus: they only allow the information displayed to be read, and not modified. Via menu 0 it is possible to view the appliance operating data as detected by the board in real time; Menu 1 shows the parameters that characterise the operation of the appliance and their current values.
Menu 7 pertains exclusively to Robur's authorized Technical Assistance Centres.
To view the information contained in these menus, proceed as illustrated in the paragraph "How to acces the menus".
Menu 2 is an execution menu: it is used to reset the flame controller, reset errors and manual defrosting control.
To perform these procedures, see Paragraph 3.3 RESET OPERATIONS AND MANUAL DEFROSTING → 21.
Menu 3 is a settings menu: it allows the values displayed to be set. The correct values of these parameters, for optimum performance of the appliance with the plant to be used connected, have already been set during installation. In any case, to set new values for the parameters, see Paragraph 4.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 36.
Menus 4, 5, 6 and 7 exclusively concern the installation technician and Robur's authorized Technical Assistance Centre.
Menu 8 may currently be selected, but not used.

Display and knob

The controller's display can be viewed through the glass of the viewing aperture on the front panel of the appliance.
Upon activation, all of the LEDs of the display light up for approximately three seconds, and then the name of the board, S61, appears. After around 15 seconds after the appliance powers up, the appliance starts running if the required consent is available.
During correct operation the display shows, alternately, the following information: outlet water temperature, inlet water temperature, and the difference between the two water temperatures (see Table 3.2 Operating information → 20).

Table 3.2 – Operating information

OPERATING MODE: HEATING	
PARAMETER	THE DISPLAY SHOWS
Hot outlet water temperature	50.0
Hot inlet water temperature	40.0
Differential temperature (outlet - inlet)	10.0

Example of data visualised on display: water temperature and differential

If there are operating problems, the display shows, sequentially, the operating codes corresponding to the problem detected. A list of these codes with their description and the procedure to follow to bring the appliance back to correct operation is provided in Paragraph 8.1 MACHINE OPERATING CODES → 69.
The knob is used to display or set parameters, or to execute actions/commands (e.g.: a function or reset), when permitted.

HOW TO ACCESS THE MENUS

- To use the knob with the special key supplied with the appliance:

You will need: the appliance's electrical power switches set to "ON"; the controller's display sequentially shows the operating data (temperature, delta T) regarding the current mode (e.g.: heating) and any active operating codes ("u/E...").

1. Remove the front panel by removing the fixing screws.
2. Remove the cover of the electrical panel to access the knob.
3. Use the special key through the hole to operate the knob and access the controller's menus and parameters.
4. To display the menus just press the knob once: the display shows the first menu: "0." (= menu 0).
5. The display shows "0.". To display the other menus, turn the knob clockwise; The display will read, in order: "1.", "2.", "3.", "4.", "5.", "6.", "7.", "8." and "E" (see Table 3.1 Menu of electronic board → 19).
6. To display the parameters in a given menu (for example, menu 0), turn the knob until it displays the menu in question (in the example: "0.") and press the knob: the display will show the first of the menu's parameters, in this example "0.0" or "0.40" (= menu 0, parameter "0" or "40").
7. In the same way: **turn** the knob to scroll through content (menus, parameters, actions), **press** the knob to select/confirm the content (access a menu, display/set a parameter, execute an action, quit or return to the previous level). For example, to quit the menus, turn the knob to scroll through menus "0.", "1.", "2." etc. until the controller displays the quit screen "E"; now press the knob to quit.

In the case of menus 0 and 1, the user can view any parameter. For information about menu 2, refer to Paragraph 3.3 RESET OPERATIONS AND MANUAL DEFROSTING → 21. To set the parameters of menu 3, refer to Paragraph 4.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 36. The other menus are not for the User: the information in these menus is dealt with in the sections dedicated to the installation technician or Robur TAC.

The special key allows the knob of the electronic board to be operated without opening the cover of the electrical panel, so that operators are protected from live components. When the necessary settings have been completed, put away the special key, replace the cap on the aperture of the electrical panel and refit the front panel of the appliance.

3.3 RESET OPERATIONS AND MANUAL DEFROSTING

There are several possible reasons why the appliance may have error status and therefore its operation arrested; such an error situation does not necessarily correspond to damage or malfunction on the part of the appliance. The cause that has generated the error may be temporary: for example, presence of air in the gas supply line or temporary power failure.
The appliance can be reset with controller menu 2, the Comfort Control Panel (if present) or the DDC (if present). In these two latter cases, refer to their documentation.

Reset appliance controller

The Table 3.3 Menu 2 → 22 shows the actions available in menu 2.

For regulatory reasons, the flame controller reset is in a dedicated voice of menu.

Table 3.3 – Menu 2

ACTION	REQUIRED FOR EXECUTION	SHOWN ON DISPLAY AS
20	Reset flame controller arrest	2. 20
21	Reset other operating codes	2. 21
22	Manual defrost	2. 22
23	Timed forcing to minimum power	2. 23
24	Timed forcing to maximum power	2. 24
25	Regulation of power	2. 25
E	(EXIT MENU)	2. E

The general operating codes of the controller can be reset with functions "20" and "21". Actions "23", "24" and "25" are used to regulate the combustion parameters or for gas type changeovers, and are thus for use only by the installation technician or Robur TAC (for other information refer to Paragraph 6.1 PROCEDURE FOR INITIAL ACTIVATION → 59).

ACTION "20"

Reset flame controller arrest; this may be used when the appliance is first activated, see Paragraph 3.1 START UP (AND SHUT DOWN) → 17, when the appliance is in a permanent locked condition or after a long period of disuse (see Paragraph 3.5 PROLONGED PERIODS OF DISUSE → 23).

You will need: access to the electrical panel, see Paragraph "Display and knob".

To reset the flame control unit select menu 2, as indicated in the Paragraph "Accessing the Menus"; then proceed as follows:

1. The display shows: "2." press the knob to access the menu. The display initially shows item "2. 20".
2. Press the knob to display the flashing reset request: "reS1".
3. Press the knob again to reset the flame controller. The reset request stops flashing, and again the display shows "2. 20". The reset operation has been performed.
4. To quit the menu, turn the knob clockwise until the "2. E" is displayed. Now press the knob to return to menu selection: "2.".
5. To exit the menu selection and return to the normal visualisation of the parameters of the appliance, turn the knob clockwise until "E" displays; press the knob to quit.

ACTION "21"

Reset other warnings/errors; this is required to reset any warnings and errors that may occur during operation of the appliance.

You will need: access to the electrical panel, see Paragraph "Display and knob".

To reset the controller errors, select menu 2, as indicated in the Paragraph "Accessing the Menus"; Then:

1. The display shows: "2." press the knob to access the menu. The display initially shows item "2. 20".
2. Turn the knob clockwise to display item "2. 21".
3. Press the knob to display the flashing reset request: "rEr1".
4. Press the knob again to perform a board error reset. The reset request stops flashing, and the again display shows "2. 21". The reset operation has been performed.
5. To quit the menu, turn the knob clockwise until the "2. E" is displayed. Now press the knob to return to menu selection: "2.".
6. To exit the menu selection and return to the normal visualisation of the parameters of the appliance, turn the knob clockwise until "E" displays; press the knob to quit.

ACTION "22"

Manual defrosting; the execution of the manual defrosting command, provided that the conditions exist (these are verified electronically), allows the fan coil to be defrosted, overriding software control regarding the timing of this operation.

Defrosting mode is managed automatically by the on-board electronics and is activated only under specific operating conditions (the on-board electronics verify the appropriate requirements).

You will need: access to the electrical panel, see Paragraph "Display and knob".

To execute the manual defrosting command, select menu 2 as described in the Paragraph "how to access the menus", then proceed as follows:

1. The display shows: "2." press the knob to access the menu. The display initially shows item "2. 20".
2. Turn the knob clockwise to display "2. 22".
3. Press the knob to display the manual defrosting flashing request: "deFr".
4. Press the knob again to execute the command. The manual defrosting request stops flashing, and the again display shows "2. 22". The manual defrosting operation has been performed (if the appropriate requirements are satisfied).
5. To quit the menu, turn the knob clockwise until the "2. E" is displayed. Now press the knob to return to menu selection: "2.".
6. To exit the menu selection and return to the normal visualisation of the parameters of the appliance, turn the knob clockwise until "E" displays; press the knob to quit.

3.4 OPERATING SETTINGS

The operations described require basic knowledge of the plant installed and of the S61 controller fitted to the appliance; before proceeding, you must acquire this information, Paragraph 3.2 ON-BOARD ELECTRONICS → 19.

At the moment of installation, the appliance is set up by the installation technician for best operation according to the type of plant installed. Subsequently it is possible to modify the operating parameters, but this is not recommended if not in possession of the necessary knowledge and experience in order to do so. In any case, to set new operating parameters for the appliance see Paragraph 4.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 36.

3.5 PROLONGED PERIODS OF DISUSE

When the appliance is to be inactive for a long period, it is necessary to disconnect the appliance before the period of disuse and reconnect it before it is used again.
To carry out these operations, contact a reputable hydraulic system installation technician.

Disconnecting the appliance

You will need: the appliance connected to the power/gas supply. Necessary equipment and materials.

1. If the appliance is in operation, switch it off with the CCP (if present) or DDC (if present), or the consent switch and wait for the shutdown cycle to terminate completely (approximately 7 minutes).

2. Disconnect the appliance from the power supply, putting the external disconnection switch in the OFF position (see GS in Figure 5.5 Electrical wiring diagram → 43) provided in the appropriate panel by the installation technician.
3. Close the gas valve.

Do not leave the appliance connected to power and gas supply if it is expected to remain inactive for a long period.

If you wish to disconnect the appliance during the winter, one of the following three conditions must be met:

1. make sure that the hydraulic plant connected to the appliance contains an adequate percentage of glycol antifreeze (see Paragraph 4.6 FILLING OF HYDRAULIC CIRCUIT → 34 and Table 4.2 Percentage of monoethylene glycol → 35);
2. empty the hydraulic circuit completely: for this purpose the plant must be provided with water drainage points that are adequately equipped, sized and located, to allow the water present in the circuit to drain away completely and to allow the correct disposal of any glycol antifreeze present. For these operations, contact a reputable hydraulic system installation technician;
3. activate the antifreeze function, which runs the circulation pumps and the appliance under 6°C. To do this, contact your hydraulic system installation technician. This function requires the appliance to be ALWAYS powered up (electricity and gas) and power failures excluded.**Otherwise the manufacturer declines all contractual and extra-contractual liability for consequent damage.**

Connecting the appliance before it is used again (to be carried out by the installation technician)

Before starting this procedure, the hydraulic system installation technician must:

- ascertain whether the appliance requires any maintenance operations (contact your authorised Robur Technical Assistance Centre or consult Paragraph 6.2 MAINTENANCE → 63);
- fill the hydraulic circuit if it has been emptied, carrying out the instructions given in Paragraph 4.6 FILLING OF HYDRAULIC CIRCUIT → 34;
- if the hydraulic circuit has not been emptied, check that the water content of the plant is correct; if necessary, top up the circuit to at least the minimum quantity (see Paragraph 4.6 FILLING OF HYDRAULIC CIRCUIT → 34);
- if necessary add, to the water of the system (free of impurities), inhibited monoethylene glycol antifreeze in a quantity in proportion to the MINIMUM winter temperature in the area of installation (see Table 4.2 Percentage of monoethylene glycol → 35);
- bring the plant to the correct pressure, making sure that the pressure of the water in the plant is not less than 1 bar and not over 2 bar;

You will need: the appliance disconnected from the electricity/gas supply

1. open the plant gas supply valve to the appliance and make sure that there is no smell of gas (indicating possible leaks);
2. If no smell of gas is detected, connect the appliance to the electricity supply mains via the external circuit breaker provided by the installation technician in the appropriate panel (set the "GS" circuit breaker to the "ON" position, see Figure 5.5 Electrical wiring diagram → 43);
3. power up the CCP (if present) or DDC (if present);
4. check that the hydraulic circuit is charged;

5. check that the condensate siphon is NOT empty or blocked (see Paragraph 4.5 CONDENSATE DISCHARGE CONNECTION → 32);
6. check that the air/fumes pipes are not blocked.
7. switch on the appliance by means of the on/off command (or DDC if present and in control mode, or via CCP, if present).

4 HYDRAULIC SYSTEM INSTALLATION TECHNICIAN

In this section you will find all the instructions necessary for installing the appliance from a hydraulic viewpoint.

Before proceeding with operations to create the hydraulic and gas supply plant of the appliance, the professionally qualified personnel concerned are advised to read Paragraph 2.1 WARNINGS → 7: it provides important information regarding installation safety and references to current regulations.

4.1 GENERAL INSTALLATION PRINCIPLES

Prior to installation, carry out careful internal cleaning of all pipes and every other component to be used both on the hydraulic plant and the fuel supply plant, in order to remove any residues that may compromise operation of the appliance.

Installation of the appliance must be carried out in compliance with current regulations regarding design, installation and maintenance of heating and cooling plants and must be undertaken by professionally qualified personnel in accordance with the manufacturer's instructions.
During the installation stage, observe the following indications:

- Check that there is an adequate mains gas supply, in accordance with the manufacturer's specifications; see Table 6.1 Network gas pressure → 61 for the correct supply pressures.
- The appliance must be installed outdoors, located in an area in which air circulates naturally and which does not require any particular protection from the weather. **In no case must the appliance be installed inside a room.**
- The front of the appliance must be at least 80 cm away from walls or other fixed constructions; the right and left sides must have a minimum clearance of 45 cm; the minimum rear clearance from walls is 60 cm. (see Figure 4.2 Clearances → 30).
- No obstruction or overhanging structure (protruding roofs, eaves, balconies, ledges, trees) must obstruct either the air flowing from the top part of the appliance, or the exhaust fumes outlet.
- The appliance must be installed in such a way that the exhaust fumes outlet is not in the immediate vicinity of any external air inlets of a building. Respect current regulations regarding the exhaust fumes outlet.
- Do not install the appliance close to flues, chimneys or other similar structures, in order to prevent hot or polluted air from being drawn by the fan through the condenser. In order to function correctly the appliance must use clean air from the environment.
- If it is necessary to install the appliance near buildings, make sure that the appliance is not in the line of water dripping from guttering or similar.
- Fit a gas cock on the gas supply line.
- Fit antivibration joints on the hydraulic connections.

4.2 POSITION OF THE APPLIANCE

Lifting the appliance and placing it in position

The appliance must be kept in the same packing in which it left the factory while it is moved on site.

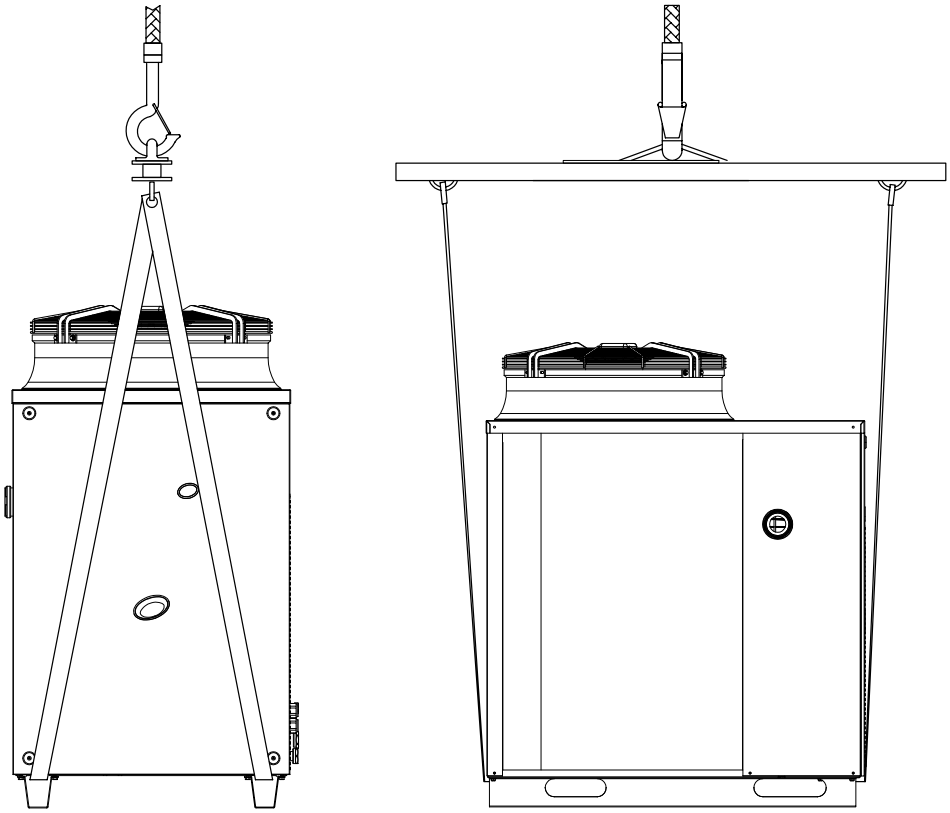
Packing must only be removed upon final installation.

If the appliance has to be lifted, connect braces to the openings provided on the base bar, and use suspension and spacer bars to prevent these braces from damaging the panels during moving operations (see Figure 4.1 Instruction for lifting → 28).

The lifting crane and all accessory devices (braces, cables, bars) must be suitable sized for the load to be lifted. For the weight of the appliance, consult Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12.

The manufacturer cannot be held responsible for any damage that occurs during the setting up of the appliance.

Figure 4.1 – Instruction for lifting



The appliance can be installed at ground level, on a terrace or on a roof (if compatible with its "dimensions" and "weight").
The dimensions and weight of the appliance are given in Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12.

MOUNTING BASE

Always position the appliance on a flat level surface that is made of fireproof material and able to sustain the weight of the appliance itself.
In addition, provide a small "containing" step that will prevent water from spreading during possible winter defrosting phases.

During winter operation, the appliance, on the basis of temperature and humidity conditions of the outside air, can carry out defrosting cycles that cause the layer of frost/ice on the fan coil to melt.

Take this possibility into consideration, adopting appropriate measures (for example: a "containing" step and channelling of water into a suitable drain) in order to prevent "un-

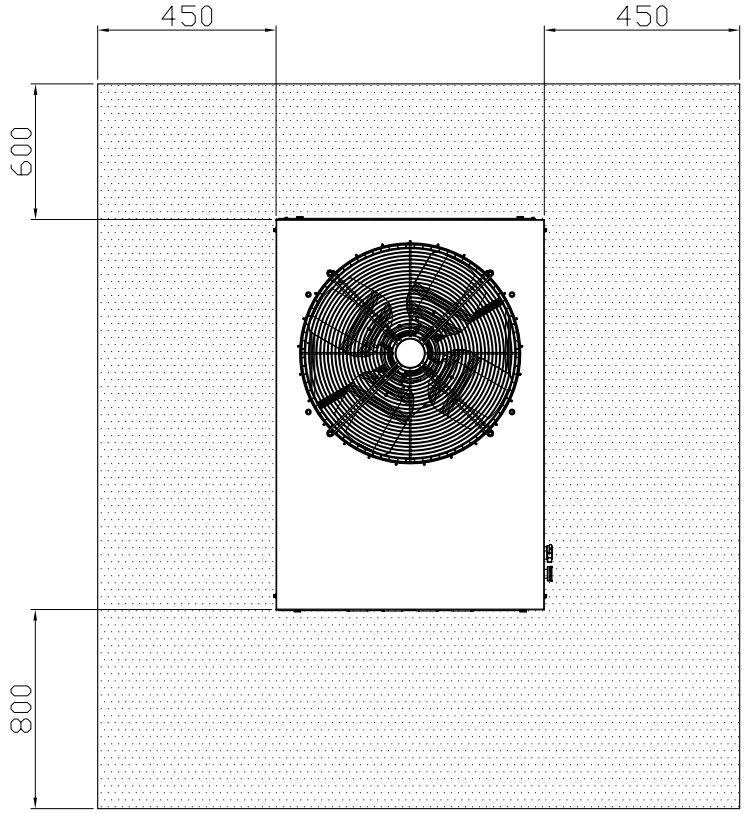
controlled" spread of water around the appliance and the consequent risk that a layer of ice will form (with the danger of falls on the part of passing people).
The manufacturer may not be held responsible for any damage arising from the failure to observe this warning.
Installation at ground level
If a horizontal support base is unavailable (see also "SUPPORTS and LEVELLING" below), it is necessary to create a flat level base in concrete which is larger than the dimensions of the base of the appliance by at least 100-150 mm on each side.
The dimensions of the appliance are given in Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12.
Provide a "containing" step and a suitable drainage channel for the water.
Installation on a terrace or roof
Position the appliance on a levelled flat surface made of fireproof material (see also "SUPPORTS and LEVELLING" below).
The structure of the building will have to support the weight of the appliance added to the weight of the supporting base.
The weight of the appliance is given in Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12.
Create a "containing" step and a suitable drainage channel for the water, providing a gangway around the appliance for maintenance purposes.
Although the appliance produces vibrations of limited intensity, the use of antivibration mounts (available as accessories, see Section 7 ACCESSORIES → 67) is strongly recommended in such cases of installation on roofs or terraces in which resonance phenomena may arise.
In addition, it is advisable to use flexible connections (anti-vibration joints) between the appliance and the hydraulic and gas supply pipes.

Avoid positioning the appliance directly above rest areas or other areas that require quiet.

SUPPORTS and LEVELLING
The appliance must be correctly levelled by placing a level on the upper part of the appliance.
If necessary, level the appliance with metal spacers, placing them appropriately in relation to the mounts; do not use wooden spacers as these degrade quickly.
CLEARANCES
Position the appliance so as to maintain **minimum clearances** from combustible surfaces, walls or other appliances, as illustrated in Figure 4.2 Clearances → 30.

Minimum clearances are necessary in order to be able to carry out maintenance operations and to ensure the correct airflow required for heat exchange with the finned coil.

Figure 4.2 – Clearances



Position the appliance preferably out of range of rooms and/or environments where strict silence is required, such as bedrooms, meeting rooms, etc.
Evaluate the acoustic impact of the appliance on the basis of the installation site: avoid locating the appliance in positions (corners of buildings, etc.) that could amplify the noise it produces (reverb effect).

4.3 HYDRAULIC CONNECTIONS

General indications

- The hydraulic plant may be created using pipes in stainless steel, black steel, copper or crosslinked polyethylene for heating/cooling plants. All water pipes and pipe connections must be adequately insulated in accordance with current regulations, to prevent heat loss and the formation of condensate..
- To prevent icing in the primary circuit in the winter, the appliance is equipped with an antifreeze device that activates the external water circulation pump of the primary circuit (if controlled by the appliance) and the burner of the appliance itself (when necessary). It is therefore necessary to ensure a continuous supply of electricity and gas to the appliance throughout the whole of the winter period. If it is not possible to ensure a continuous supply of electricity and gas to the appliance, use glycol antifreeze of the inhibited monoethylene type.
- If glycol antifreeze is to be used (see Paragraph 4.6 FILLING OF HYDRAULIC CIRCUIT → 34), DO NOT USE galvanised pipes, as they are potentially subject to corrosion phenomena in the presence of glycol.
- When rigid pipes are used, to prevent the transmission of vibrations, it is recommended that the appliance water inlet and outlet are connected with antivibration joints.

WARNING: the presence of free chlorine (CL_2) in the water can damage steel or copper parts of the installation. Make sure that water does not contain free chlorine; if in doubt, it is recommended to make a specific analysis and/or add to water some specific product (by example, Alphi-11 Protector, by Fernox, which also has inhibitory effect against possible icing). For further details, please contact directly Robur SpA (phone: 035 888 111). The non-respect of the above recommendations can compromise the smooth operation and the lifetime of the appliance, invalidating warranty.

Table 4.1 – Chemical and physical parameters of water

CHEMICAL AND PHYSICAL PARAMETERS OF WATER IN HEATING/COOLING SYSTEMS		
PARAMETER	**UNIT OF MEASUREMENT**	**OPTIMAL VALUE**
pH	\	6,5 - 8,0
Chlorides	mg/L	< 125
Total chlorine	mg/L	< 5
Total hardness ($CaCO_3$)	°F	10 - 15
Iron	mg/L	< 50
Copper	mg/L	< 3
Aluminium	mg/L	< 3
Langelier's index	\	0
SUBSTANCES HAZARDOUS EVEN AT VERY LOW CONCENTRATION		
Free chlorine		ABSENT
Fluorides		ABSENT
Sulphides		ABSENT

Physical and chemical properties of the system water.

The components described below, are those to be always fitted in proximity to the appliance:

- ANTIVIBRATION JOINTS in line with the water and gas connections of the appliance.
- MANOMETERS installed in the inlet and outlet water pipes.
- INLET FLOW CALIBRATION VALVE, either of the gate valve or the overcentre valve type, installed in the water inlet pipe of the appliance (only if the appliance is controller by a DDC).
- WATER FILTER installed in the appliance water inlet pipe.
- ISOLATION BALL VALVE in the water and gas pipes of the plant.
- 3 BAR SAFETY VALVE installed in the appliance outlet water pipe.
- PLANT EXPANSION TANK installed in the appliance outlet water pipe.
- EXPANSION TANK for individual appliance installed in the appliance water outlet pipe (primary side). Provide a plant expansion tank in any case (secondary side), installed in the appliance water outlet pipe.

The appliance is not equipped with an expansion tank: therefore it is necessary to install a suitable expansion tank, sized in relation to the maximum heat excursion and maximum operating pressure of the water of the plant.

- variable rate WATER CIRCULATION PUMP, FOR PLANT WITH A SINGLE APPLIANCE, located on the water inlet pipe of the appliance, flowing towards the appliance.
- variable rate WATER CIRCULATION PUMP, FOR PLANT WITH A SEVERAL APPLIANCES (each appliance have is pump), flowing towards the appliance.
- PLANT FILLING SYSTEM: if automatic filling systems are used, a seasonal check of the percentage of monoethylene glycol in the plant is recommended.

For the others components to instal on the system refer to "Design Manual" for the GAHP line. For further information or technical support in this regard, contact Robur S.p.A.'s Presales Office (tel.+39 035.888.111) or visite site www.robur.it.

The operations necessary for the First Activation or Regulation of the appliance must be carried out exclusively by an authorised Robur Technical Assistance Centre (TAC). These operations are described in Section 6 INITIAL ACTIVATION AND MAINTENANCE → 59.

The products' guarantee is void if initial activation is not carried out by a Robur TAC.

4.4 GAS SUPPLY SYSTEM

The installation of gas supply pipes must be carried out in compliance with norms and other current regulations.
The gas mains pressure must be in the range given in Table 6.1 Network gas pressure → 61.

Supplying gas to the appliance at higher pressures than those indicated above can damage the gas valve, giving rise to a situation of danger.

For LPG systems fit a first stage pressure reducer of the flow necessary near the liquid gas tank to reduce the pressure to 1.5 bar and a second stage pressure reducer from 1.5 to 0.03 bar near the appliance.

LPG may cause corrosion. The connectors between the pipes must be made of a material that is resistant to this corrosive action.

Vertical gas pipes must be equipped with a siphon and provided with a drain for the condensate that may form inside the pipe during cold periods. It may also be necessary to insulate the gas pipe to prevent the formation of excessive condensate.

In any case, provide a cut-off valve (cock) on the gas supply line, to isolate the appliance if required.

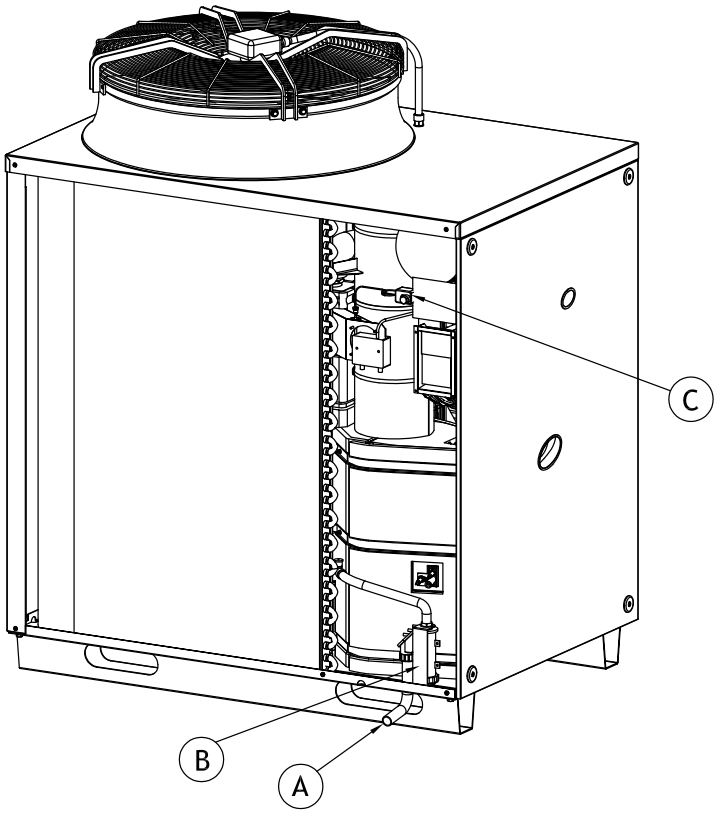
For data regarding hourly fuel consumption of the appliance, refer to Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12.

4.5 CONDENSATE DISCHARGE CONNECTION

The fumes condensate outlet is on the left of the unit.
The unit is supplied complete with a siphon to which a piece of pipe is attached. During transport, the pipe is stored inside the unit's left mounting bracket at the front of the appliance.
To install/connect the pipe, proceed as follows:

1. Pass the pipe through the hole in the left mounting bracket (see Figure 4.3 Position of condensate discharge and manual reset fumes thermostat → 33).
2. Connect the tube to a plastic condensate discharge manifold of the correct length.
3. The connection between the pipe and the condensate manifold must be in a visible location.

Figure 4.3 – Position of condensate discharge and manual reset fumes thermostat



LEGEND

A	Condensate drain pipe
B	Condensate drain siphon
C	Manual reset fumes thermostat

The condensate discharge to the sewer must be:

- sized so as to discharge the maximum condensation flow (see Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12 under the respective heading);
- implemented with material capable of resisting a degree of acidity equal to 3 - 5 pH;
- sized to ensure a slope of 10mm per metre of length; if this slope cannot be achieved, a condensate pump (available as an accessory) must be installed near to the discharge - see Section 7 ACCESSORIES → 67);
- implemented in such a way as to prevent the condensate icing in the expected operating conditions;
- mixed, for example, with domestic effluent (washing machine, dishwasher, etc.), usually of base pH, so as to form a buffer solution before discharge into the sewer.

Do not discharge the condensate into the guttering, since it may ice and corrode the materials normally used for gutters.

LOADING THE SIPHON

Proceed as follows to load the siphon:

1. Connect the condensate discharge pipe to a drain.
2. Pour 0.2 litres of water directly into the fumes discharge pipe and check that the siphon is full (detail B in Figure 4.3 Position of condensate discharge and manual reset fumes thermostat → 33).

If the appliance is operated with the siphon empty, there is a risk of leaks of combusted gas.

4.6 FILLING OF HYDRAULIC CIRCUIT

After having completed all the connections of the hydraulic, electrical and gas supply plants, the hydraulic system installation technician can proceed with filling the hydraulic circuit, observing the following stages:

You will need: the appliance connected hydraulically and electrically.

1. Activate the automatic air bleeding valves present in the plant and open all thermostatic valves.
2. Fill the hydraulic circuit, ensuring the minimum water content in the plant, and adding, if necessary, to the plant water (free of impurities) a quantity of monoethylene glycol in proportion with the minimum winter temperature in the installation zone (see table 4.2 Percentage of monoethylene glycol → 35).
3. Check the filter on the return pipe for impurities; clean it if necessary.
4. Check that the siphon on the drainage condenses has been filled with water as indicated in the relative paragraph.
5. Bring the plant to the correct pressure, making sure that the water pressure is not less than 1 bar and not over 2 bar, and run the circulation pump for at least 30 minutes. Check the water filter again and clean it if necessary.

To facilitate the operation of bleeding air from the hydraulic circuit, the appliance is equipped with an additional manual air bleeding valve.

Possible use of glycol antifreeze

Glycols, normally used to lower the freezing point of water, are substances in an intermediate state of oxidisation which, in the presence of oxidising agents such as oxygen, are transformed into corresponding acids. This transformation into acids increases the corrosive nature of the fluid contained in the circuit. For this reason, mixtures that are commercially available almost always contain inhibiting substances that are able to control the pH of the solution. A necessary condition for the oxidisation of the glycol, and therefore its degradation, is the presence of an oxidising agent such as oxygen. In closed circuits in which no replenishment of water, and therefore of oxygen, occurs over the course of time, once the oxygen initially present has reacted, the degenerative phenomenon of glycol is hugely inhibited.

Most circuits, however, are of the non-sealed type, and therefore receive a more or less continuous supply of oxygen.

Therefore it is essential, whatever type of glycol is in question, to verify that it is adequately inhibited and that the necessary checks are regularly performed during its entire period of use.

Antifreeze liquids for cars, which do not contain inhibiting components other than ethylene glycol, are not recommended for cooling and heating plants.

The manufacturer does not accept any contractual or extra-contractual liability for damage caused by the use or incorrect disposal of glycol antifreeze.

It is equally important to recall that the use of monoethylene glycol modifies the thermophysical characteristics of the water in the plant, and in particular its density, viscosity and specific average heat. Always check the date of expiry and/or degradation of the product with the supplier.

In the Table 4.2 Percentage of monoethylene glycol → 35 is shown the approximate freezing temperature of the water and the consequent increased drop in pressure of the appliance and of the circuit of the plant, according to the percentage of monoethylene glycol.

This Table 4.2 Percentage of monoethylene glycol → 35 should be taken into account for the sizing of the pipes and the circulation pump (for calculation of internal pressure drops of the appliance, refer to the Table 2.1 GAHP-A LT technical data → 11 or Table 2.2 GAHP-A HT technical data → 12).
Nevertheless, it is advisable to consult the technical specifications of the monoethylene glycol used. If automatic loading systems are used, a seasonal check of the quantity of glycol present in the plant is also necessary.

Table 4.2 – Percentage of monoethylene glycol

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

Technical data for filling the hydraulic circuit

If the percentage of glycol is ≥ 30% (for ethylene glycol) or ≥ 20% (for propylene glycol):

- then parameter 182 in menu 4 must be set to "1" (at the installer's care).

4.7 EXHAUSTING THE COMBUSTION PRODUCTS

The appliance is approved for the connection of the combustion product exhaust pipes, present on each single unit, to a flue linked directly to the outside.
Each single unit is provided with a connection of Ø 80 mm (equipped with a suitable seal) located on the left side (see Figure 2.1 Size (Standard ventilation) → 14 or Figure 2.2 Size → 15) and outlet in a vertical position.
Each unit of the appliance is supplied complete with an exhaust air duct installation kit, to be fitted to the appliance by the hydraulic system installation technician.
The exhaust air duct installation kit consists of (see Figure 4.4 Fume outlet → 36):

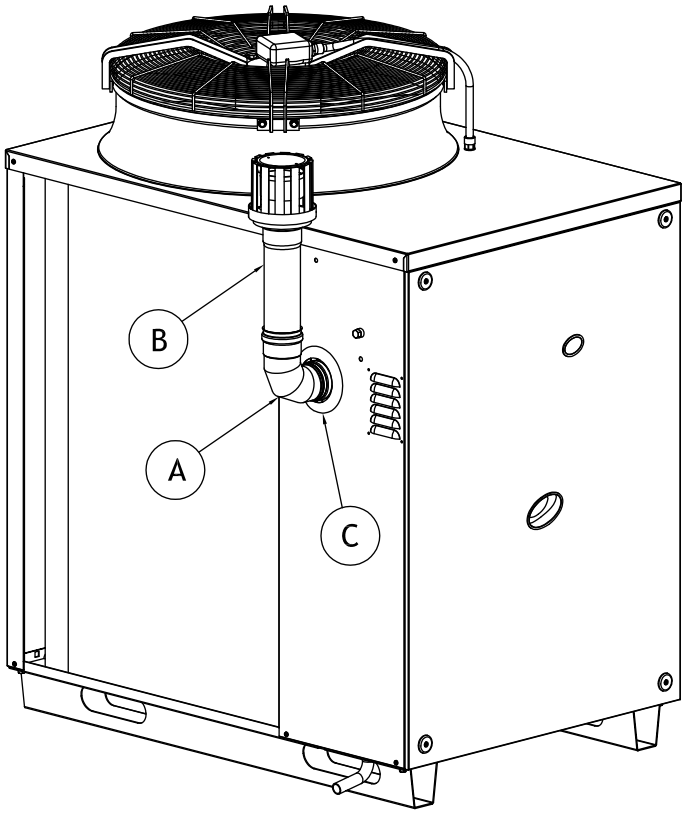
- n. 1 exhaust air pipe Ø 80mm (length 300 mm) with terminal;
- n. 1 rain cover;
- n. 1 curve 90° Ø 80 mm.

To assemble and fit the external exhaust fumes installation kit, proceed as follows:

You will need: the appliance positioned in its installation site (refer to Figure 4.4 Fume outlet → 36).

1. Fit the rain cover (C) on the curve 90° (A).
2. Fit the curve 90° (A) to the clamp on the left side of the appliance.
3. Fit the terminal/pipe assembly (B) to the curve (A).

Figure 4.4 – Fume outlet



LEGEND

A	Curve 90° Ø 80
B	Pipe Ø 80 Lg.300 mm w/terminal
C	rain cover

4.8 PROGRAMMING OF HYDRAULIC PARAMETERS

The operations described in this paragraph are necessary only if the appliance is not connected to a DDC or to a CCP.

If the appliance is connected to a DDC, follow the instructions given in the DDC manuals exclusively.
This paragraph explains how to set the hydraulic parameters on the electronic board of the appliance. Users not familiar with the basic procedures for the use of the board should refer to Paragraph 3.2 ON-BOARD ELECTRONICS → 19.
To configure the appliance, access menu 3 of the electronic board.
With regard to the hydraulic configuration, six parameters may be set: select the letter E to exit to the previous menu.

Table 4.3 – Menu 3 parameters

HYDRAULIC PARAMETER	THE DISPLAY SHOWS
Hot water thermostat control selection	3.160
Hot water setpoint	3.161
Hot water temperature differential	3.162
(EXIT MENU)	3. E

Description of parameters:

- Select water thermostating, parameter 160: this parameter may have two values, 0 or 1. When the user chooses:

·0: the temperature that affects the activation and deactivation of the appliance is detected by the sensor on the INLET water, i.e. water flowing into the appliance.
·1: the temperature that affects the activation and deactivation of the appliance is detected by the sensor on the OUTLET water, i.e. water flowing out of the appliance.

- Water set-point, parameter 161: this parameter sets the water temperature that, when reached, causes the appliance to be deactivated (when the power modulation is not active - parameter 181)
- Water differential, parameter 162: this parameter represents an interval in degrees that, when added to the set-point, defines the temperature at which the appliance is reactivated. This parameter is used only if the power modulation is NOT active (parameter 181).

The appliance functions by heating the water until it reaches the set-point temperature. At this point, if the power modulation is not active (parameter 181), it switches off. The temperature of the water goes down again until it reaches the temperature corresponding to "set-point + differential"; when this is reached the appliance switches on again.
Example:
Thermostating: reading from inlet sensor.
Parameter 181: 0 (power modulation NOT active)
Set-point: +40.0°C
Differential: - 2.0° C

- The appliance is functioning: the water in the plant heats up until it reaches the set-point temperature = +40°C.
- The appliance switches off: the water in the plant, returning from use, becomes progressively cooler, until it reaches a temperature of 38°C = 40°C - 2°.
- The appliance switches on again, and the plant water heats up again.
- The cycle is repeated.

The following procedure illustrates in detail how to configure the parameters on the electronic board inside the appliance.
If the procedures for how to access the knob and menus are not familiar, see paragraphs "Display and knob" and "How to access the menus" and following.
To set the parameters of menu 3:
You will need: the appliance on and access to the electrical panel, see "Display and knob".
Access menu 3. The display shows the first parameter of the menu, number 160.

1. Turn the knob clockwise to scroll through the parameters: 3.160, 3.161, 3.162; lastly the letter E is shown.
2. Press the knob when a parameter is displayed to select it, or when E is displayed to exit the menu.
3. For example, to set parameter 161 (hot water set-point), proceed as follows:
   · Select the parameter: turn the knob until the display shows 3.161;
   · Press the knob to access the value of the parameter; the display shows the previously set value, which flashes, for example 40.0 °C;
   · Turn the knob to modify the value of the parameter;
   · Press the knob to confirm the value selected; the display shows the current parameter again, 3.161. The new value for this parameter has been set.
4. If other parameters are to be modified, proceed as described previously, and then exit from the menu by pressing the knob on the letter E.

To exit the menu, turn the knob clockwise until E is displayed, then press it to confirm. For details regarding the codes displayed by the appliance during operation, see Paragraph 8.1 MACHINE OPERATING CODES → 69.

5 ELECTRICAL SYSTEM INSTALLATION TECHNICIAN

This section illustrates the operations to perform for the correct electrical installation of the appliance, and contains electrical diagrams that may be of use in the event of maintenance operations.
Installation of the appliance may only be carried out by firms that are qualified in accordance with current legislation in the country of installation, i.e. by professionally qualified personnel.

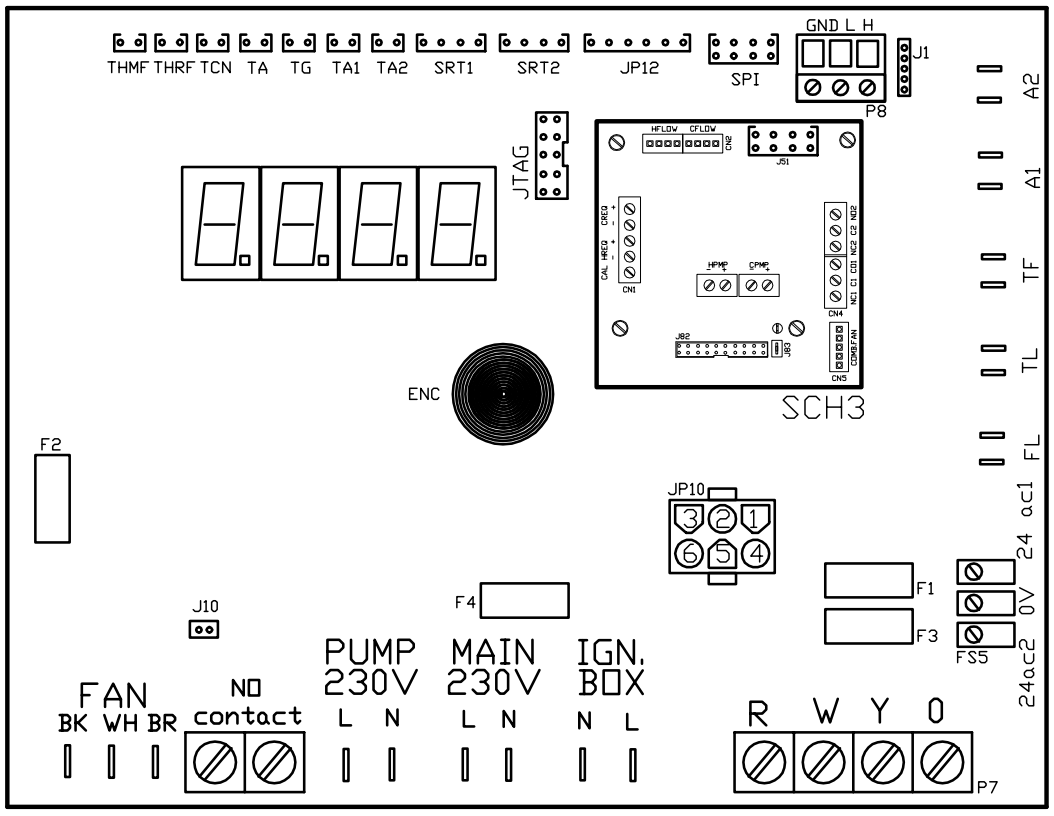
Installation that is incorrect or that does not comply with current legislation may cause damage to people, animals or things; Robur S.p.A. is not responsible for any damage caused by installation that is incorrect or that does not comply with current legislation.

Figure 5.1 Electronic board S61 → 39 and Table 5.1 Electronic board S61 → 40 detail the S61 controller's inputs and outputs. The supplementary controller Mod10 is shown in detail in Figure 5.2 Mod10 controller → 41.
The appliance and the system can be controlled and regulated in one of the following ways depending on the type of installation and control system selected:

- **TYPE A (NOT APPLICABLE at PRO Platform)**: controlled by Comfort Control Panel.
- **TYPE B**: controlled by DDC (see Figure 5.3 Direct Digital Control (DDC) → 41).
- **TYPE C**: controlled by consent switch (e.g. on-off switch, ambient thermostat, timer, etc.).

In Paragraph 5.1 ELECTRICAL DIAGRAMS OF THE APPLIANCE → 42 may be found the Electrical diagrams of the appliance.

Figure 5.1 – Electronic board S61



LEGEND
See table below

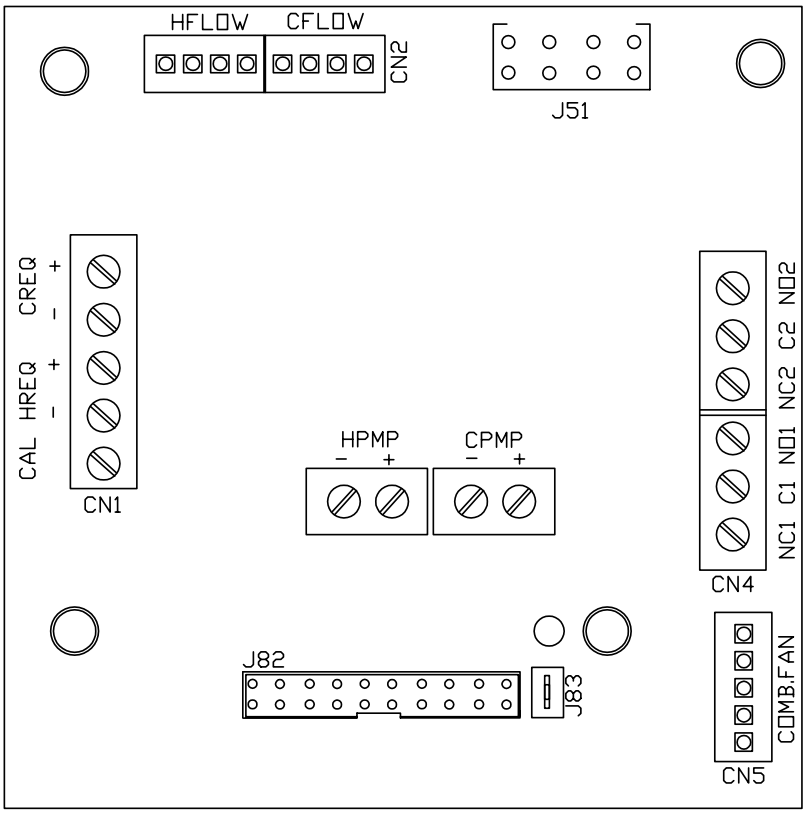
SCH S61

Table 5.1 – Electronic board S61

CODE	DESCRIPTION
SCH1	Electronic board S61
SCH3	Mod10 electronic controller (see figure for further details)
A1, A2	Auxiliary inputs
ENC	Knob
F1	Fuse T 2A
F2	Fuse F 10A
F3	Fuse T 2A
F4	Fuse T 3.15A
FAN (BK, WH, BR)	Fan output
FL	water flow switch input (GAHP-A)
FS5 (24V AC)	Controller power 24-0-24 Vac
IGN.BOX (L, N)	Flame controller power 230 V AC
J1	CAN BUS jumper
J10	Jumper N.O. contact
J82	W10 board connector (on Mod10)
JP10	6-pole flame controller connector
JP12	Exhausted gas probe input
JTAG	S61 controller programming connector
MAIN 230V (L, N)	S61 controller power 230 V AC
N.O. contact	Pump contact, N.O.
P7 (R, W, Y, o)	Consent inputs
P8 (GND, L, H)	CAN BUS connector
PUMP 230V (L, N)	Hydraulic pump power output
SPI	Communication port with Mod10 controller
SRT1	Hydraulic pump rotation sensor input
SRT2	Hot water flowmeter input [E3 A/GS/WS]
TA	Ambient temperature probe input
TA1	Input probe of evaporator output
TA2	Not used
TCN	Combustive air temperature probe input
TF	Exhausted gas thermostat input
TG	Generator temperature probe input
THMF	Hot water delivery temperature probe input
THRF	Hot water return temperature probe input
TL	Generator limit thermostat input

SCH S61

Figure 5.2 – Mod10 controller

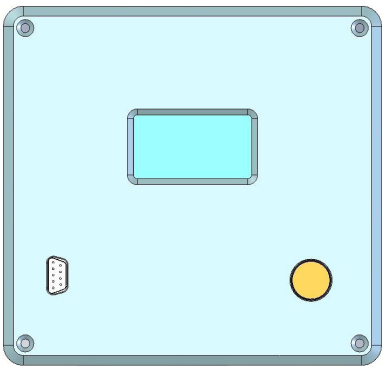


LEGEND

HFLOW	Not used
CFLOW	Not used
J51	SPI connector
HPMP	Primary circuit hot water pump control output (0-10 V) [E3 A/GS/WS]
CPMP	Cold side water pump control output [E3 GS/WS]
NC1-C1	Status indication of locking warnig/error
CN5	Blower control
J82	W10 auxiliary controller connector
J83	W10 cable shielding connection W10
CN1	Inputs 0-10V (not used)

Mod10 controller

Figure 5.3 – Direct Digital Control (DDC)

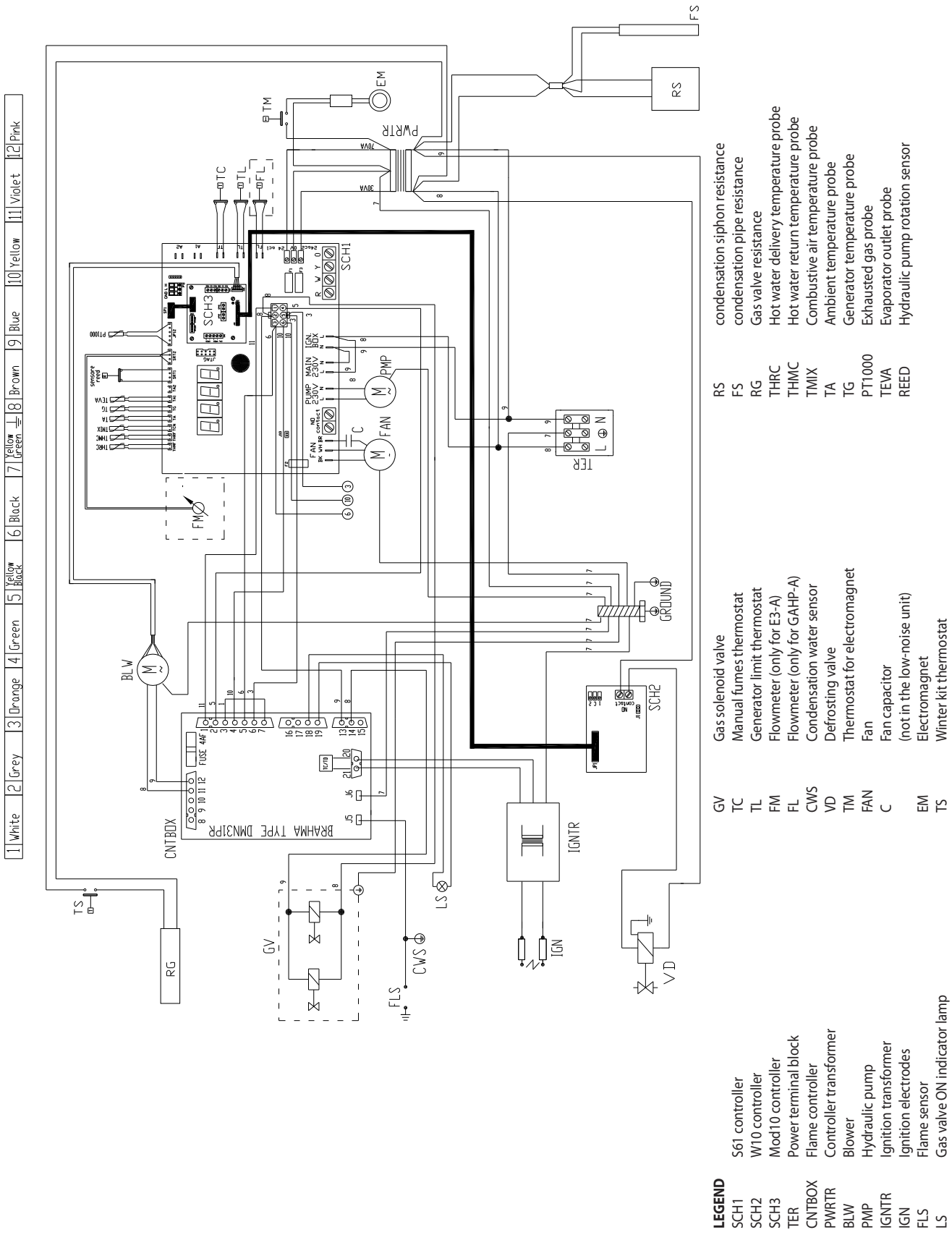


LEGEND

DDC	Direct Digital Control

5.1 ELECTRICAL DIAGRAMS OF THE APPLIANCE

Figure 5.4 – Appliance internal wiring diagram



LEGEND

SCH1	S61 controller	GV	Gas solenoid valve	RS	condensation siphon resistance
SCH2	W10 controller	TC	Manual fumes thermostat	FS	condensation pipe resistance
SCH3	Mod10 controller	TL	Generator limit thermostat	RG	Gas valve resistance
TER	Power terminal block	FM	Flowmeter (only for E3-A)	THRC	Hot water delivery temperature probe
CNTBOX	Flame controller	FL	Flowmeter (only for GAHP-A)	THMC	Hot water return temperature probe
PWRTR	Controller transformer	CWS	Condensation water sensor	TMIX	Combustive air temperature probe
BLW	Blower	VD	Defrosting valve	TA	Ambient temperature probe
PMP	Hydraulic pump	TM	Thermostat for electromagnet	TG	Generator temperature probe
IGNTR	Ignition transformer	FAN	Fan	PT1000	Exhausted gas probe
IGN	Ignition electrodes	C	Fan capacitor	TEVA	Evaporator outlet probe
FLS	Flame sensor		(not in the low-noise unit)	REED	Hydraulic pump rotation sensor
LS	Gas valve ON indicator lamp	EM	Electromagnet		
		TS	Winter kit thermostat		

5.2 HOW TO CONNECT THE APPLIANCE ELECTRICALLY

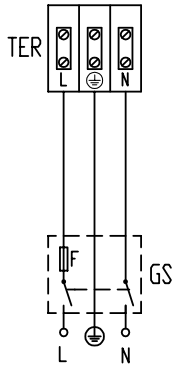
Before making the electrical connections, make sure that work is not carried out on live elements.

You will need: the appliance in its permanent location.

1. Prepare a cable of the FG7(O)R 3Gx1.5 type for the power supply to the appliance.
2. Connect the appliance to the mains (with the cable indicated in point 1), fitting in proximity to the mains a general external bipolar circuit breaker (see detail «GS» in Figure 5.5 Electrical wiring diagram → 43) with 2 type T 5A fuses or a 10 A magnetothermic switch.
3. Make the electrical connection in such a way that the ground wire is longer than the live wires. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection.

The electrical safety of the appliance is guaranteed only when it is correctly connected to an efficient grounding system, executed in accordance with current safety regulations. Do not use gas pipes to ground electrical appliances.

Figure 5.5 – Electrical wiring diagram



LEGEND

TER	terminal board
L	phase
N	neutral
Components NOT SUPPLIED	
GS	general switch

Example of connection of appliance to 230 V 1 N - 50 Hz electricity supply

5.3 TYPE B (DDC)

This paragraph illustrates the operations to be performed when one or more appliances are connected to a Direct Digital Controller (DDC). In particular:

1. What is the CAN bus cable.
2. How to connect the CAN BUS cable to the appliance's controller
3. How to connect the CAN BUS cable to the DDC.
4. How to connect the DDC.
5. How to connect the plant water circulation pump.

For specific information regarding the DDC, refer to the specific manuals supplied with it.

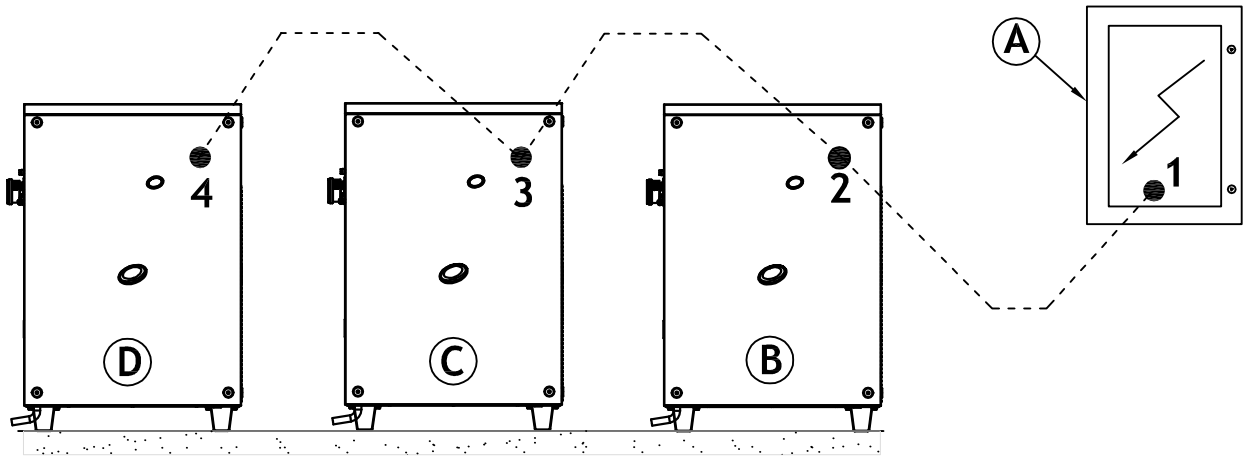
The appliance and the DDC communicate with each other via a CAN bus network.
The CAN bus network is characterized by a series of elements (appliances or DDCs) called nodes, connected to each other by a three-wire cable. The nodes are of two types: terminal nodes and intermediate nodes.

- Terminal nodes are appliances or DDCs that are connected to one other element only.
- Intermediate nodes are appliances or DDCs that are connected to two other elements.

The diagram in Figure 5.6 Example of CAN BUS → 44 gives an example of a CAN BUS network: 3 appliances are connected to each other and to 1 DDC. Appliance D and the DDC (A) are terminal nodes, while appliances C and B are intermediate nodes as they are connected to 2 elements.

It is possible to place one DDC at any point of the CAN bus network: appliances and DDCs may act equally as terminal or intermediate nodes. One DDC can control and monitor up to 16 appliances. If there are more than 16 appliances on the network, it is necessary to connect more than one DDC on the same network, up to a maximum of 3.

Figure 5.6 – Example of CAN BUS



LEGEND

A	CCP or DDC	B-C-D	Appliance	2-3	Intermediate nodes
		1-4	Terminal nodes		

Terminal nodes and intermediate nodes

What is the CAN bus cable

The CAN bus cable must meet the {Honeywell SDS standard}.

Table 5.2 CAN BUS cables type → 44 gives details of some types of CAN bus cable, grouped according to the maximum distance covered by each single type.

Table 5.2 – CAN BUS cables type

CABLE NAME	SIGNAL / COLOR			MAX LENGTH	Note
Robur					Ordering Code O-CVO008
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	

Example types of cables used to connect the CAN network.

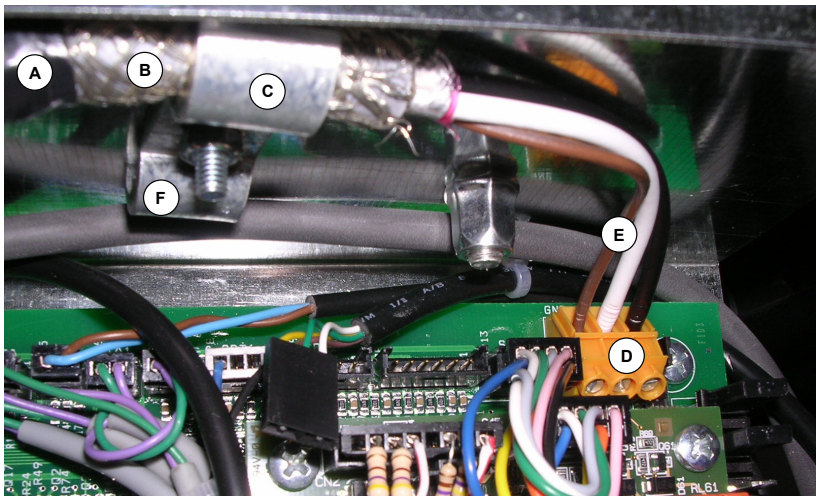
For overall distances to cover of ≤200 m and networks with a maximum of 6 nodes (a typical example: up to 5 GAHP-A + 1 DDC) a simple shielded cable 3x0.75 mm may be used.

As shown in Table 5.2 CAN BUS cables type → 44, the CAN connection requires a CAN bus cable with 3 wires. If the available cable has more than 3 coloured wires, use the wires with the colours indicated in 5.2 CAN BUS cables type → 44 and cut the remaining ones. The ROBUR NETBUS cable is available as an accessory, see Section 7 ACCESSORIES → 67.

How to connect the CAN BUS cable to the appliance's controller

The CAN BUS cable must be connected to the special socket on the machine's on-board controller, as shown below (see Figure 5.7 CAN BUS cable connection → 45).

Figure 5.7 – CAN BUS cable connection



LEGEND

A	Insulating tape to protect board/shield
B	CAN bus cable shield
C	Cable fixing bracket
D	Connector for connecting terminals of CAN bus wires
E	Terminals (n° 3) of CAN bus cable

Example of a single CAN bus cable connected to the board

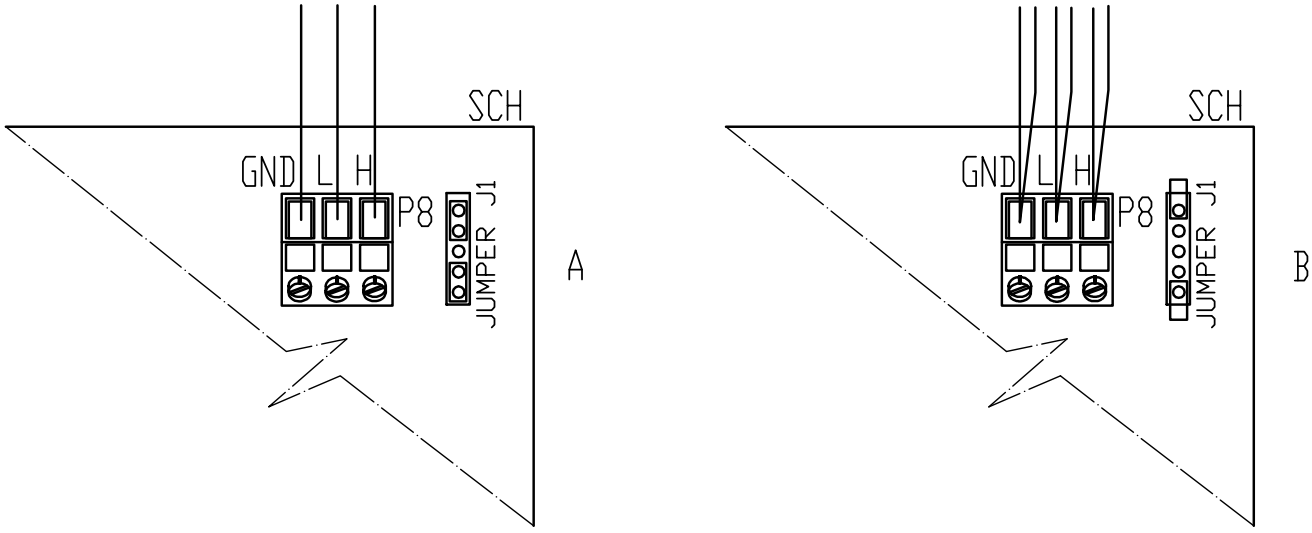
Before working on the electrical panel of the appliance, make sure that it is not connected to the power supply.

1. Cut a length of cable, long enough to allow it to be installed without kinking.
2. Having chosen one end of the length of cable, remove the sheath from a length of approximately 70-80 mm, taking care not to cut the shielding (metallic shield and/or aluminium sheet and, if present, the bare connector in contact with the shield) and the wires contained within.
3. If the cable is too thin to be held in place in the cable holder bracket (detail C in Figure 5.7 CAN BUS cable connection → 45), make it thicker by wrapping insulating tape around it on the sheath in the area adjacent to the stripped part (to an approximate diameter of 12-13 mm).
4. Pull back the shielding in the sheathe; apply electrician's tape to the end of the shielding as pulled back (detail A, Figure 5.7 CAN BUS cable connection → 45).
5. If the appliance is a **terminal node** of the network connect the three coloured wires to the orange connector, as shown in detail "A" of Figure 5.8 Electrical wiring diagram → 46. Respect the correct indications L, H, GND provided in Table 5.2 CAN BUS cables type → 44, on the figure and on the diagram at the base of the connector.
6. If the appliance is an **intermediate node** repeat the operations from step 2 to step 5 for the other length of cable required (so to will have two cable lengths everyone without the sheath). To interlace between they the threads with the same color and to connect them to the orange connector, as shown in detail "B" of Figure 5.8 Electrical wiring diagram → 46.

7. Fix the CAN bus cable (or two cables, according to the type of node being connected) to the cable fixing bracket in the upper part of the inside of the electrical panel so that the rolled-back sheathing makes solid contact with the metal bracket. The cables must be held firmly in place by the bracket if pulled.
   To position the jumpers on the board according to the type of node being configured:

- If the appliance is a **terminal node** on the network (i.e. 3 wires are inserted in the orange connector on the board): set the jumpers as shown in detail "A" of Figure 5.8 Electrical wiring diagram → 46:
- If the appliance is an **intermediate node** on the network (i.e. 6 wires are inserted in the orange connector on the board); set the jumpers as shown in detail "B" of Figure 5.8 Electrical wiring diagram → 46:

Figure 5.8 – Electrical wiring diagram



LEGEND					
SCH	electronic board	H	Data signal HIGH	B	Detail case "intermediate node" (6 wires; J1=jumper "open")
GND	Common data	J1	Jumper CAN-BUS in board		
L	Data signal LOW	A	Detail case "terminal node" (3 wires; J1=jumper "closed")	P8	Port can/connector

Connection cable CAN BUS to electronic board: detail A case "terminal node", detail B case "intermediate node"

8. After having carried out all the above operations, close the electrical panel and refit the front panel of the appliance.

How to connect the CAN BUS cable to the DDC

The CAN bus cable is connected to the specific orange connector (P8) supplied with the DDC in a bag.

Before working on the DDC, make sure that it is off.

The DDC, like the controller on the appliance, has jumpers that must be moved so that it can be configured as an intermediate or terminal node. The position of the jumpers on a new DDC is CLOSED.

To connect the CAN bus cable to a DDC:

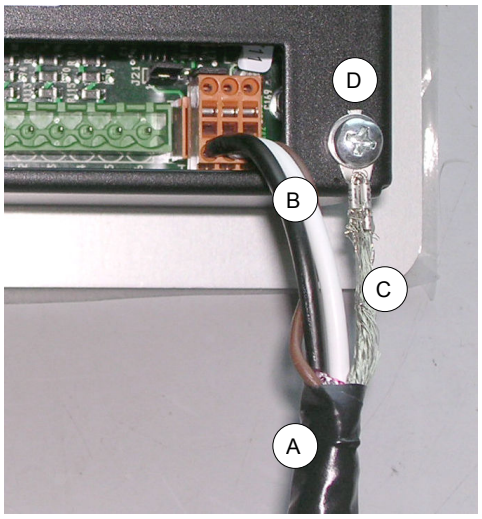
You will need: DDC not powered up.

1. Depending on the type of node being configured, set the DDC's jumpers J21 as shown in detail "A" or detail "B" in Figure 5.10 detail wires and jumpers J21 - terminal/intermediate node DDC → 48. If necessary, open the DDC's back panel (4 screws); after jumpers J21 have been correctly positioned, close the cover again and retighten the 4 screws.

- If the DDC is an **intermediate node** on the network (with no. 6 wires in the orange connector "P8"): set the jumpers "J21" as shown in detail "B" of Figure 5.10 detail wires and jumpers J21 - terminal/intermediate node DDC → 48: Jumpers OPEN.
- If the DDC is an **terminal node** on the network (with no. 3 wires in the orange connector "P8"): set the jumpers "J21" as shown in detail "A" of Figure 5.10 detail wires and jumpers J21 - terminal/intermediate node DDC → 48: Jumpers CLOSED.

2. Prepare the orange CAN bus connector, from the supplied sleeve.
3. Cut a length of cable, long enough to allow it to be installed without kinking.
4. Remove the sheath for a length of approximately 70-80 mm, taking care not to cut the shielding (metallic shield and/or aluminium sheet and, if present, the bare connector in contact with the shield) and wires contained inside.
5. Roll the shielding and connect it to a 4-mm eyelet terminal, as illustrated in Figure 5.9 Connection from CAN BUS to connector P8 → 48, details C and D. Now proceed as follows:
6. If the DDC is an **terminal node** connect the three coloured wires to the orange connector "P8", following the diagram provided in detail "A" of Figure 5.10 detail wires and jumpers J21 - terminal/intermediate node DDC → 48. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 5.2 CAN BUS cables type → 44 and in the example.
7. If the DDC is an **intermediate node** repeat the operations from step 2 to step 4 for the other length of CAN bus cable required. Connect the six coloured wires to the orange connector "P8", following the diagram provided in detail "B" of Figure 5.10 detail wires and jumpers J21 - terminal/intermediate node DDC → 48. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 5.2 CAN BUS cables type → 44 and in the example.
8. Insert the orange connector ("P8") with the wires first into the opening prepared in the cover of the DDC, and then into the appropriate socket on the DDC itself, making sure it is correctly inserted.
9. Use the rear cover bolts located near the CAN BUS socket to secure the 4 mm eyelet (or 2 eyelets) (detail D, Figure 5.9 Connection from CAN BUS to connector P8 → 48). The cable should be secured against pulling out.

Figure 5.9 – Connection from CAN BUS to connector P8

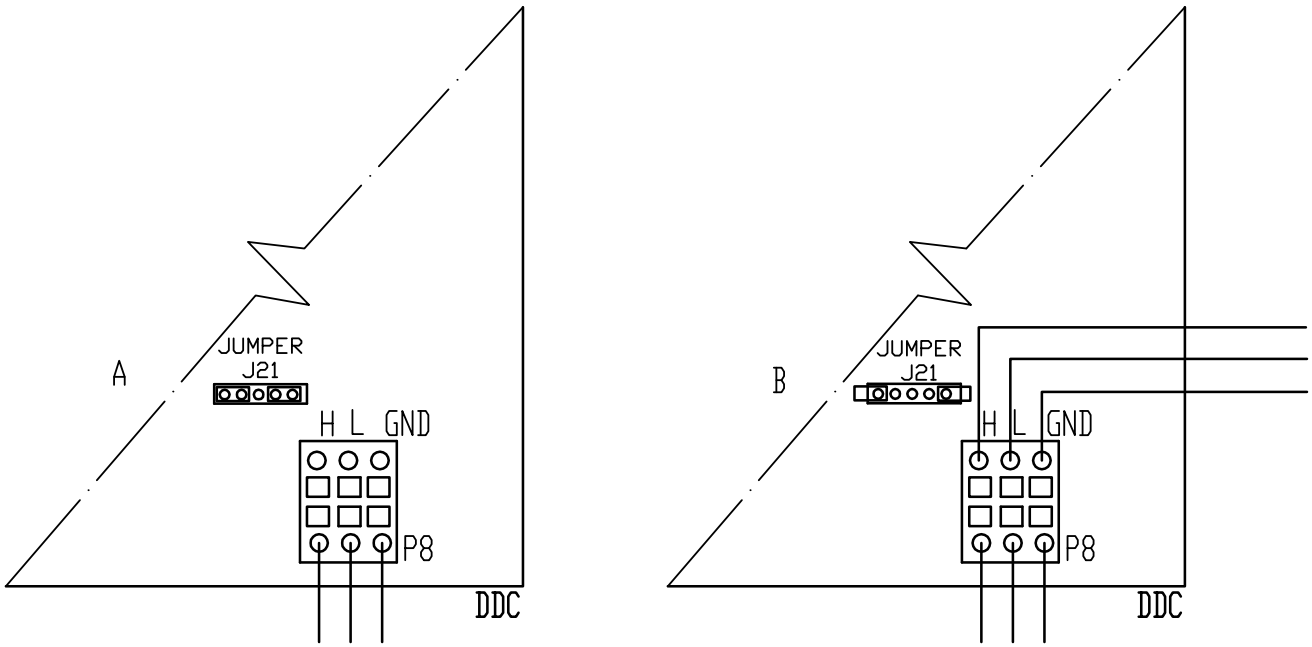


LEGEND

A	Insulating tape to protect board/shield
B	CAN BUS cable wires
C	CAN bus cable shield
D	terminal and screw for fixing

Connection detail of cable CAN BUS.

Figure 5.10 – detail wires and jumpers J21 - terminal/intermediate node DDC



LEGEND

DDC	Direct Digital Control
J21	Jumper CAN-BUS in DDC board
A	detail case "terminal node" (3 wires; J21=jumper "closed")
B	detail case "intermediate node" (6 wires; J21=jumper "open")
H,L,GND	data signal wires

Detail terminal and intermediate node: jumpers position J21: "closed" - "open".

How to connect the DDC

The DDC requires a low voltage power supply (24 V) with a 230/24 V AC, 50 Hz safety transformer; the minimum power requirement is 20 VA. For the connection use a cable with the minimum specifications 2 x 0.75 mm^2.

Connect the DDC to the transformer via the 4-pole connector provide for this, following the diagram in Figure 5.11 DDC - electric supply → 49. Pass the cable through the opening in the cover before fixing the wires to the connector.
To power up the DDC, proceed as follows.

You will need: the appliance disconnected from the electricity supply

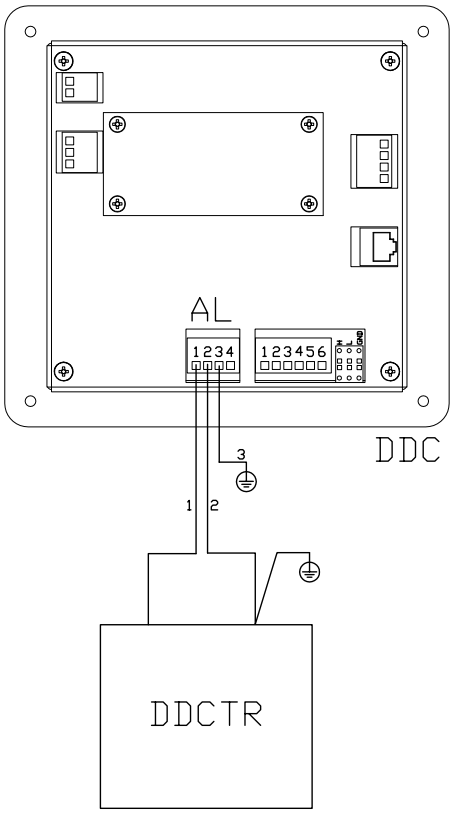
1. Remove the DDC's back panel by undoing the 4 bolts securing it.
2. Cut a suitable length of power cord (minimum 2x0.75 mm^2).
3. Pass the power cord (DDC side) through the hole in the DDC's cover and hook up as shown in the example, with the following polarities: terminal 1 = 24 V; terminal 2 = 0 V; terminal 3 = ground.

Make the grounding connection on the transformer terminal connected to terminal 2 of the 4-pole connector (EP) of the DDC. Terminal 2 is connected internally to terminal 3, and is thus grounded; if the transformer already has one wire grounded, it must be connected to this terminal. Terminal 3 of the DDC's 4 pole connector must always be grounded (r ≤ 0.1Ω).

4. On completion, close the DDC's back panel with the 4 bolts.

The DDC is equipped with a backup battery which retains the memory settings in case of power failure. **The backup battery lasts approximately 7 years**, after which time it must be replaced by an authorised Robur Technical Assistance Centre.

Figure 5.11 – DDC - electric supply



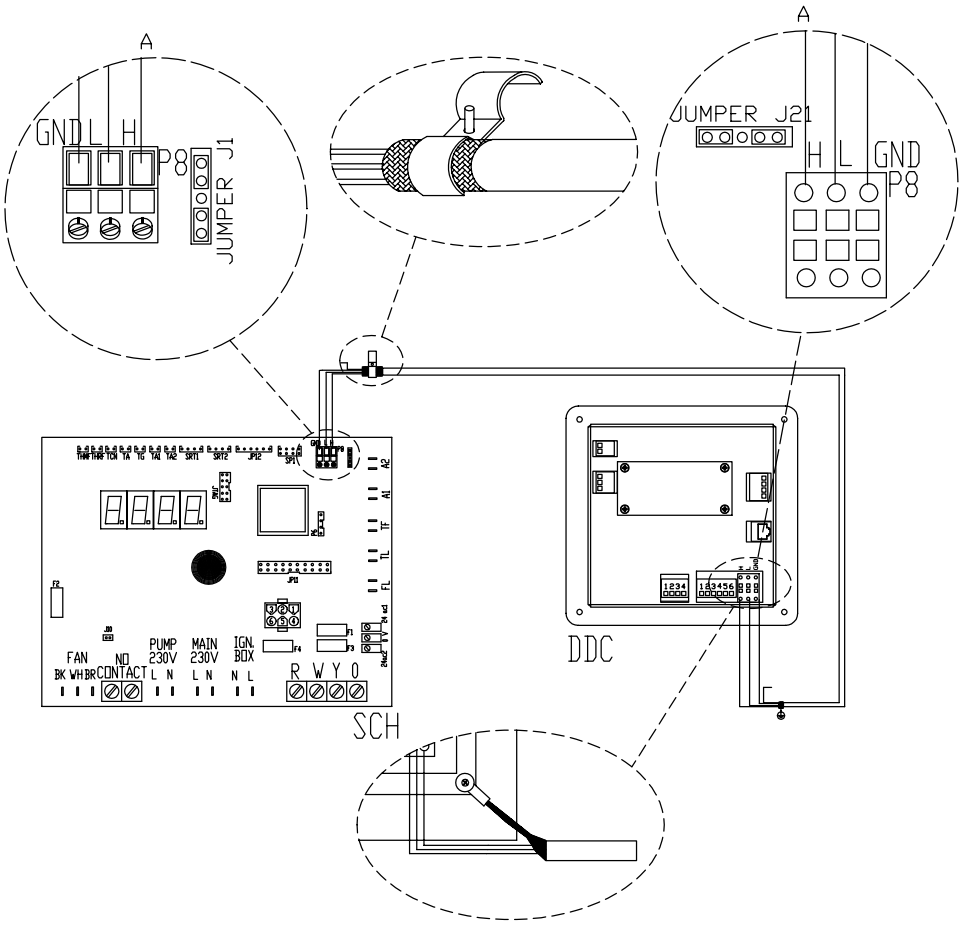
LEGEND

DDC	Direct Digital Control
AL	supply 4 poles connector
1	clamp and wire for 24 Vac supply
2	clamp and wire for 0 Vac supply
3	clamp and wire for ground contact (required connection)
DDCTR	safety transformer
- (230/24 Vac	50/60 Hz)

DDC electric supply from external transformer

The following wiring diagrams show the connection of the DDC to 1 appliance (Figure 5.12 Connexion câble CAN BUS for plants with one unit → 50) and 2 appliances (Figure 5.13 Connexion câble CAN BUS for plants with more unit → 51) respectively.

Figure 5.12 – Connexion câble CAN BUS for plants with one unit

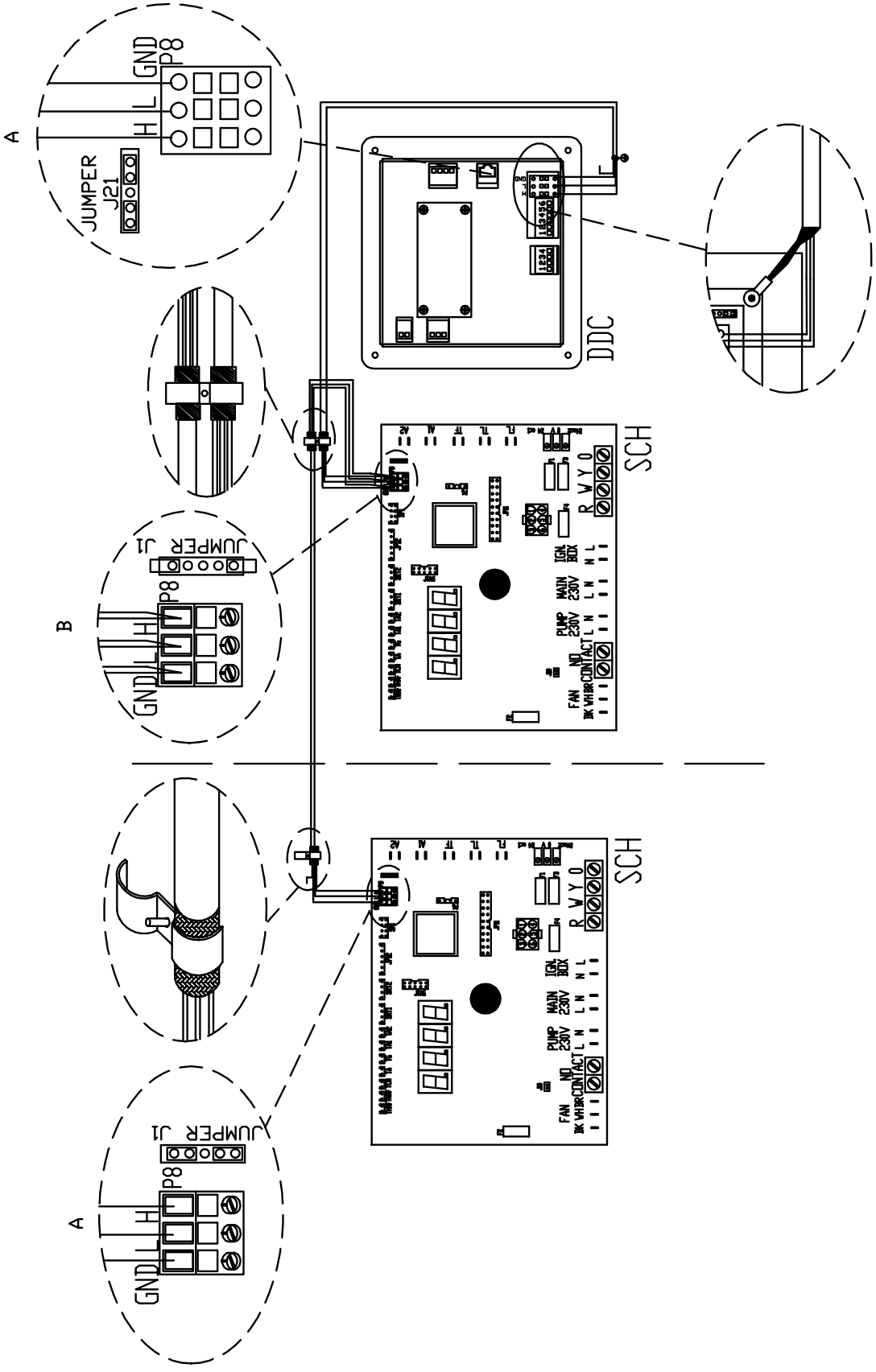


LEGEND

DDC	direct digital control
SCH	electronic board S61
J1	Jumper CAN-BUS in board S61
J21	Jumper CAN-BUS in board DDC
A	terminal nodes connection - (3 wires; J1 e J21 = "closed")
H,L,GND	data signal wires (rif. cables table)

Connexion câble CAN BUS between one DDC and one unit

Figure 5.13 – Connexion câble CAN BUS for plants with more unit



Connexion câble CAN BUS between one DDC and more unit

How to connect the plant water circulation pump

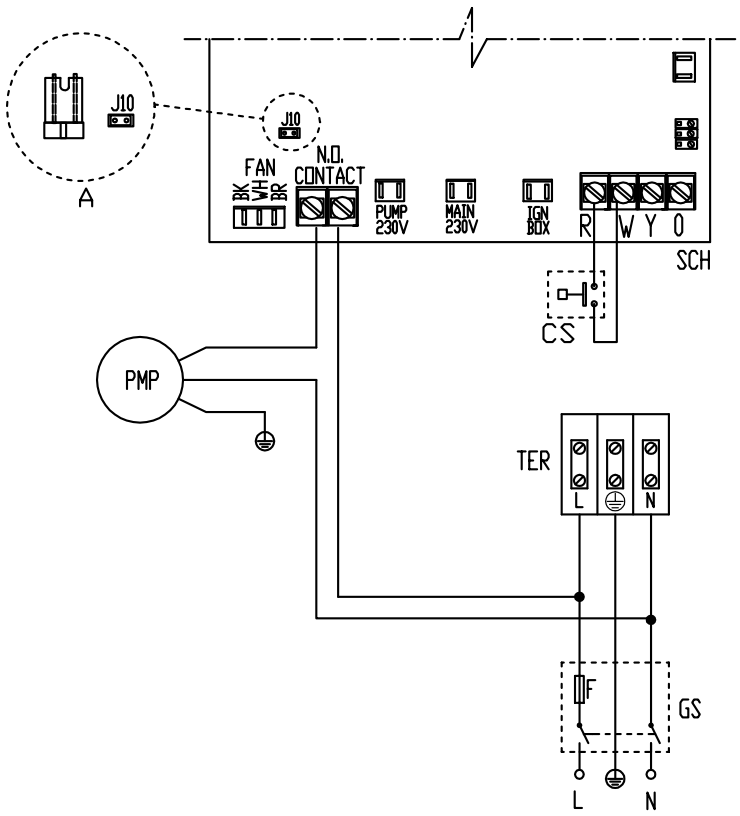
It is possible to control the pump of the plant either from the appliance's controller or independently.

Controlling the pump from the appliance's controller

Control of the plant water circulation pump from the appliance's controller depends on the power rating of the pump itself. 2 cases may be distinguished:

- Direct control from the controller with power absorbed by the pump less than 700 W. If the power absorbed by the pump is less than 700 W, make the connection as shown in Figure 5.14 Electrical wiring diagram → 52 and check that the jumper (J10, located at the bottom left of the controller, above the "NO Contact" contacts) is CLOSED, as shown in detail A.
- Direct control from the controller with power absorbed by the pump of more than 700 W. If the power absorbed by the pump is more than or equal to 700 W, make the connection as shown in Figure 5.15 Electrical wiring diagram → 53 using a control relay. In this case it is necessary to OPEN the jumper (J10, located at the bottom left of the controller, above the "NO Contact" contacts) positioning it as shown in detail A of the Figure.

Figure 5.14 – Electrical wiring diagram

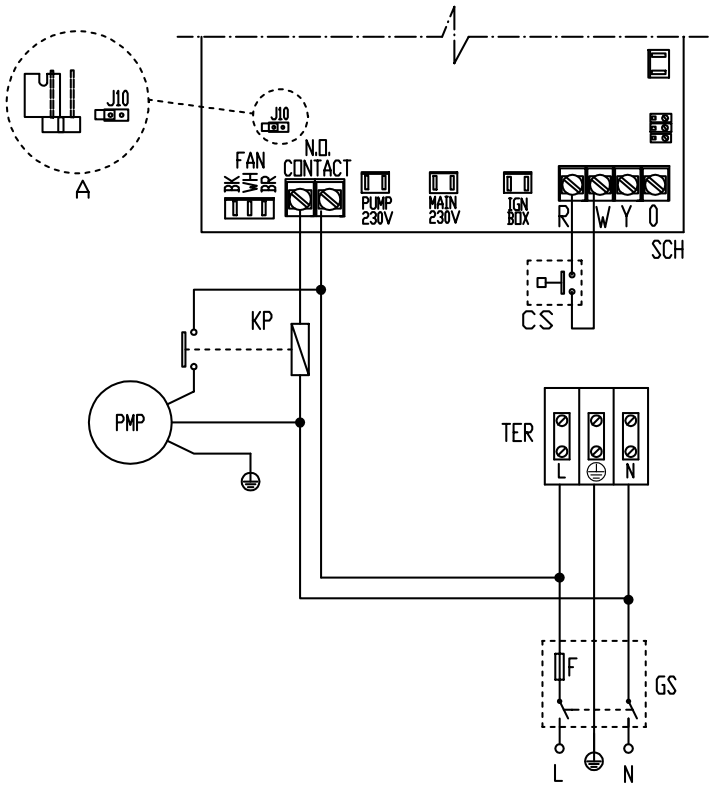


LEGEND

SCH	electronic board
TER	terminal board
J10	jumper closed
N.O. CONTACT	clean exit normally open
L	phase
N	neutral
Components NOT SUPPLIED	
CS	ON/OFF control switch
PMP	water pump <700W
GS	general switch

Example of pump/appliance electrical connection with 230 Vac pump (with absorbed power of < 700 W), controlled directly by the appliance.

Figure 5.15 – Electrical wiring diagram



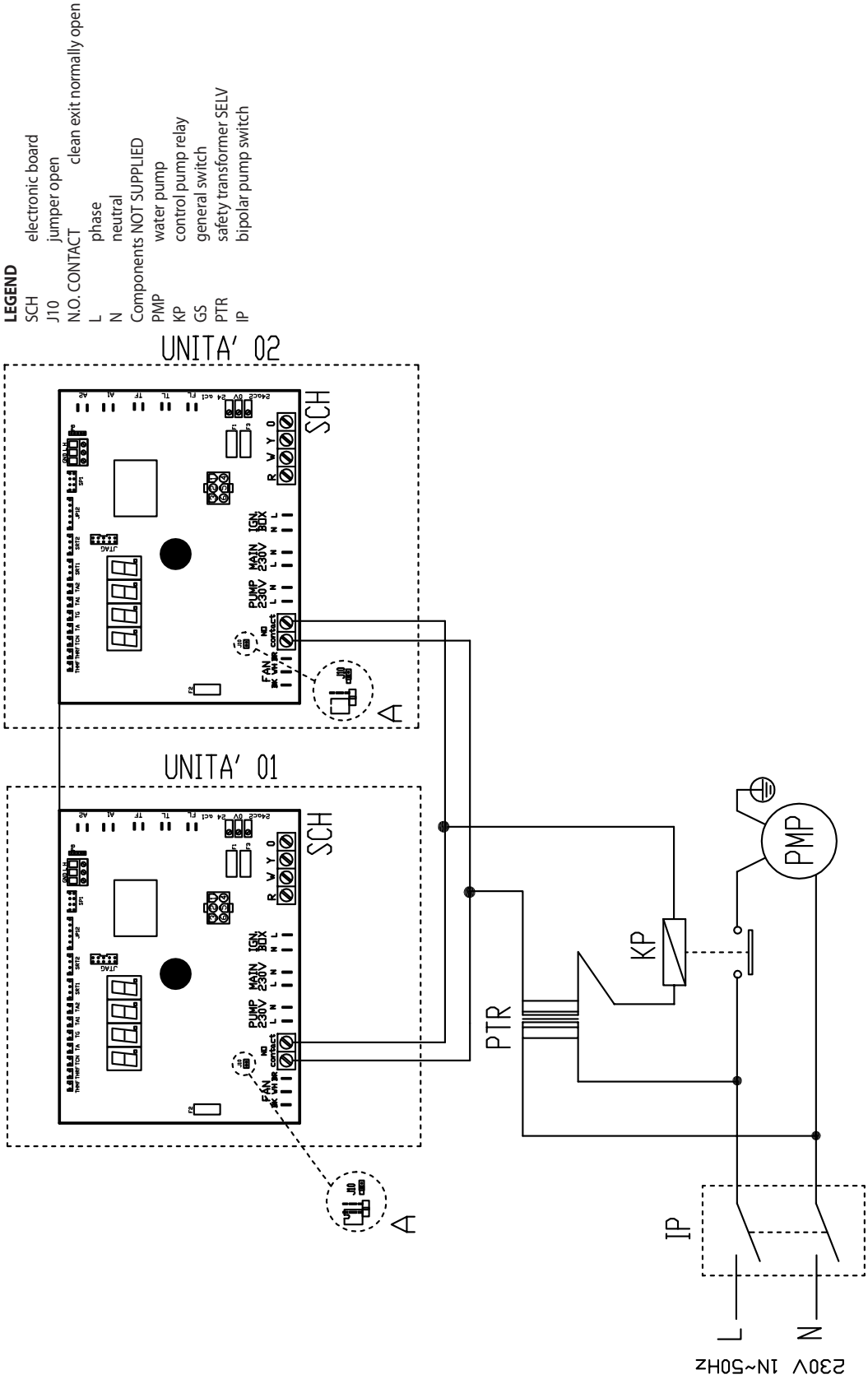
LEGEND

SCH	electronic board
TER	terminal board
J10	jumper open
N.O. CONTACT	clean exit normally open
L	phase
N	neutral
Component NOT SUPPLIED	
CS	ON/OFF control switch
PMP	water pump =700W
KP	control pump relay
GS	general switch

Example of pump/appliance electrical connection with 230 Vac pump (with absorbed power equal or more than 700 W), controlled directly by the appliance through a relay

If several appliances are connected on the same hydraulic circuit, it is always necessary to provide a safety transformer (secondary SELV) and a respective control relay; make the connections according to the diagram in Figure 5.16 Electrical wiring diagram → 54.

Figure 5.16 – Electrical wiring diagram



Example of pump/appliance electrical connection with 230 Vac pump, controlled directly by the appliance through a relay and a SELV safety transformer

Independent control of the pumps

If it is intended to manage the operation of the plant water circulation pump separately, it is necessary to provide a delayed relay, with a de-excitation time of 10 minutes: after

the opening of the appliance's consent switch contacts, the circulation pump will thus continue to circulate the water in the plant for a further 10 minutes, thereby ensuring the complete dispersal of the heating energy produced.

When the pump is controlled by the appliance's controller, this delay is automatically applied by the board.

5.4 TYPE C (CONSENT SWITCH)

In this type of installation and control, the system pump does not vary the flow rate.

Before making the electrical connections, make sure that work is not carried out on live elements.

General indications

- Check that the power supply voltage is 230 V 1N - 50 Hz power.
- Make the electrical connections as given in the following wiring diagrams.
- Make the electrical connection in such a way that the ground wire is longer than the live wires. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection.

The electrical safety of the appliance is guaranteed only when it is correctly connected to an efficient grounding system, executed in accordance with current safety regulations. Do not use gas pipes to ground electrical appliances.

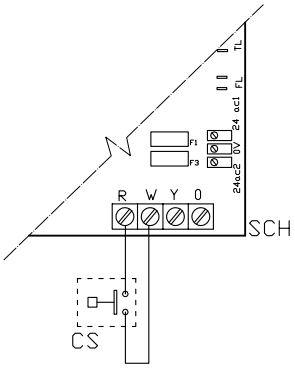
How to connect the consent switch

You will need: the appliance is not powered electrically (external master power switch set to OFF)

1. Connect the consent switch (on-off switch or ambient thermostat or timer, etc.) to terminals **R** and **W** on the appliance's control circuit as shown in Figure 5.17 Electrical wiring diagram → 55 (detail "CS").

For the appliance to operate correctly, it is ALWAYS necessary to provide a consent switch. Do not use the general mains external circuit breaker («GS») to switch the appliance on or off.

Figure 5.17 – Electrical wiring diagram



LEGEND

SCH	Electronic board
R	Common
W	Terminal consensus warming
Components NOT SUPPLIED	
CS	ON/OFF command switch

electrical connections of ON/OFF command switch

How to connect the plant water circulation pump

For how to connect the system pumps, see the section with this title in Paragraph 5.3 TYPE B (DDC) → 43.

5.5 HOW TO REMOTELY CONTROL THE FLAME CONTROLLER RESET

The flame controller reset can be controlled remotely by installing a button (not supplied) to the flame controller inside the unit's electrical panel.
Connect the button as instructed below.

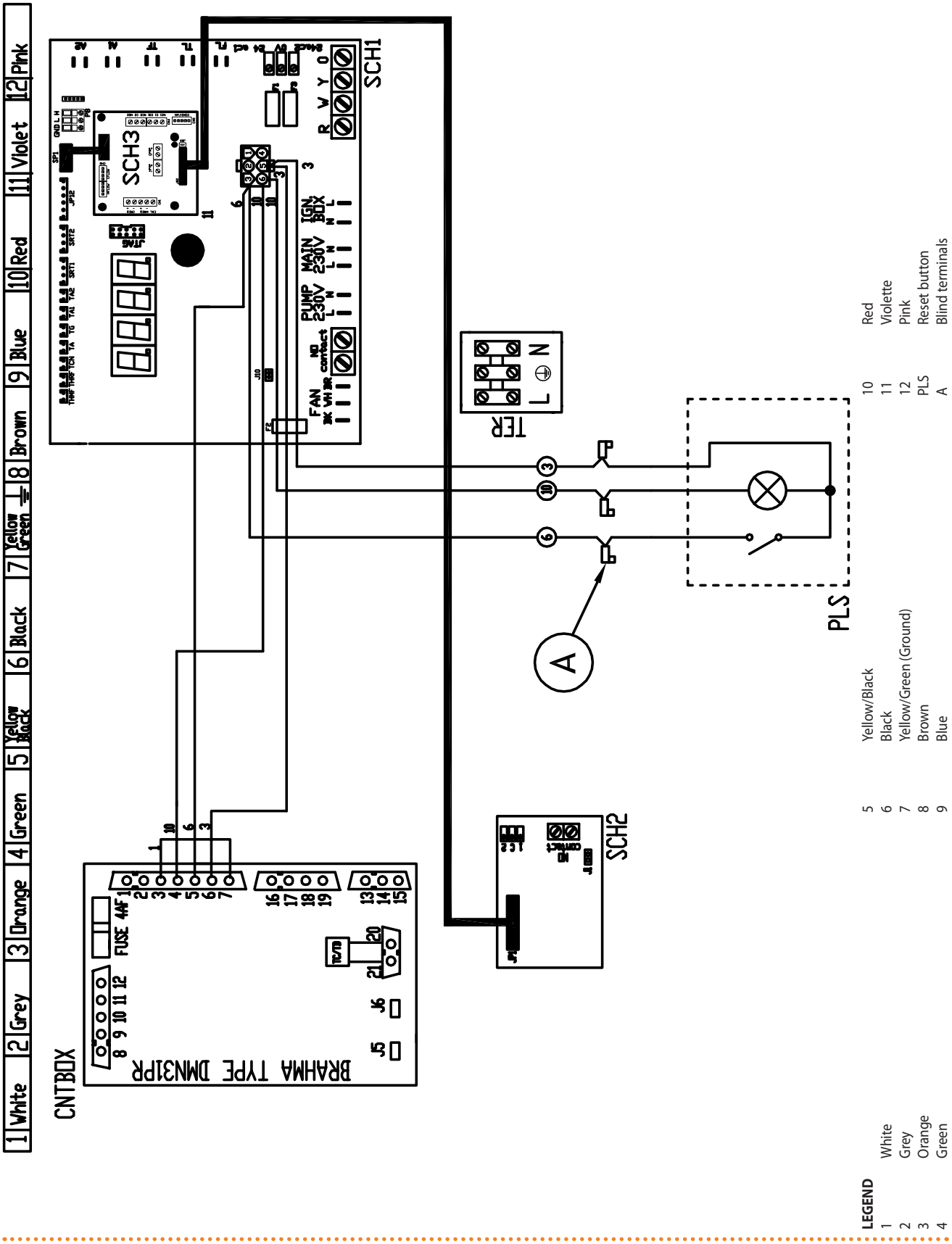
You will need: the appliance disconnected from the electricity supply

1. The cable required to connect the reset button must be 3x0.75mm^2.
2. Cut a suitable length of cable.
3. Connect the cable to the blind terminals A (see Figure 5.18 Button connection for flame controller reset → 57).

The cable may not be longer than 20 metres.

Incorrect wiring of the reset button may damage the component irreparably. Check the cabling carefully before powering the unit.

Figure 5.18 – Button connection for flame controller reset



6 INITIAL ACTIVATION AND MAINTENANCE

In this section you will find the following information:

- Indications required by the authorized Robur Technical Assistance Centre (TAC) in order to carry out the entire procedure of first start-up of the appliance.
- Indications regarding maintenance operations of the appliance.

At the end of the section you will find instructions for changing the type of gas.
Before proceeding with the operations described in this section, the installation technician concerned is invited to read Paragraph 2.1 WARNINGS → 7. in regard to switching the appliance on and off, refer to Paragraph 3.1 START UP (AND SHUT DOWN) → 17.

If the appliance is connected to a DDC (and the DDC is in controller mode), for the phases of activation and deactivation of the appliance it is necessary to refer to the two manuals dedicated to the DDC itself.

6.1 PROCEDURE FOR INITIAL ACTIVATION

The entire procedure for the initial activation of the appliance must only carried out by an authorised Robur Technical Assistance Centre (TAC). The product's guarantee may be void if the procedure is not carried out by a Robur TAC.
On leaving the factory, the appliance is reliable and tested.
The entire procedure for initial activation of the appliance consists in carrying out the following (main) operating stages:

1. preliminary verification of plant compliance;
2. checking and adjusting the combustion parameters;
3. regulating the plant operating parameters.

Preliminary verification of plant compliance
The Robur TAC technician must:

- check that the whole plant has been manufactured in accordance with its design, following the instructions supplied by the manufacturer and respecting current legislation. The design must have been drawn up by a qualified self-employed professional person.
- check personally that all of the connections (hydraulic/gas and electrical) of the appliance have been made correctly;
- Check that the necessary conditions for plant compliance effectively exist (as per the declaration consigned to the user by the qualified firm that has carried out installation of the appliance).

The Declaration of Compliance CERTIFIES that the plant conforms to current regulations. This declaration is a **compulsory** document, and as such must be issued by law to the owner by the qualified firm that has overseen the installation of the appliance.

- Check that the water pressure and flow in the hydraulic circuit and the dynamic gas mains pressure are correct, as indicated by the manufacturer.
- Check that the electrical power supply is 230V 50Hz
- Check that the air/fumes pipes are properly connected.
- Check that the fumes condensate discharge is installed.
- Check that the safety clearances have been observed, as shown in Figure 4.2 Clearances → 30.

If all the conditions listed above exist, the TAC can proceed with the initial activation of the appliance.
If any non-compliant elements arise during the initial verification, the TAC may choose not to proceed with the operation of "initial activation".

In this case, the Robur TAC technician must:

- Advise the user/installation technician of any installation anomaly.
- Inform the user/installation technician of any situation that is deemed to be hazardous for the appliance and for people.
- Inform of any missing documentation relative to the plant.
- Indicate, in relation to the reports made, any corrective measures to be taken on the plant which the installation technician will have to carry out in order to proceed with the operation of "initial activation".

It is the responsibility of the user/installation technician to carry out any corrective measures on the plant indicated by the TAC. Following such corrective measures performed by the installation technician, the TAC will assess the plant again. At this point, if, in the opinion of the TAC, safety and compliance conditions exist, the TAC must carry out the "initial activation".

Plant situations that are hazardous for people and for the appliance.

If one of the following hazardous situations arises, the TAC must not carry out the "initial activation":

- appliance installed indoors;
- appliance installed too near combustible surfaces or in any case in conditions that do not permit access and maintenance operations in safety;
- control of switching on and off of the appliance not via the CCP/DDC or consent switch but via the master power switch;
- situations attributable to defects or failures of the appliance that took place during its transport or installation;
- smell of gas due to probable leaks from the plant itself and in any case all situations that are due to non-compliant plants, considered potentially hazardous.

Anomalous plant situations.

If one of the following situations exists, the TAC may carry out the "initial activation" at its discretion, but the appliance will be left off until conditions dictated by the manufacturer are restored:

- installations (potentially not hazardous) not carried out according to good workmanship practices, installations (potentially not hazardous) not complying with current national and local regulations;
- installations (potentially not hazardous) not carried out according to good workmanship practices, not complying with the instructions supplied by the manufacturer;
- installations that can lead to operating anomalies of the appliance.

Checking and adjusting the combustion parameters

During the initial activation procedure, the combustion parameters must be checked and set ONLY by a Robur TAC. In this stage, NEITHER the user NOR the installation technician is authorised to perform such operations, and in so doing may invalidate the guarantee of the appliance.

The appliance is supplied with all of its units already regulated for the type of gas for which the appliance itself is set up.
The type of gas for which the appliance is set up can be identified from the adhesive label located on the unit's internal gas pipe (see detail M, Figure 6.2 Gas changeover → 65).

The appliance is supplied with the nozzles required to make the gas type change to G30 and G31.

During the first start-up procedure it is in any case necessary to:

- check the dynamic gas mains pressure
- check and adjust the appliance's combustion parameters

You will need: the appliance connected to the gas and electricity supply: switched off and with the gas cock closed; front panel removed.

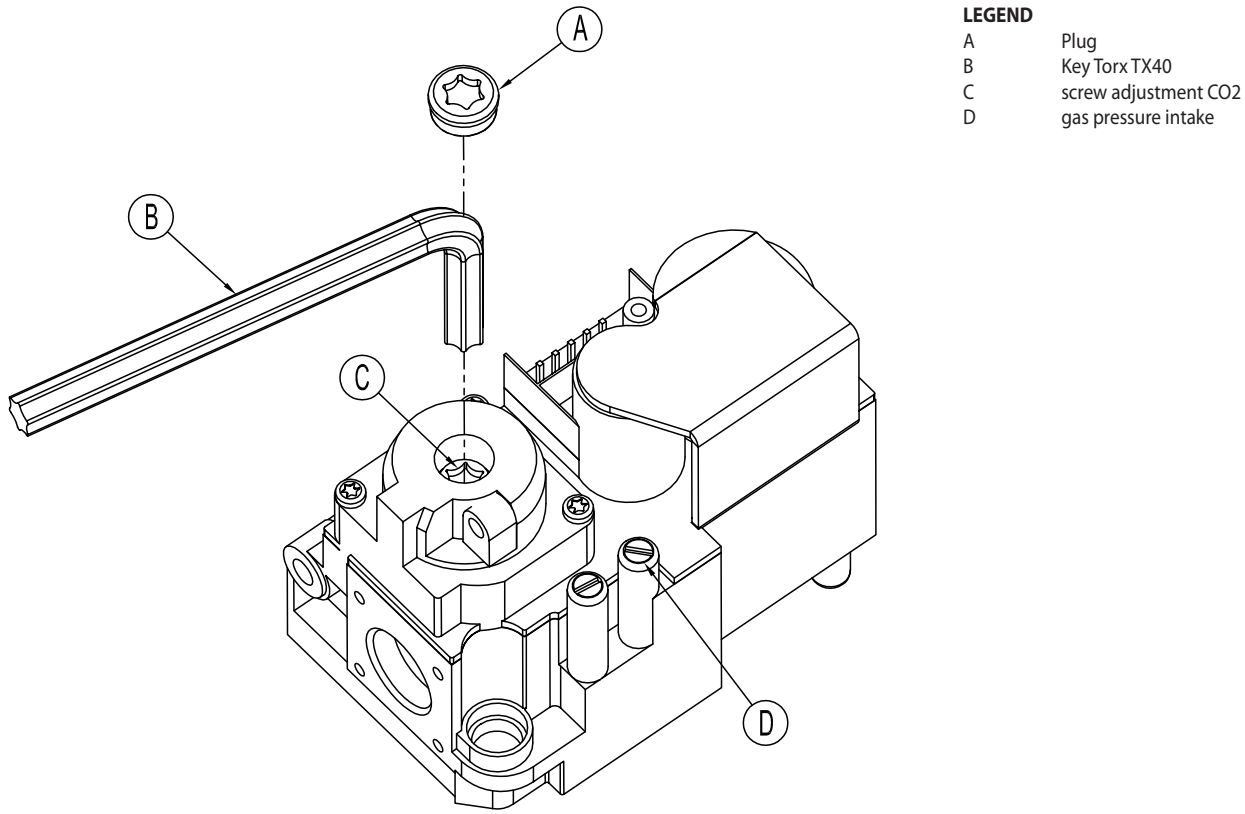
Check the dynamic gas mains pressure

1. Connect the manometer to the gas intake (see detail D, Figure 6.1 Gas valve → 61).
2. Open the gas cock and check that the static mains pressure is in line with the values given in Table 6.1 Network gas pressure → 61.

If the static mains pressure is greater than 50 mbar DO NOT switch on the appliance!

3. Give the consent signal for operation.
4. After a few seconds of operation, check that the dynamic mains pressure is in line with the values given in Table 6.1 Network gas pressure → 61.

Figure 6.1 – Gas valve



Gas valve Honeywell VK 4115V

Table 6.1 – Network gas pressure

E3-GS; E3-WS; E3-A; GAHP-GS; GAHP-WS; GAHP-A		Gas supply pressure						
Product categories	**Countries of destination**	**G20** [mbar]	**G25** [mbar]	**G30** [mbar]	**G31** [mbar]	**G25.1** [mbar]	**G27** [mbar]	**G2,350** [mbar]
$II_{2H3B/P}$	AL, BG, CY, CZ, DK, EE, FI, GR, HR, IT, LT, MK, NO, RO, SE, SI, SK, TR	20		30	30			
	AT, CH	20		50	50			
II_{2H3P}	AL, BG, CZ, ES, GB, HR, IE, IT, LT, MK, PT, SI, SK, TR	20			37			
	RO	20			30			

E3-GS; E3-WS; E3-A; GAHP-GS; GAHP-WS; GAHP-A		Gas supply pressure						
Product categories	**Countries of destination**	**G20** [mbar]	**G25** [mbar]	**G30** [mbar]	**G31** [mbar]	**G25.1** [mbar]	**G27** [mbar]	**G2,350** [mbar]
$II_{2ELL3B/P}$	DE	20	20	50	50			
II_{2Esi3P}	FR	20	25		37			
$II_{2HS3B/P}$	HU	25		30	30	25		
II_{2E3P}	LU	20			50			
$II_{2L3B/P}$	NL		25	50	50			
$II_{2E3B/P}$	PL	20		37	37			
$II_{2ELwLs3B/P}$		20		37	37		20	13
$II_{2ELwLs3P}$		20			37		20	13
$I_{2E(R)B}$; I_{3P}	BE	20	25		37			
I_{3P}	IS				30			
I_{2H}	LV	20						
$I_{3B/P}$	MT			30	30			
I_{3B}				30				

If the pressure reading is not in line with Table 6.1 Network gas pressure → 61 DO NOT activate the appliance!

5. Proceed with the regulation/verification of the combustion parameters as stated in the next paragraph.

Checking and adjusting the combustion parameters

After having checked the dynamic mains pressure (see section), you may check and adjust the combustion parameters as follows.

1. Insert the combustion products analysis probe into the vertical tract of the flue gas pipe (see reference B in Figure 4.4 Fume outlet → 36).
1. Give the unit functioning consent and wait for at least 5 minutes for normal combustion conditions.
2. With the appliance running, access menu 2 parameter 24 of the unit's controller: the display will flash "P_H1", press to confirm forcing maximum thermal power .
3. Check that the value of CO_2 read on the flue gas analyser coincides with the value given in Table 6.2 Gas nozzles and content of CO2 → 65 at the "Content of CO_2 with/MAX modulation" line with +0.2 -0.4 tolerance.
   Example (G20 gas): the nominal content of CO_2 is equal to 9.1%, values in the range between 8.7-9.% are therefore acceptable.
4. Access menu 2 parameter 23 of the unit's controller inside the electric panel: the display will flash "P_L1", press to confirm forcing minimum thermal power.
5. Now check that the difference between the value read in point 4 and that now displayed on the flue gas analyser, corresponds to the data given in the Table 6.2 Gas nozzles and content of CO2 → 65 at the "Delta CO_2 between MAX and MIN potentiality" line with tolerance of +0.3-0.0.
   Example (G20 gas): if at point 4 a content of CO_2 equal to 9.2% was detected, at point 6 there must be a value of (9.2%-0.4) with tolerance of +0.3 -0.0 on the delta value, i.e. a value in the range of 8.8-8.5%.
6. If this is not the case, remove cap A from the gas valve (see Figure 6.1 Gas valve → 61) and use a Torx TX40 wrench to act on screw C in Figure 6.1 Gas valve → 61. Turn clockwise to increase the percentage of CO_2 and anti-clockwise to decrease the percentage of CO_2.

1/8 turn of the regulator screw reduces (counterclockwise) or increases (clockwise) the CO_2 content by approximately 0.1%. DO NOT turn the screw more than one full turn in either direction.

7. With the appliance running, access menu 2 parameter 24 of the unit's controller: the display will flash "P_H1", press to confirm forcing maximum thermal power .
8. Check that, also following a regulation intervention on screw C, the value of CO_2 corresponds to the value read in Table 6.2 Gas nozzles and content of CO2 → 65 at the "Content of CO_2 with/Max modulation" line with tolerance of +0.2 -0.4.

If you cannot calibrate the CO_2 percentage after the second attempt, DO NOT activate the appliance; contact Robur technical service at +39 035/888111.

9. If you have successfully calibrated the combustion parameters, access menu 2 parameter 25 of the unit's controller: the display will flash "unF1", press to confirm modulation of thermal power.

After 30 minutes of operation the appliance automatically cancels the preceding forced power mode. To anticipate this timing, select and execute action "25" in menu 2.

10. Switch the appliance off.
11. Close the gas valve.
12. Reinstall the cap A in Figure 6.1 Gas valve → 61.
13. Reinstall the front panel.

6.2 MAINTENANCE

Correct maintenance prevents problems, guarantees maximum operating efficiency of the appliance and allows running costs to be contained.

Before carrying out any operation on the appliance, switch it off via the CCP/DDC (or consent switch) and wait for the shutdown cycle to terminate. When the appliance is off, disconnect it from the gas and electricity mains via the external circuit breaker and the gas valve.

Any operation that regards internal components of the appliance must be carried out by an authorized Robur Technical Assistance Centre (TAC), according to the instructions supplied by the manufacturer.

Ordinary scheduled maintenance

Perform the operations described below at least once a year. If the unit is subjected to particularly heavy use (for example in processing plants or in other conditions of continuous operation), these maintenance operations must be performed more often.

Maintenance operations that the user may NOT carry out (operations for a Robur TAC).

- Check cleansing of the water filters.
- Inspecting the condensate siphon and removing any foreign substances.
- Checking that the oil pressure pump is operating correctly:

- checking the oil level;
- checking the transmission belts (replacement every 5 years or 10,000 hours of operation).

- Checking the ignition and flame detector system.
- Checking the operation of internal components (safety and regulation equipment).
- Analysis of combustion products.

Furthermore, as regards the maintenance of the combustion unit, the following should be done at least **once yearly**:

- Burner: clean and replace if visibly damaged on the surface.

- Electrodes: check and repair in case of incorrect physical configuration, alumina deposits or degraded protective ceramic and gaskets.
- Fumes limit thermostat and combustion unit: replace only after having identified the cause of the problem and made sure that it is not due to the heat exchanger overheating. If you replace it, track the new component.

Extraordinary maintenance

The operations described in this paragraph must be carried out as and when necessary.

- Adding water and antifreeze to the hydraulic plant.

If it should become necessary to add water to the plant and, if required, to the water in the plant (free of impurities) glycol antifreeze of the inhibited monoethylene type, for the correct execution of these procedures, proceed as described in Paragraph 4.6 FILLING OF HYDRAULIC CIRCUIT → 34.

6.3 CHANGE OF GAS TYPE

This operation must be carried out exclusively by an authorised Robur Technical Assistance Centre (TAC).

If the appliance is to be used with a type of gas other than that indicated on the sticker inside the appliance (see detail M in Figure 6.2 Gas changeover → 65), switch off the appliance, shut off its power and gas supplies and proceed as follows:

You will need: the appliance switched off and disconnected from the gas/electricity supplies

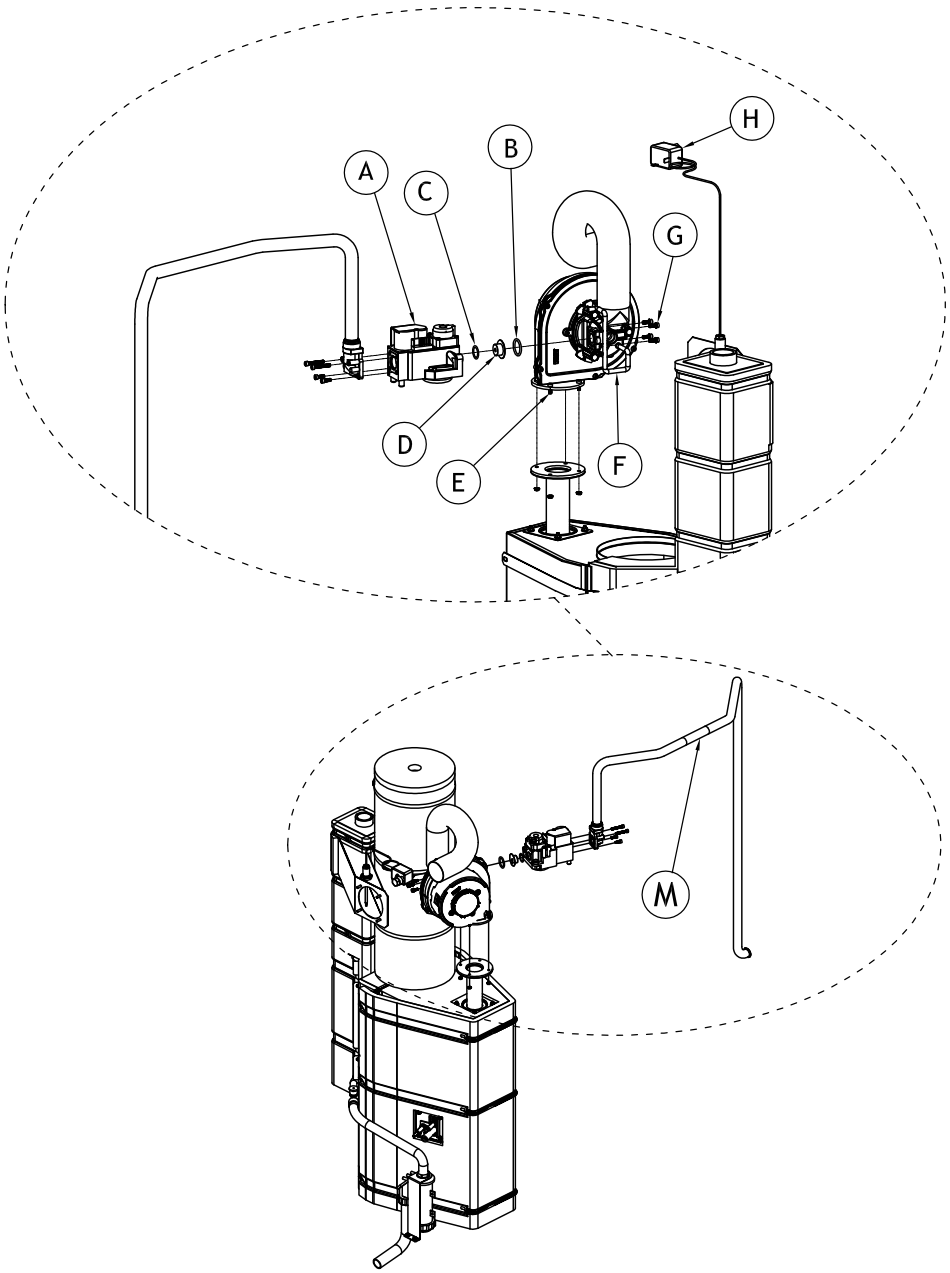
1. Disconnect the gas pipe from the gas valve.
2. Undo the 4 bolts E shown in Figure 6.2 Gas changeover → 65 and remove the gas valve/blower assembly from the burner.
3. Protect the burner from bolts and nuts falling into it.
4. Using a CH 4 hex key, undo the 4 bolts G indicated in Figure 6.2 Gas changeover → 65 and remove the nozzle D from the gas valve.
5. Replace the nozzle and o-ring C (see Figure 6.2 Gas changeover → 65) with those of the diameter suited to the new type of gas (see Table 6.2 Gas nozzles and content of CO2 → 65). The nozzle code is stamped on the nozzle itself.
6. Check that the o-ring B is fitted.
7. Reassemble the gas valve to the blower with the 4 bolts G taking care that the red silicon hose between the venturi tube and the gas valve (see detail F of Figure 6.2 Gas changeover → 65) is correctly installed.
8. Replace the white gasket between the blower and the burner.
9. Reinstall the blower/gas valve assembly to the burner with the 4 bolts E, taking care not to damage the white gasket.
10. Reconnect the gas pipe to the gas valve.
11. Replace the sticker indicating the type of gas for which the appliance was set up (detail M of Figure 6.2 Gas changeover → 65) with one that indicates the new type of gas used.
12. Check the tightness of the installation as follows:

- Connect a manometer to the gas intake D (Figure 6.1 Gas valve → 61).
- Open the gas valve.
- Close the gas cock and check that the mains pressure has not dropped.

13. If there is no gas leak, supply gas and electricity to the appliance and restart it.

14. complete the change of gas type by checking that all gas connections are sealed, including those not directly affected by this operation (using soapy water or another suitable method).
15. Now check and adjust the combustion parameters as indicated in the respective paragraph.

Figure 6.2 – Gas changeover



LEGEND

A	Gas valve
B	O-ring
C	O-ring
D	Gas nozzle
E	Fixing screws
F	Red silicon pipe
G	Fixing screws
H	Manual reset fumes thermostat
M	Sticker stating type of gas for which appliance is configured

Gas changeover

Table 6.2 – Gas nozzles and content of CO2

Gas type	G20	G25	G25.1	G27	G2.350	G30	G31
Nozzle code	180	181	181	187	184	182	183
Nozzle diameter	4,7	5,2	5,2	5,4	5,9	3,4	3,6
Content CO2 with MAX modulation	9,1%	9,2%	10,1%	9,0%	9,0%	10,4%	9,8%
Delta CO2 between Max and Min potential	0,4	0,6	0,8	0,5	0,5	0,5	0,4

7 ACCESSORIES

This section contains a list of the accessories that are available for the installation and use of the appliance. To order these accessories, contact Robur S.p.A. on +39 035.888111.

Table 7.1 – Accessories

ACCESSORIES			
Name	**Description**	**Code**	**Notes**
CIRCULATION PUMPS	Wilo-Stratos Para 25-11.	O-PMP004	Variable rate pump for cold and hot water. Only for E^3.
FILTERS	Sludge filter 1" 1/4	O-FLT014	
	Sludge filter 1" 1/2	O-FLT015	Only for E^3.
	Air separator filter 1" 1/4	O-FLT010	
	Air separator filter 1" 1/2	O-FLT016	Only for E^3.
BOILERS AND HYDRAULIC SEPARATORS	Sanitary water boiler with oversize coil, 300 l	O-SRB004	Only for E^3.
	Sanitary water boiler with oversize coil, 500 l	O-SRB005	Only for E^3.
	Sanitary water boiler with oversize coil, 500 l	O-SRB006	With integral solar coil. Only for E^3.
	Sanitary water boiler with oversize coil, 750 l	O-SRB007	With integral solar coil. Only for E^3.
	Thermal tank, three fittings, 300 l	O-SRB000	
	Thermal tank, three fittings, 500 l	O-SRB001	
	Thermal tank, three fittings, 800 l	O-SRB002	
	Thermal tank, three fittings, 1000 l	O-SRB003	
VALVES	Flow regulator valve	O-VLV001	Only for E^3.
	3-way valve DN20 Kvs 6.3	O-VLV004	
	3-way valve DN25 Kvs 10	O-VLV005	
	3-way valve DN32 Kvs 16	O-VLV006	
	3-way zone ball valve 1"1/4	O-VLV002	
	3-way zone ball valve 1"1/2	O-VLV003	
GLYCOL ANTIFREEZE	Glycol antifreeze and corrosion protection for hot/cold hydraulic systems.	O-GLC006	5 liters tank
REGULATOR COMPONENTS	Radio module (Siemens)	O-DSP007	Only for E^3.
	Repeater (Siemens)	O-DSP009	Only for E^3.
	Sender (Siemens)	O-DSP008	Only for E^3.
	Room unit basic (Siemens)	O-DSP004	Only for E^3.
	Room unit cooling (Siemens)	O-DSP005	Only for E^3.
	Room unit cooling (Siemens) (radio)	O-DSP006	Only for E^3.
	Servocontrol 230V AC for zone valves, on/off 90 sec	O-BBN000	
	Modulating servocontrol for 3-way valves 230V AC 150 sec	O-BBN001	
	Probe + sender (Siemens)	O-DSP010	Only for E^3.
	Contact probe (Siemens)	O-SND006	Only for E^3.
	External probe (Siemens)	O-SND003	Only for E^3.
	Immersion probe, length 2 m	O-SND004	Only for E^3.
	Solar sensor (Siemens)	O-SND005	Only for E^3.
	Commissioning tool	O-DSP002	Only for E^3.
	Communications switchboard	O-DSP003	Only for E^3.
Robur "NETBUS" CAN BUS CABLE	Cable for data communication networks: for network connection between CCI/DDC and appliance.	O-CVO008	

8 APPENDIX

8.1 MACHINE OPERATING CODES

Table 8.1 – TABLE OF OPERATING CODES generated by S61 controller (firmware version 3.015)

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
E 400	FAULT ON RESET CIRCUIT OF FLAME CONTROL UNIT	Fault on reset circuit of flame control unit.	Contact authorised Robur TAC.
u 401	GENERATOR LIMIT TEMPERATURE THERMOSTAT	High temperature detected by limit thermostat on body of generator	Reset limit thermostat manually: operation will be restored automatically when the cause ceases.
E 401	GENERATOR LIMIT TEMPERATURE THERMOSTAT	U 1 code active for 1 hour, or U 1 code generated 3 times in 2 hours of operation.	Contact authorised Robur TAC.
u 402	FUMES THERMOSTAT	High temperature detected by exhaust fumes thermostat	Reset occurs automatically when the condition that generated the code ceases, with hysteresis of 8 °C
E 402	FUMES THERMOSTAT	u 2 code active for 1 hour, or u 2 code generated 3 times in 2 hours of operation.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If codes u 2 and/or E 2 occur again, contact authorised Robur TAC.
E 405	HIGH AMBIENT TEMPERATURE	HIGH temperature detected by ambient temperature sensor.	Reset occurs automatically when the condition that generated the code ceases.
E 406	LOW AMBIENT TEMPERATURE	LOW temperature detected by ambient temperature sensor.	Reset occurs automatically when the condition that generated the code ceases.
u 407	HIGH CONDENSER INLET TEMPERATURE	HIGH temperature detected by condenser inlet temperature sensor or fumes sensor.	Reset occurs automatically when the condition that generated the code ceases.
E 407	HIGH CONDENSER INLET TEMPERATURE	u 7 code active for 1 hour, or u 7 code generated 12 times in 2 hours of operation.	Carry out appropriate checks. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 408	FLAME CONTROL UNIT ERROR	E 12 on unit and condenser inlet temperature increasing by over 10 °C within 1 hour.	Carry out appropriate checks. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
u 410	INSUFFICIENT HOT WATER FLOW	Insufficient water flow (the circulator is on and the flowmeter measure a low water flow).	Reset occurs automatically when correct water flow is restored.
E 410	INSUFFICIENT HOT WATER FLOW	u 10 code is repeated, or code u 10 is active for 1 hour	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
u 411	INSUFFICIENT ROTATION OF OIL PRESSURE PUMP	Insufficient rotation of oil pressure pump.	Reset occurs automatically 20 minutes after the Code is generated.
E 411	INSUFFICIENT ROTATION OF OIL PRESSURE PUMP	u 11 code generated twice in 2 hours of operation.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
u 412	FLAME CONTROL UNIT ARREST	Failure to ignite burner.	Reset occurs automatically when the solenoid valve opens again (new attempt at ignition), or after code is active for 5 minutes.
E 412	FLAME CONTROL UNIT ARREST	Flame arrest signal.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 20). If the code persists, contact authorised Robur TAC.
E 416	HOT OUTLET WATER TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on hot outlet water temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 417	COLD INLET WATER TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on inlet water temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 420	CONDENSER INLET TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on condenser inlet temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 422	WATER FLOWMETER FAULT	Water flowmeter fault	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 423	AIR/GAS MIXTURE SENSOR FAULT	Air gas mixture sensor fault	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 424	FUMES TEMPERATURE SENSOR FAULT	Fumes temperature sensor fault	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 428	GAS SOLENOID VALVE EXCITED DURING FLAME CONTROLLER ARREST	The flame controller is arrested (E 12) but the gas solenoid valve is excited. In this case the flame controller is de-excited (E 12 resets).	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
u 429	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Gas solenoid valve is off for 5 seconds (with central flame control unit on).	Reset occurs automatically if the gas solenoid valve switches on again within 10 minutes (with central flame control unit on).
E 429	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Code U 29 is active for more than 10 minutes (with flame controller unit on).	Carry out appropriate checks. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 436	BLOWER FAULT	Blower fault	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 437	LOW COMBURENT AIR TEMPERATURE	Air comburent temperature equal or smaller of -10 °C	Reset occurs automatically when the condition that generated the code ceases.

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
E 444	EVAPORATOR TEMPERATURE SENSOR FAULT	Evaporator temperature probe fault	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
u 446	HOT INLET WATER TEMPERATURE TOO HIGH	Hot inlet water temperature higher than upper operating limit of the appliance (if the appliance is in operation).	Resets automatically if, with the circulator on, the cause resolves or (with circulator off) 20 minutes after generation of code.
u 447	LOW HOT WATER TEMPERATURE	Hot water temperature lower than lower operating limit of the appliance (if the appliance is in operation).	Reset occurs automatically when cause resolves or 430 seconds after the code is generated.
E 447	LOW HOT WATER TEMPERATURE	u 447 code generated 3 times in 1 hour of operation of the circulator.	Reset occurs automatically when the condition that generated the code ceases. If the code persists, contact authorised Robur TAC.
u 448	HOT WATER DIFFERENTIAL TEMPERATURE TOO HIGH	High hot water differential temperature.	Reset occurs automatically 20 minutes after the operating code is generated.
E 448	HOT WATER DIFFERENTIAL TEMPERATURE TOO HIGH	u 48 code generated twice in 2 hours of operation.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21).
E 449	SATELLITE BOARD NOT PRESENT	Satellite board not present.	Reset occurs automatically when the condition that generated the code ceases.
u 452	DEFROSTING FUNCTION ACTIVATED	Defrosting function activated. Defrosting is activated if at least 90 minutes has passed since the last defrosting (or 180 minutes if temperature is inferior of -5°C), if the flame control unit has been on for at least 15 minutes, and if room temperature, temperature of hot inlet water and of the evaporator require its execution.	The Code clears automatically when execution of defrosting ends.
u 453	WATER FLOW IN HOT PASSIVE MODULE	Warning is generated if system operating in conditioning mode and the flowmeter of the hot module is closed.	Reset is automatic and occurs when the condition that generated it ceases to apply.
u 478	OUTLET HOT WATER TEMPERATURE TOO HIGH	Outlet hot water temperature too high	Reset is automatic and occurs when the condition that generated it ceases to apply.
u 479	DEFROST FUNCTION ACTIVATED - HOT SIDE Activation takes place only if the hot module is off and the antifreeze function is enabled (see menu 1, parameter 163).	Antifreeze function activated (with function enabled: see menu 1, item163; and only with machine off). In this case the antifreeze function activates the plant water circulator. If this temperature falls further to below 3 °C, the function also activates the flame controller.	Resets automatically (defrost function disabled) if, with only the circulator operating, the hot water inlet/outlet temperature rises above 5°C (at which point the circulator switches off); or, if also the flame controller is on, when the temperature reaches 18 °C (in this case the flame controller and then the circulator switch off).
u 480	INCOMPLETE PARAMETERS	Incomplete parameters.	The code remains until operating parameters are entered and completed. Contact authorised Robur TAC. If the board is replaced, Code E 80 may appear; this means that the unit's characterisation parameters have not been set.
E 80/480	INVALID PARAMETERS	Invalid parameters or damage to parameter memory.	Reset occurs automatically when correct parameters are entered. If the code persists, contact authorised Robur TAC: if the parameters are incorrect, it is necessary to enter and complete the unit operating and characterisation parameters; if the memory is damaged, the controller must be replaced.
u 481	INVALID BANK 1 PARAMETERS	Invalid Bank 1 data - Bank 2 data OK.	Reset occurs automatically 5 seconds after the code is generated.
E 481	INVALID BANK 1 PARAMETERS	The program attempts to resolve the problem by writing the second page over the first; if after 3 attempts this fails, the error is generated.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
u 482	INVALID BANK 2 PARAMETERS	Invalid Bank 2 data - Bank 1 data OK.	Reset occurs automatically 5 seconds after the code is generated.
E 482	INVALID BANK 1 PARAMETERS	The program attempts to resolve the problem by writing the first page over the second; if after 3 attempts this fails, the error is generated.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Robur TAC.
E 484	FAULTY TRANSFORMER CONNECTION OR 24 V AC FUSES	Damage to one of the 2 24-0-24 V AC transformer fuses, or one of 24-0-24 V AC wires to the board not supplying current.	Check fuses and 24-0-24 V AC electrical power connections on the controller. Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 21). If the code persists or occurs again, contact authorised Robur TAC.
E 485	INCORRECT MODULE TYPES (from menu 6)	The set module type (from menu 6) does not correspond to the one managed by the controller.	Reset occurs automatically when correct parameters are entered. If the code persists, contact authorised Robur TAC.
E 486	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Robur TAC.
E 487	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Robur TAC.
E 488	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Robur TAC.
E 489	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Robur TAC.
E 490	AMBIENT TEMPERATURE SENSOR DEFECTIVE	Interruption or short circuit of ambient temperature sensor.	Reset may be performed from the CCI/DDC (or from the S61 board via menu 2, parameter 1). If the code persists or occurs again, contact authorised Robur TAC.
E 491	CONTROLLER DEFECTIVE	One of the following is absent: serial number of board, hardware version code or encryption key written during board test.	Contact authorised Robur TAC.

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