

Installation, user and maintenance manual

GAHP-A

Air-Water gas absorption heat pump

powered by gas and renewable energies



Revisione: P

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INDEX OF CONTENTS

1	PREFACE	4
2	SAFETY WARNINGS.....	5
2.1	WARRANTY TERMS	7
3	OVERVIEW AND TECHNICAL FEATURES	8
3.1	GENERAL INFORMATION	8
3.2	NOTES ON OPERATION OF THE APPLIANCE	10
3.3	TECHNICAL MANUFACTURING CHARACTERISTICS.....	11
3.4	TECHNICAL DATA	11
3.5	DIMENSIONS AND SERVICE PANEL	15
4	NORMAL OPERATION	17
4.1	START UP (AND SHUT DOWN)	17
4.2	ON-BOARD ELECTRONICS.....	19
4.3	RESET OPERATIONS AND MANUAL DEFROSTING	22
4.4	OPERATING SETTINGS	24
4.5	PROLONGED PERIODS OF DISUSE	24
5	HYDRAULIC INSTALLATION	27
5.1	GENERAL INSTALLATION PRINCIPLES	27
5.2	POSITION OF THE APPLIANCE	27
5.3	HYDRAULIC CONNECTIONS	30
5.4	GAS SUPPLY.....	32
5.5	CONDENSATE DISCHARGE.....	33
5.6	FILLING OF HYDRAULIC CIRCUIT	34
5.7	EXHAUST FLUE GAS.....	36
5.8	PROGRAMMING OF HYDRAULIC PARAMETERS	37
6	ELECTRICAL INSTALLATION.....	40
6.1	ELECTRICAL DIAGRAM OF THE APPLIANCE.....	45
6.2	HOW TO CONNECT THE APPLIANCE ELECTRICALLY.....	46
6.3	TYPE A (Comfort Control Panel).....	47
6.4	TYPE B (DDC)	56
6.5	TYPE C (Consent switch).....	66
6.6	HOW TO RESET THE FLAME CONTROLLER FROM REMOTE	67
7	INITIAL ACTIVATION AND MAINTENANCE	69
7.1	PROCEDURE FOR FIRST START UP	69
7.2	MAINTENANCE.....	73
7.3	CHANGE OF GAS TYPE	74
8	ACCESSORIES.....	77
9	OPERATING CODES/TROUBLESHOOTING	78
9.1	OVERVIEW AND OPERATING CODES/TROUBLESHOOTING.....	78
	DECLARATLON OF CONFORMITY.....	91

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 operation of the appliance according to their own requirements;
- Installation technicians (hydraulic and electrical) for 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.
- (IN CASE) one or more APPENDIX sections in which are reported some "specific" information for a particular country.

References

If the appliance is connected to a Comfort Control Panel (see detail CCP in Figure 6.3 Comfort Control Panel e Accessory → 43) it is switched on and controlled by the Comfort Control Panel. In this case, refer to the manual supplied with it.

If the appliance is connected to a Direct Digital Controller (see Figure 6.4 CCI/DDC → 44) 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.

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** in the edge 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 SAFETY WARNINGS



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



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.



The appliance is not intended to be used by persons (including children) whose physical, sensory and mental capacities are impaired, or who lack the necessary experience and knowledge, unless they are supervised or instructed in its use by persons responsible for their safety. Children must be supervised to ensure that they do not play with the appliance.



The unit uses a water/ammoniac absorption cycle for hot water production. The ammoniac is in water solution inside a sealed circuit tested for tightness by the manufacturer. In case of coolant leaks, switch off the electrical power and gas supplies only if this can be done in total safety. Contact your Technical Assistance Centre.



Frequent topping up of the hydraulic with water can result in damage due to scale and corrosion, depending on the quality of the water being used. Make sure the system is water tight and that the expansion tank is operational.



Concentrations of chlorides or free chlorine in the circuit above the values given in Table 5.1 Chemical and physical parameters of water → 31 will damage the unit's water/ammonia exchanger.



Close the gas supply before working on the gas circuit. On completing work on the gas circuit, check for leakages as required by established regulations.



Do not operate the appliance if dangerous conditions exist: odour of gas in the grid or near the appliance; problems with the electrical/gas grid or hydraulic circuit; parts of the appliance submerged in water or otherwise damaged; controls or safety components bypassed or defective. In these cases, ask for assistance to professionally qualified personnel.



If you smell gas:

- do not use electrical devices such as telephones, multimeters or other equipment that can cause sparks next to the appliance;
- shut off gas supply closing the isolation valve;
- cut off electrical power opening the main breaker upstream of the appliance (to be provided by the electrical installer in an appropriate panel);

- ask for assistance to professionally qualified personnel from a telephone distant from the appliance.



Moving parts, also during the appliance's start-up and shut-down cycles. Do not remove guards. Make sure the appliance cannot be started up inadvertently.



POISONING HAZARD

Make sure the flue gas components are tight and compliant with established regulations. After any intervention on these parts, check for tightness.



BURN HAZARD

The appliance contains numerous hot parts. Do not open up the appliance or touch the fumes outlet pipe. If necessary, contact your Technical Assistance Centre.



The appliance has a sealed circuit classified as pressure equipment, i.e. with internal pressure higher than atmospheric pressure. The fluids contained in the 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 circuit or on its valves.



ELECTROCUTION HAZARD

- Use only approved components for the electrical connections, as specified by the manufacturer.
- Disconnect the electrical power supply before working on the appliance's internal electrical equipment (electrical panel, motors, control board, etc.).
- Make sure the appliance cannot be started up inadvertently.



The electrical safety of the appliance is ensured only when it is correctly connected to an efficient grounding system, compliant with current safety regulations.



DAMAGE DUE TO AGGRESSIVE SUBSTANCES IN THE AIR SUPPLY

Hydrocarbons containing chlorine and fluorine compounds, will increase corrosion. Make sure the air supply is free of aggressive substances.



ACID CONDENSATE

Drain out the condensate produced during combustion as indicated in paragraph 5.5 CONDENSATE DISCHARGE → 33.



EXPLOSIVE/FLAMMABLE MATERIALS HAZARD

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



RECOMMENDATION. Stipulate a maintenance contract with an authorised specialist contractor for the annual inspection of the appliance and maintenance when needed. Maintenance and repairs may only be done by a contractor legally authorised to work on gas appliances and equipment. Use only original spare parts.

2.1 WARRANTY TERMS

Warranty can be invalidated by each one of the following conditions:

- faulty installation
- improper use
- failure to follow the manufacturer's indications about installation, use and maintenance
- alteration or modification of the product or any part
- operational conditions extreme or however outside of the operational ranges defined by the manufacturer
- damages caused by external agents such as salts, chlorine, sulphur or other chemical substances contained in the installation water or present in the air of the installation site
- abnormal actions transmitted by the plant or installation to the appliance (mechanical stresses, vibrations, thermal expansions, overvoltages...)
- incidental damages or force majeure

3 OVERVIEW AND TECHNICAL FEATURES

In this section you will find general information, hints on the operating principle of the appliance and its manufacturing features. This section also contains technical data and dimensional drawings of the appliance.

3.1 GENERAL INFORMATION

This manual is 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 requirements for condensing boilers with nominal thermal capacity up to 70 kW.
- EN 378 Refrigerating systems and heat pumps.



The emission values of nitrogen oxides (NOx) of gas absorption heat pumps of the GAHP series are lower than 60 mg/kWh, in compliance with the requirements of the standard RAL UZ 118 "Blauer Engel".

Information regarding the above EC certifications is given in Paragraph 3.4 TECHNICAL DATA → 11, as well as on the Nameplate of the appliance itself.

Installation and regulatory references

On receiving the appliance at the installation site, before placing into final position, check there are no signs of transportation damages of the external panels or packaging.



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 professionally qualified personnel by i.e. firms qualified according to the current legislation of the country of installation.



"Professionally qualified personnel" means personnel with specific technical competence in the sector of heating/cooling installations 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 installations and 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 concerning 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 installer must provide the owner with a Declaration stating that the installation has been completed in compliance with state-of-the-art practices, current national and local regulations, and recommendations by the manufacturer.

Before contacting Technical Assistance for commissioning and first start-up, the installer must ensure that:

- the electricity and gas grids characteristics correspond to the specifications on the nameplate of the appliance;
- the gas supply pressure is compliant with the value reported in Table 5.2 Network gas pressure → 33 (considering a tolerance of $\pm 15\%$);
- the appliance is fed by the type of gas for which it is designed;
- the gas supply system and water distribution system are sealed;
- the gas and electricity supply systems are properly rated for the capacity required by the appliance and are equipped with all safety and control devices required by current regulations



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

Initial activation procedure

The complete procedure for the first start up of the appliance must be carried out by an authorized technician according to the instructions supplied by the manufacturer.

To carry out entire procedure correctly, follow the instructions in Paragraph 7.1 PROCEDURE FOR FIRST START UP → 69.



Warranty could be invalidated if the *first start up* is not carried out and validated by an authorized technician.

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 Comfort Control Panel (see Figure 6.3 Comfort Control Panel e Accessory → 43 detail CCP), the appliance may be switched on and off exclusively by the CCP itself.
- If the appliance is connected to the DDC (see Figure 6.4 CCI/DDC → 44), the appliance may be switched on and off exclusively by the DDC itself.
- If the appliance is NOT connected to a CCP/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 Control 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 cause permanent damages to internal components!

If the appliance fails to operate correctly, with the consequent indication of the Machine code, follow the instructions of Paragraph 9.1 OVERVIEW AND OPERATING CODES/ TROUBLESHOOTING → 78.



In the event of failure of the appliance and/or breakage of any component, do not attempt to repair and/or restore operation; proceed as follows:

- shut off the appliance immediately (if possible and if no dangerous condition exists) through the controls (CCP, DDC or permissive switch) and wait for the end of the cooling down cycle (around 7 minutes);
- immediately get in touch with Technical Assistance.

Proper **ordinary 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 the maintenance of internal components of the appliance, contact Technical Assistance; for other maintenance requirements, see Paragraph 7.2 MAINTENANCE → 73.

Any repair of the appliance must be carried out by Technical Assistance, using only original spare parts.



Failure to observe the indications above may compromise the operation and safety of the appliance, and may invalidate warranty.

If the appliance is to be disposed of, contact the manufacturer 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 installer.

3.2 NOTES ON OPERATION OF THE APPLIANCE

The appliance uses the water/ammonia absorption thermodynamic cycle ($H_2O - NH_3$) to produce hot water, using atmospheric air as renewable energy source.

The water/ammonia thermodynamic cycle used in the unit GAHP-A is realized in a hermetically sealed circuit, directly verified by the manufacturer to ensure the perfect tightness 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 distribution systems (radiators, fan coils); it produces hot water up to +65°C in heating mode and up to +70°C in Domestic Hot Water mode.
- Version **LT**: optimised for low temperature distribution systems (heating floor, low temperature radiators); it produces hot water up to +55°C in heating mode and up to +70°C in Domestic Hot Water mode.

The fan can be:

- low consumption (S1): reduction of the electrical consumption and reduction of noise emissions
- low noise (S): reduction of noise emissions
- standard

The GAHP heat pump can be controlled with the CCP/DDC 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 3.1 Size (Standard ventilation) → 15, Figure 3.2 Dimensions (low consumption ventilation – S1) → 15 or Figure 3.3 Dimensions (low noise version) → 16). The fumes outlet must be connected to a flue (for further details, see Paragraph 5.7 EXHAUST FLUE GAS → 36).

The appliance powered by 230 V 1N 50 Hz electrical power - .

3.3 TECHNICAL MANUFACTURING CHARACTERISTICS

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

- Steel sealed circuit, externally treated with epoxy paint.
- Sealed combustion chamber suited for type C installation.
- Metal mesh radiant burner equipped with ignition electrodes and flame detection managed by an electronic flame control box.
- Titanium stainless steel shell-and-tube heat exchanger, with external insulation.
- Recovery heat exchanger (AISI 304L).
- Air heat exchanger with single-row finned coil, manufactured with steel pipes and aluminium fins.
- Automatic microprocessor-controlled two-ways defrosting valve.

Control and safety components

- S61 electronic board with integrated microprocessor, LCD display and control knob, complete with Mod10 auxiliary card to control thermal capacity and primary pump modulation (see Figures 6.1 Electronic board S61 → 41 and 6.2 Mod10 controller → 42).
- Water flowmeter.
- Sealed circuit high temperature limit thermostat, with manual reset.
- Flue temperature thermostat 120 °C, with manual reset.
- Sealed circuit safety relief valve.
- Safety by-pass valve, between high and low pressure parts of the sealed circuit.
- Antifreeze functions for hydraulic circuit.
- Ionization flame control box.
- Double shutter electric gas valve.
- Condensate discharge sensor.

3.4 TECHNICAL DATA

Table 3.1 – GAHP-A LT technical data

			GAHP-A LT S1	GAHP-A LT S	GAHP-A LT
OPERATION WHEN HEATING					
OPERATING POINT A7W50	G.U.E. gas usage efficiency	%		151 (1)	
	Thermal power	kW		38,0 (1)	
OPERATING POINT A7W35	G.U.E. gas usage efficiency	%		165 (1)	
	Thermal power	kW		41,7 (1)	

			GAHP-A LT S1	GAHP-A LT S	GAHP-A LT
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 DHW	°C	70		
Hot water return temperature	maximum heating	°C	45		
	maximum for DHW	°C	60		
	minimum temperature in continuous operation**	°C	20		
Hot water flow rate	nominal	l/h	3000		
	maximum	l/h	4000		
	minimum	l/h	1400		
Hot water pressure drop	nominal water pressure (A7W50)	bar	0,43 (2)		
Ambient air temperature (dry bulb)	maximum	°C	40		
	minimum	°C	-15 (7)		
Thermal differential	nominal	°C	10		
gas consumption	methane G20 (nominal)	m3/h	2,72 (3)		
	methane G20 (MIN)	m3/h	1,34		
	G25 (nominal)	m3/h	3,16 (9)		
	G25 (MIN)	m3/h	1,57		
	G30 (nominal)	kg/h	2,03 (4)		
	G30 (MIN)	kg/h	0,99		
	G31 (nominal)	kg/h	2,00 (4)		
G31 (MIN)	kg/h	0,98			
ELECTRICAL SPECIFICATIONS					
Power supply	Voltage	V	230		
	TYPE		SINGLE PHASE		
	Frequency	50 Hz supply	50		
Electrical power absorption	nominal	kW	0,83 (5)	1,09 (5)	0,90 (5)
	minimum	kW	0,56 (5)	-	-
Degree of protection	IP		X5D		
INSTALLATION DATA					
Sound power Lw (max)		dB(A)	75,3 (8)	73 (11)	82,1 (8)
Sound power Lw (min)		dB(A)	72,3 (8)	-	-
Sound pressure Lp at 5 metres (max)		dB(A)	53,3 (10)	51 (11)	60,1 (10)
Sound pressure Lp at 5 metres (min)		dB(A)	50,3 (10)	-	-
Minimum storage temperature		°C	-30		
Maximum operating pressure		bar	4		
Maximum condensation water flow rate		l/h	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	Diameter ()	mm	80		
	Residual head	Pa	80		
Size	width	mm	848 (6)		
	height	mm	1537 (6)		1281 (6)
	depth	mm	1258		
Weight	In operation	kg	400		390
Portata d'aria richiesta		m3/h	11000		
Prevalenza residua ventilatore		Pa	40		
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		

** in transient operation, lower temperatures are allowed

Notes:

1. As per EN12309-2 evaluated on actual thermal capacity. For operating conditions other than nominal, refer to the Design Manual.
2. For flow rates different from the nominal refer to the 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 3.1 Size (Standard ventilation) → 15, 3.2 Dimensions (low consumption ventilation – S1) → 15 and Figure 3.3 Dimensions (low noise version) → 16).
7. As an option, a version for operation down to -30 °C is available.
8. Sound power values measured according to EN ISO 9614.
9. PCI 29.25 MJ/m³ (1013 mbar – 15 °C).
10. Maximum sound pressure values in free field, with directionality factor 2, obtained from sound power level in compliance with norm EN ISO 9614.
11. Maximum sound pressure values measured in free field, direction factor 2, according to EN 3744.

Table 3.2 – GAHP-A HT technical data

			GAHP-A HT S1	GAHP-A HT S	GAHP-A HT
OPERATION WHEN HEATING					
OPERATING POINT A7W50	G.U.E. gas usage efficiency	%		152 (1)	
	Thermal power	kW		38,3 (1)	
OPERATING POINT A7W65	G.U.E. gas usage efficiency	%		124 (1)	
	Thermal power	kW		31,1 (1)	
OPERATING POINT A-7W50	G.U.E. gas usage efficiency	%		127 (1)	
	Thermal power	kW		32,0 (1)	
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		65	
	maximum for DHW	°C		70	
Hot water return temperature	maximum heating	°C		55	
	maximum for DHW	°C		60	
	minimum temperature in continuous operation**	°C		30	
Hot water flow rate	nominal	l/h		3000	
	maximum	l/h		4000	
	minimum	l/h		1400	
Hot water pressure drop	nominal water pressure (A7W50)	bar		0,43 (2)	
Ambient air temperature (dry bulb)	maximum	°C		40	
	minimum	°C		-15 (7)	
Thermal differential	nominal	°C		10	
gas consumption	methane G20 (nominal)	m ³ /h		2,72 (3)	
	methane G20 (MIN)	m ³ /h		1,34	
	G25 (nominal)	m ³ /h		3,16 (9)	
	G25 (MIN)	m ³ /h		1,57	
	G30 (nominal)	kg/h		2,03 (4)	
	G30 (MIN)	kg/h		0,99	
	G31 (nominal)	kg/h		2,00 (4)	
	G31 (MIN)	kg/h		0,98	
ELECTRICAL SPECIFICATIONS					
Power supply	Voltage	V		230	
	TYPE			SINGLE PHASE	
	Frequency	50 Hz supply		50	
Electrical power absorption	nominal	kW	0,83 (5)	1,09 (5)	0,90 (5)
	minimum	kW	0,56 (5)		-
Degree of protection	IP			X5D	
INSTALLATION DATA					
Sound power L _w (max)		dB(A)	75,3 (8)	73 (11)	82,1 (8)
Sound power L _w (min)		dB(A)	72,3 (8)		-
Sound pressure L _p at 5 metres (max)		dB(A)	53,3 (10)	51 (11)	60,1 (10)
Sound pressure L _p at 5 metres (min)		dB(A)	50,3 (10)		-
Minimum storage temperature		°C		-30	

			GAHP-A HT S1	GAHP-A HT S	GAHP-A HT
Maximum operating pressure		bar		4	
Maximum condensation water flow rate		l/h		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	Diameter ()	mm		80	
	Residual head	Pa		80	
Size	width	mm		848 (6)	
	height	mm	1537 (6)		1281 (6)
	depth	mm		1258	
Weight	In operation	kg	400		390
	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	

** in transient operation, lower temperatures are allowed

Notes:

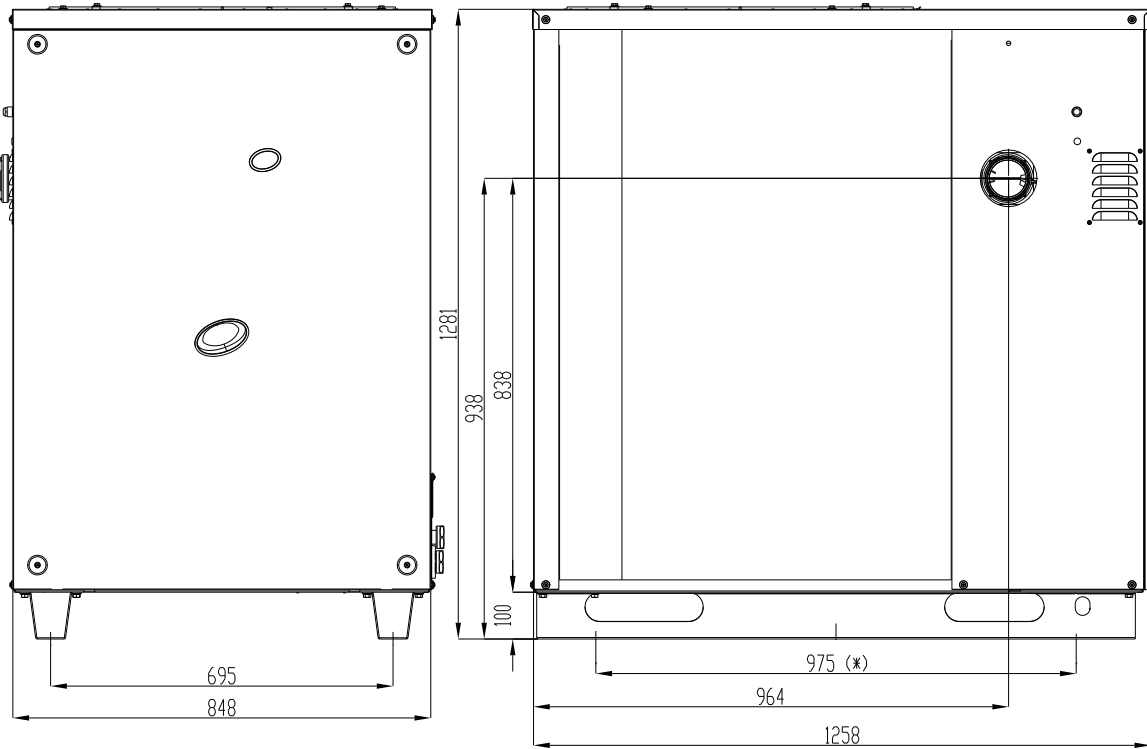
1. As per EN12309-2 evaluated on actual thermal capacity. For operating conditions other than nominal, refer to the Design Manual.
2. For flow rates different from the nominal refer to the Design Manual.
3. PCI 34.02 MJ/m³ (1013 mbar – 15 ° C).
4. PCI 46.34 MJ/kg (1013 mbar – 15 ° C).
5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 3.1 Size (Standard ventilation) → 15, 3.2 Dimensions (low consumption ventilation – S1) → 15 and Figure 3.3 Dimensions (low noise version) → 16).
7. As an option, a version for operation down to -30 °C is available.
8. Sound power values measured according to EN ISO 9614.
9. PCI 29.25 MJ/m³ (1013 mbar – 15 ° C).
10. Maximum sound pressure values in free field, with directionality factor 2, obtained from sound power level in compliance with norm EN ISO 9614.
11. Maximum sound pressure values measured in free field, direction factor 2, according to EN 3744.

Table 3.3 – PED data

			GAHP-A HT	GAHP-A LT
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 NH ₃ /l		0,146
FLUID GROUP				GROUP 1°

3.5 DIMENSIONS AND SERVICE PANEL

Figure 3.1 – Size (Standard ventilation)

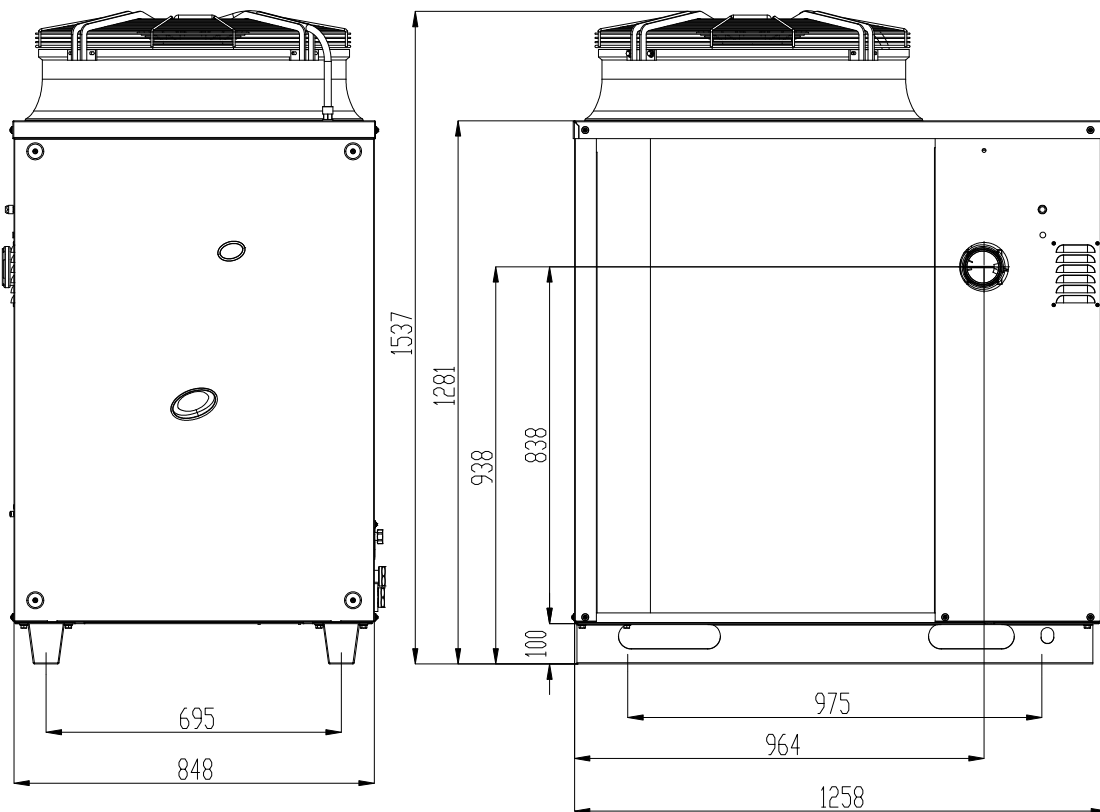


LEGEND

* Posizione dei supporti antivibranti (opzionali)

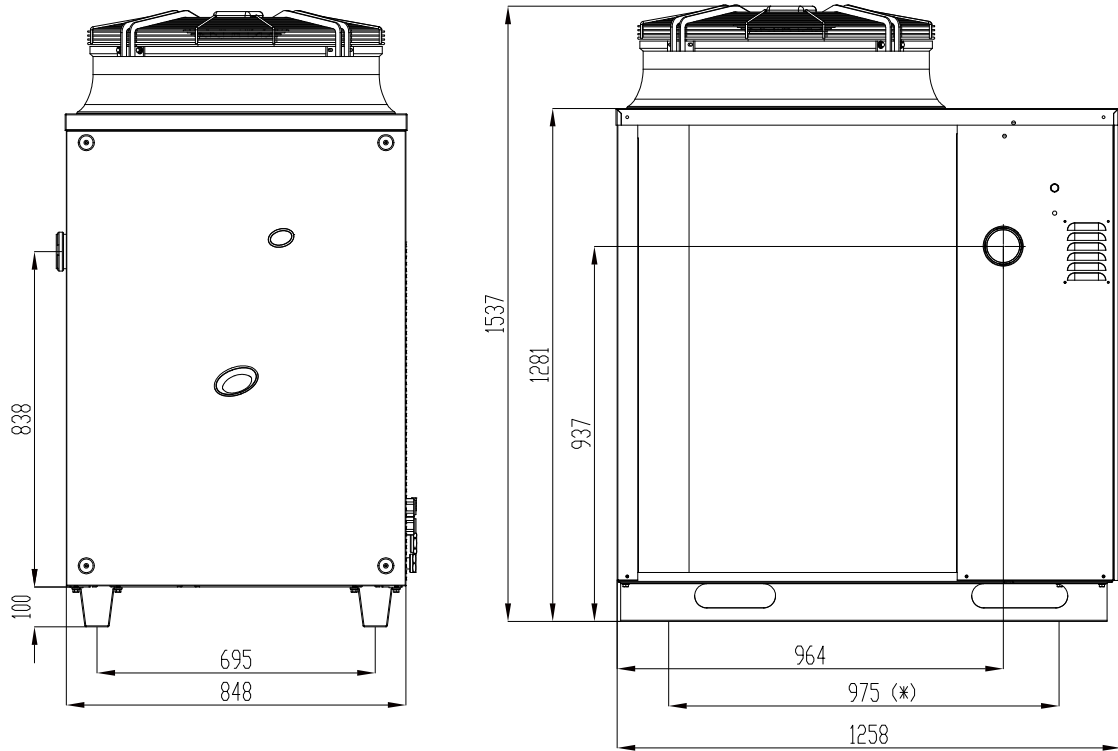
Front and side views (dimensions in mm).

Figure 3.2 – Dimensions (low consumption ventilation – S1)



Front and side views (dimensions in mm).

Figure 3.3 – Dimensions (low noise version)

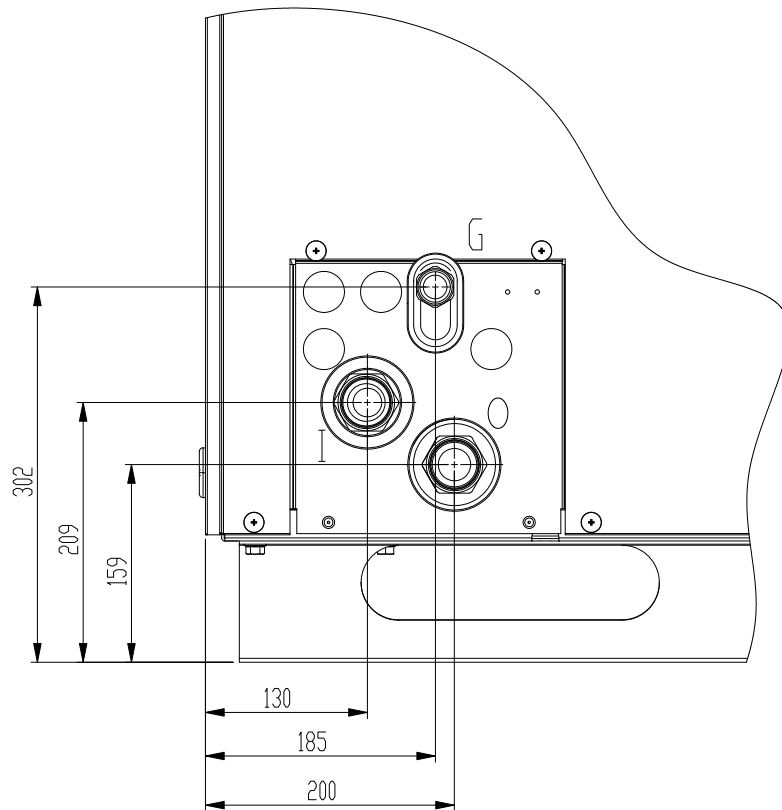


LEGEND

* Posizione dei supporti antivibranti (opzionali)

Front and side views (dimensions in mm).

Figure 3.4 – Service plate



LEGEND

- G Gas fitting Ø 3/4" F
- I Inlet water fitting Ø 1 1/4" F
- O Outlet water fitting Ø 1 1/4" F

Hydraulic/gas unions detail

4 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:** controlled by CCP (see Figure 6.3 Comfort Control Panel e Accessory → 43, detail CCP).
- **TYPE B:** controlled by DDC (see Figure 6.4 CCI/DDC → 44).
- **TYPE C:** controlled by consent switch (e.g. on-off switch, ambient thermostat, timer, etc.).

4.1 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 general electrical switch (GS) must be in the «ON» position;
- power supply to the CCP/DDC (if provided) is on;
- 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)

If the appliance is connected to a Comfort Control Panel (see detail CCP in Figure 6.3 Comfort Control Panel e Accessory → 43) it is switched on and controlled by the Comfort Control Panel. 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 Comfort Control Panel 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 cause permanent damages to internal components!

TYPE B: APPLIANCE CONNECTED TO A DIRECT DIGITAL CONTROLLER (DDC)

If the appliance is connected to a Direct Digital Controller (see Figure 6.4 CCI/DDC → 44) 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 cause permanent damages to internal components!

TYPE C: STANDALONE APPLIANCE

Stand alone 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 Control 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 cause permanent damages to internal components!

Start up

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

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.



The on/off command is essential! Do not switch the appliance on or off by connecting it to or disconnecting it from the power supply directly, as this may be a source of danger and in any case damage the appliance or the plants connected to it.

Visualising and clearing of 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 the operating codes generated by the electronic board and how to reset them, refer to the list of operating codes contained in Table 9.1 TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.024) → 78.



The controller (see Figure 6.1 Electronic board S61 → 41) 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.

Operating codes generated by the electronic board during the start-up of the appliance

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: "u_12" - flame controller arrest (temporary) (see Paragraph 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 78) and after a brief interval the appliance automatically launches the start up procedure again. If code (u_12) is signalled 4 times on successive activation attempts, the code persists, the appliance locks out the flame controller and displays the following operating code: "E_12" – flame controller arrest (see Paragraph 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 78). 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 4.3 RESET OPERATIONS AND MANUAL DEFROSTING → 22. 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. +39.035.888111).

When activation is successful, the appliance is managed by the on-board controller (see following paragraph).

4.2 ON-BOARD ELECTRONICS



The following descriptions refer to the S61 controller with firmware version 3.024.

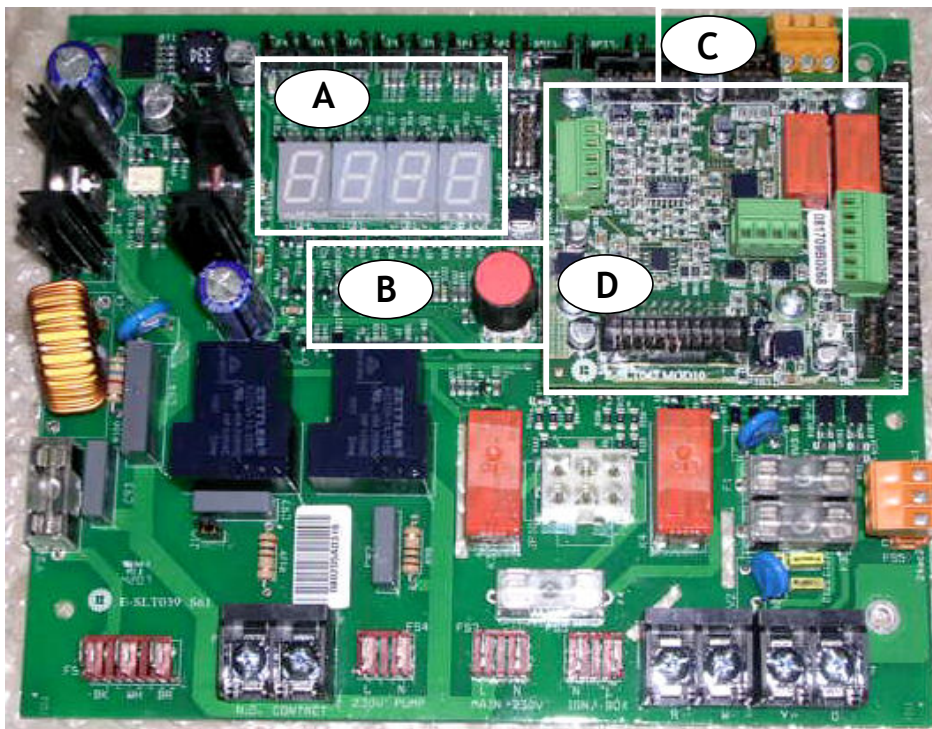
The appliance is fitted with an S61 microprocessor controller with Mod10 modulation controller mounted above it (see Figure 4.1 On-board controller → 20).

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 4.1 On-board controller → 20. 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 4.1 On-board controller → 20) is used for combustion modulation and variable rate pump control.

Figure 4.1 – 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 4.1 – 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 5	TECHNICAL ASSISTANCE CENTRE SETTINGS	5.
Menu 6	TECHNICAL ASSISTANCE CENTRE SETTINGS (MACHINE TYPE)	6.
Menu 7	VIEW DIGITAL INPUTS	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. Menu 0 shows the appliance operating data in real time. Menu 1 shows the parameters that characterise the operation of the appliance and their current values.



Menu 7 is to be used ONLY by the Robur TAC.

To view the information contained in these menus, proceed as illustrated in the paragraph "How to access the menus".

Menu 2 is an execution menu: it allows the operations of resetting the flame control unit, error reset and the manual defrosting command to be performed.

To perform these procedures, see Paragraph 4.3 RESET OPERATIONS AND MANUAL DEFROSTING → 22.

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. To set new values for the parameters, see Paragraph 5.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 37.

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 4.2 Operating information → 21).

Table 4.2 – 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 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 78.

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 4.1 Menu of electronic board → 20).
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 4.3 RESET OPERATIONS AND MANUAL DEFROSTING → 22. To set the parameters of menu 3, refer to Paragraph 5.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 37. 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.

4.3 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 4.3 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 4.3 – 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	Stop power forcing	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 7.1 PROCEDURE FOR FIRST START UP → 69).

RESET FLAME CONTROLLER (ACTION "20"):

Reset flame controller arrest; this may be used when the appliance is first activated, see Paragraph 4.1 START UP (AND SHUT DOWN) → 17, when the appliance is in a permanent locked condition or after a long period of disuse (see Paragraph 4.5 PROLONGED PERIODS OF DISUSE → 24).



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.



At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

RESET OTHER OPERATING CODES (ACTION "21"):

Reset other appliance errors; this is required to reset any errors which may occur during operation.



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.



At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

ACTION "22"

DEFROSTING (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.



At this point, if the display does not signal any other operating codes, put away the special key, replace the electrical panel cover and refit the front panel.

4.4 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 4.2 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 5.8 PROGRAMMING OF HYDRAULIC PARAMETERS → 37.

4.5 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 6.7 Electrical wiring diagram → 47) 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 two conditions must be met:

1. make sure that the hydraulic plant connected to the appliance contains an adequate percentage of glycol antifreeze (see Paragraph 5.6 FILLING OF HYDRAULIC CIRCUIT → 34 and Table 5.3 Technical data for filling the hydraulic circuit → 36);
2. activate the antifreeze function, which runs the circulation pumps and the appliance when water temperature is below 4°C or in case the outdoor temperature is lower than 2 °C. To do this, contact your installer. 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 installer)

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 7.2 MAINTENANCE → 73);
- check that the water content of the plant is correct; if necessary, top up the circuit to at least the minimum quantity (see Paragraph 5.6 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 5.3 Technical data for filling the hydraulic circuit → 36);
- 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;



In case of winter seasonal switch-off or long period of stopping, we suggest to not empty the hydraulic circuit: in that case possible oxidation process can occur. This oxidation process could damage both the hydraulic system and also the Robur heat pump. It's important to verify that no leakages occur in the hydraulic circuit that may empty part of the system. The above recommendation is necessary in order to avoid to fill continuously with water that may imply the additional introduction of oxygen and the consequent dilution of the used inhibitor, for ex glycol. In case of presence of glycol, Robur advises to use inhibited glycol. Galvanized pipes are not recommended, as they are not compatible with glycol.



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);




if you smell gas, close the gas valve again immediately without operating any other electrical device and, from a safe place, request the assistance of professionally qualified personnel.

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 6.7 Electrical wiring diagram → 47);
3. power up the CCP (if present) or DDC (if present);


4. check that the hydraulic circuit is charged;
5. Check that the condensate discharge is clean;
6. check that exhaust duct is not obstructed;
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).

5 HYDRAULIC INSTALLATION

In this section you will find all the instructions necessary for the hydraulic installation.

-  Before realizing hydraulic system and gas supply for the appliance, the professionally qualified personnel is advised to read Paragraph 3.1 GENERAL INFORMATION → 8, providing important recommendations about safety and references to current regulations.

5.1 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 system and on the fuel supply, in order to remove any debris that may compromise the 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 5.2 Network gas pressure → 33 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 have a minimum clearance of 80 cm 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 5.2 Clearances → 30).
- No obstruction or overhanging structure (roofs, eaves, balconies, ledges, trees) shall interfere either with the exhaust air flowing from the top of the appliance or with the exhaust flue gas.
- The appliance must be installed in such a way that the exhaust flue gas outlet is not in proximity of any external air inlet of a building. Respect current regulations regarding the exhaust flue gas 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 the appliance is installed near buildings, make sure it is not on the dripping line from gutters or similar.
- Fit a gas cock on the gas supply line.
- Fit antivibration joints on the hydraulic connections.

5.2 POSITION OF THE APPLIANCE

Lifting the appliance and placing it in position

Do not remove packaging during handling on the installation site.

-  Packing must only be removed upon final installation.

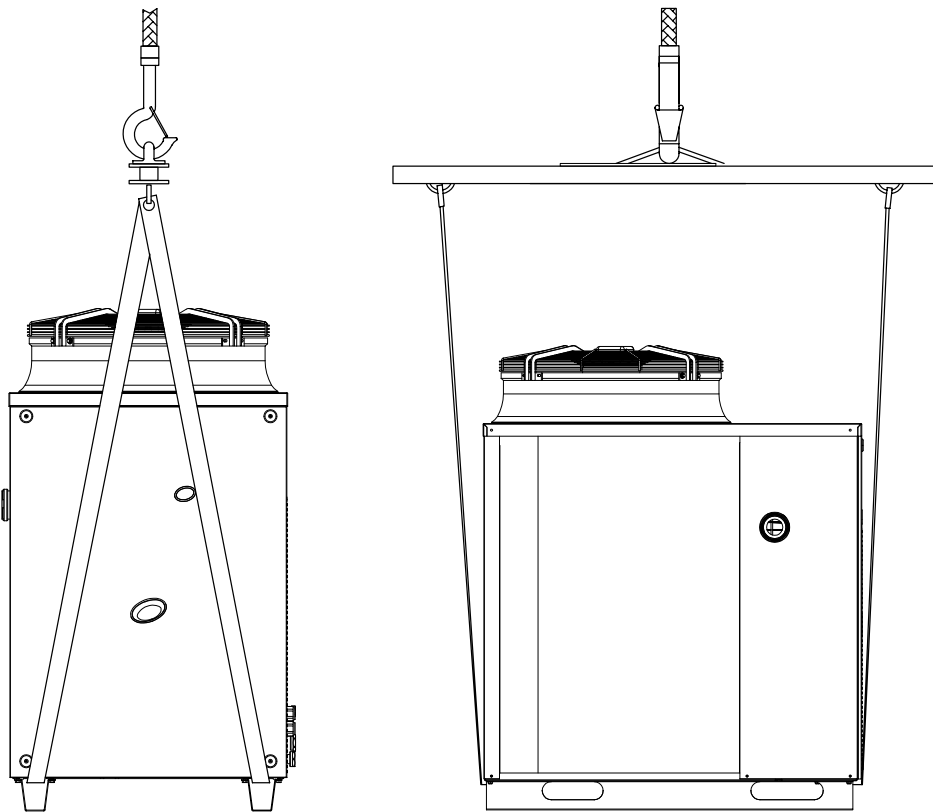
If the appliance has to be lifted, pass slings into the openings in the base supports and use spreader bars to prevent the slings from damaging the casing during handling (see Figure 5.1 Instruction for lifting → 28).



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 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13.

The manufacturer cannot be held responsible for any damage occurring during the installation of the appliance.

Figure 5.1 – 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 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13.

MOUNTING BASE

Always place the appliance on a levelled flat surface made of fireproof material and able to support the weight of the appliance.

In addition, provide a small “containing” step that will prevent water from spreading during possible winter defrosting phases.



During winter operation, the appliance (depending on temperature and humidity conditions of the outdoor air) can carry out defrosting cycles melting the layer of frost/ice on the coil.

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 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 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13.

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 must support the total weight of the appliance and the supporting base.

The weight of the appliance is given in Table 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13.

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 8 ACCESSORIES → 77) is strongly recommended in such cases of installation on roofs or terraces in which resonance phenomena may arise.

Moreover, it is advisable to use flexible connections (anti-vibration joints) between the appliance and the hydraulic and gas supply pipes.



Avoid placing the appliance on the roof directly above locals requiring quietness.

SUPPORTS AND LEVELLING

The appliance must be correctly levelled by placing a spirit level on the upper part.

If necessary, level the appliance with metal shimming; do not use wooden spacers as these deteriorate quickly.

CLEARANCES AND WARNINGS

Position the appliance so as to maintain **minimum clearances** from combustible surfaces, walls or other appliances, as illustrated in Figure 5.2 Clearances → 30.



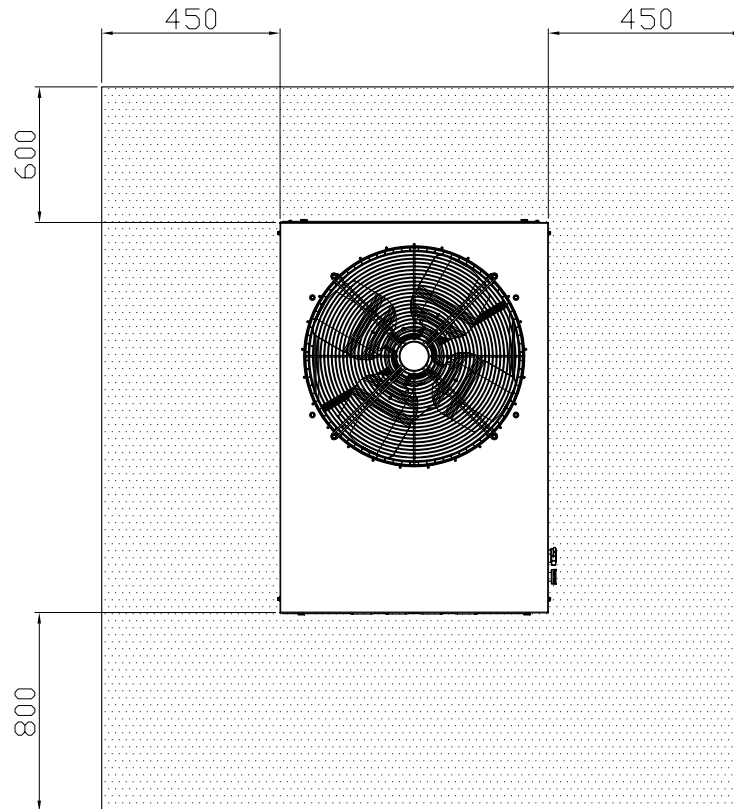
Minimum clearances are required for maintenance accessibility.

The fumes outlet terminals must be installed in such a way that they do not allow the fumes to collect or return to the circuit in the unit's installation area. The outlet terminal must be constructed in conformity with established regulations.

Do not install any cover or obstruction to the evacuation of the air issuing from the fan.

When deciding on the installation position, especially if multiple units are used, consider that each unit requires 11,000 m³/h of air for the coil. Make sure that the installation and position allow for sufficient air flow to the coil and prevent recirculation, which would reduce efficiency and shut-down the appliance of the units and force them to switch off.

Figure 5.2 – Clearances



Place the appliance preferably far from environments where silence is required, such as bedrooms, meeting rooms, etc.

Evaluate the noise impact of the appliance with respect to the installation site: avoid placing the appliance in locations (such as corners of buildings) where noise could be amplified (reverberation effect).

5.3 HYDRAULIC CONNECTIONS

General indications

- The hydraulic installation may be realized using pipes in stainless steel, black steel, copper or crosslinked polyethylene for heating/cooling applications. All water pipes and pipe connections must be properly insulated in compliance with current regulations to prevent heat losses and outer condensation.
- To prevent icing in the primary circuit during winter time, the appliance is provided with antifreeze functions activating the 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 permanent supply of electricity and gas to the appliance throughout the whole winter period. If it is not possible to ensure a permanent 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 5.6 FILLING OF HYDRAULIC CIRCUIT → 34), DO NOT USE galvanised pipes, as they are potentially subject to corrosion phenomena in the presence of glycol.
- If using rigid pipes, use vibration damping couplings at the water and gas connections on the appliance's service plate to prevent vibration.

As other hydronic appliances, Robur heating and cooling systems operate with grid-water of good quality. In order to prevent any possible problem of operation or reliability caused by filling or top-up water, please refer to codes and norms about water treatment

for thermo-hydraulic installations in civil or industrial applications. Parameters indicated in Table 5.1 Chemical and physical parameters of water → 31 must be complied with.

Table 5.1 – Chemical and physical parameters of water

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

1 with aluminium or light alloys radiators, pH must also be lower than 8 (in compliance with applicable rules)

2 value referred to the maximum water temperature of 80 °C

3 in compliance with applicable rules

Water quality can be measured through parameters like acidity, hardness, conductivity, chlorides content, chlorine content, iron content and the like.



The presence of free chlorine in the water, in particular, can jeopardize parts of the installation and Robur units. Therefore, please make sure that free chlorine content and total hardness are compliant with the allowable ranges reported in Table 5.1 Chemical and physical parameters of water → 31.

The way the installation is operated can be the cause of possible degradation of water quality.

Moreover, abnormally massive water top-up or reintegration can cause a drift of chemical or physical above-mentioned parameters. Reintegration should not exceed 5% per year of the total amount of water. It is advised to check regularly the water quality, especially in case of automatic or periodic top-up.

In case water treatment is needed, this operation should be carried out by a professional or competent person, following strictly the instructions by the manufacturer or supplier of the chemical substances for the treatment, since dangers could arise for health, for the environment and for Robur appliances.

Several products for water treatment are available on the market.

Robur does not perform detailed market surveys. Therefore Robur suggests to contact Companies which are specialized in water treatments. They will be able to suggest the best way how to proceed according to the type of installation.

In case washing of the pipes is needed, this operation should be carried out by a professional or competent person, following strictly the instructions by the manufacturer or supplier of the chemical substances for the washing, avoiding the use of substances aggressive for stainless steel or containing/releasing free chlorine.

Please make sure the pipes are properly rinsed in order to remove any residue of chemical substances from the pipes.

Robur is not liable for ensuring that water quality is always compliant with what reported in Table 5.1 Chemical and physical parameters of water → 31. Non-compliance with indications above may jeopardize the proper operation, integrity and reliability of Robur appliances, invalidating the warranty.

For any further detail, please contact directly Robur S.p.A. (tel.+39 035.888.111).

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

- FLEXIBLE JOINTS on water and gas connections of the appliance.
- PRESSURE GAGES on the inlet and outlet water pipes.
- FLOW REGULATION VALVE on the water inlet pipe (only if the appliance is controlled by a CCP/DDC).
- WATER FILTER installed on the water inlet pipe.
- ISOLATION BALL VALVE on the water and gas pipes of the installation.
- 3 BAR SAFETY VALVE installed on the outlet water pipe.
- PLANT EXPANSION TANK installed in the appliance outlet water pipe.
- EXPANSION TANK for the individual appliance, installed on the water outlet pipe (primary side). Provide a plant expansion tank in any case (secondary side), installed in the water outlet pipe.



The appliance is not equipped with an expansion tank; therefore it is necessary to install a suitable expansion tank, sized for the maximum temperature range and maximum operating water pressure 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 other components to be installed in the system, refer to "Design Manual". For further information or technical support in this regard, contact Robur S.p.A.'s Presales Office (tel.+39 035.888.111) or visit 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 7 INITIAL ACTIVATION AND MAINTENANCE → 69.



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

5.4 GAS SUPPLY

The installation of gas supply pipes must be compliant with current regulations and norms.

The gas supply pressure must be in the range given in Table 5.2 Network gas pressure → 33.



Supplying gas to the appliance at pressures higher than those indicated above can damage the gas valve, resulting in dangerous situations.

LPG systems must be equipped with a first stage pressure reducer close to the LPG storage tank, in order to reduce the gas pressure to 1,5 bar, and a second stage pressure reducer, close to the unit, in order to reduce pressure from 1,5 bar to the value in agreement with the gas network pressure of the country of installation (see Table 5.2 Network gas pressure → 33).



Exemple for the Italian market: for the G30 gas, from 1,5 bar to 0,030 bar (30mbar); for the G31 gas, from 1,5 bar to 0,037 bar (37mbar).



LPG may cause corrosion; piping and fitting materials must be resistant to this corrosion.

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 an isolation valve (ball valve) on the gas supply line, to isolate the appliance when required.

Table 5.2 – Network gas pressure

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

For data regarding hourly fuel consumption of the appliance, refer to Table 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13.

5.5 CONDENSATE DISCHARGE

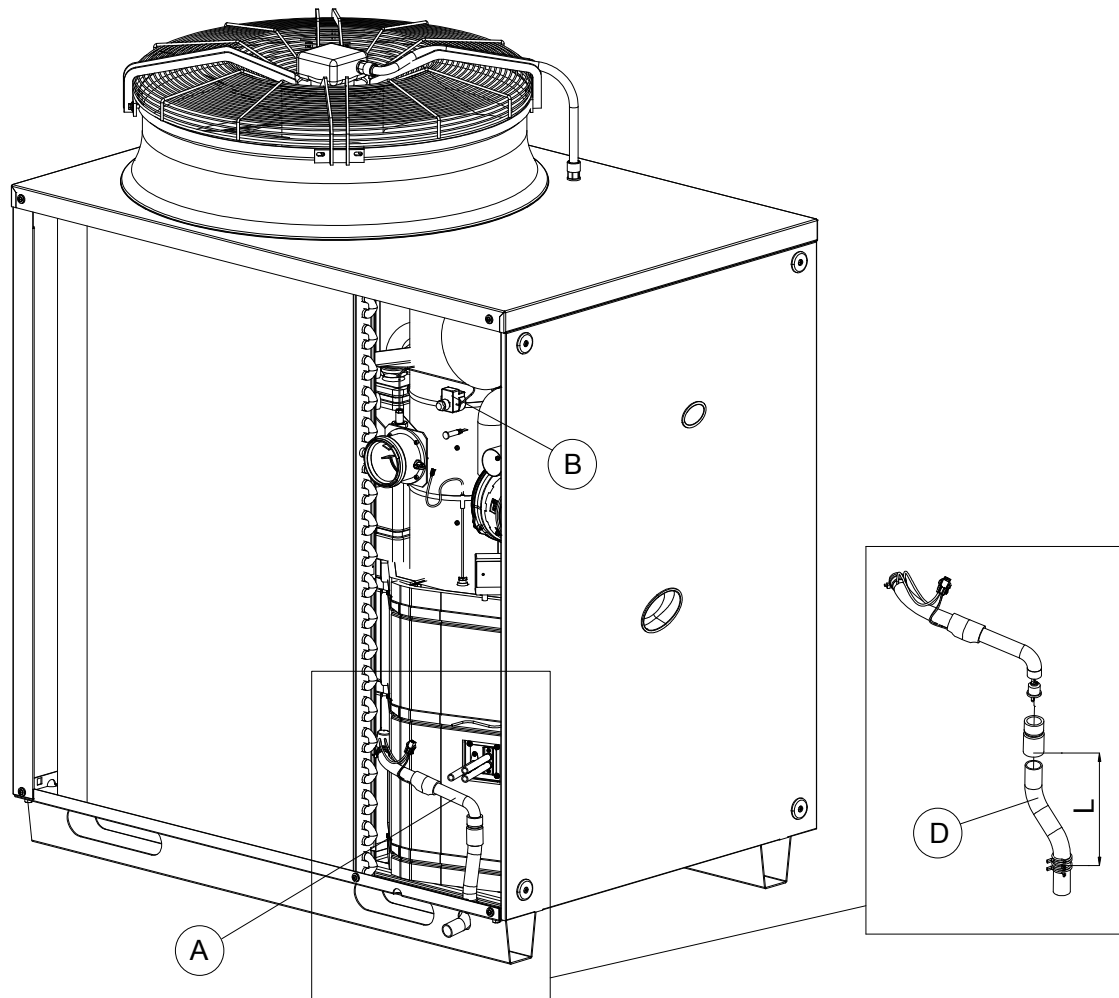
The fumes condensate outlet is on the left of the appliance.



The distance L between the coupling C and the base may not exceed 110 mm.

1. The condensate discharge corrugated pipe, coming out from the side of the underbase left support, must be connected to a proper discharge header.
2. The connection between the pipe and the manifold must remain visible.

Figure 5.3 – Position of condensate discharge and manual reset fumes thermostat



LEGEND

- A Condensate discharge hose
- B Fumes thermostat manual reset
- D Corrugated hose

The condensate discharge to the sewer must be:

- sized so as to discharge the maximum condensation flow (see Table 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13);
- made of materials resistant to acidity with pH 3 to 5;
- sized to ensure a slope of 10 mm per metre of length; if this slope cannot be achieved, a condensate pump must be installed near to the discharge;
- realized in such a way as to prevent icing of the condensate;
- mixed, for example, with domestic effluents (washing machine, dishwasher, etc.), usually alkaline, acting as a buffer solution before discharging into the sewer.



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

5.6 FILLING OF HYDRAULIC CIRCUIT

After having completed all hydraulic, gas and electrical connections, the installer can proceed filling the hydraulic circuit, observing the following steps:



You will need: the appliance connected hydraulically and electrically.

1. Activate the automatic air purging valves of the plant and open all thermostatic valves.
2. Fill the hydraulic circuit with clean water and add, if necessary, the proper quantity of monoethylene glycol according the minimum winter temperature in the installation site (see table 5.3 Technical data for filling the hydraulic circuit → 36).
3. Check the filter on the return pipe for impurities; clean it if necessary.
4. 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 oxidation 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 condition necessary for the oxidation and degradation of glycol 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 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 damages caused by the use or 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 average specific heat. Always check the date of expiry and/or degradation of the product with the supplier.

In the Table 5.3 Technical data for filling the hydraulic circuit → 36 the approximate freezing temperature of the water-glycol mixture and the consequent increase in pressure drops of the appliance are shown, according to the percentage of monoethylene glycol. This Table 5.3 Technical data for filling the hydraulic circuit → 36 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 3.1 GAHP-A LT technical data → 11 or Table 3.2 GAHP-A HT technical data → 13).

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 5.3 – Technical data for filling the hydraulic circuit

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



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

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

5.7 EXHAUST FLUE GAS

The appliance is homologated for the discharge of the exhaust gases directly outside through a flue pipe.

Each single unit is provided with a connection of $\varnothing 80$ mm (equipped with a suitable seal) located on the left side (see Figure 3.1 Size (Standard ventilation) \rightarrow 15 or Figure 3.2 Dimensions (low consumption ventilation – S1) \rightarrow 15 or Figure 3.3 Dimensions (low noise version) \rightarrow 16).

The appliance is complete with an exhaust duct kit, to be fitted by the installer.

The exhaust duct kit consists of (see Figure 5.4 Fume outlet \rightarrow 37):

- n. 1 exhaust flue pipe $\varnothing 80$ mm (length 300 mm) complete with terminal;
- n. 1 rain cover;
- n. 1 90° elbow $\varnothing 80$ mm.

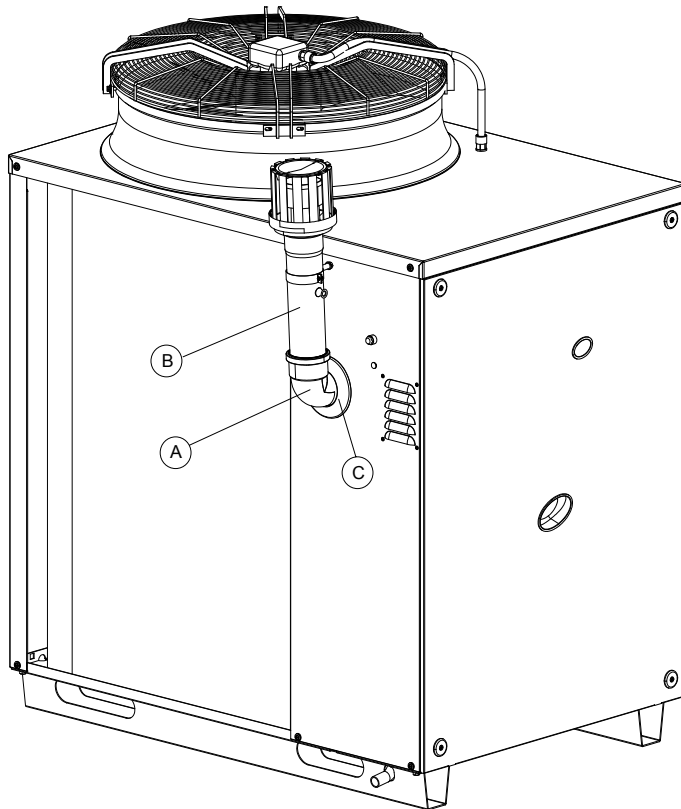
To assemble and fit the external exhaust fumes installation kit, proceed as follows:



You will need: the appliance positioned in its installation site (refer to Figure 5.4 Fume outlet \rightarrow 37).

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

Figure 5.4 – Fume outlet



LEGEND

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

5.8 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 CCP/DDC, follow the instructions given in the CCP/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 4.2 ON-BOARD ELECTRONICS → 19.

To configure the appliance, access menu 3 of the electronic board.

With regard to the hydraulic configuration, three parameters may be set: select the letter E to exit to the previous menu.

Table 5.4 – 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:

- Hot water thermostat control, parameter 160. This parameter takes two values: "0" and "1". Value "0" indicates that the appliance's "activation/deactivation" temperature is to be read by the water probe at the appliance's INTAKE. Value "1" indicates that the appliance's "activation/deactivation" temperature is to be read by the water probe at the appliance's OUTLET.
- 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 9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 78.

6 ELECTRICAL INSTALLATION

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.

Before proceeding with operations to create the electrical plant of the appliance, the professionally qualified personnel concerned are advised to read Paragraph 3.1 GENERAL INFORMATION → 8: it provides important information regarding installation safety and references to current norms.



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 6.1 Electronic board S61 → 41 and Table 6.1 Electronic board S61 → 41 provide details of input and output of the S61 electronic board. The auxiliary electronic card Mod10 is shown in detail in Figure.

6.2 Mod10 controller → 42.

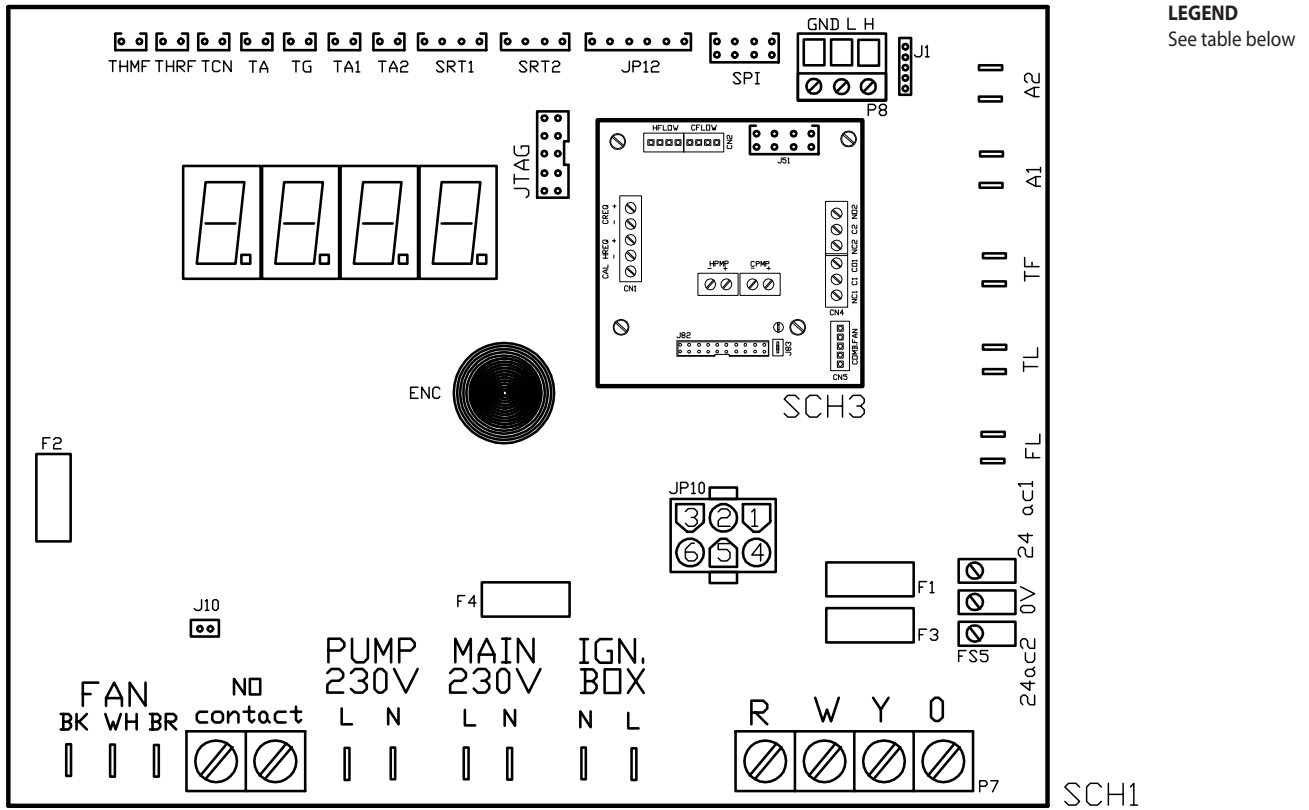
The appliance and the system can be controlled and regulated in one of the following ways depending on the type of installation and control system selected:

- **TYPE A:** controlled by CCP (see Figure 6.3 Comfort Control Panel e Accessory → 43, detail CCP).
- **TYPE B:** controlled by DDC (see Figure 6.4 CCI/DDC → 44).
- **TYPE C:** controlled by consent switch (e.g. on-off switch, ambient thermostat, timer, etc.).



In Paragraph 6.1 ELECTRICAL DIAGRAM OF THE APPLIANCE → 45 may be found the Electrical diagrams of the appliance.

Figure 6.1 – Electronic board S61



SCH S61

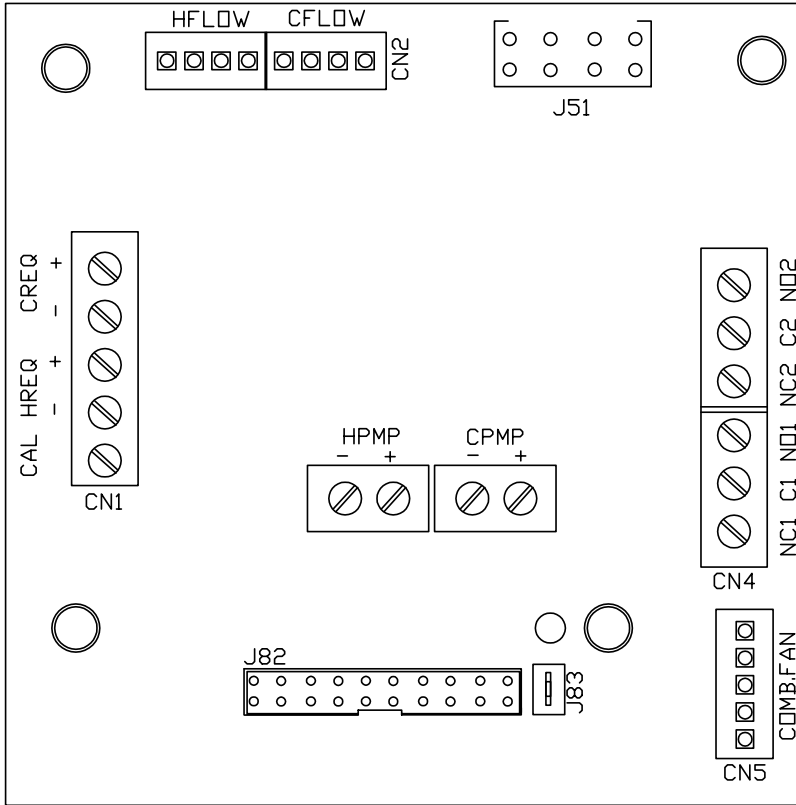
Table 6.1 – Electronic board S61

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
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	Fumes sensor or generator fin sensor 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
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

CODE	DESCRIPTION
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 6.2 – Mod10 controller

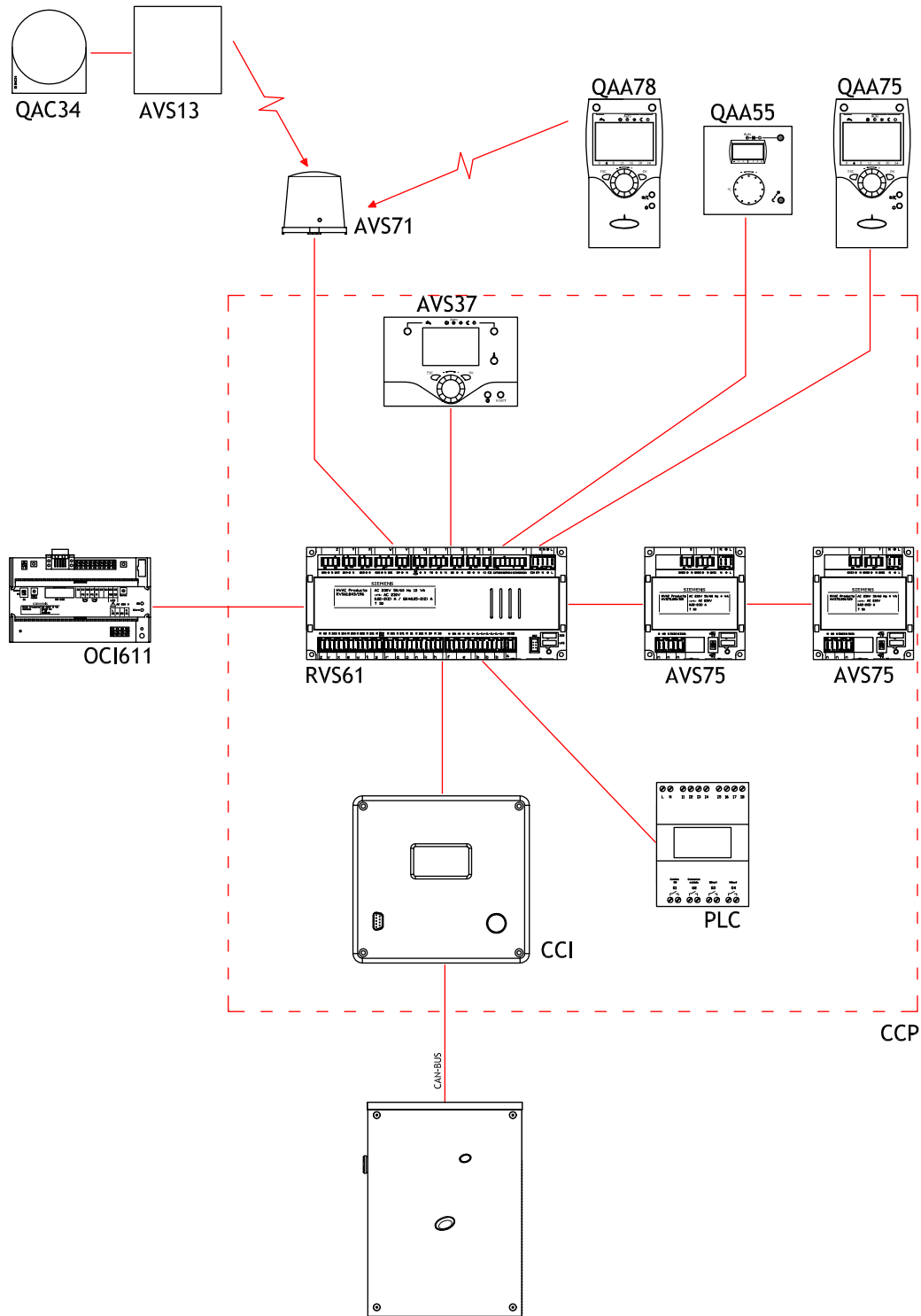


LEGEND

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

Mod10 controller

Figure 6.3 – Comfort Control Panel e Accessory



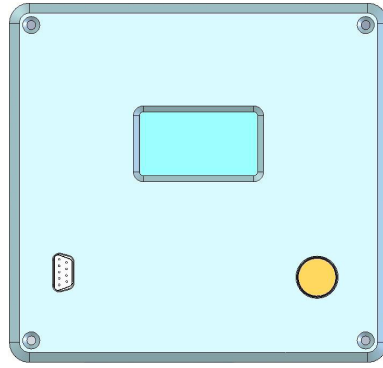
LEGEND

CCP Comfort Control Panel
 Components composing the CCP
 AVS37 Comfort Control Siemens
 RVS61 System controller and set-point
 CCI Comfort Control Interface
 PLC Programmable Logic Control
 AVS75 Expansion

Optional components to predict

QAA55 Base room unit
 QAA75 Room unit
 QAA78 Radio room unit
 ASV71 Antenna
 AVS13 Transmitter
 QAC34 External temperature probe
 LPS Central communications for remote control

Figure 6.4 – CCI/DDC



6.1 ELECTRICAL DIAGRAM OF THE APPLIANCE

Figure 6.5 – Wiring diagram of the unit with standard/ low noise fan (S)

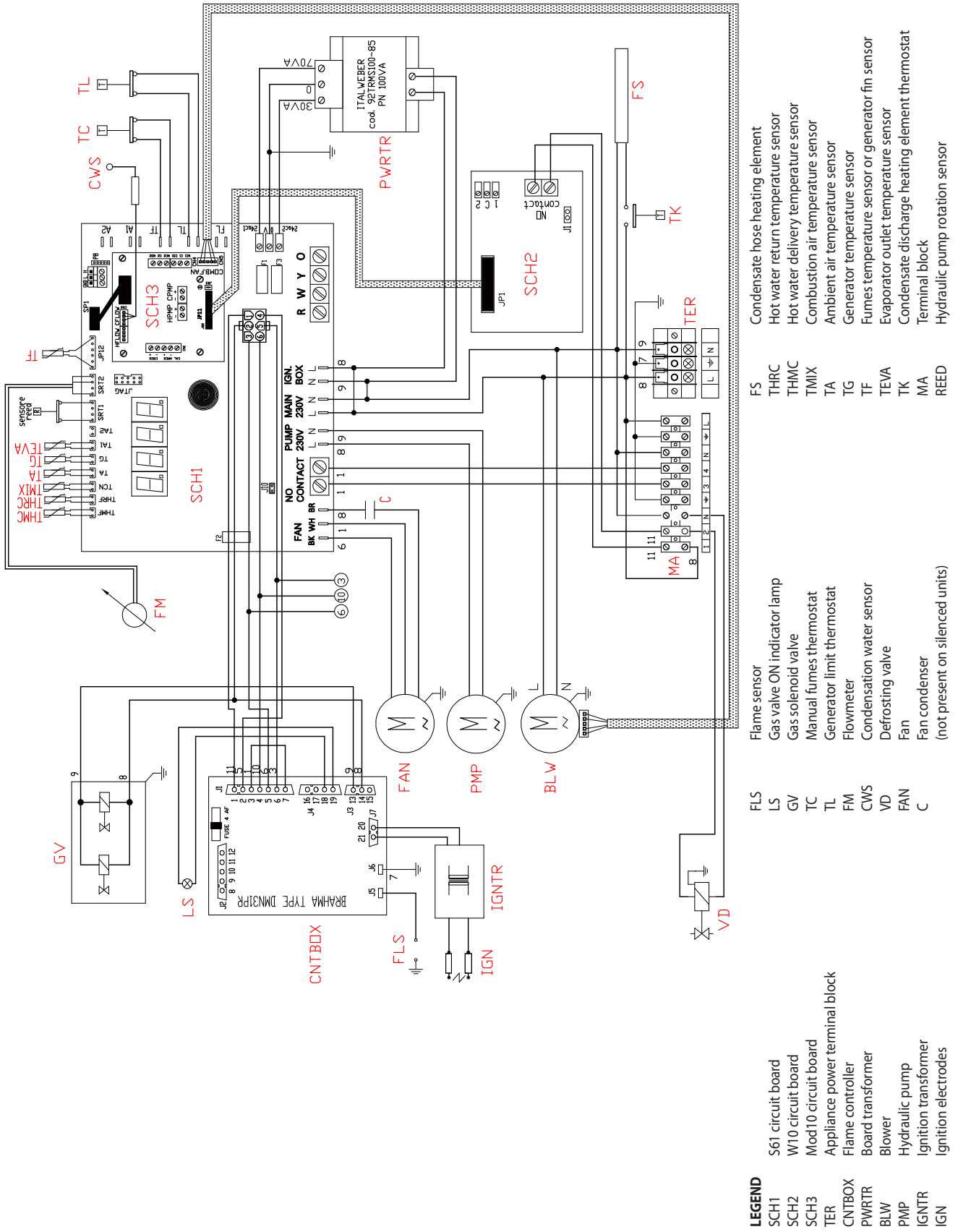
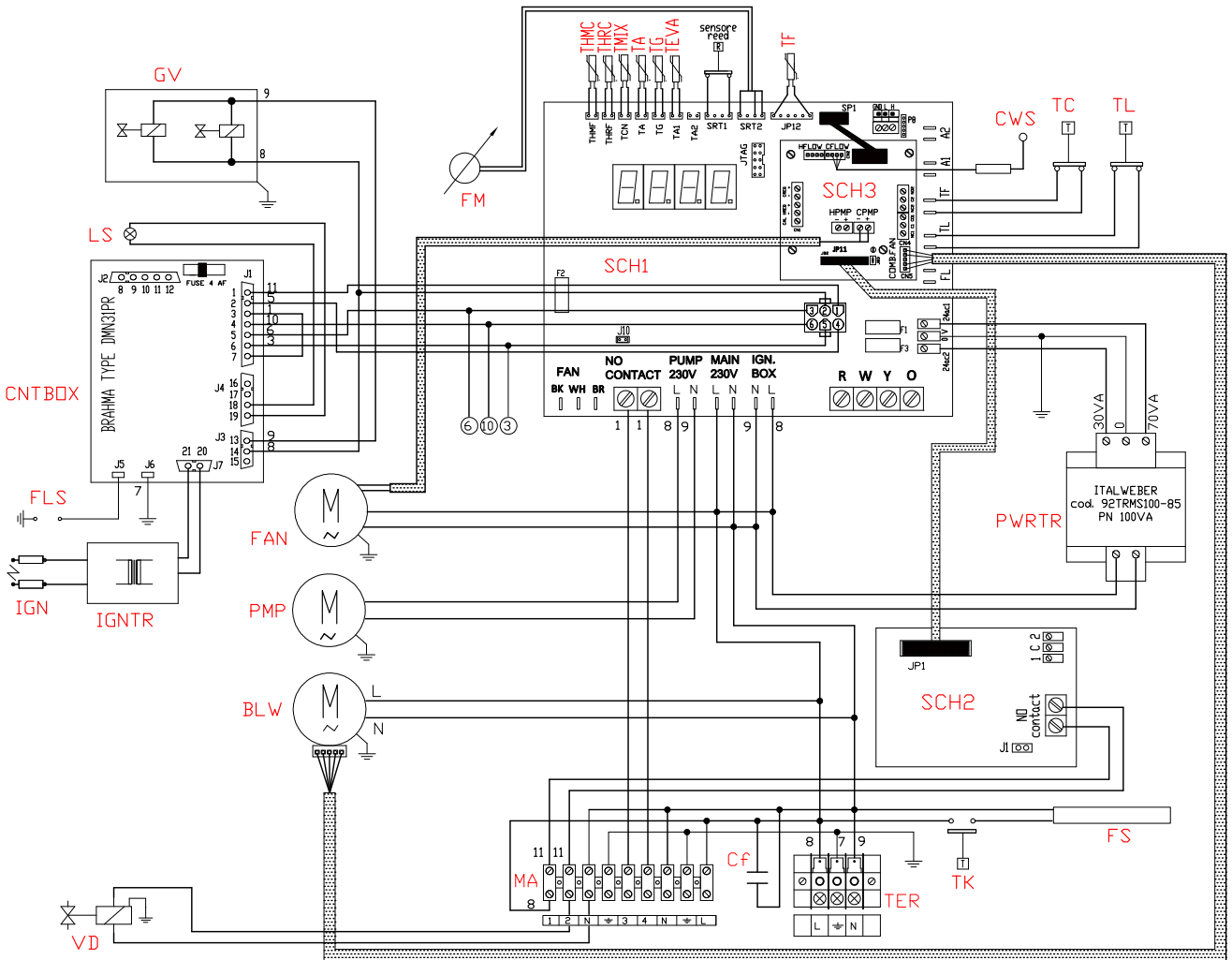


Figure 6.6 – Wiring diagram of the appliance with low consumption fan (S1)



LEGEND	LS	Gas valve ON indicator lamp	THMC	Hot water delivery temperature sensor
SCH1	GV	Gas solenoid valve	TMIX	Combustion air temperature sensor
SCH2	TC	Manual fumes thermostat	TA	Ambient air temperature sensor
SCH3	TL	Generator limit thermostat	TG	Generator temperature sensor
TER	FM	Flowmeter	TF	Fumes temperature sensor or generator fin sensor
CNTBOX	CWS	Condensation water sensor	TEVA	Evaporator outlet temperature sensor
PWRTR	VD	Defrosting valve	TK	Condensate discharge heating element thermostat
BLW	FAN	Fan	MA	Terminal block
PMP	C	Fan condenser (not present on silenced units)	REED	Hydraulic pump rotation sensor
IGNTR	FS	Condensate hose heating element		
IGN	THRC	Hot water return temperature sensor		
FLS				

6.2 HOW TO CONNECT THE APPLIANCE ELECTRICALLY



Before making electrical connections, make sure not to work on live elements.



You will need: the appliance in its permanent location.

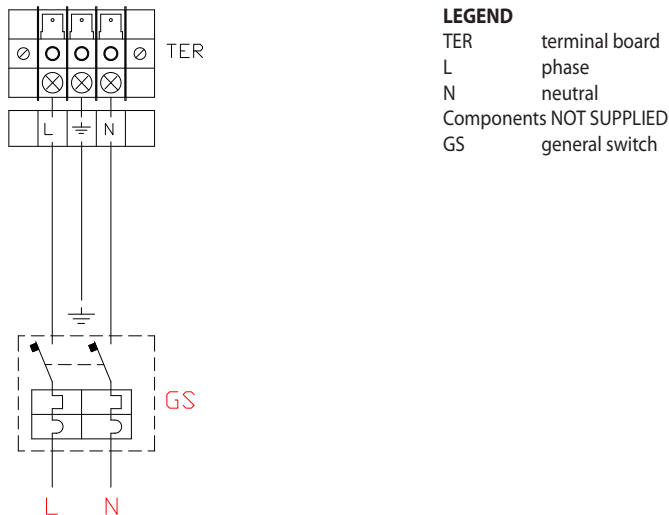
1. Use a cable type FG7(O)R 3Gx1.5 for the power supply to the appliance.
2. Connect power supply with the cable indicated at point 1, fitting close to the appliance a two-pole isolator switch with 3 mm distance between contacts (see detail «GS» in Figure 6.7 Electrical wiring diagram → 47) and two 5A fuses type T or a 10A magnetothermic breaker.

3. Prepare 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 torn away if the cable is accidentally pulled off; this will ensure the ground connection.



Electrical safety is ensured only when the appliance is correctly connected to an efficient grounding system, realized according to current safety regulations. Do not use gas pipes as grounding.

Figure 6.7 – Electrical wiring diagram



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

6.3 TYPE A (COMFORT CONTROL PANEL)



This paragraph illustrates the operations to be performed when one or more appliances are connected to a Comfort Control Panel (CCP). In particular:

1. What is the CAN BUS cable.
2. How to connect the CAN BUS cable to the appliance's electronic board
3. How to connect the CAN BUS cable to the Comfort Control Panel
4. How to connect the Comfort Control Panel
5. How to connect the plant water circulation pump.



For specific information regarding the operation and programming of the CCP, refer to the specific manuals supplied with it.

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

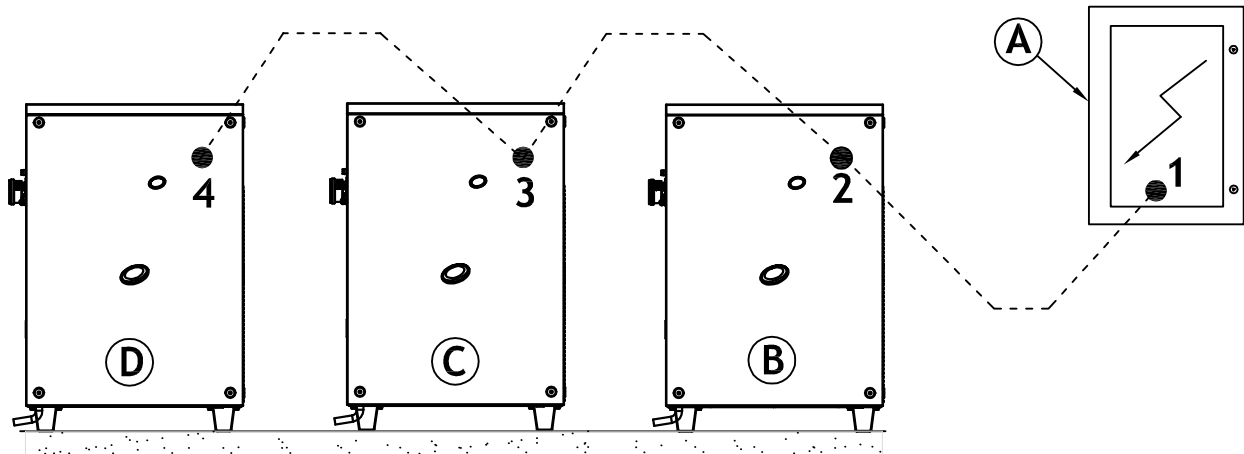
- Terminal nodes are appliances or CCPs that are connected to one other element only.
- Intermediate nodes are appliances or controllers which are connected to two other elements.

The diagram in Figure 6.8 Example of CAN BUS → 48 gives an example of a CAN BUS network: 3 appliances are connected to each other and to 1 CCP. Appliance D and the CCP (A) are terminal nodes, while appliances C and B are intermediate nodes as they are connected to 2 elements.



One CCP can control up to 3 appliances of the same type.

Figure 6.8 – Example of CAN BUS



LEGEND
 A Controller
 B-C-D Appliance
 1-4 Terminal nodes
 2-3 Intermediate nodes
 Terminal nodes and intermediate nodes

What is the CAN BUS cable



The cable to be used must be suitable for CAN BUS applications.

The following table gives details of some types of CAN BUS cables, grouped according to the maximum distance covered by each single type.

Table 6.2 – CAN BUS cables type

CABLE NAME	SIGNAL / COLOR			MAX LENGTH	Note	
Robur						
ROBUR NETBUS	H= BLACK	L= WHITE	GND= BROWN	450 m	Ordering Code O-CV0008	
Honeywell SDS 1620						
BELDEN 3086A	H= BLACK	L= WHITE	GND= BROWN	450 m	In all cases the fourth conductor should not be used	
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 total distances lower than 200 m and networks with a maximum of 4 nodes (example: up to 3 GAHP + 1 controller) a simple shielded cable 3x0.75 mm may be used.

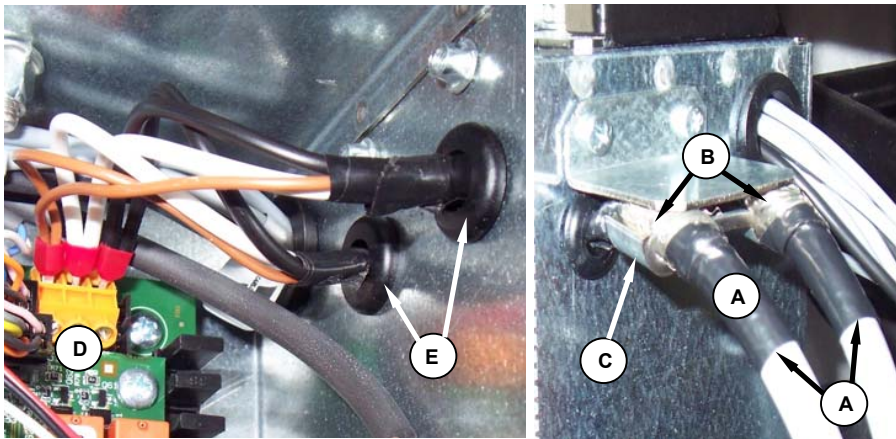
As shown in Table 6.2 CAN BUS cables type → 48, the CAN connection requires a CAN BUS cable with 3 cores. If the cable available has more than 3 coloured wires, use the wires with the colours indicated in 6.2 CAN BUS cables type → 48 and cut the remaining ones.

The ROBUR NETBUS cable is available as an accessory, see Section 8 ACCESSORIES → 77.

How to connect the CAN BUS cable to the appliance's electronic board

The CAN BUS cable must be connected to the dedicated terminals on the appliance's electronic board, as shown below (see Figure 6.9 CAN BUS cable connection → 49).

Figure 6.9 – CAN BUS cable connection



LEGEND

- A protective isolating tape
- B shielding of CAN BUS cable (pre-wired to last unit)
- C cable bracket (the CAN BUS cables of an intermediate node are present)
- D CAN BUS/circuit board connector
- E wires (6) of the CAN BUS cable (intermediate node)

Example of a single CAN bus cable connected to the board



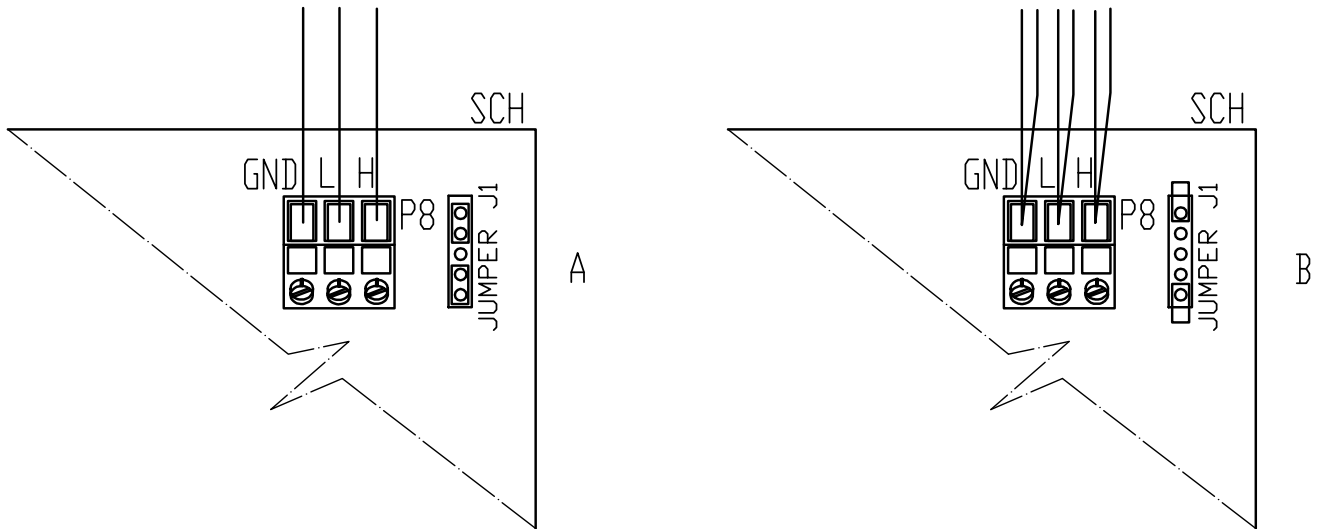
Before working on the electrical panel of the appliance, make sure that power supply is off.

1. Cut a length of cable long enough to allow installing it without kinking.
2. On one end of the cable, remove the jacket for a length of approximately 70-80 mm, taking care not to cut the shielding (metal mesh and/or aluminium sheet and, if present, the bare connector in touch with the shield) and the wires contained within.
3. If the cable is too thin to be held in place in the cable holding bracket (detail C in Figure 6.9 CAN BUS cable connection → 49), make it thicker by wrapping insulating tape around the jacket close to the stripped part (to an approximate diameter of 12-13 mm).
4. Pull back the shielding on the jacket; apply isolating tape to the end of the shielding as pulled back (detail A, Figure 6.9 CAN BUS cable connection → 49).
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 6.10 Electrical wiring diagram → 50. Respect the correct indications L, H, GND provided in Table 6.2 CAN BUS cables type → 48, on the figure and on the electronic board below the connector.
6. If the appliance is an **intermediate node** repeat the operations from step 2 to step 5 for the other cables required (in this way you will have two cable lengths each one without the jacket on one end). Twist together the cores with the same color and connect them to the orange connector, as shown in detail "B" of Figure 6.10 Electrical wiring diagram → 50.
7. Fix the CAN BUS cable (or two cables, according to the type of node being connected) to the holding bracket in the upper part of the electrical panel so that the pulled-back shielding is in solid touch with the metal bracket. The cables must be firmly held in place by the bracket if pulled.

In order to position the jumpers on the electronic 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 6.10 Electrical wiring diagram → 50:
- 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 6.10 Electrical wiring diagram → 50:

Figure 6.10 – Electrical wiring diagram



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

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

8. After finished with 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 Comfort Control Panel

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



Before working on the Comfort Control Panel, make sure that it is off.



The CCP, 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 CCP is CLOSED.

To connect the CAN bus cable to a CCP:



You will need: the Comfort Control Panel not powered up.

1. Open the Comfort Control Panel's electrical panel with the handle on its left.
2. Depending on the type of node being configured, set the CCI's jumpers J21 as shown in detail "A" or detail "B" in Figure 6.12 Connection of CCI to CAN-BUS network → 52. If necessary, open the CCI's back panel (4 screws); after jumpers J21 have been correctly positioned, close the cover again and retighten the 4 bolts.
3. Cut a length of cable long enough to allow installing it 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 6.11 Connection from CAN BUS to connector P8 → 51, details C and D. Now proceed as follows:

6. If the CCP is a **terminal node** of the network connect the three coloured wires to the orange connector "P8", as shown in detail "A" of Figure 6.12 Connection of CCI to CAN-BUS network → 52. Observe the terminal markings L, H, GND (on the CCI's board at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 48 and in the example.
7. If the CCP 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 instruction provided in detail "B" of Figure 6.12 Connection of CCI to CAN-BUS network → 52. Observe the terminal markings L, H, GND (on the CCI's board at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 48 and in the example.
8. Insert the orange connector "P8" with the wires first into the opening prepared in the cover of the CCI, and then into the appropriate socket on the CCI 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 6.11 Connection from CAN BUS to connector P8 → 51). The cable should be secured against pulling out.

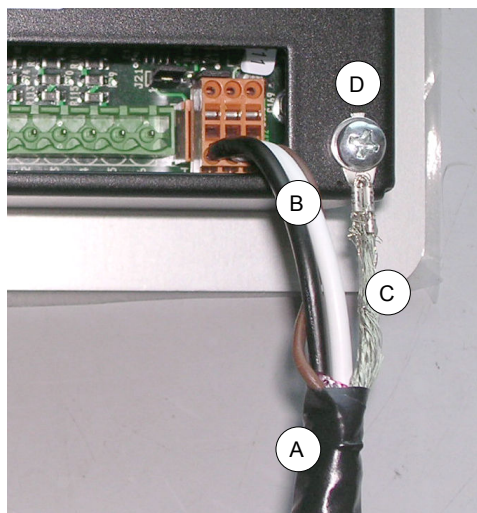


The CCI has jumpers J21: the position of the jumpers, depends if the CCI is an intermediate or terminal node, must be as shown in Figure 6.12 Connection of CCI to CAN-BUS network → 52.



The CCI is equipped with a backup battery which, if the power supply fails, is capable of storing set values in the memory; **the backup battery has a service life of around 7 years**, after which it is necessary to replace it (by contacting a ROBUR Technical Assistance Centre).

Figure 6.11 – Connection from CAN BUS to connector P8

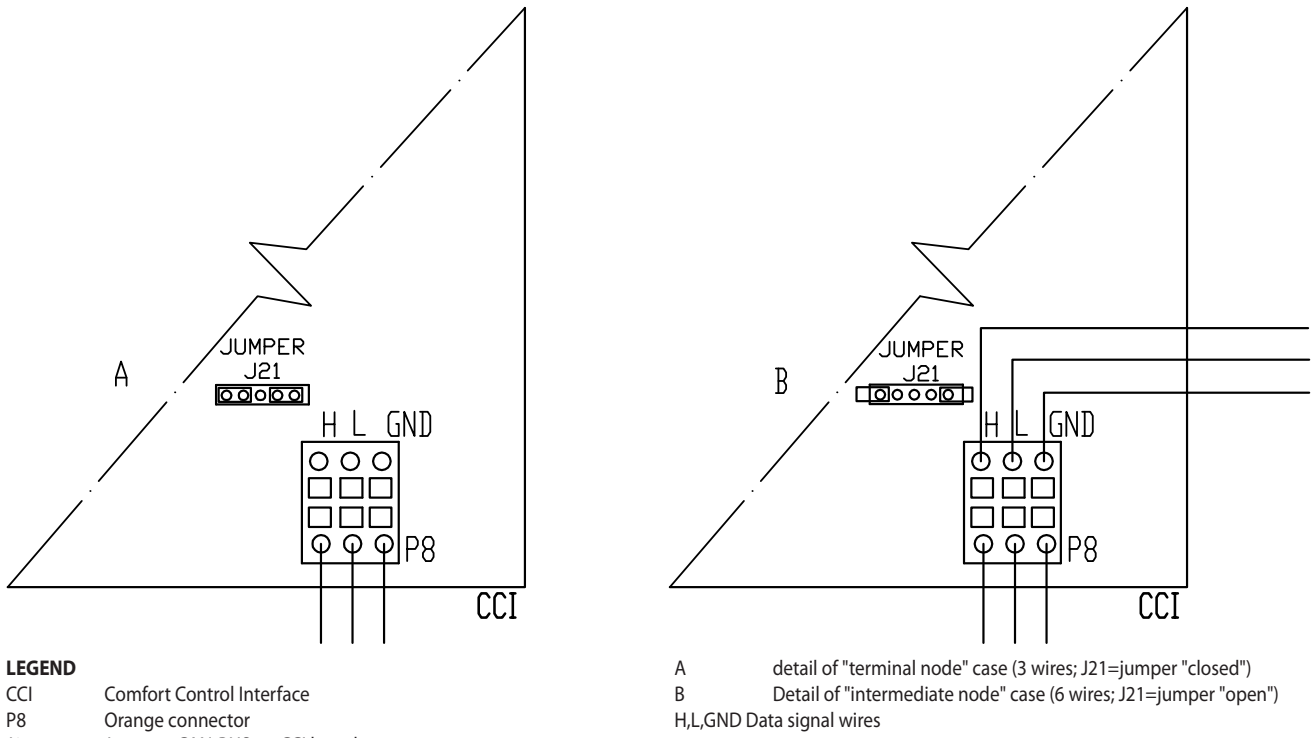


LEGEND

- 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.

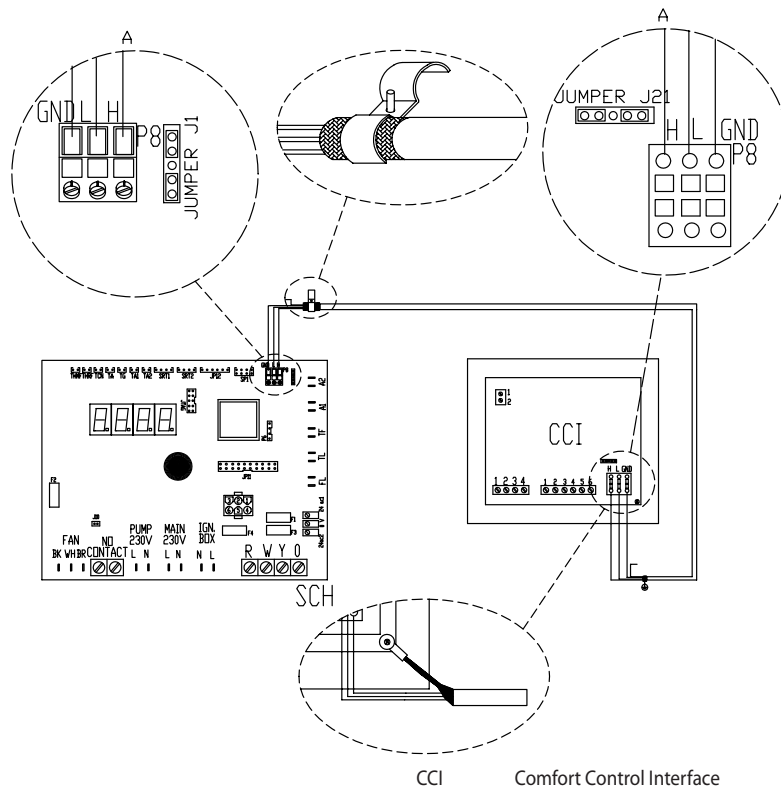
Figure 6.12 – Connection of CCI to CAN-BUS network



Jumpers J21 closed

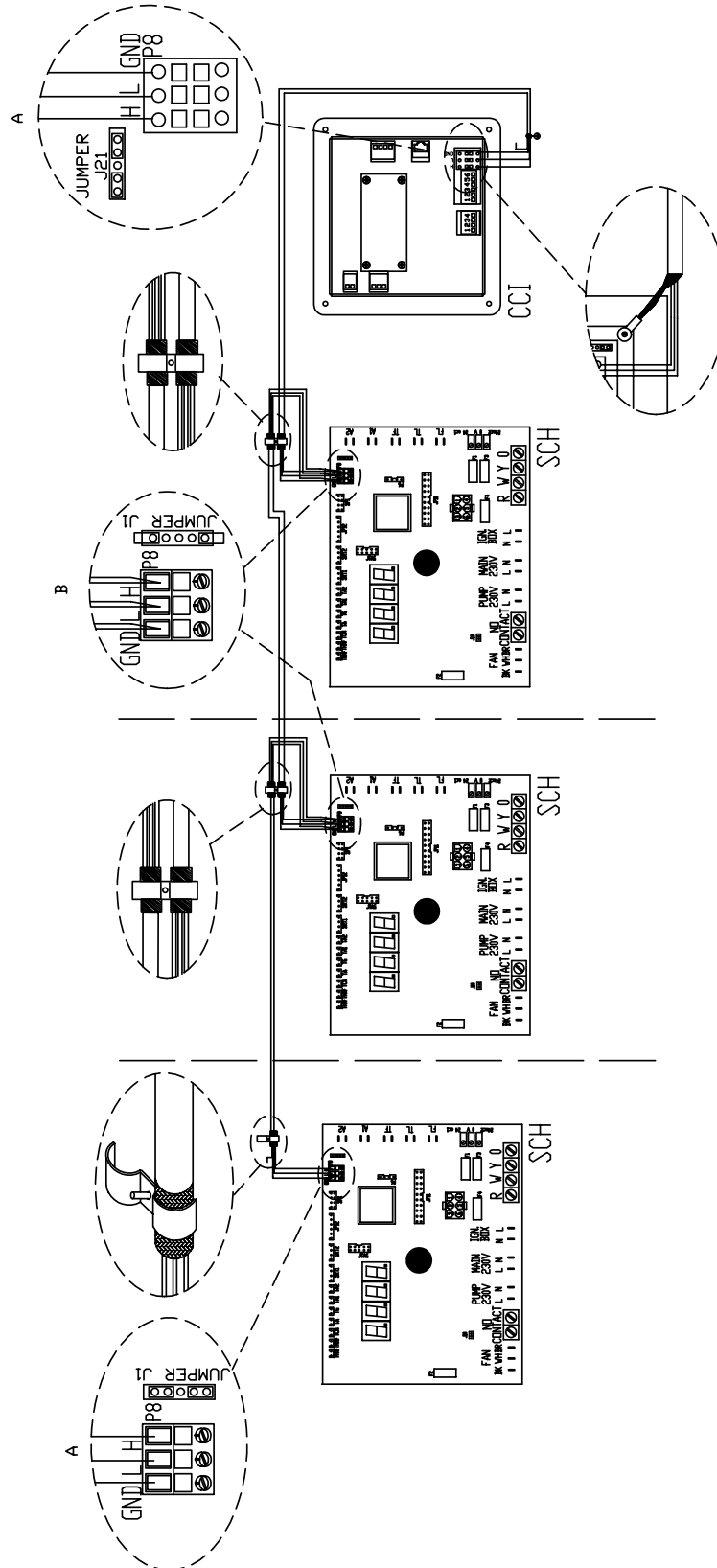
The following wiring diagrams show the connection of the CCI to 1 appliance (Figure 6.13 Connection of CCI to 1 appliance → 52) and 3 appliances (Figure 6.14 Connection of CCI to 3 appliances → 53) respectively.

Figure 6.13 – Connection of CCI to 1 appliance



Connection of CCI to 1 appliance

Figure 6.14 – Connection of CCI to 3 appliances



LEGEND

SCH S61 controller

CCI

Comfort Control Interface

Connection of CCI to 3 appliances

How to connect the Comfort Control Panel



You will need: the appliance disconnected from the electricity supply

1. The Comfort Control Panel's power cord must be type tipo FG7 3Gx2.5mm². the power supply is 230V AC 1N 50Hz.
2. Cut a suitable length of cable.
3. The cable must be connected to the terminal block on the bottom right of the Comfort Control Panel. First make a hole in the electrical cabinet near to the terminal block and pass the cable through it.
4. Connect the cable to the terminal block as given in Figure 6.7 Electrical wiring diagram → 47 and fit a 10 A thermal cut out upstream of the Comfort Control Panel.

How to connect the plant water circulation pump



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

To optimise the operation of the appliance it is necessary to install, on the primary circuit, variable rate WILO STRATOS PARA pumps (see Section 8 ACCESSORIES → 77) which are controlled and modulated with the Robur Mod10 controller.



No other models pump are supported.

The instructions for connecting the WILO STRATOS PARA pumps are given below (see Section 8 ACCESSORIES → 77).

Each WILO pump includes its power cord and signal cable 0-10V (both 1.5 m long) for connection to the appliance's electrical panel. For longer cable runs, use a shielded 2x0.75 mm² 0-10V signal cable and a FG7 3Gx2.5mm² power cord.



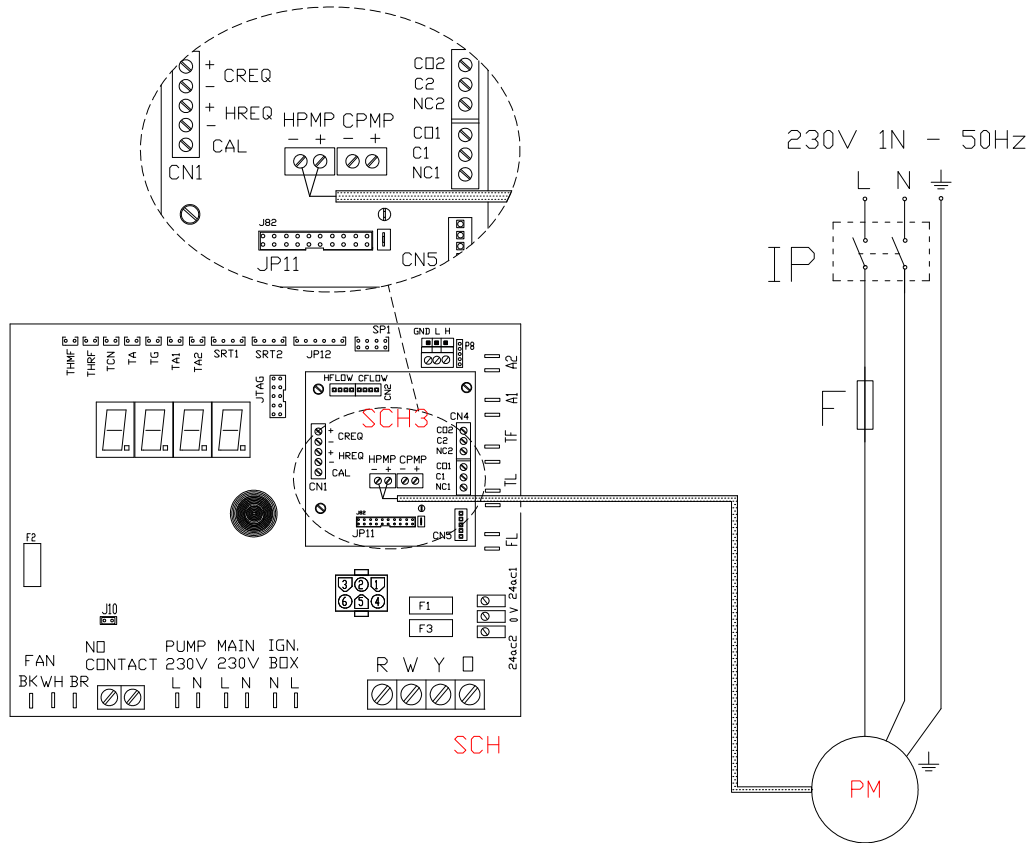
You will need: the appliance in its permanent location.

1. Check that power supply is off.
2. Remove the front panel of the appliance and the cover of the electrical panel.
3. Connect the brown wire of the WILO STRATOS PARA pump on the terminal "-" of the connector HPMP on the Mod10 board. Connect the white wire of the WILO STRATOS PARA pump on the terminal "+" of the connector HPMP on the Mod10 board. Insulated black and blue wires (see Figure 6.15 Wiring diagram for connection of Wilo variable rate pumps → 55).
4. Connect the pump to the mains with an upstream external bipolar switch (see detail IP, Figure 6.15 Wiring diagram for connection of Wilo variable rate pumps → 55) with a delayed action 2 A fuse, or connect it to the terminal clamps inside the units electrical enclosure (see detail MA, Figure 6.16 Wiring diagram for hooking up the Wilo variable rate pump powered by the unit → 56).
5. After finished with all the above operations, close the electrical panel and refit the front panel of the appliance.



NEVER switch on or off the WILO STRATOS PARA pump through the switch on the power supply.

Figure 6.15 – Wiring diagram for connection of Wilo variable rate pumps



LEGEND

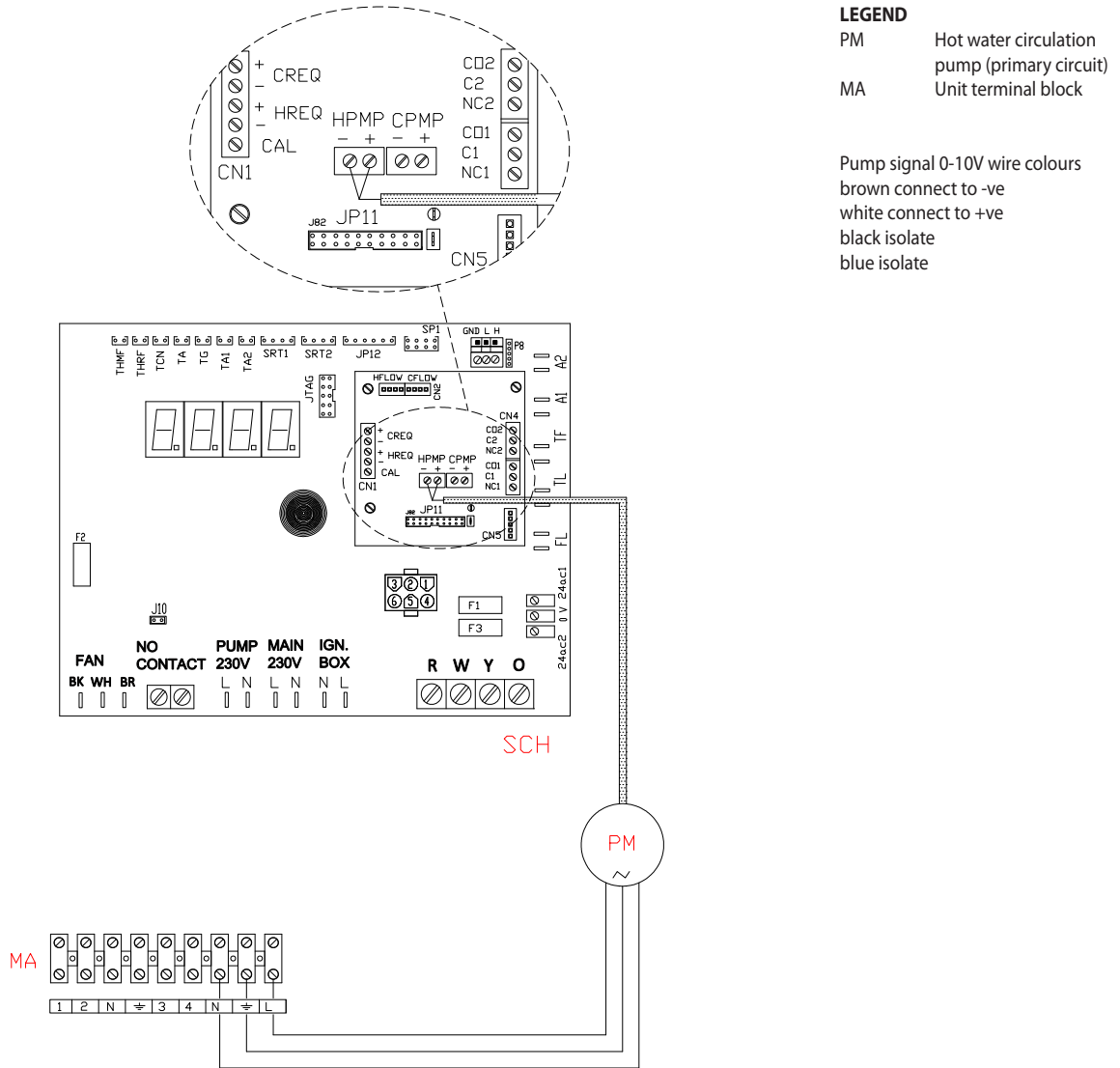
- IP** Bipolar pump power switch
- F** Fuse
- PM** Hot water circulation pump (primary circuit)

Pump signal 0-10V wire colours

- brown** connect to -ve
- white** connect to +ve
- black** isolate
- blue** isolate

Wiring diagram for connection of Wilo variable rate pumps

Figure 6.16 – Wiring diagram for hooking up the Wilo variable rate pump powered by the unit



Wiring diagram for hooking up the Wilo variable rate pump powered by the unit

6.4 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 electronic board
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 6.8 Example of CAN BUS → 48 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.

What is the CAN BUS cable



The cable to be used must be suitable for CAN BUS applications.

Table 6.2 CAN BUS cables type → 48 gives details of some types of CAN bus cable, grouped according to the maximum distance covered by each single type.



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

As shown in Table 6.2 CAN BUS cables type → 48, 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 6.2 CAN BUS cables type → 48 and cut the remaining ones. The ROBUR NETBUS cable is available as an accessory, see Section 8 ACCESSORIES → 77.

How to connect the CAN BUS cable to the appliance's electronic board

The CAN BUS cable must be connected to the dedicated terminals on the appliance's electronic board, as shown below (see Figure 6.9 CAN BUS cable connection → 49).



Before working on the electrical panel of the appliance, make sure that power supply is off.

1. Cut a length of cable long enough to allow installing it without kinking.
2. On one end of the cable, remove the jacket for a length of approximately 70-80 mm, taking care not to cut the shielding (metal mesh and/or aluminium sheet and, if present, the bare connector in touch with the shield) and the wires contained within.
3. If the cable is too thin to be held in place in the cable holding bracket (detail C in Figure 6.9 CAN BUS cable connection → 49), make it thicker by wrapping insulating tape around the jacket close to the stripped part (to an approximate diameter of 12-13 mm).
4. Pull back the shielding on the jacket; apply isolating tape to the end of the shielding as pulled back (detail A, Figure 6.9 CAN BUS cable connection → 49).
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 6.10 Electrical wiring diagram → 50. Respect the correct indications L, H, GND provided in Table 6.2 CAN BUS cables type → 48, on the figure and on the electronic board below the connector.

6. If the appliance is an **intermediate node** repeat the operations from step 2 to step 5 for the other cables required (in this way you will have two cable lengths each one without the jacket on one end). Twist together the cores with the same color and connect them to the orange connector, as shown in detail "B" of Figure 6.10 Electrical wiring diagram → 50.
7. Fix the CAN BUS cable (or two cables, according to the type of node being connected) to the holding bracket in the upper part of the electrical panel so that the pulled-back shielding is in solid touch with the metal bracket. The cables must be firmly held in place by the bracket if pulled.

In order to position the jumpers on the electronic 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 6.10 Electrical wiring diagram → 50:
 - 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 6.10 Electrical wiring diagram → 50:
8. After finished with 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:

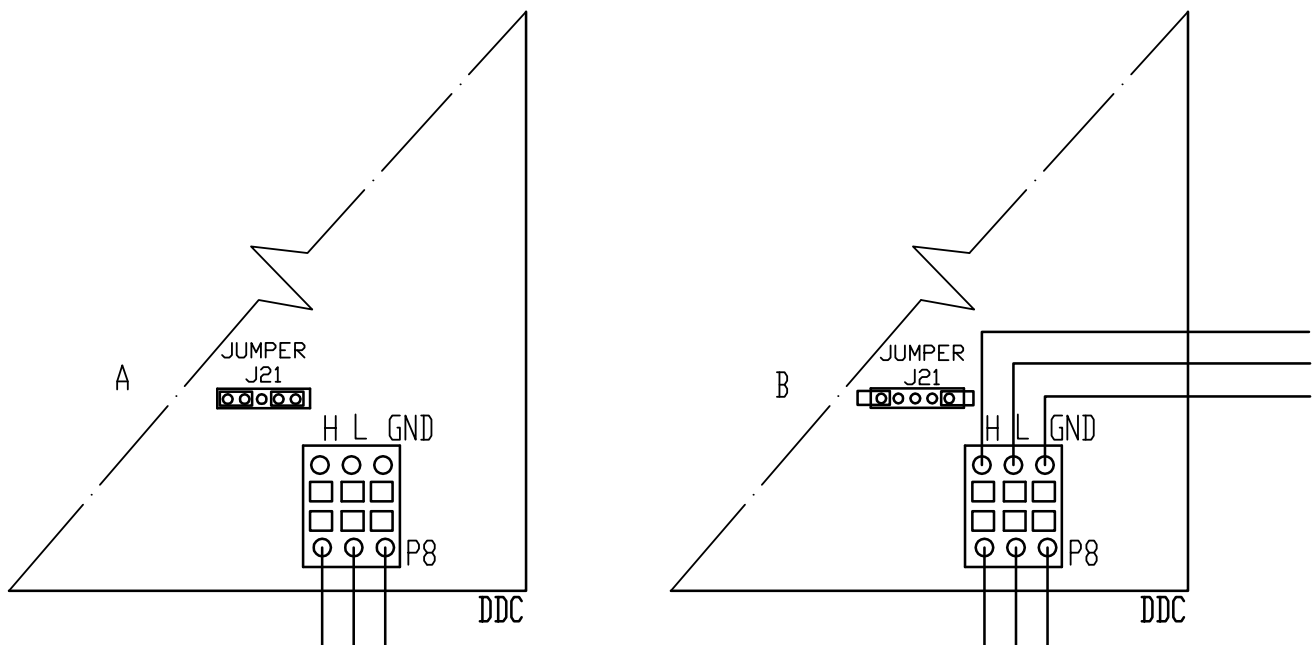


You will need: DDC not powered up.

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 6.17 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 59. 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 6.17 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 59: 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 6.17 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 59: Jumpers CLOSED.
2. Prepare the orange CAN bus connector, from the supplied sleeve.
 3. Cut a length of cable long enough to allow installing it 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 6.11 Connection from CAN BUS to connector P8 → 51, 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 6.17 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 59. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 48 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 6.17 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 59. Observe the terminal markings L, H, GND (on the DDC at the base of the socket "P8") which are given both in Table 6.2 CAN BUS cables type → 48 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 6.11 Connection from CAN BUS to connector P8 → 51). The cable should be secured against pulling out.

Figure 6.17 – detail wires and jumpers J21 - terminal/intermediate node CCI/DDC



LEGEND

DDC CCI/DDC
 J21 Jumper CAN-BUS in CCI/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 mm².

Connect the DDC to the transformer via the 4-pole connector provide for this, following the diagram in Figure 6.18 CCI/DDC - electric supply → 60. 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 mm²).
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.



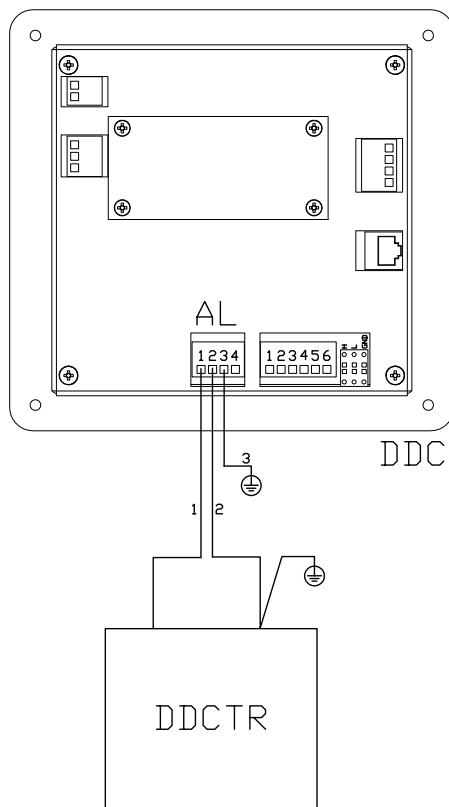
Make the grounding connection on the transformer terminal connected to terminal 2 of the 4-pole connector (EP) of the DDC. Terminal 2 is connected internally to terminal 3, and is thus grounded; if the transformer already has one wire grounded, it must be connected to this terminal. Terminal 3 of the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

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 6.18 – CCI/DDC - electric supply



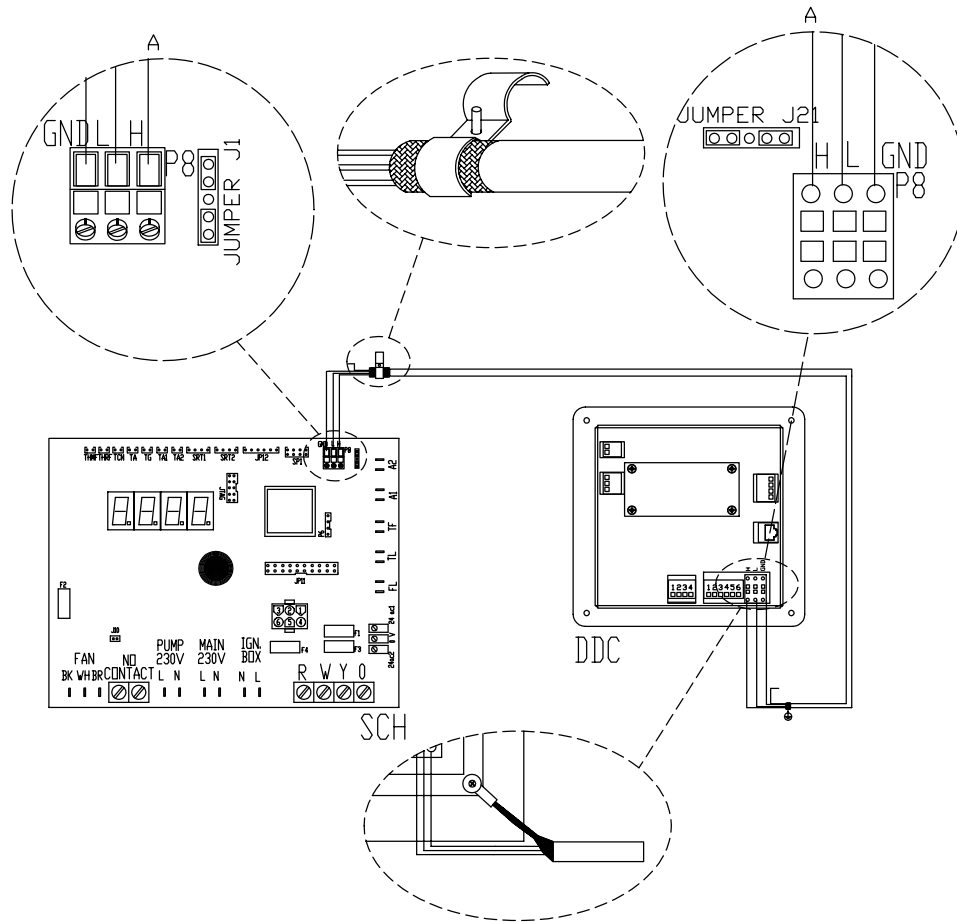
LEGEND

DDC	CCI/DDC
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)

CCI/DDC electric supply from external transformer.

The following wiring diagrams show the connection of the DDC to 1 appliance (Figure 6.19 Connexion câble CAN BUS for plants with one unit → 61) and 2 appliances (Figure 6.20 Connexion câble CAN BUS for plants with more unit → 62) respectively.

Figure 6.19 – Connexion câble CAN BUS for plants with one unit

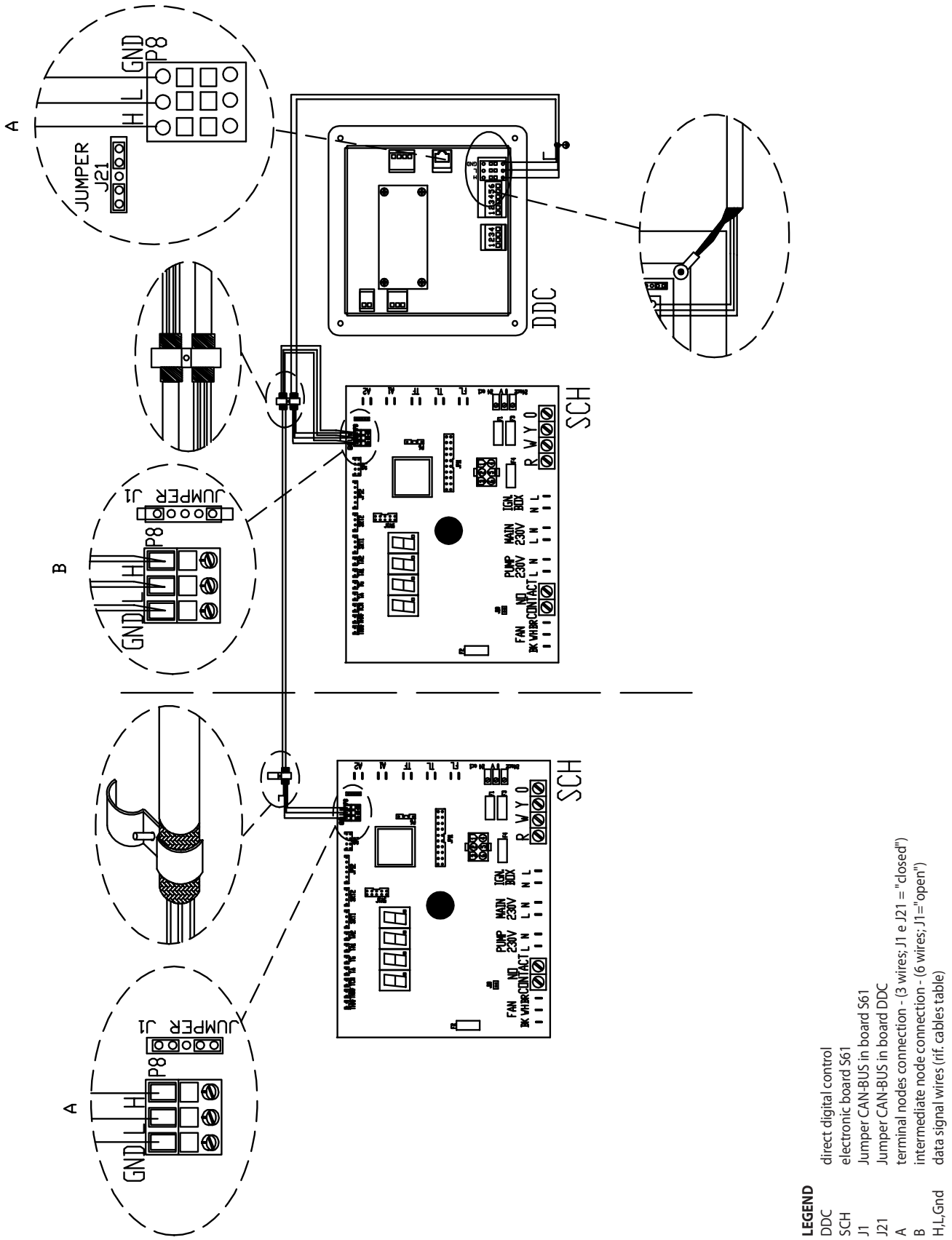


LEGEND

- 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 6.20 – Connexion câble CAN BUS for plants with more unit



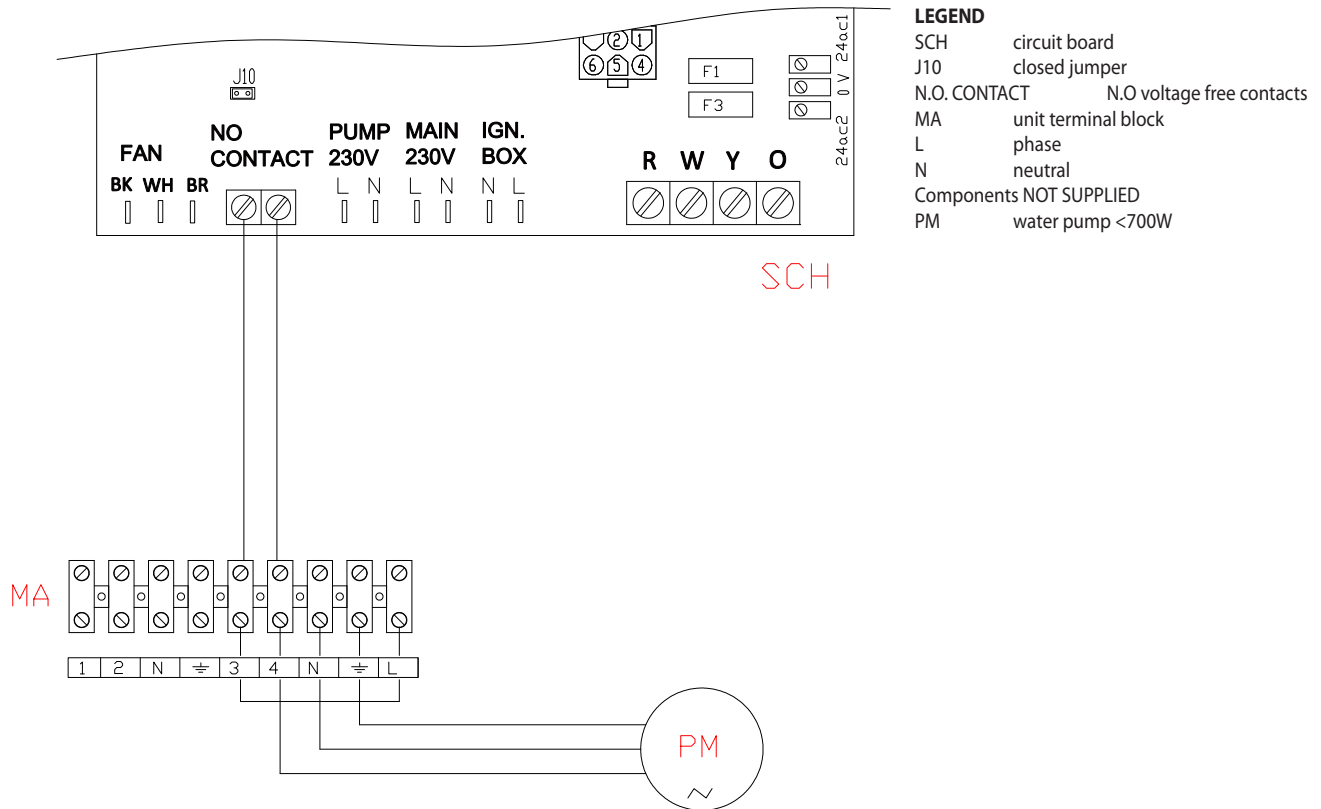
Connexion câble CAN BUS between one DDC and more unit

How to connect the plant water circulation pump

The control of the circulation pump from the electronic board of the appliance depends on the power rating of the pump itself. There may be 2 different cases:

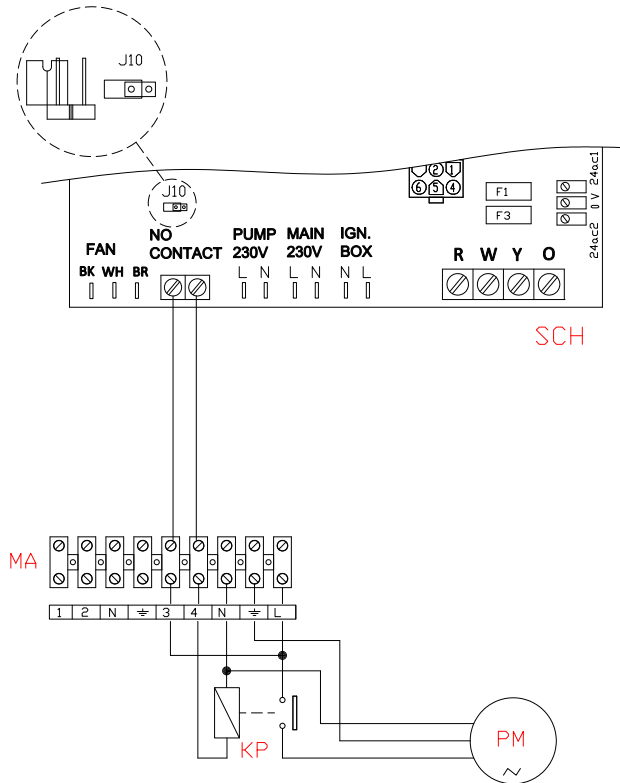
- If the power of the pump is lower than 700 W, make the connection as shown in Figure 6.21 Electrical wiring diagram → 63 and check that the jumper J10 (located at the bottom left of the electronic board, above the "NO Contact" contacts) is CLOSED, as shown in detail A.
- If the power of the pump is equal to or higher than 700 W, make the connection as shown in Figure 6.22 Electrical wiring diagram → 64 using a relay. In this case the jumper J10 (located at the bottom left of the electronic board, above the "NO Contact" contacts) must be OPEN, as shown in detail A.

Figure 6.21 – Electrical wiring diagram



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

Figure 6.22 – Electrical wiring diagram



LEGEND

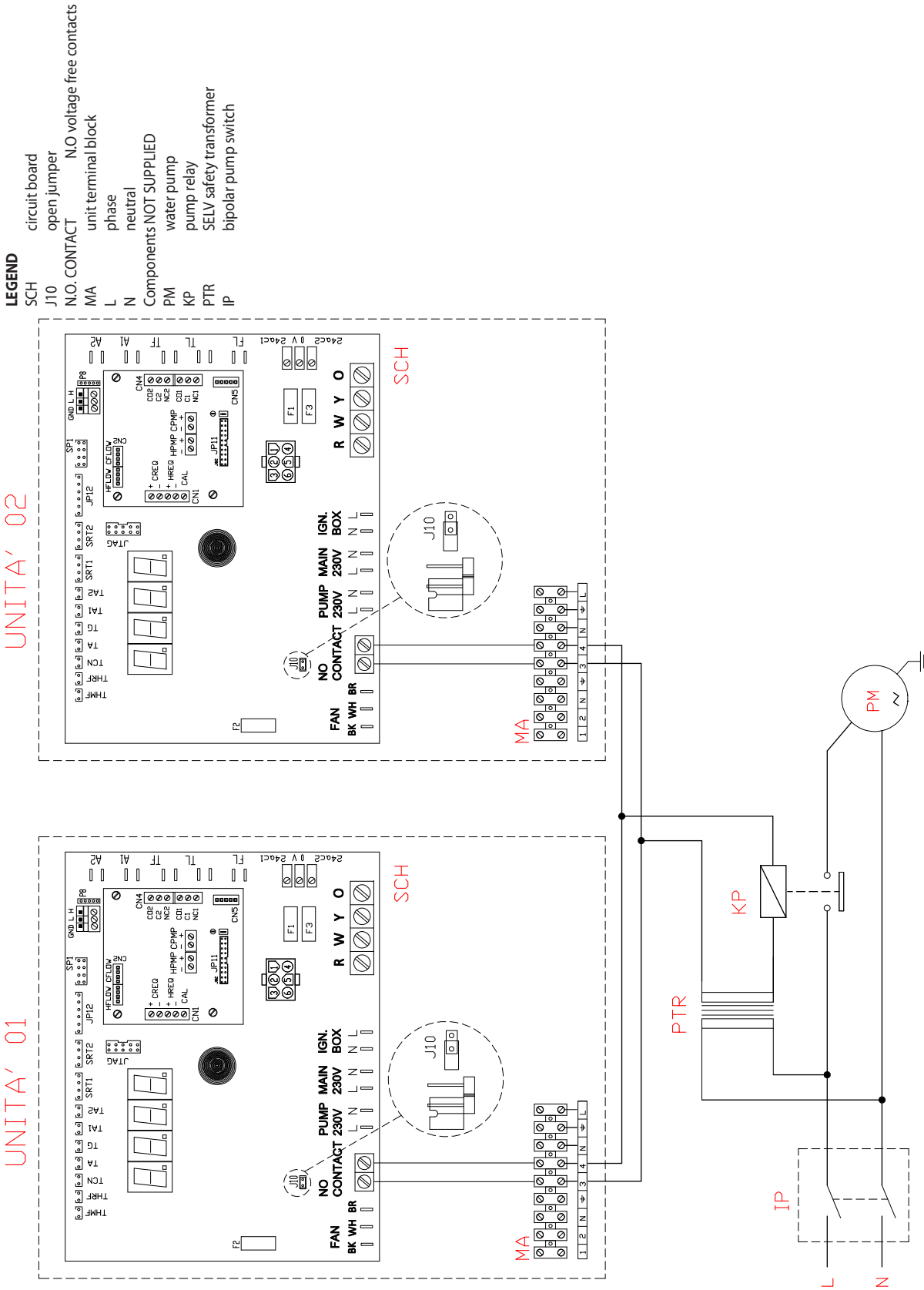
- SCH circuit board
- J10 open jumper
- N.O. CONTACT N.O voltage free contacts
- MA unit terminal block
- L phase
- N neutral
- Components NOT SUPPLIED
- PM water pump > 700W
- KP pump relay

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 (SELV secondary) with relevant relay; make connections according to the diagram in Figure 6.23 Electrical wiring diagram → 65.

Figure 6.23 – 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



Variable flow pump WILO STRATOS PARA can also be used (see Section 8 ACCESSORIES → 77). In this case, for the electrical wiring of the pump, please refer to Figure 6.15 Wiring diagram for connection of Wilo variable rate pumps → 55 and the relevant paragraph.



The primary circulation pump/s must be controlled by the S61 board, or directly (via “N.O. contact” contacts or 0-10V signal) or indirectly (“OR” use of said contacts by BMS type external systems). Otherwise, the primary circulation pump/s must be running permanently.

6.5 TYPE C (CONSENT SWITCH)



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.

Electrical safety is ensured only when the appliance is correctly connected to an efficient grounding system, realized according to current safety regulations. Do not use gas pipes as grounding.

How to connect the consent switch



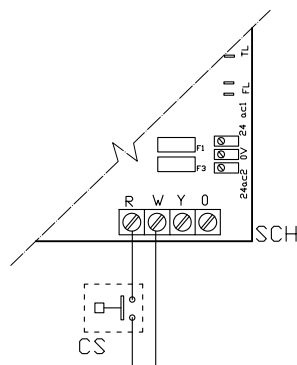
You will need: the appliance is not powered electrically (external master power switch set to OFF)

1. Connect the permissive (on-off switch or ambient thermostat or timer, etc.) to terminals **R** and **W** on the appliance’s electronic board as shown in Figure 6.24 Electrical wiring diagram → 66 (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 6.24 – 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 6.4 TYPE B (DDC) → 56.



Variable flow pump WILO STRATOS PARA can also be used (see Section 8 ACCESSORIES → 77). In this case, for the electrical wiring of the pump, please refer to Figure 6.15 Wiring diagram for connection of Wilo variable rate pumps → 55 and the relevant paragraph.

6.6 HOW TO RESET THE FLAME CONTROLLER FROM REMOTE

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 3x0.75mm².
2. Cut a suitable length of cable.
3. Connect the cable to the blind terminals A (see Figure 6.25 Button connection for flame controller reset → 68).



The blind terminals are hidden on the right inside the cable tray. To extract them, remove the cover of the tray, slide the cables out of the provided slots, and carefully close the tray again.

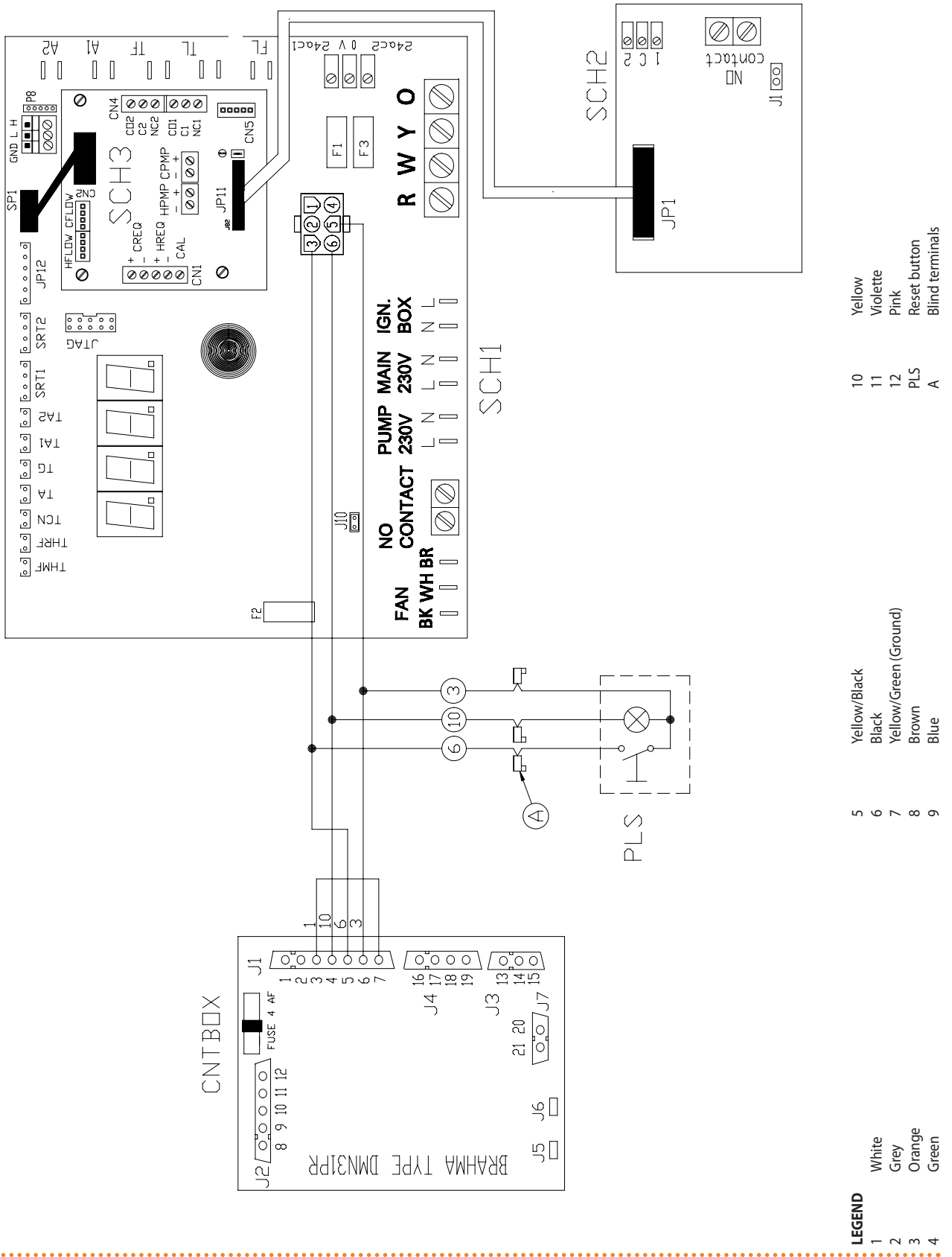


The cable may not be longer than 20 metres.



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

Figure 6.25 – Button connection for flame controller reset



7 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 installer is invited to read Paragraph 3.1 GENERAL INFORMATION → 8. Please refer to Paragraph 4.1 START UP (AND SHUT DOWN) → 17 for switching the appliance on and off.



If the appliance is connected to a CCP for the appliance start-up and switch-off control phases, reference must be made to the two CCP files dedicated to it.



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.

7.1 PROCEDURE FOR FIRST START UP

The entire procedure for the initial activation of the appliance must only be carried out by an authorized Robur Technical Assistance Centre (TAC). The product's guarantee may be void if the procedure is not carried out by a Robur TAC.

Before leaving the factory, the appliance has been thoroughly 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. check/setup of the combustion parameters;
3. regulating the plant operating parameters.

Preliminary checks of the installation compliance

The authorized technician must:

- Check that the whole installation has been realized in accordance with its design, following the manufacturer's instructions and respecting current legislation. The design must have been drawn up by a professional specifier.
- Check that all the connections (hydraulic, gas and electrical) of the appliance have been made correctly.
- Check that the installation is actually compliant as per the Declaration of Conformity provided by the installer to the owner.

The Declaration of Conformity CERTIFIES that the installation is compliant with current regulations. This Declaration is a **mandatory** document and as such it must be provided by the installer to the owner.

- 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 properly installed.
- Check that the safety clearances have been observed, as shown in Figure 5.2 Clearances → 30.

If all the conditions listed above are in place, the authorized technician can proceed with the commissioning and start up of the appliance.

If any non-compliance is found during the preliminary checks, the authorized technician may choose not to proceed with the "first start up".

In this case, the authorized technician must:

- Report the user/installer of any installation anomaly.
- Report the user/installer of any situation that is potentially hazardous for the appliance and for people.
- Report of any missing documentation relevant to the installation.
- According to the reports made, advise any corrective action to be taken at the installer's care in order to proceed with the "first start up".



It is the responsibility of the user/installation technician to carry out any corrective measures on the plant indicated by the authorized technician. After such corrective measures have been completed, the authorized technician will assess the plant again. At this point, if safety and compliance conditions are judged satisfactory, the authorized technician must carry out the "first start up".



Plant conditions that are hazardous for people or for the appliance. If any of the following hazardous situations arises, the authorized technician must not carry out the "first start up":

- appliance installed indoors;
- appliance installed close to combustible substances or surfaces or in any case in conditions of bad accessibility or not allowing safe maintenance operations;
- control of switching on and off of the appliance not via the CCP/DDC or consent switch but via the master power switch;
- damages or failures of the appliance due to transportation 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.



Plant anomalies. If any of the following situations exists, the authorized technician may carry out the "first start up" at his choice, but the appliance must be left off until the anomalies are removed:

- installations (not potentially hazardous) not carried out according to sound workmanship practices, installations (not potentially hazardous) not complying with current national and local regulations;
- installations (not potentially hazardous) not carried out according to good workmanship practices, not complying with the instructions provided by the manufacturer;
- installations that can cause operational troubles on the appliance.

Procedure for checking/setting-up 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 delivered already regulated for the type of gas requested. Anyway, the combustion parameters must **ALWAYS** be checked and set during the first start up.

The type of gas for which the appliance is set up can be identified from the sticker positioned on the gas pipe inside the unit (see detail M, Figure 7.2 Gas changeover → 76).



The nozzles required to change the gas type to G30 and G31 are supplied together with the appliance.

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

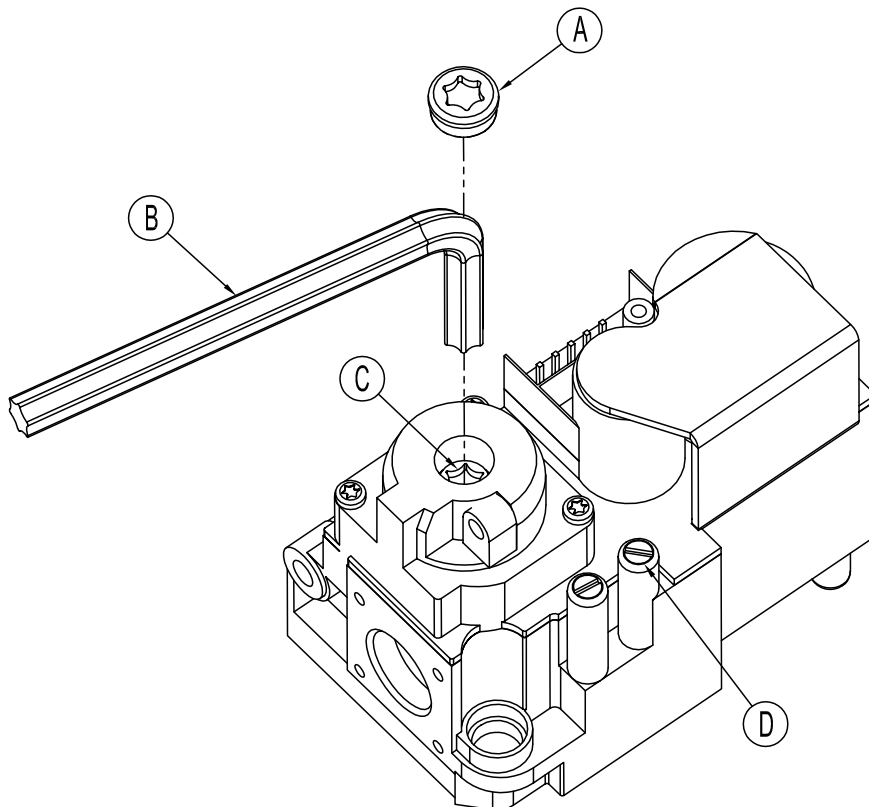
1. Connect the manometer to the gas intake (see detail D, Figure 7.1 Gas valve → 71).
2. Open the gas valve and check that the grid static pressure complies to the value reported in Table 5.2 Network gas pressure → 33 (with a tolerance of $\pm 15\%$).



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 some seconds of operation, check that the grid dynamic pressure complies with the value reported in Table 5.2 Network gas pressure → 33 (with a tolerance of $\pm 15\%$).

Figure 7.1 – Gas valve



LEGEND

- | | |
|---|----------------------|
| A | Plug |
| B | Key Torx TX40 |
| C | screw adjustment CO2 |
| D | gas pressure intake |

Gas valve Honeywell VK 4115V



If the pressure measured by the pressure gage is not complying with the value reported in Table 5.2 Network gas pressure → 33 (with a tolerance of $\pm 15\%$), it is NOT possible to switch the appliance on!

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 5.4 Fume outlet → 37).
2. Give the unit functioning consent and wait for at least 5 minutes for normal combustion conditions.
3. 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 .
4. Check that the value of CO₂ read on the flue gas analyser coincides with the value given in Table 7.3 Gas nozzles and content of CO₂ → 75 at the "Content of CO₂ with/MAX modulation" line with +0.2 -0.4 tolerance.

Example (G20 gas): the nominal content of CO₂ is equal to 9.1%, values in the range between 8.7-9.3% are therefore acceptable.

5. 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.
6. 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 7.3 Gas nozzles and content of CO₂ → 75 at the "Delta CO₂ between MAX and MIN potentiality" line with tolerance of +0.3-0.0.

Example (G20 gas): if at point 4 a content of CO₂ 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%.

7. If this is not the case, remove cap A from the gas valve (see Figure 7.1 Gas valve → 71) and use a Torx TX40 wrench to act on screw C in Figure 7.1 Gas valve → 71. Turn clockwise to increase the percentage of CO₂ and anti-clockwise to decrease the percentage of CO₂.



1/8 turn of the regulator screw reduces (counterclockwise) or increases (clockwise) the CO₂ content by approximately 0.1%. DO NOT turn the screw more than one full turn in either direction.

8. 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 .
9. Check that, also following a regulation intervention on screw C, the value of CO₂ corresponds to the value read in Table 7.3 Gas nozzles and content of CO₂ → 75 at the "Content of CO₂ with/Max modulation" line with tolerance of +0.2 -0.4.



If you cannot calibrate the CO₂ percentage after the second attempt, DO NOT activate the appliance; contact Robur technical service at +39 035/888111.

10. If the check/setup of the combustion parameters has been successful, please enter menu 2, parameter 25, of the electronic board inside the electric box of the appliance: on the display, the message "unF1", will blink; press to remove the operational override previously selected and then return to the normal operational configuration with modulation of the thermal power.



After 30 minutes, the appliance will automatically remove the thermal power override previously selected. To speed up, select and execute action "25" of menu 2.

11. Switch the appliance off.
12. Close the gas valve.
13. Reinstall the cap A in Figure 7.1 Gas valve → 71.
14. Reinstall the front panel.

7.2 MAINTENANCE

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



The maintenance operations described in this paragraph must be performed exclusively by the serviceman in charge of the plant or by an authorized CAT Robur.



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



The "efficiency check" and every other "check and maintenance operation" (see Table 7.1 → 74 and 7.2 → 74), **must be performed with a frequency in agreement to current law** or, if more restrictive, in respect of what requested by the planner (builder of the system) or by the manufacturer of the unit.



The liability of CHECKING THE EFFICIENCY AS A FUNCTION OF THE SYSTEM, OF THE FUEL IN USE AND OF THE THERMAL POWER, to be carried out with the purpose of containing the energy consumption, **is in charge to the responsible of the system.**



Before any maintenance operation, switch off the appliance by means of the permissive contacts (or by means of DDC/CCP) and wait for the completion of the shut-down cycle. When the appliance is off, switch off power supply and gas supply (according to anti-icing settings), opening the electrical breaker and closing the gas isolation valve.

GUIDELINES FOR THE PREVENTIVE MAINTENANCE OPERATIONS

In Table 7.1 → 74 are reported the **guidelines** for the preventive maintenance operations.



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

Table 7.1

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

1 - It is suggested the cleaning of the air heat exchanger once every 4 years [the optimal frequency of this operation is in any case a consequence of the installation site].
 2 - Check that the plant is able to achieve the setpoint temperature.

ORDINARY SCHEDULED MAINTENANCE

Perform the following operations at least **once every 2 years**.



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

Table 7.2

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

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



Nella Sezione 5 HYDRAULIC INSTALLATION → 27 sono riportati i **suggerimenti relativi all'impianto idraulico**.

7.3 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 the adhesive label located on the unit's electric panel, switch off the appliance, shut off its power and gas supplies and proceed as follows (see Figure 7.2 Gas changeover → 76):



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

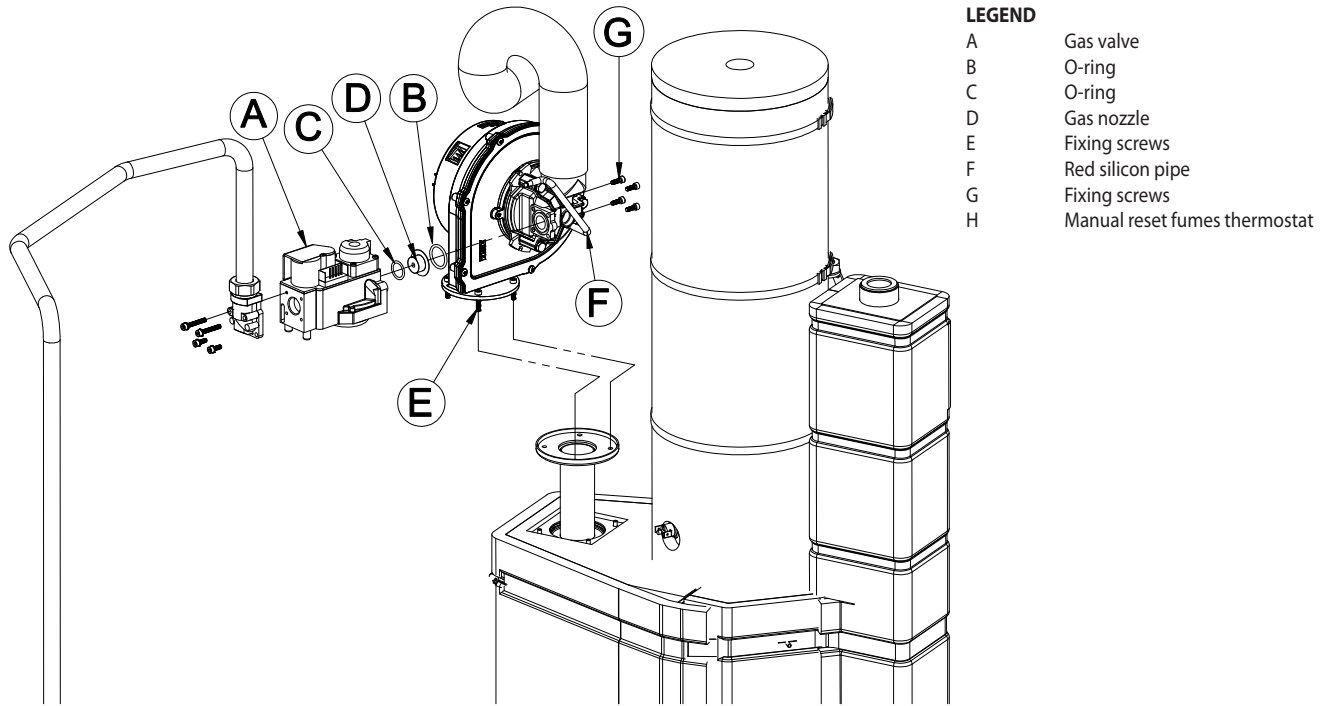
1. Disconnect the gas pipe from the gas valve.
2. Undo the 4 bolts E shown in Figure 7.2 Gas changeover → 76 and remove the gas valve/blower assembly from the burner.
3. Protect the burner from bolts and nuts falling into it.

4. Using a CH 4 hex key, undo the 4 bolts G indicated in Figure 7.2 Gas changeover → 76 and remove the nozzle D from the gas valve.
5. Replace the nozzle and o-ring C (see Figure 7.2 Gas changeover → 76) with those of the diameter suited to the new type of gas (see Table 7.3 Gas nozzles and content of CO₂ → 75). 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 7.2 Gas changeover → 76) 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 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 7.1 Gas valve → 71).
 - 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.

Table 7.3 – 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 CO ₂ with MAX modulation	9,1%	9,2%	10,1%	9,0%	9,0%	10,4%	9,8%
Delta CO ₂ between Max and Min potential	0,4	0,6	0,8	0,5	0,5	0,5	0,4

Figure 7.2 – 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

Gas changeover

8 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 8.1 – Accessories

ACCESSORIES			
Name	Description	Code	Notes
CIRCULATION PUMPS	Wilo-Stratos Para 25-11.	O-PMP004	Variable rate pump for cold and hot water.
	Pompa Wilo-Stratos Para 30-12	O-PMP008	Max variable flow pump.
FILTERS	Sludge filter 1" 1/4	O-FLT014	
	Sludge filter 1" 1/2	O-FLT015	
	Air separator filter 1" 1/4	O-FLT010	
	Air separator filter 1" 1/2	O-FLT016	
BOILERS AND HYDRAULIC SEPARATORS	Sanitary water boiler with oversize coil, 300 l	O-SRB004	
	Sanitary water boiler with oversize coil, 500 l	O-SRB005	
	Sanitary water boiler with oversize coil, 500 l	O-SRB006	With integral solar coil.
	Sanitary water boiler with oversize coil, 750 l	O-SRB007	With integral solar coil.
	Thermal tank, three fittings, 300 l	O-SRB000	
	Thermal tank, three fittings, 500 l	O-SRB001	
	Thermal tank, three fittings, 800 l	O-SRB002	
VALVES	Thermal tank, three fittings, 1000 l	O-SRB003	
	Flow regulator valve	O-VLV001	
	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	
REGULATOR COMPONENTS	Radio module (Siemens)	O-DSP007	
	Repeater (Siemens)	O-DSP009	
	Sender (Siemens)	O-DSP008	
	Room unit basic (Siemens)	O-DSP004	
	Room unit cooling (Siemens)	O-DSP005	
	Room unit cooling (Siemens) (radio)	O-DSP006	
	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	
	Contact probe (Siemens)	O-SND006	
	External probe (Siemens)	O-SND003	
	Immersion probe, length 2 m	O-SND004	
	Solar sensor (Siemens)	O-SND005	
	Commissioning tool	O-DSP002	
	Communications switchboard	O-DSP003	
"NETBUS" CAN BUS CABLE	Cable for data communication networks: for network connection between controller and appliance.	O-CVO008	
Transformer	50VA transformer	O-TRS005	

9 OPERATING CODES/TROUBLESHOOTING

9.1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING

Table 9.1 – TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.024)

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 Technical Assistance.
u 401	GENERATOR LIMIT TEMPERATURE THERMOSTAT	High temperature detected by limit thermostat on body of generator	Acknowledge the thermostat manually: reset will be automatic as soon as fault condition is over.
E 401	GENERATOR LIMIT TEMPERATURE THERMOSTAT	u_01 code active for 1 hour, or u_01 code generated 3 times in 2 hours of operation.	Contact authorised Technical Assistance.
u 402	FUMES THERMOSTAT	High temperature detected by exhaust fumes thermostat	Acknowledge the thermostat manually: reset will be automatic as soon as fault condition is over.
E 402	FUMES THERMOSTAT	u_02 code active for 1 hour, or u_02 code generated 3 times in 2 hours of operation.	Contact authorised Technical Assistance.
E 405	HIGH AMBIENT TEMPERATURE	HIGH temperature detected by ambient temperature sensor.	Reset occurs automatically when the condition that generated the code ceases.
u 406	LOW AMBIENT TEMPERATURE	LOW temperature detected by ambient temperature sensor.	Reset occurs automatically when the cause ceases or when the unit is switched off.
u 407	HIGH CONDENSER INLET TEMPERATURE	Temperature measured by condenser inlet sensor, fumes sensor or generator fin sensor HIGH.	Reset occurs automatically when the condition that generated the code ceases.
E 407	HIGH CONDENSER INLET TEMPERATURE	u_07 code active for 1 hour, or u_07 code generated 12 times in 2 hours of operation.	Carry out appropriate checks. Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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 controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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 controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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 controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
u 412	FLAME CONTROL UNIT ARREST	Failure to ignite burner.	Reset occurs automatically when the solenoid valve opens again (new ignition attempt), or if the code persists for 5 minutes.
E 412	FLAME CONTROL UNIT ARREST	Flame arrest signal.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 20). If the code persists, contact authorised Technical Assistance.
E 416	HOT OUTLET WATER TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on outlet hot water temperature sensor.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 417	COLD INLET WATER TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on inlet water temperature sensor.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 420	CONDENSER INLET TEMPERATURE SENSOR DEFECTIVE	Fault (interruption or short circuit) on condenser inlet temperature sensor.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 422	WATER FLOWMETER FAULT	Water flowmeter fault	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 423	AIR/GAS MIXTURE SENSOR FAULT	Air gas mixture sensor fault	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 424	FUMES TEMPERATURE SENSOR FAULT	Fumes temperature sensor fault	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 425	CONDENSATE DISCHARGE CLOGGED	Condensate discharge clogged	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 426	GENERATOR FIN TEMPERATURE SENSOR	Generator fin temperature sensor	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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 controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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 controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
u 436	BLOWER FAULT	Blower fault	Reset occurs automatically 20 minutes after the operating code is generated.

CODES	DESCRIPTION	TRIP CONDITIONS	RESET METHOD
E 436	BLOWER FAULT	u_36 code generated three times in 1 hour of operation.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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.
E 444	EVAPORATOR TEMPERATURE SENSOR FAULT	Evaporator temperature probe fault	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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_47 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 Technical Assistance.
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 controller (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, item 163; 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 Technical Assistance. 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 Technical Assistance: 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 5 attempts this fails, the error is generated.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
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 2 PARAMETERS	The program attempts to resolve the problem by writing the first page over the second; if after 5 attempts this fails, the error is generated.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 21). If the code persists, contact authorised Technical Assistance.
E 484	FAULTY TRANSFORMER CONNECTION OR 24V 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 controller (or from the S61 board via menu 2, parameter 21). If the code persists or occurs again, contact authorised Technical Assistance.
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 Technical Assistance.
E 486	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 487	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 488	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 489	MEMORY TEST UNSUCCESSFUL	Processor error.	Contact authorised Technical Assistance.
E 490	AMBIENT TEMPERATURE SENSOR DEFECTIVE	Interruption or short circuit of ambient temperature sensor.	Reset may be performed from the controller (or from the S61 board via menu 2, parameter 1). If the code persists or occurs again, contact authorised Technical Assistance.
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 Technical Assistance.



Robur mission

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

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13 MCM SDC 016

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