remeha

Installation, user and maintenance manual

GAHP-A

air-water gas absorption heat pump

powered by natural gas and renewable energy

Revision: A
Code: D-LBR637

INDEX OF CONTENTS

1 SAFETY AND SYMBOLS

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.

Note on controllers

If the appliance is connected to a Comfort Control Panel (CCP), to a Comfort Control Interface (CCI) or to a Direct Digital Controller (DDC), please refer to the relevant manuals for configuration and operation.

1.1 SYMBOLS

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

1.2 SAFETY

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

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

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 4.1 Chemical and physical parameters of water → 26 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.

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, compilant 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 4.4 CONDENSATE DISCHARGE → 24.

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.

Operation and maintenance of the appliance

During normal operation, do not switch off the appliance by cutting electrical power supply. The appliance must be switched off by means of its controls; after switching off, wait for the end of the cooling down cycle (about 7 minutes). The cooling down cycle finishes when the oil pump stops (no component of the appliance is moving any more).

Shutting off the power supply while the appliance is running can cause permanent damages to internal components!

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 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 or qualified technician; for other maintenance requirements, see Paragraph 8 MAINTENANCE → 62.
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.

2 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.

2.1 CONFORMITY TO CE STANDARDS

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

2.2 GENERAL FEATURES

The appliance uses the water/ammonia absorption thermodynamic cycle ($H_20 – NH_3$) 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 hermitically sealed circuit, directly verified by the manufacturer to ensure the perfect tightness of all joints, thus making refrigerant top-ups completely unnecessary.
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 appliance is supplied with the following technical manufacturing characteristics, control and safety components.
Manufacturing features

- 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 shall-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 5.1 Electronic board S61 → 30 and 5.2 Mod10 controller → 31).
- 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.

2.3 TECHNICAL DATA

Table 2.1 – GAHP-A LT technical data

			GAHP-A LT S
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)
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	-20 (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	1,09 (5)
	minimum	kW	-

			GAHP-A LT S
Degree of protection	IP		X5D
INSTALLATION DATA			
Level of acoustic pressure at 10 meters (maximum)		dB(A)	45 (8)
Level of acoustic pressure at 10 meters (minimum)		dB(A)	-
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)
	depth	mm	1258
Weight	In operation	kg	400
GENERAL INFORMATION			
INSTALLATION MODE			B23P, B33, B53P
COOLING FLUID	AMMONIA R717	kg	7
	WATER H2O	kg	10
MAXIMUM PRESSURE OF THE COOLING CIRCUIT		bar	35

** in transient operation, lower temperatures are allowed

Notes:

1. As per EN12309-2 evaluated over the actual thermal capacity.
2. -
3. PCI 34.02 MJ/m3 (1013 mbar – 15 ° C).
4. PCI 46.34 MJ/kg (1013 mbar – 15 ° C).
5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 2.1 Dimensions (low noise version) ⟶ 13).
7. As an option, a version for operation down to -30 °C is available.
8. Free field, frontal, directionality factor 2.
9. PCI 29.25 MJ/m3 (1013 mbar – 15 ° C).

Table 2.2 – GAHP-A HT technical data

			GAHP-A HT S
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)

			GAHP-A HT S
Ambient air temperature (dry bulb)	maximum	°C	40
	minimum	°C	-20 (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	1,09 (5)
	minimum	kW	-
Degree of protection	IP		X5D
INSTALLATION DATA			
Level of acoustic pressure at 10 meters (maximum)		dB(A)	45 (8)
Level of acoustic pressure at 10 meters (minimum)		dB(A)	-
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)
	depth	mm	1258
Weight	In operation	kg	400
GENERAL INFORMATION			
INSTALLATION MODE			B23P, B33, B53P
COOLING FLUID	AMMONIA R717	kg	7
	WATER H2O	kg	10
MAXIMUM PRESSURE OF THE COOLING CIRCUIT		bar	35

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Notes:

1. As per EN12309-2 evaluated over the actual thermal capacity.
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5. ± 10% depending on power voltage and absorption tolerance of electric motors.
6. Overall dimensions excluding fumes pipes (see Figure 2.1 Dimensions (low noise version) ⟶ 13).
7. As an option, a version for operation down to -30 °C is available.
8. Free field, frontal, directionality factor 2.
9. PCI 29.25 MJ/m3 (1013 mbar – 15 ° C).

Table 2.3 – PED data

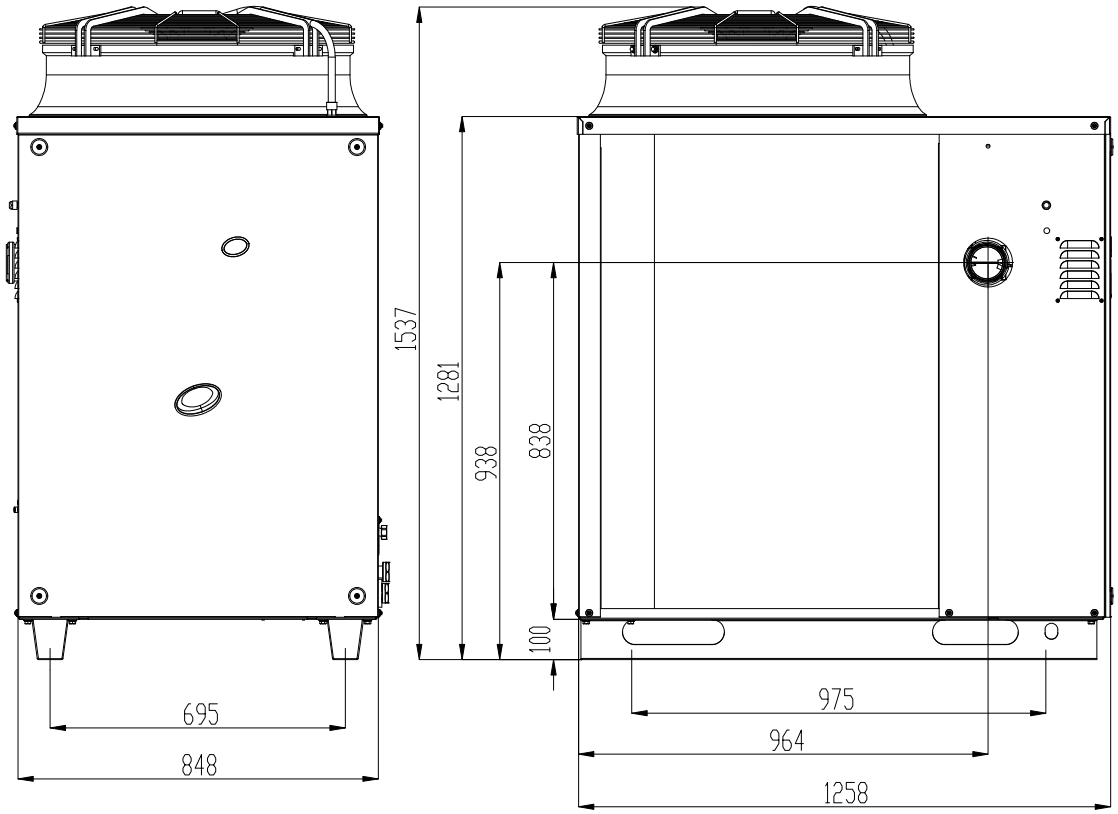
			GAHP-A HT S	GAHP-A LT S
PED data				
COMPONENTS UNDER PRESSURE	Generator	l	18,6	
	Leveling chamber	l	11,5	
	Evaporator	l	3,7	
	Cooling volume transformer	l	4,5	
	Cooling absorber solution	l	6,3	
	Solution pump	l	3,3	
TEST PRESSURE (IN AIR)		bar g	55	
SAFETY VALVE PRESSURE CALIBRATION		bar g	35	
FILLING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

Table 2.4 – Network gas pressure

E3-GS; E3-WS; E3-A; GAHP-GS; GAHP-WS; GAHP-A		**Gas supply pressure**						
Product categories	**Countries of destination**	**G20** [mbar]	**G25** [mbar]	**G30** [mbar]	**G31** [mbar]	**G25.1** [mbar]	**G27** [mbar]	**G2,350** [mbar]
$II_{2H3B/P}$	AL, BG, CY, CZ, DK, EE, FI, GR, HR, IT, LT, MK, NO, RO, SE, SI, SK, TR	20		30	30			
	AT, CH	20		50	50			
II_{2H3P}	AL, BG, CZ, ES, GB, HR, IE, IT, LT, MK, PT, SI, SK, TR	20			37			
	RO	20			30			
$II_{2ELL3B/P}$	DE	20	20	50	50			
II_{2Esi3P}	FR	20	25		37			
$II_{2HS3B/P}$	HU	25		30	30	25		
II_{2E3P}	LU	20			50			
$II_{2L3B/P}$	NL		25	50	50			
$II_{2E3B/P}$	PL	20		37	37			
$II_{2ELwLs3B/P}$		20		37	37		20	13
$II_{2ELwLs3P}$		20			37		20	13
$I_{2E(R)B}$, I_{3P}	BE	20	25		37			
I_{3P}	IS				30			
I_{2H}	LV	20						
$I_{3B/P}$	MT			30	30			
I_{3B}				30				

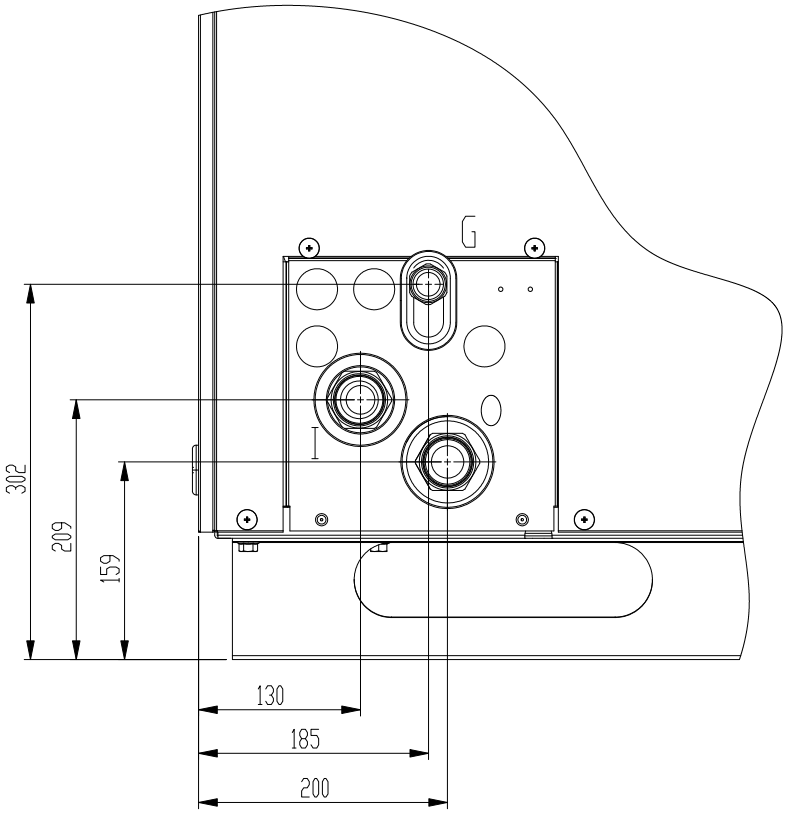
2.4 DIMENSIONS

Figure 2.1 – Dimensions (low noise version)



Front and side views (dimensions in mm).

Figure 2.2 – Service plate

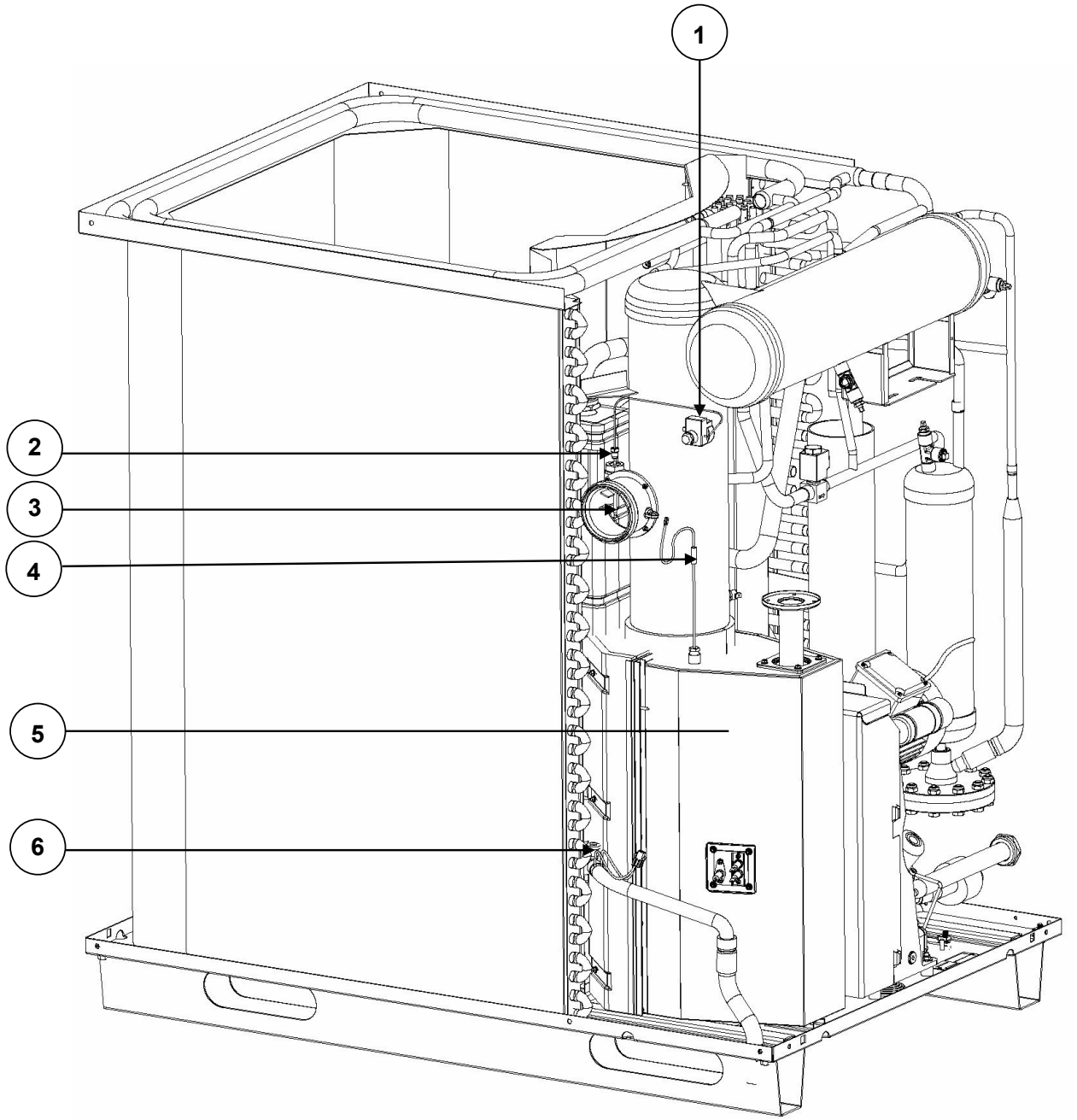


LEGEND

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

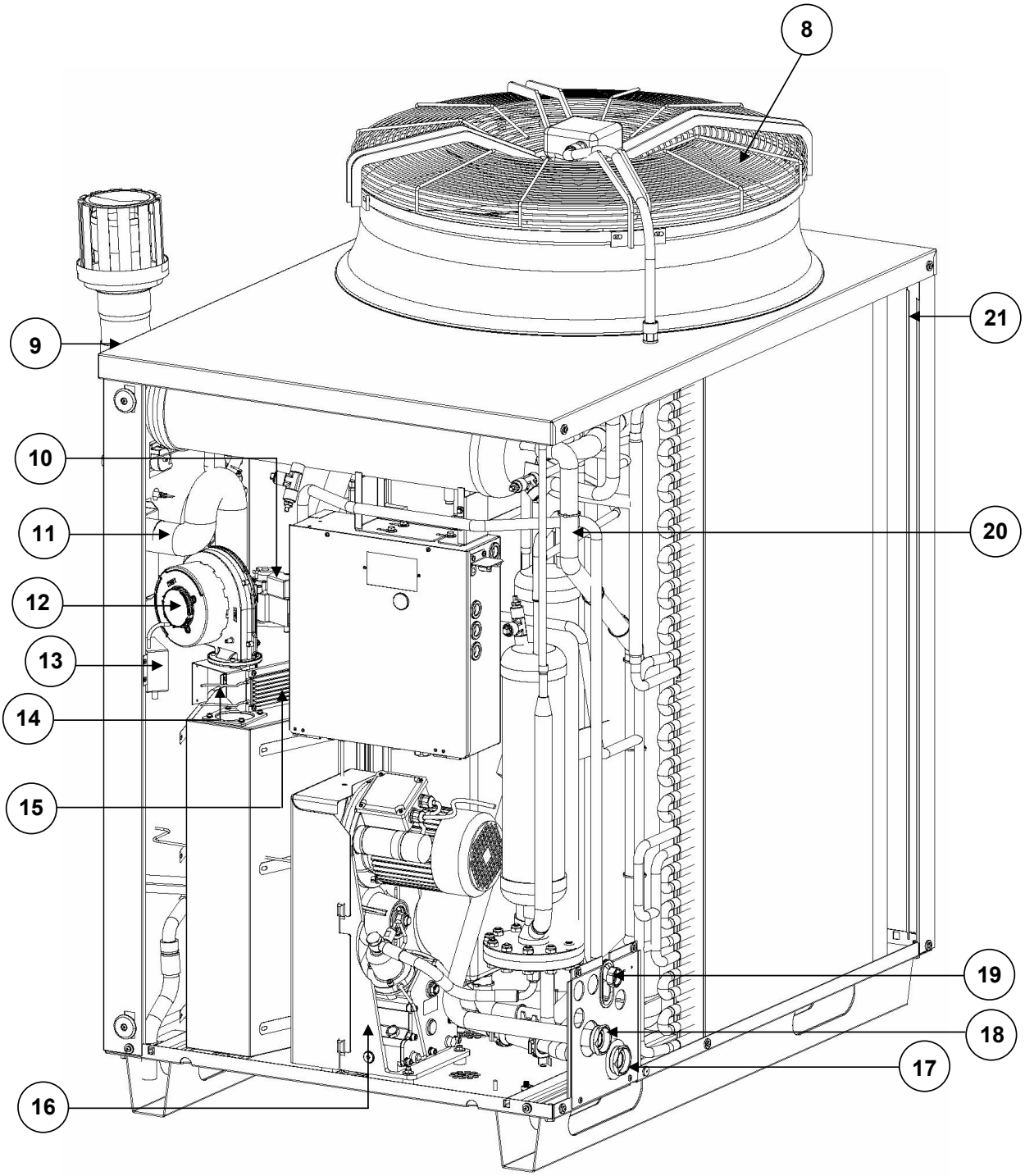
Hydraulic/gas unions detail

Figure 2.3 – Internal components - left side view



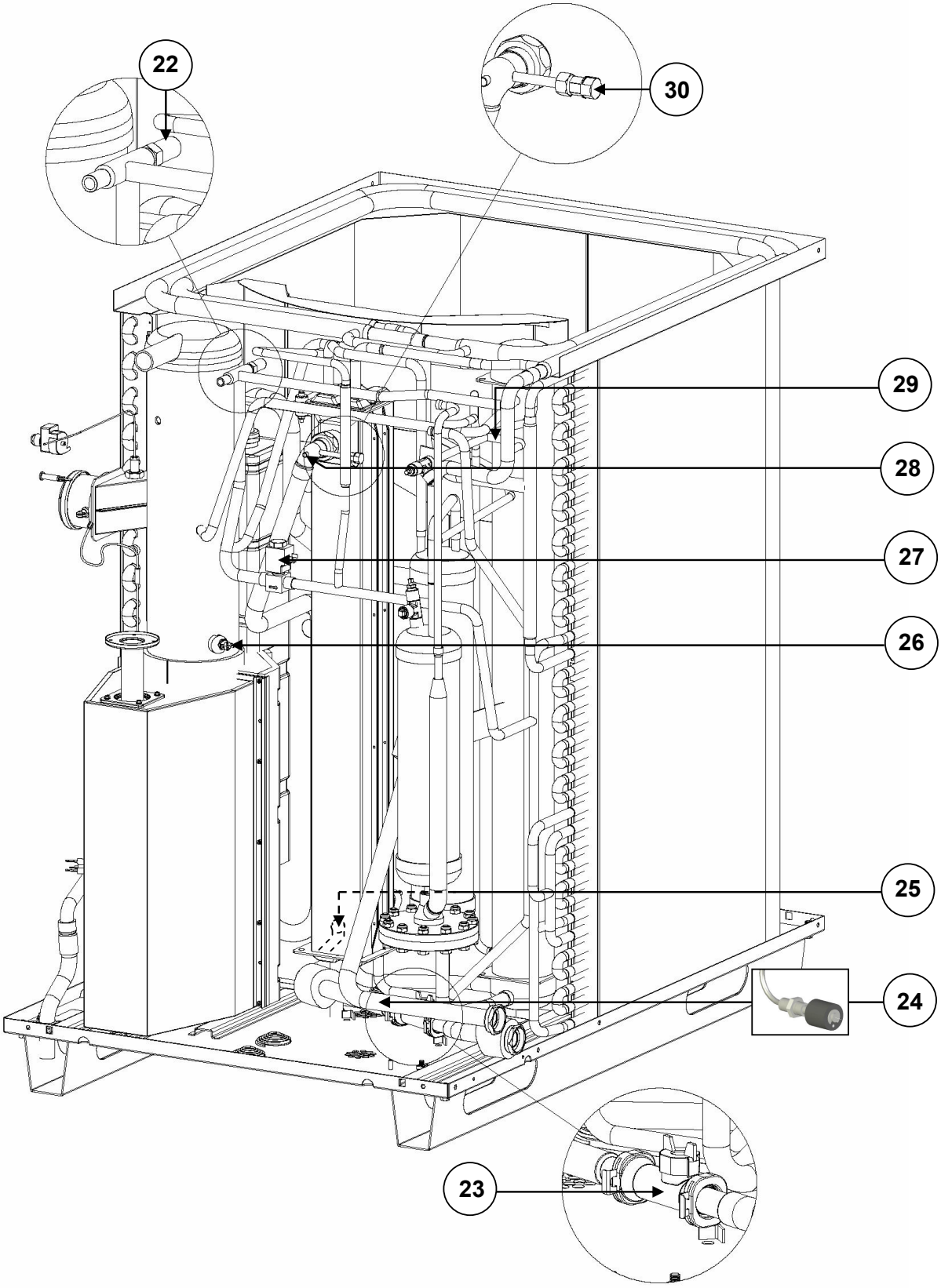
See table "Internal components"

Figure 2.4 – Internal components - front view



See table "Internal components"

Figure 2.5 – Internal components - right side view



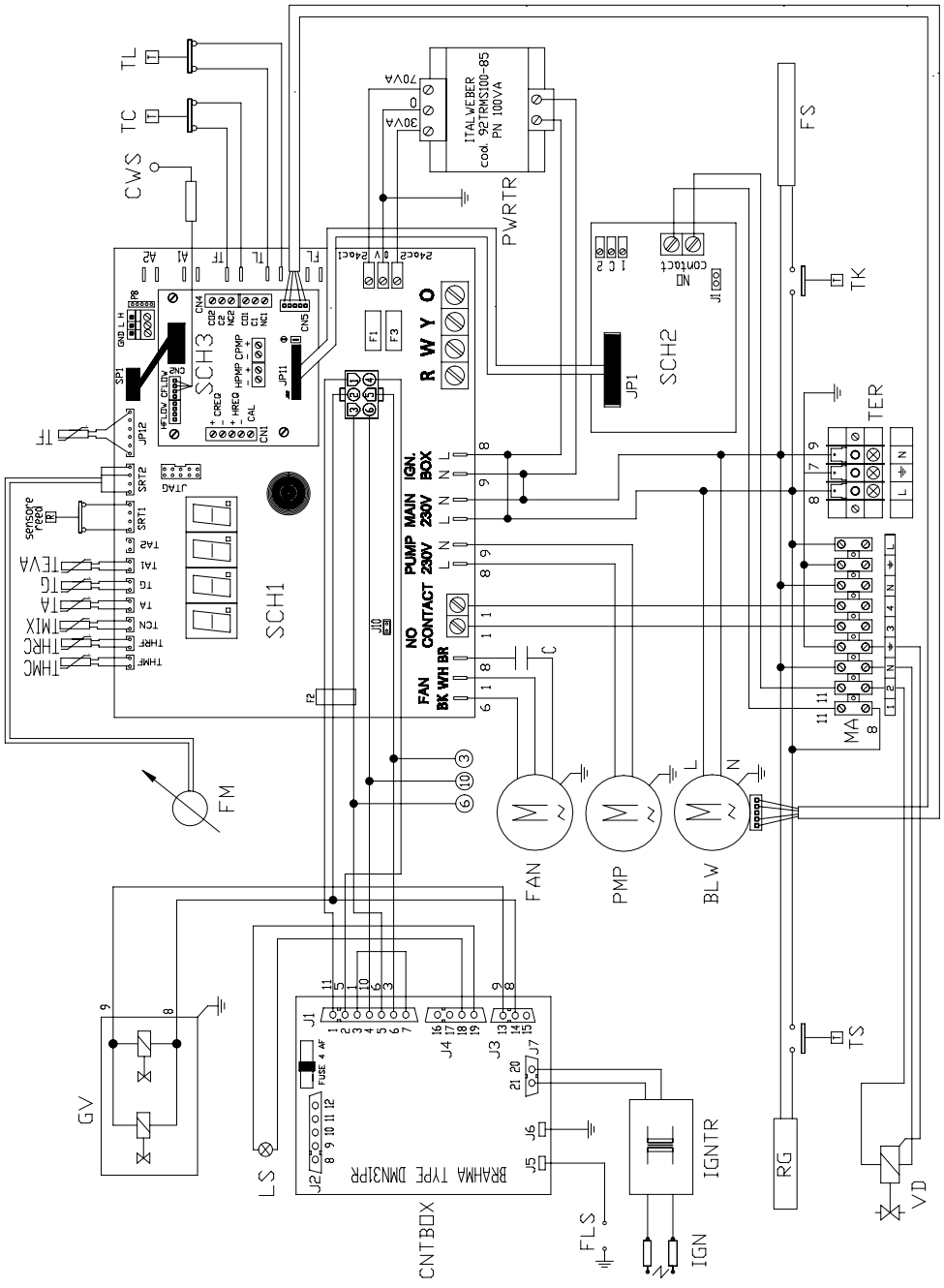
See table "Internal components"

Table 2.5 – Internal components

n.	DESCRIPTION
1	Manual reset of the flue exhaust thermostat
2	Sensing element of the flue exhaust thermostat
3	DN80 flue exhaust connection
4	PT1000 flue exhaust temperature probe
5	Flame sensing / ignition electrodes
6	Condensate level sensor
8	Air fan
9	Tapping point for flue analisys
10	Gas valve
11	Combustion air hose
12	Combustion blower
13	Ignition transformer
14	Tmix air-gas mixture temperature probe
15	Blower-Gas valve heating element
16	Oil pump
17	1"¼ F water connection (flow)
18	1"¼ F water connection (return)
19	Gas fitting
20	TG generator temperature probe
21	TA outdoor temperature probe
22	Safety valve
23	HUBA flowmeter (flow pipe)
24	Not applicable
25	Flow temperature probe
26	Limit thermostat
27	Defrosting valve
28	Return temperature probe
29	Teva evaporator temperature probe
30	Air-vent manual valve

2.5 ELECTRICAL DIAGRAM OF THE APPLIANCE

Figure 2.6 – Wiring diagram of the unit with standard/ low noise fan (S)



LEGEND

SCH1	S61 circuit board	LS	Gas valve ON indicator lamp	RG	Gas valve heating element
SCH2	W10 circuit board	GV	Gas solenoid valve	THRC	Hot water return temperature sensor
SCH3	Mod10 circuit board	TC	Manual fumes thermostat	THMC	Hot water delivery temperature sensor
TER	Appliance power terminal block	TL	Generator limit thermostat	TMIX	Combustion air temperature sensor
CNTBOX	Flame controller	FM	Flowmeter	TA	Ambient air temperature sensor
PWRTR	Board transformer	CWS	Condensation water sensor	TG	Generator temperature sensor
BLW	Blower	VD	Defrosting valve	TF	Fumes temperature sensor or generator fin sensor
PMP	Hydraulic pump	FAN	Fan	TEVA	Evaporator outlet temperature sensor
IGNTR	Ignition transformer	C	Fan condenser	TK	Condensate discharge heating element thermostat
IGN	Ignition electrodes		(not present on silenced units)	MA	Terminal block
FLS	Flame sensor	TS	Gas valve heating element thermostat	REED	Hydraulic pump rotation sensor
		FS	Condensate hose heating element		

3 TRANSPORTATION AND POSITIONING

LIFTING AND PLACING THE APPLIANCE INTO POSITION

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.
Do not remove packaging during handling on the installation site.

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.

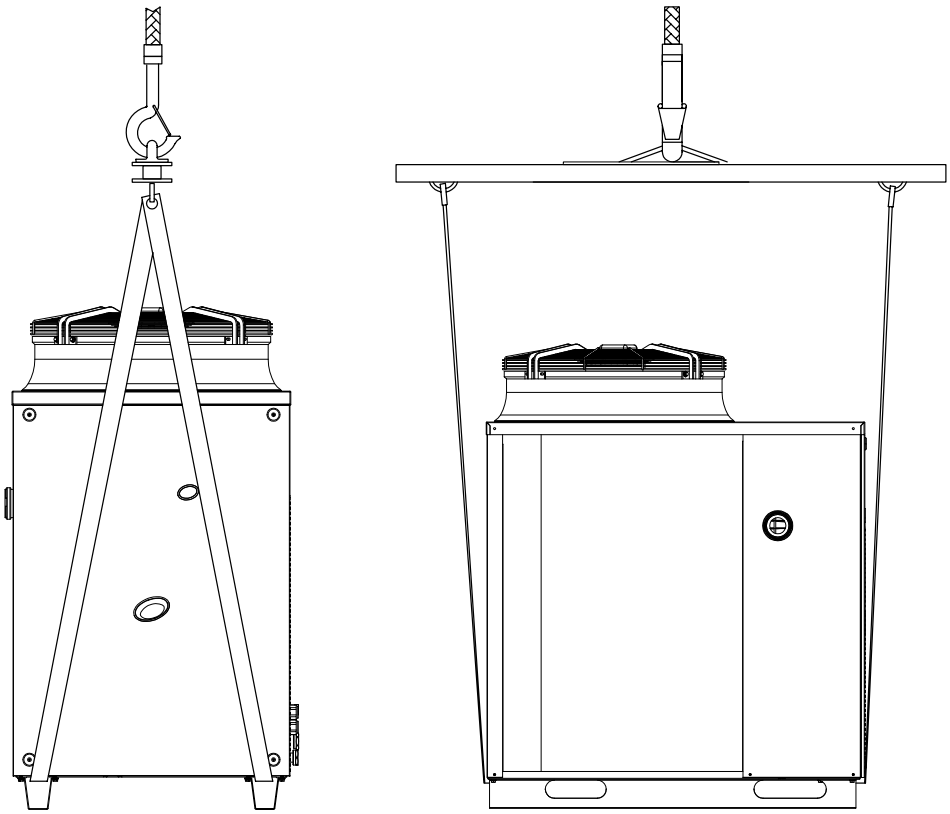
Packing items (plastic bags, polystyrene foam, nails, etc.) must be kept out of the reach of children, as they are potentially dangerous.

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 3.1 Instruction for lifting → 19).

The crane and all lifting accessories must be properly sized for the load to be lifted.

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

Figure 3.1 – Instruction for lifting

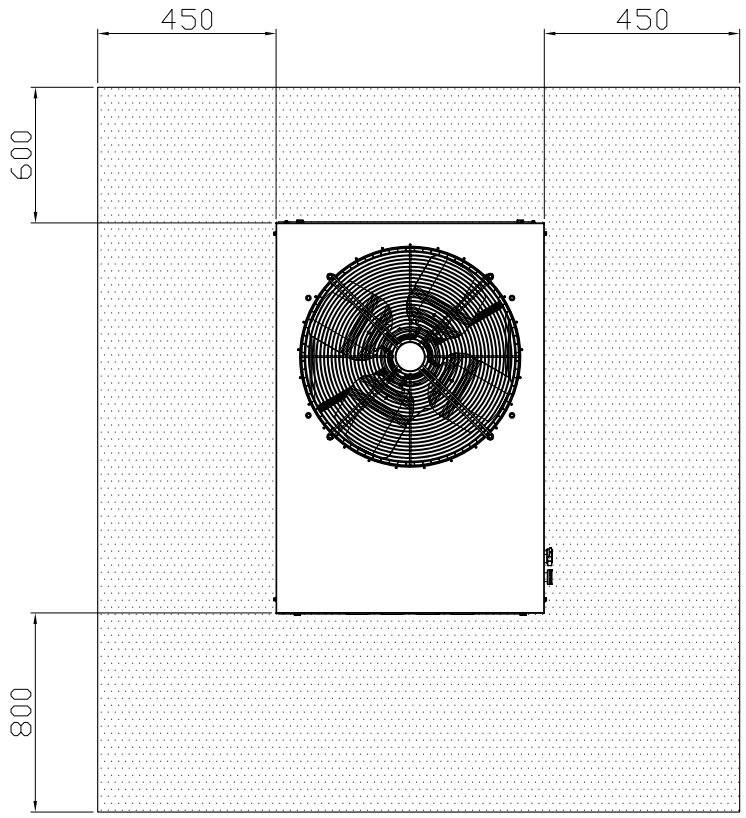


- The appliance must be installed outdoors, located in an area in which air circulates naturally and which does not require any particular protection from the weather. **In no case must the appliance be installed inside a room.**

- 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 3.2 Clearances → 20).
- 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 the discharge of exhaust flue pipes, chimneys or the like, in order to avoid that warm or polluted air is fed through the evaporator. To operate properly, the appliance needs clean air from the open environment.
- If the appliance is installed near buildings, make sure it is not on the dripping line from gutters or similar.

The appliance can be installed at ground level, on a terrace or on a roof (if compatible with its dimensions and weight).

Figure 3.2 – Clearances



CLEARANCES

Position the appliance so as to maintain **minimum clearances** from combustible surfaces, walls or other appliances, as illustrated in Figure 3.2 Clearances → 20.

Minimum clearances are required for maintenance accessibility.

When deciding on the installation position, especially if multiple units are used, consider that each unit requires 11,000 m^3/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.

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).

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

Provide a retaining edge and proper evacuation of defrosting water to avoid possible spilling and prevent icing on the ground of the defrosting water during winter time.

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.

The manufacturer may not be held responsible for any damage arising from failure to observe this warning.

MOUNTING BASE

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

Installation at ground level

If a horizontal base is not available, create a concrete levelled socle larger than the base of the appliance by at least 100-150 mm on each side.

Installation on a terrace or roof

Position the appliance on a levelled flat surface made of fireproof material.
The structure of the building must support the total weight of the appliance and the supporting base.
If necessary, provide a walkway around the appliance for accessibility.
Although the appliance produces vibrations of limited intensity, the use of antivibration mounts (available as accessories, see Section ACCESSORIES → 66) 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.

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.

4 HYDRAULIC INSTALLATION

4.1 GENERAL INSTALLATION PRINCIPLES

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.

Before realizing hydraulic system and gas supply for the appliance, the professionally qualified personnel is advised to read Paragraph 2.1 Conformity to CE standards → 8, providing important recommendations about safety and references to current regulations.

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.

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.

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 2.4 Network gas pressure → 12 (considering a tolerance of ±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.

4.2 HYDRAULIC CONNECTIONS

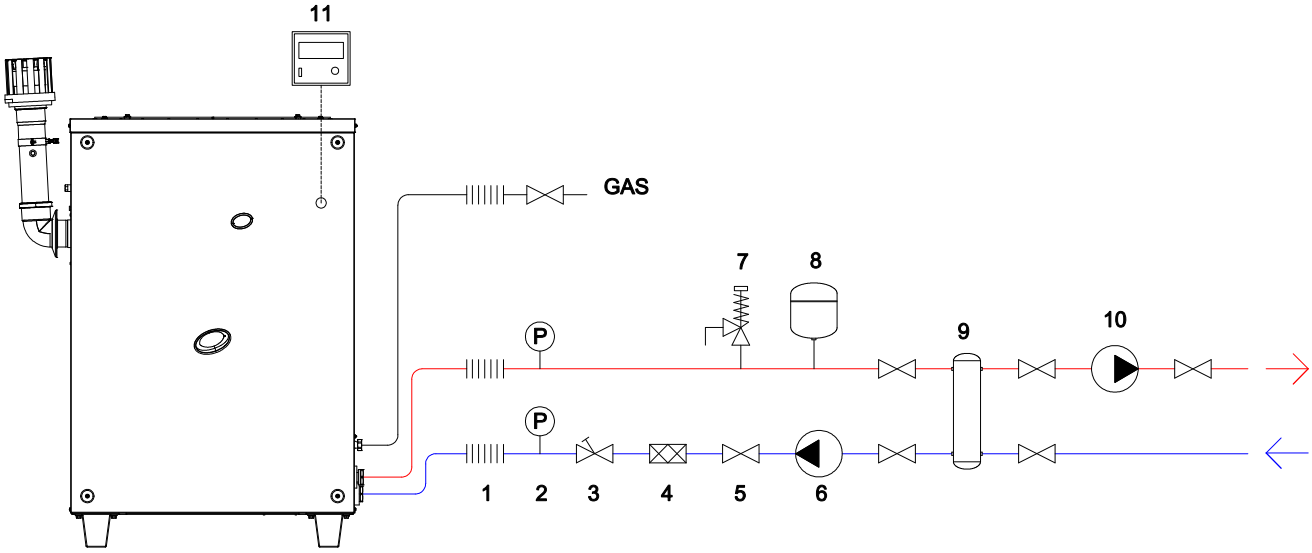
General indications

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.

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 (shutter or balancing) at the water inlet pipe.
- 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.
- 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.

Figure 4.1 – Hydraulic plan



LEGEND			
1	Fexible joint	6	Water pump (primary circuit)
2	Pressure gage	7	Safety valve 3 bar
3	Flow regulator valve	8	Expansion tank
4	Water filter	9	Hydraulic separator / inertial tank with 4 connections
5	Isolation valve	10	Water pump (secondary circuit)
		11	Controller

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.

- WATER CIRCULATION PUMP installed on the inlet pipe, flowing towards the appliance.
- FILLING SYSTEM: if automatic filling systems are used, a seasonal check of the percentage of monoethylene glycol in the plant is recommended.

4.3 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 2.4 Network gas pressure → 12.

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 pression from 1,5 bar to the value corresponding with the gas network pressure of the country of installation (see Table 2.4 Network gas pressure → 12).

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.

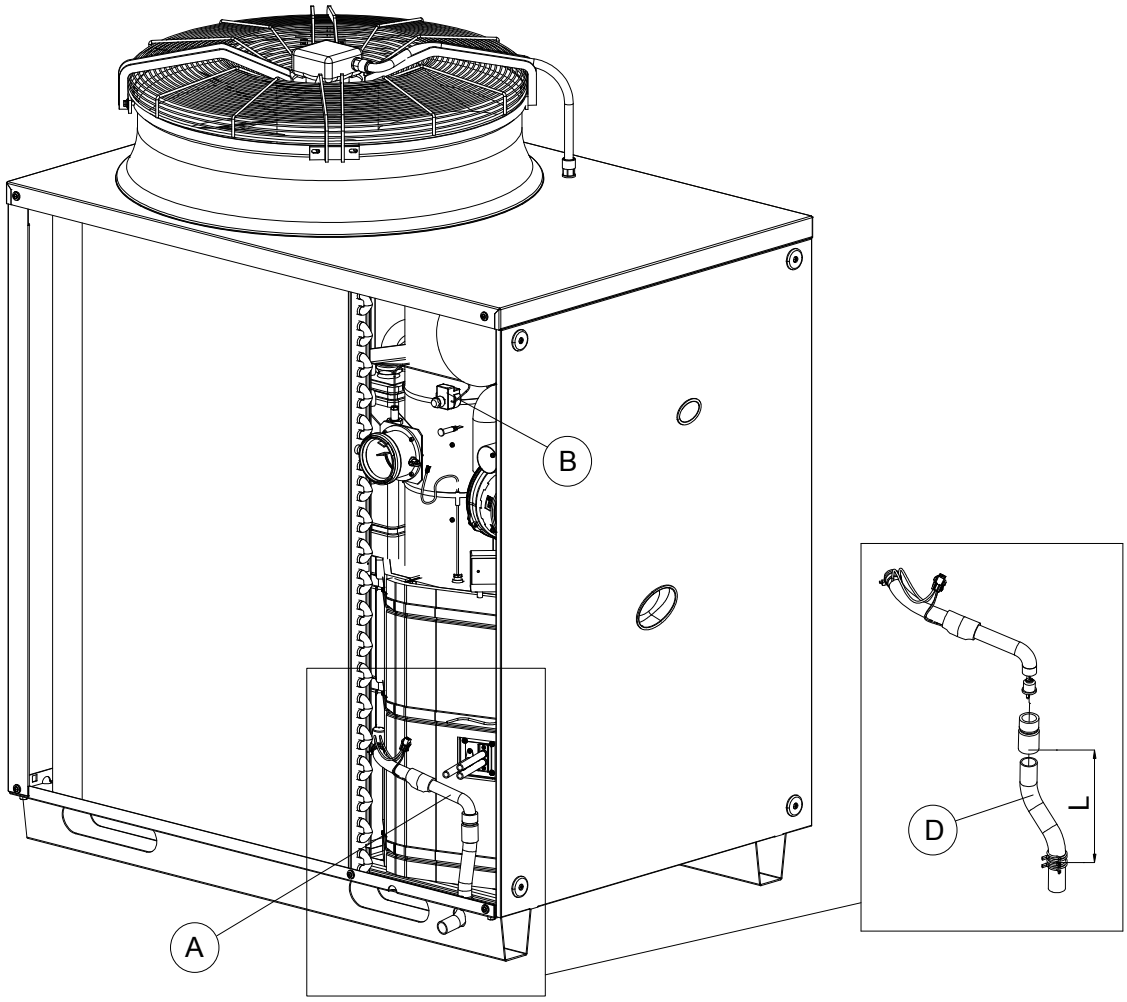
4.4 CONDENSATE DISCHARGE

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

The distance L between the coupling 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 4.2 – 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 2.1 GAHP-A LT technical data → 9 or Table 2.2 GAHP-A HT technical data → 10);
- 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.

4.5 WATER QUALITY

As other hydronic appliances, Remeha heating 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 4.1 Chemical and physical parameters of water → 26 must be complied with.

Table 4.1 – 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
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 Remeha units. Therefore, please make sure that free chlorine content and total hardness are compliant with the allowable ranges reported in Table 4.1 Chemical and physical parameters of water → 26.

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 appliances.
Several products for water treatment are available on the market.
Remeha does not perform detailed market surveys, therefore 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.
Manufacturer is not liable for ensuring that water quality is always compliant with what reported in Table 4.1 Chemical and physical parameters of water → 26. Non-compliance with indications above may jeopardize the proper operation, integrity and reliability of Remeha appliances, invalidating the warranty.

Possible use of glycol antifreeze

- 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, DO NOT USE galvanised pipes, as they are potentially subject to corrosion in the presence of glycol.

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 4.2 Technical data for filling the hydraulic circuit → 27 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 4.2 Technical data for filling the hydraulic circuit → 27 should be taken into account for the sizing of the pipes and the circulation pump (for calculation of internal pressure drops of the appliance, refer to the Table 2.1 GAHP-A LT technical data → 9 or Table 2.2 GAHP-A HT technical data → 10).
Nevertheless, it is advisable to consult the technical specifications of the monoethylene glycol used. If automatic loading systems are used, a seasonal check of the quantity of glycol present in the plant is also necessary.

Table 4.2 – 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 ≥ 30% (for ethylene glycol) or ≥ 20% (for propylene glycol):

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

4.6 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:

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 4.2 Technical data for filling the hydraulic circuit → 27).
3. Check the filter on the return pipe for impurities; clean it if necessary.

4.7 EXHAUST FLUE GAS

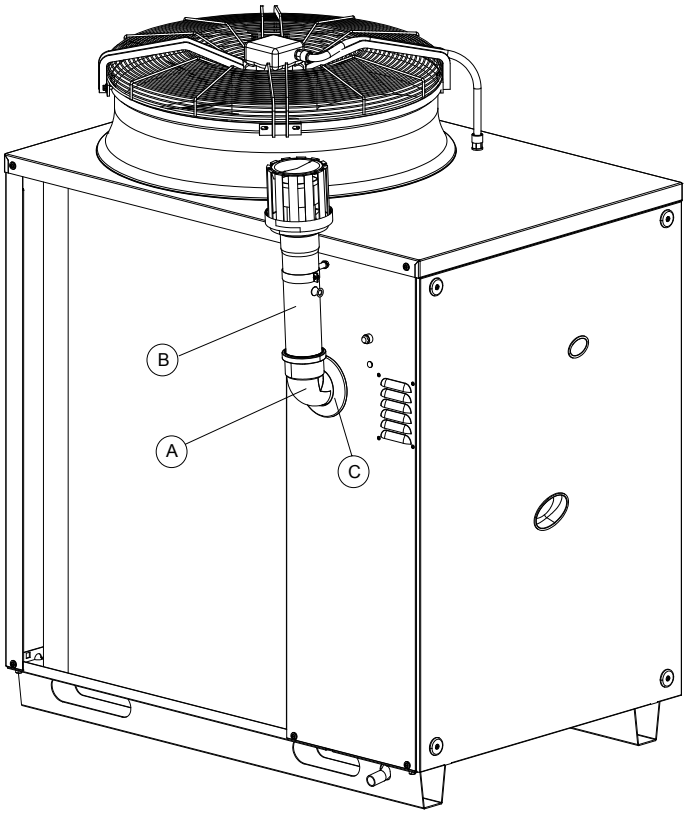
The appliance is homologated for the discharge of the exhaust gases directly outside through a flue pipe.
Each single unit is provided with a connection of Ø 80 mm (equipped with a suitable seal) located on the left side (see Figure 2.1 Dimensions (low noise version) → 13) and outlet in a vertical position.
The appliance is complete with an exhaust duct kit, to be fitted by the installer.
The exhaust duct kit consists of (see Figure 4.3 Fume outlet → 29):

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

For assembling the exhaust kit, proceed as shown here after (please refer to Figure 4.3 Fume outlet → 29):

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 4.3 – Fume outlet



LEGEND

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

5 ELECTRICAL INSTALLATION

Before connecting power supply, the appliance must be placed in its final position.

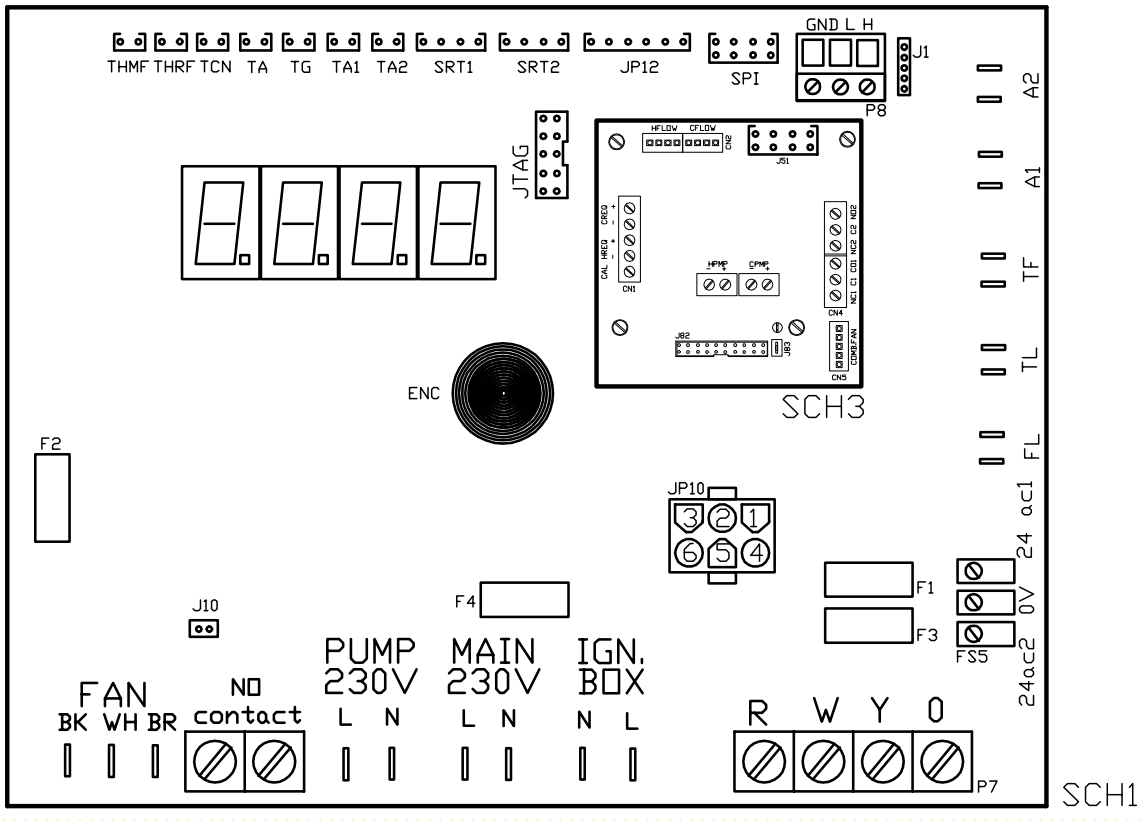
Before making electrical connections, make sure not to work on live elements.

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.

Primary circulation pump must always be piloted by the electronic board S61, either directly (through "N.O. contact" terminals or 0-10V signal) or indirectly (using the above mentioned signals in logic "OR" with external BMS systems). Otherwise, the primary circulation pump must be permanently on.

Figure 5.1 Electronic board S61 → 30 and Table 5.1 Electronic board S61 → 30 provide details of input and ouput of the S61 electronic board. The auxiliary electronic card Mod10 is shown in detail in Figure 5.2 Mod10 controller → 31.

Figure 5.1 – Electronic board S61



LEGEND
See table below

SCH S61

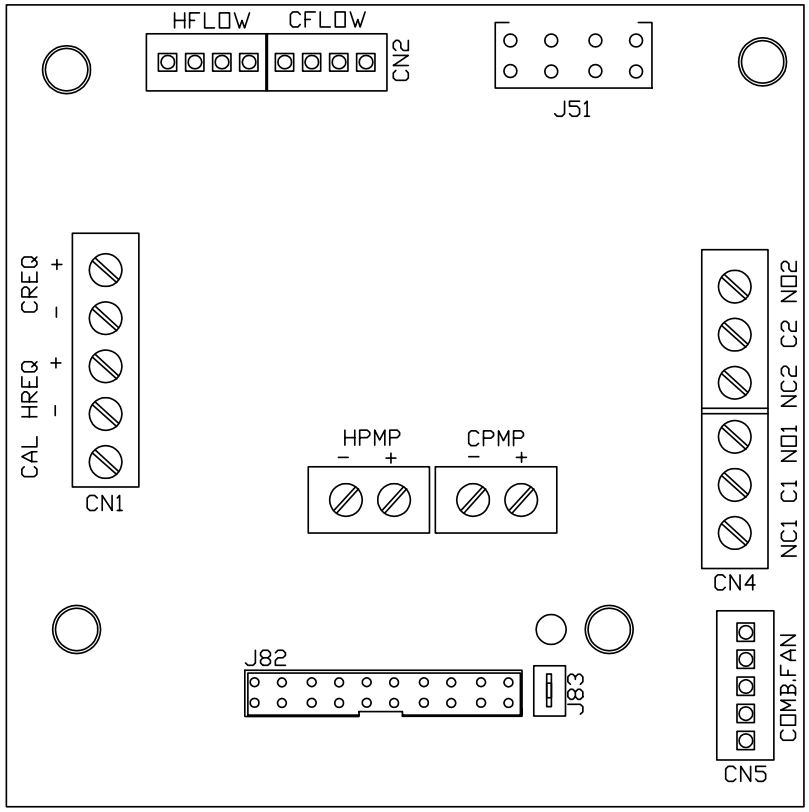
Table 5.1 – Electronic board S61

CODE	DESCRIPTION
SCH1	Electronic board S61
SCH3	Mod10 electronic controller (see figure for further details)
A1, A2	Auxiliary inputs
ENC	Knob
F1	Fuse T 2A

CODE	DESCRIPTION
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
TG	Generator temperature probe input
THMF	Hot water delivery temperature probe input
THRF	Hot water return temperature probe input
TL	Generator limit thermostat input

SCH S61

Figure 5.2 – Mod10 controller



LEGEND

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

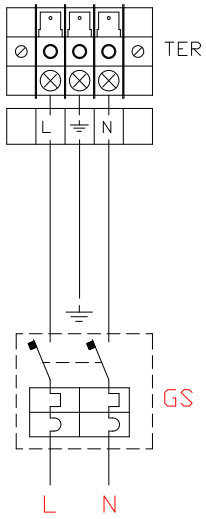
Mod10 controller

5.1 ELECTRICAL POWER SUPPLY

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 5.3 Electrical wiring diagram → 32) 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.

Figure 5.3 – Electrical wiring diagram



LEGEND

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

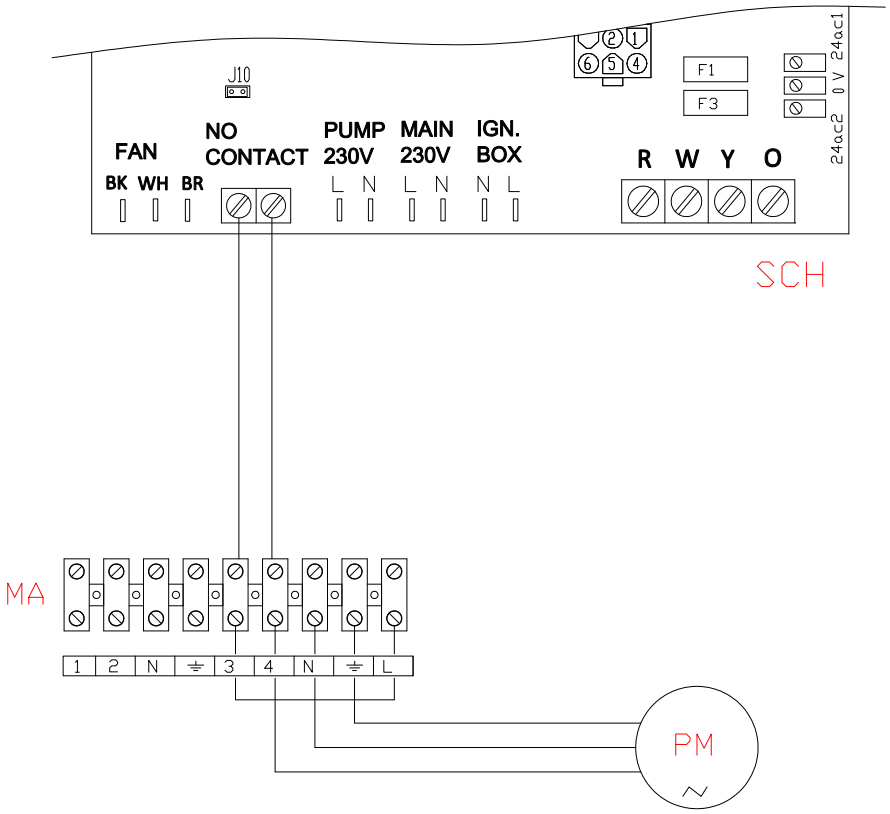
Example of connection of appliance to 230 V 1 N - 50 Hz electricity supply

5.2 WIRING OF AN ON/OFF 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 5.4 Electrical wiring diagram → 33 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 5.5 Electrical wiring diagram → 33 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 5.4 – Electrical wiring diagram

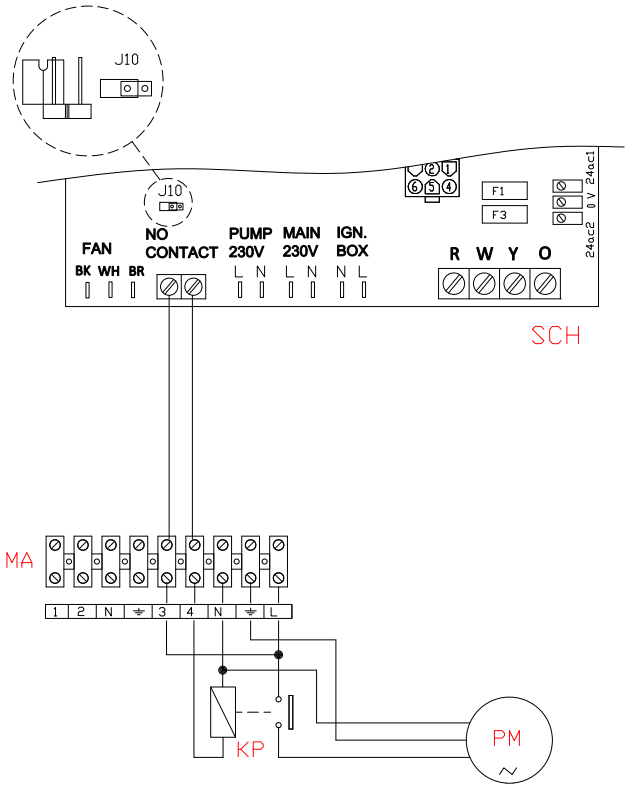


LEGEND

SCH	circuit board
J10	closed jumper
N.O. CONTACT	N.O voltage free contacts
MA	unit terminal block
L	phase
N	neutral
Components NOT SUPPLIED	
PM	water pump <700W

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

Figure 5.5 – Electrical wiring diagram



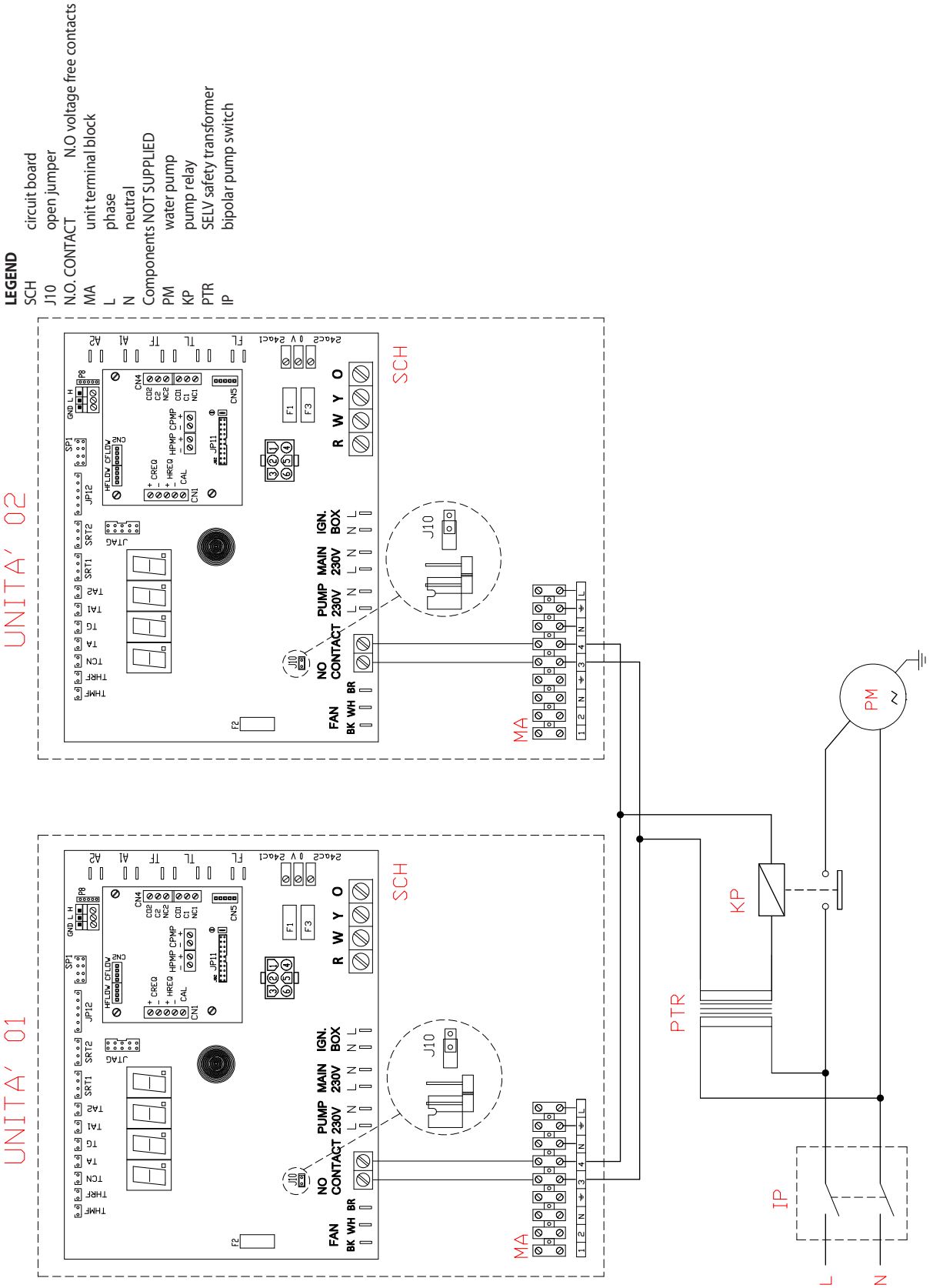
LEGEND

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 5.6 Electrical wiring diagram → 35.

Figure 5.6 – 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

5.3 WIRING OF A MODULATING PUMP

In order to further optimize the operation of the appliance it is possible to use for the primary circuit a modulating pump WILO STRATOS PARA (check Section ACCESSORIES → 66) for which the dedicated electronic card Mod10 has been developed.

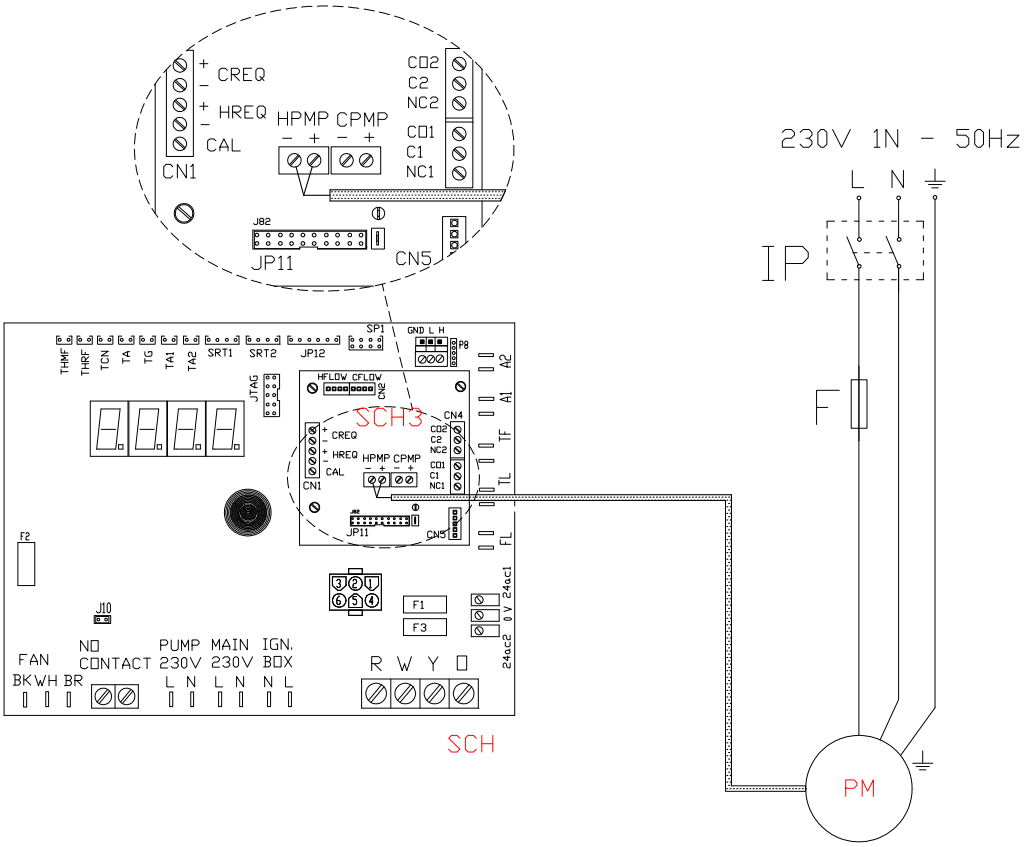
No other modulating pumps are supported.

The instructions for connecting the WILO STRATOS PARA pumps are given below (see Section ACCESSORIES → 66).
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 mm^2 0-10V signal cable and a FG7 3Gx2.5mm^2 power cord.

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 5.7 Wiring diagram for connection of Wilo variable rate pumps → 37).
4. Connect the pump to the mains with an upstream external bipolar switch (see detail IP, Figure 5.7 Wiring diagram for connection of Wilo variable rate pumps → 37) with a delayed action 2 A fuse, or connect it to the terminal clamps inside the units electrical enclosure (see detail MA, Figure 5.8 Wiring diagram for hooking up the Wilo variable rate pump powered by the unit → 38).
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 5.7 – Wiring diagram for connection of Wilo variable rate pumps



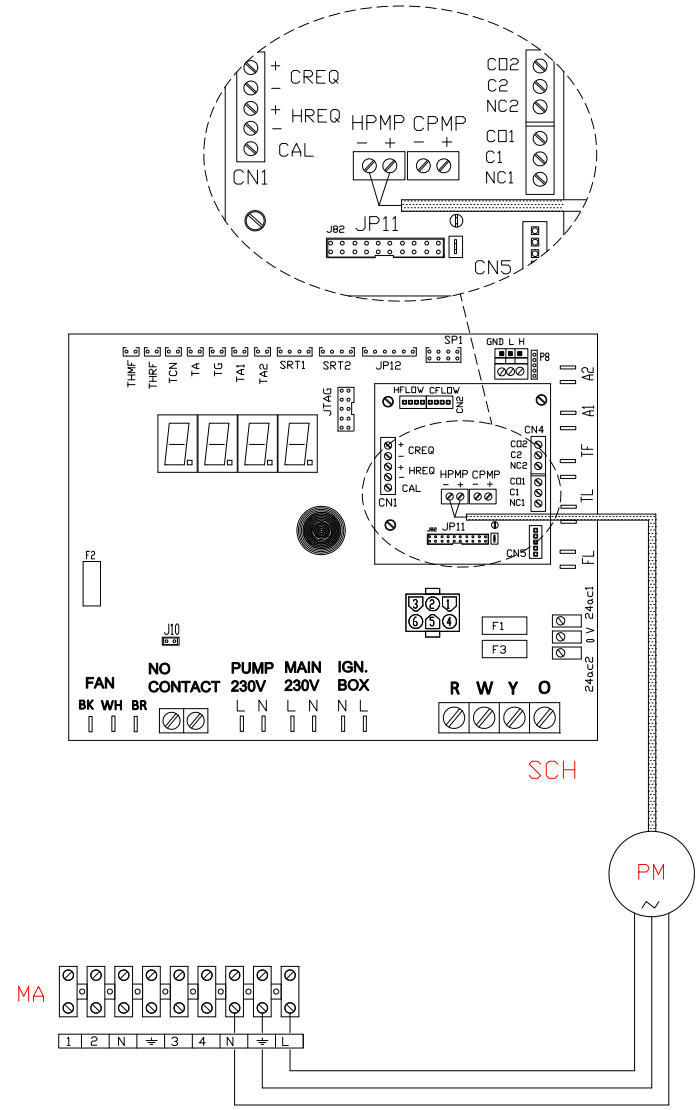
LEGEND

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



LEGEND

PM	Hot water circulation pump (primary circuit)
MA	Unit terminal block

Pump signal 0-10V wire colours
brown connect to -ve
white connect to +ve
black isolate
blue isolate

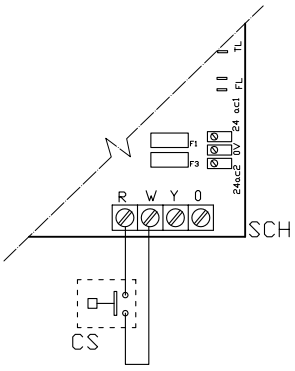
Wiring diagram for hooking up the Wilo variable rate pump powered by the unit

5.4 ON/OFF PERMISSIVE

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 5.9 Electrical wiring diagram → 39 (detail "CS").

NEVER use the main general switch (GS) to switch the appliance on or off.

Figure 5.9 – 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

5.5 CAN BUS CABLE CONNECTION

This paragraph describes how to connect one or more appliances to a controller through the CAN BUS cable. In particular the following items are explained:

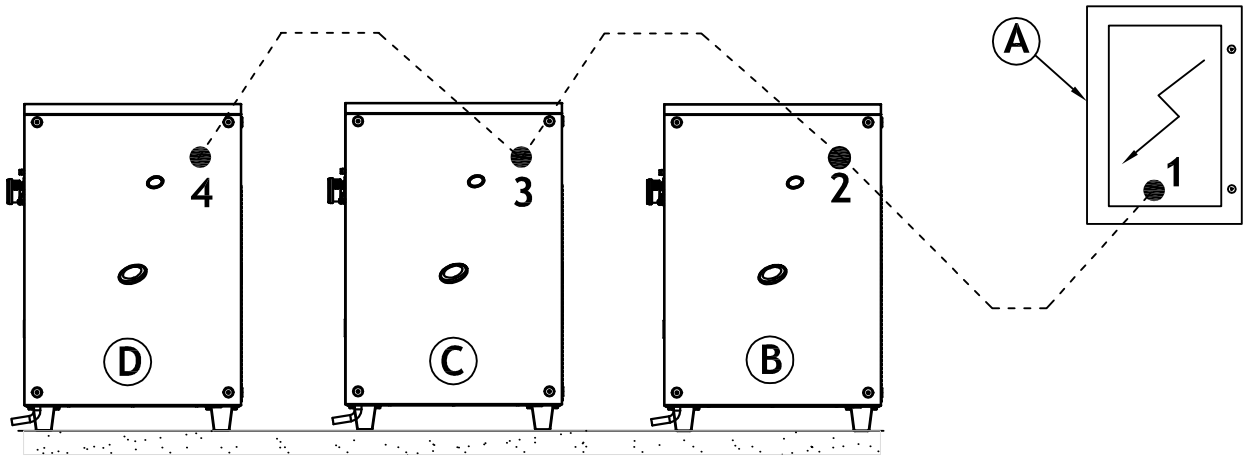
1. What is the CAN BUS cable.
2. How to connect the CAN BUS cable to the appliance's electronic board

CAN BUS serial connection is composed by a set of elements (appliances or controllers) called nodes, connected through a 3-cores cable. Nodes can be quilified as terminal nodes or as intermediate nodes.

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

Schematics of Figure 5.10 Example of CAN BUS → 39 is an exemple of CAN BUS net: 3 appliances are connected each other and to one controller. Appliance D and the controller A are terminal nodes, while appliances B and C are intermediate nodes.

Figure 5.10 – Example of CAN BUS



LEGEND		B-C-D	Appliance	2-3	Intermediate nodes
A	Controller	1-4	Terminal 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 5.2 – CAN BUS cables type

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

Example types of cables used to connect the CAN network.

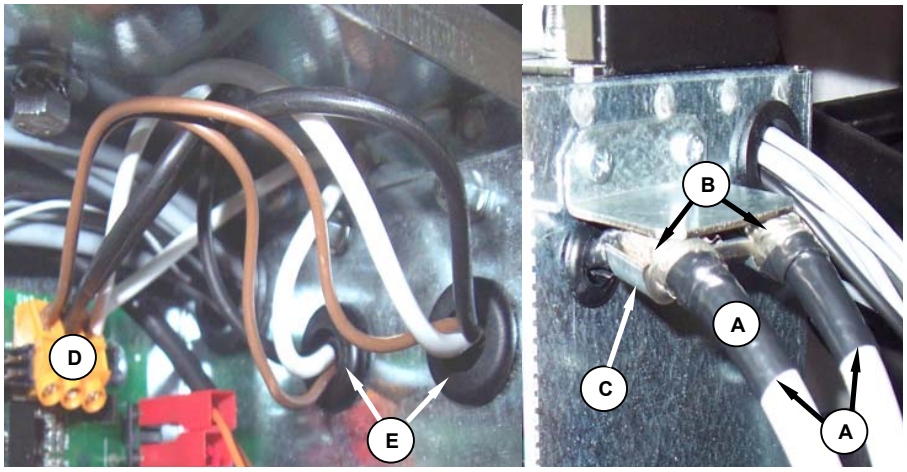
For total distances lower than 200 m and networks with a maximum of 4 nodes (example: up to 3 GAHP + 1 controller) a simple shielded cable 3x0.75 mm may be used.

As shown in Table 5.2 CAN BUS cables type → 40, the CAN connection requires a CAN bus cable with 3 wires. If the available cable has more than 3 coloured wires, use the wires with the colours indicated in 5.2 CAN BUS cables type → 40 and cut the remaining ones.

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 5.11 CAN BUS cable connection → 40).

Figure 5.11 – 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

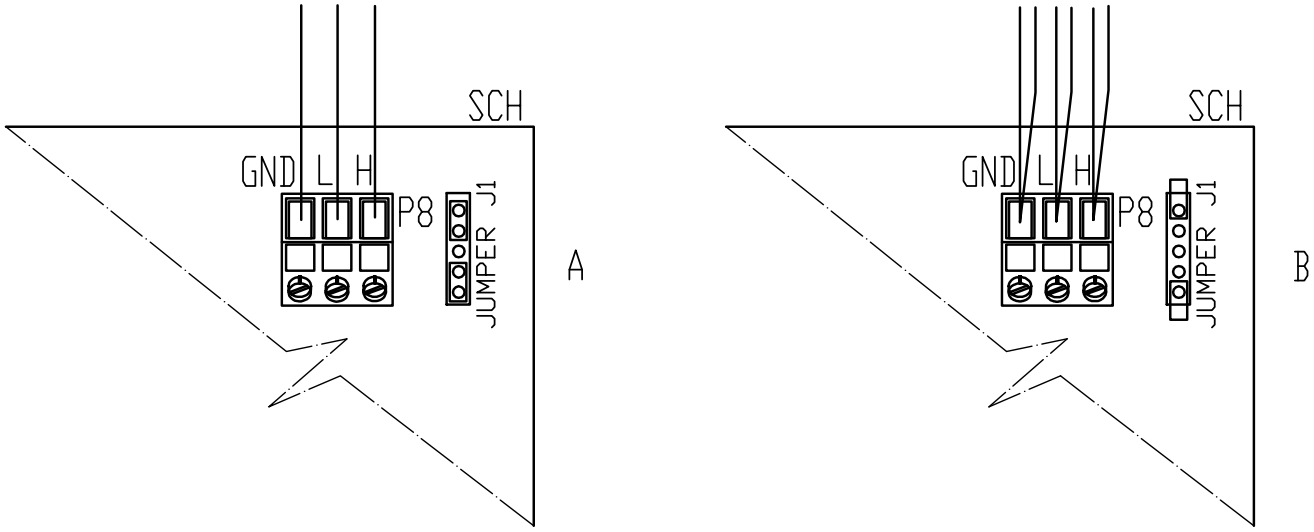
Before working on the electrical panel of the appliance, make sure that power supply is off.

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 5.11 CAN BUS cable connection → 40), 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 5.11 CAN BUS cable connection → 40).
5. If the appliance is a **terminal node** of the network connect the three coloured wires to the orange connector as shown in detail "A" of Figure 5.12 Electrical wiring diagram → 41. Respect the correct indications L, H, GND provided in Table 5.2 CAN BUS cables type → 40, 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 5.12 Electrical wiring diagram → 41.
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 5.12 Electrical wiring diagram → 41:
- If the appliance is an **intermediate node** on the network (i.e. 6 wires are inserted in the orange connector on the board); set the jumpers as shown in detail "B" of Figure 5.12 Electrical wiring diagram → 41:

Figure 5.12 – Electrical wiring diagram

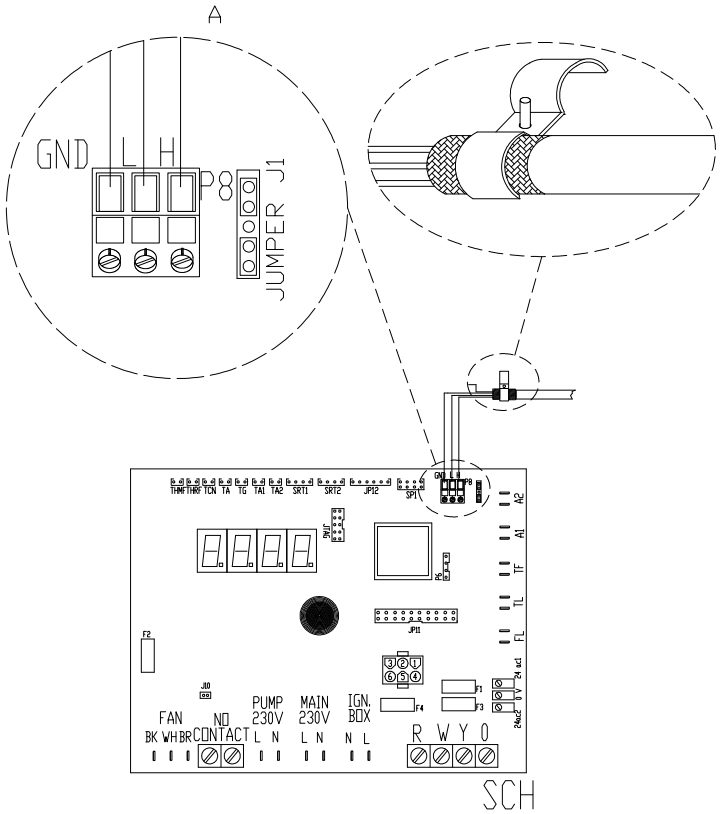


LEGEND					
SCH	electronic board	H	Data signal HIGH	B	Detail case "intermediate node" (6 wires; J1=jumper "open")
GND	Common data	J1	Jumper CAN-BUS in board		
L	Data signal LOW	A	Detail case "terminal node" (3 wires; J1=jumper "closed")	P8	Port can/connector

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

8. After finished with all the above operations, close the electrical panel and refit the front panel of the appliance.

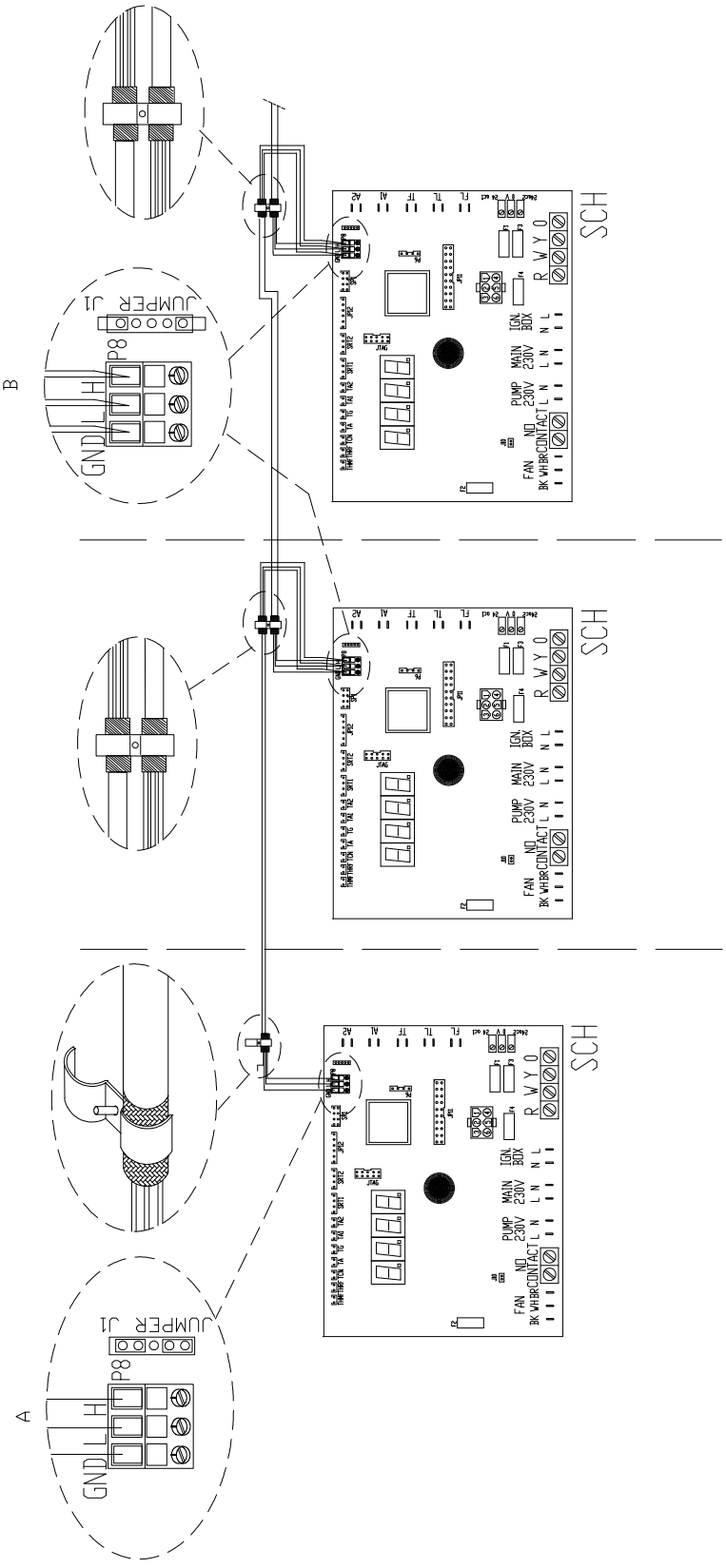
Figure 5.13



LEGEND

SCH	S61 controller

Figure 5.14



LEGEND

SCH S61 controller

5.6 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

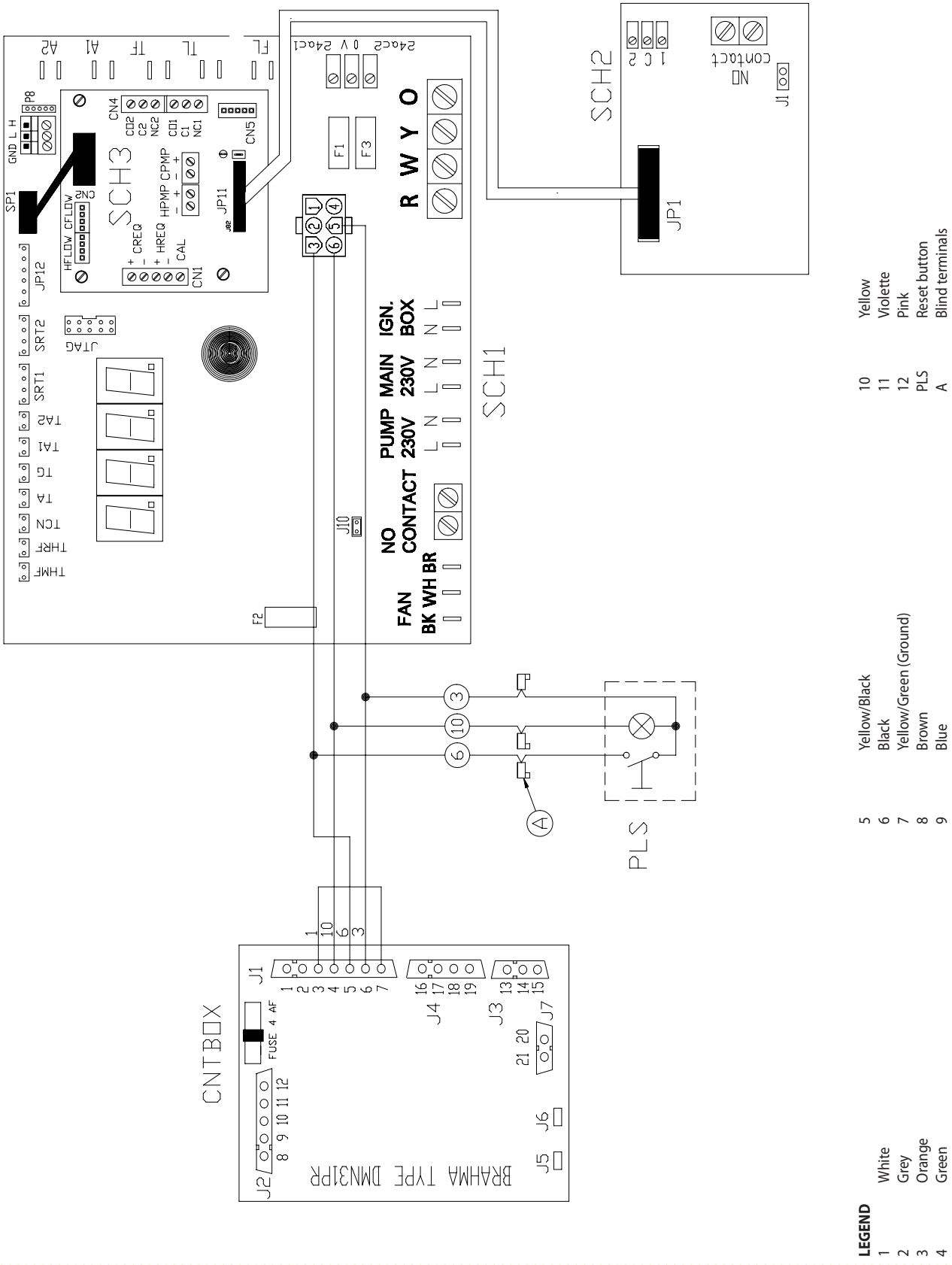
1. The cable required to connect the reset button must be 3x0.75mm^2.
2. Cut a suitable length of cable.
3. Connect the cable to the blind terminals A (see Figure 5.15 Button connection for flame controller reset → 45).

The blind terminals are hidden on the rightinside 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 5.15 – Button connection for flame controller reset



6 COMMISSIONING AND FIRST START UP

Before proceeding with the operations described in this section, the installer is invited to read Paragraph 2.1 Conformity to CE standards → 8. Please refer to Paragraph 7.1 SWITCHING ON AND OFF → 52 for switching the appliance on and off.

6.1 PROCEDURE FOR FIRST START UP

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

Warranty could be invalidated if the *first start up* is not carried out and validated by Technical Assistance**.**

Before leaving the factory, the appliance has been thoroughly tested.

Preliminary checks of the installation compliance

The Technical Assistance 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 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 3.2 Clearances → 20.
- 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.
If all the conditions listed above are in place, the Technical Assistance can proceed with the commissioning and start up of the appliance.
If any non-compliant elements arise during the initial verification, the Technical Assistance may choose not to proceed with the operation of "initial activation".
In this case, the Technical Assistance 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 Technical Assistance. After such corrective measures have been completed, the Technical Assistance will assess the plant again. At this point, if safety and compliance conditions are judged satisfactory, the Technical Assistance 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 Technical Assistance 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;
- appliance started and stopped by power supply switch and not by controller or by permissive;
- damages or failures of the appliance due to transportation or installation;
- smell of gas due to possible leakages;
- all situations with non-compliances considered potentially dangerous.

Plant anomalies. If any of the following situations exists, the Technical Assistance 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.

First start-up procedure

1. Check that power supply voltage is correct.
2. Check that water flow rate is correct.
3. Check that water pressure with the appliance at rest is 2 bar.
4. Purge air. To facilitate air purging operations, the appliance is equipped with a manual air vent.
5. Let the circulation pump run for at least 30 minutes. Check again water filter cleanliness and clean if necessary.
6. Check again water pressure.

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 6.2 Gas changeover → 51).

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:

- set the menu 4 parameters (see Table 6.1 Menu 4 → 48)
- check the dynamic gas mains pressure
- check and adjust the appliance's combustion parameters

Table 6.1 – Menu 4

PARAMETER	DESCRIPTION	SETTING	VALID RANGE	DEFAULT RANGE
4.40	UNIT ID CODE: unequivocally identifies each machine connected in a CAN network; it is to be set with a different value on every nit, regardless of the type of unit and the systems on which it works.	The value to be set for this parameter is the numeric code assigned to the current machine.	0 to 478	For single unit = 0 For Link= from 0 to 4
4.150	SYSTEM CODE – HOT MODULE: unequivocally identifies the system on which the unit (hot module) works, if present.	The value to be set for this parameter is the numeric code assigned to the system on which the hot module of this unit works, if present.	0 to 15	0
4.160	Controlled water temperature (valid only if the DDC is not connected)	0. return 1. delivery	0; 1	1
4.161	Water setpoint (valid only if the DDC is not connected).	Desired temperature in °C	10 to x; x depending on the version	+40°C
4.162	Differential (valid only if the DDC is not connected).	Desired delta in °C	-20 °C to -1 °C	-2 °C
4.163	Anti-icing functionalities	0. not active 1. active	0; 1	1
4.174	Circulation pump modulation in heating mode	0. not active 1. active	0; 1	1
4.182	Glycol in the primary circuit	0. glycol below 30% for ethylenic or below 20% for propylenic 1. glycol above 30% for ethylenic or above 20% for propylenic	0; 1	0
4.183	Circulation pump modulation in DHW mode	0. not active 1. active	0; 1	1
4.191	Threshold for anti-icing activation	Desired temperature in °C	+4°C to +15 °C	+4°C

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

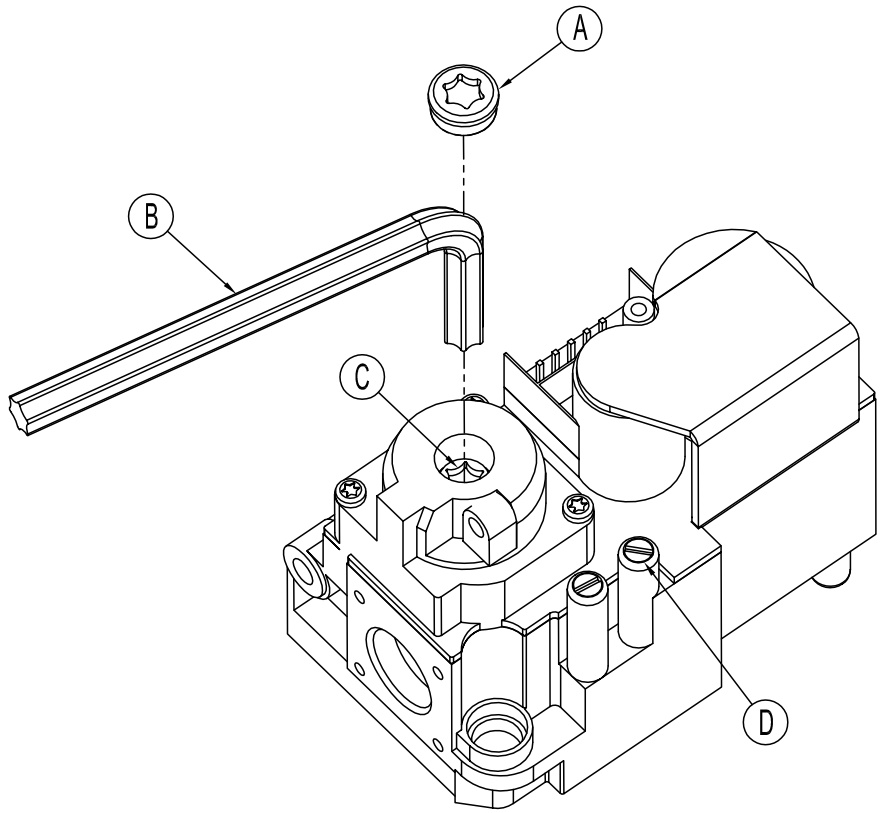
Check the dynamic gas mains pressure

1. Connect the manometer to the gas intake (see detail D, Figure 6.1 Gas valve → 49).
2. Open the gas valve and check that the grid static pressure complies to the value reported in Table 2.4 Network gas pressure → 12 (with a tolerance of ±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 2.4 Network gas pressure → 12 (with a tolerance of ±15%).

Figure 6.1 – 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 2.4 Network gas pressure → 12 (with a tolerance of ±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 4.3 Fume outlet → 29).
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 CO_2 read on the flue gas analyser coincides with the value given in Table 6.2 Gas nozzles and content of CO2 → 51 at the "Content of CO_2 with/MAX modulation" line with +0.2 -0.4 tolerance.
   Example (G20 gas): the nominal content of CO_2 is equal to 9.1%, values in the range between 8.7-9.3% 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 6.2 Gas nozzles and content of CO2 → 51 at the "Delta CO_2 between MAX and MIN potentiality" line with tolerance of +0.3-0.0.

Example (G20 gas): if at point 4 a content of CO_2 equal to 9.2% was detected, at point 6 there must be a value of (9.2%-0.4) with tolerance of +0.3 -0.0 on the delta value, i.e. a value in the range of 8.8-8.5%.

7. If this is not the case, remove cap A from the gas valve (see Figure 6.1 Gas valve → 49) and use a Torx TX40 wrench to act on screw C in Figure 6.1 Gas valve → 49. Turn clockwise to increase the percentage of CO_2 and anti-clockwise to decrease the percentage of CO_2.

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

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 CO_2 corresponds to the value read in Table 6.2 Gas nozzles and content of CO2 → 51 at the "Content of CO_2 with/Max modulation" line with tolerance of +0.2 -0.4.

If you cannot calibrate the CO_2 percentage after the second attempt, DO NOT activate the appliance; contact technical service.

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 6.1 Gas valve → 49.
14. Reinstall the front panel.

6.2 CHANGE OF GAS TYPE

This operation must be carried out exclusively by an authorised technician.

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 6.2 Gas changeover → 51):

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

1. Disconnect the gas pipe from the gas valve.
2. Undo the 4 bolts E shown in Figure 6.2 Gas changeover → 51 and remove the gas valve/blower assembly from the burner.
3. Protect the burner from bolts and nuts falling into it.
4. Using a CH 4 hex key, undo the 4 bolts G indicated in Figure 6.2 Gas changeover → 51 and remove the nozzle D from the gas valve.

5. Replace the nozzle and o-ring C (see Figure 6.2 Gas changeover → 51) with those of the diameter suited to the new type of gas (see Table 6.2 Gas nozzles and content of CO2 → 51). The nozzle code is stamped on the nozzle itself.
6. Check that the o-ring B is fitted.
7. Reassemble the gas valve to the blower with the 4 bolts G taking care that the red silicon hose between the venturi tube and the gas valve (see detail F of Figure 6.2 Gas changeover → 51) 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:

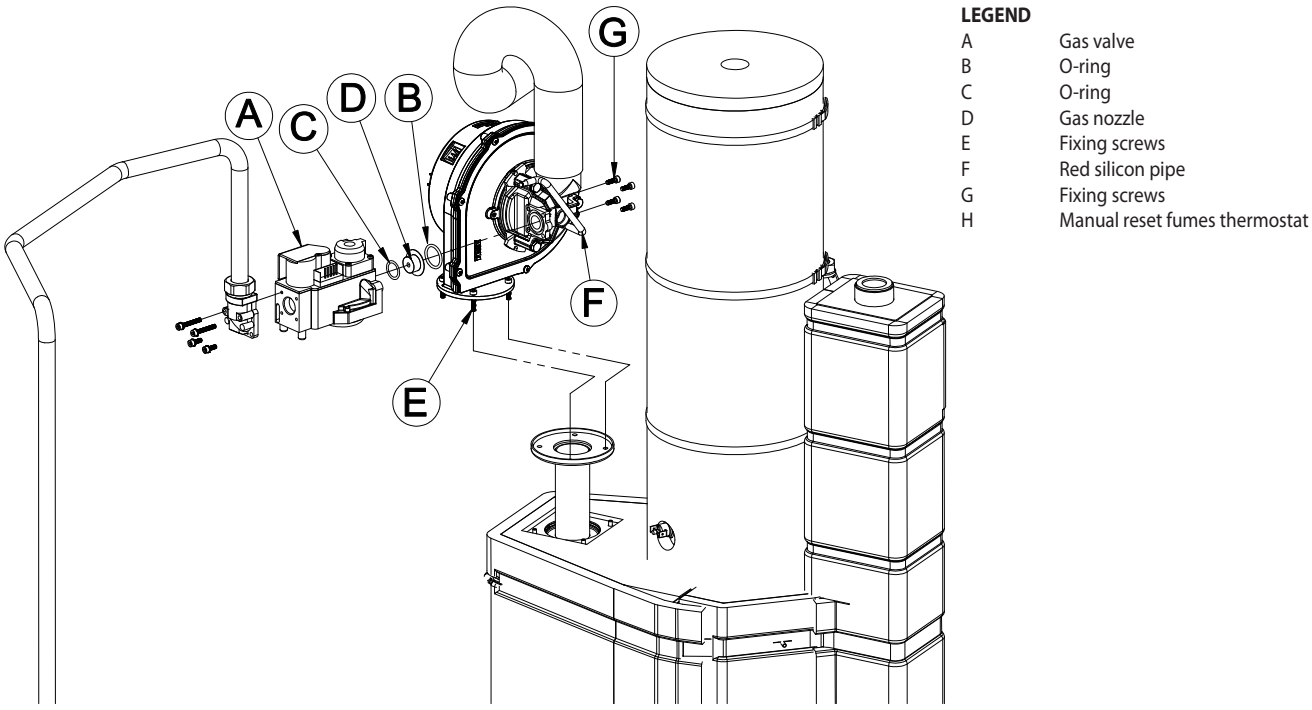
- Connect a manometer to the gas intake D (Figure 6.1 Gas valve → 49).
- Open the gas valve.
- Close the gas cock and check that the mains pressure has not dropped.

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 6.2 – Gas nozzles and content of CO2

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

Figure 6.2 – Gas changeover



Gas changeover

7 NORMAL OPERATION

7.1 SWITCHING ON AND OFF

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;
- 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.

STAND ALONE 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.

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.

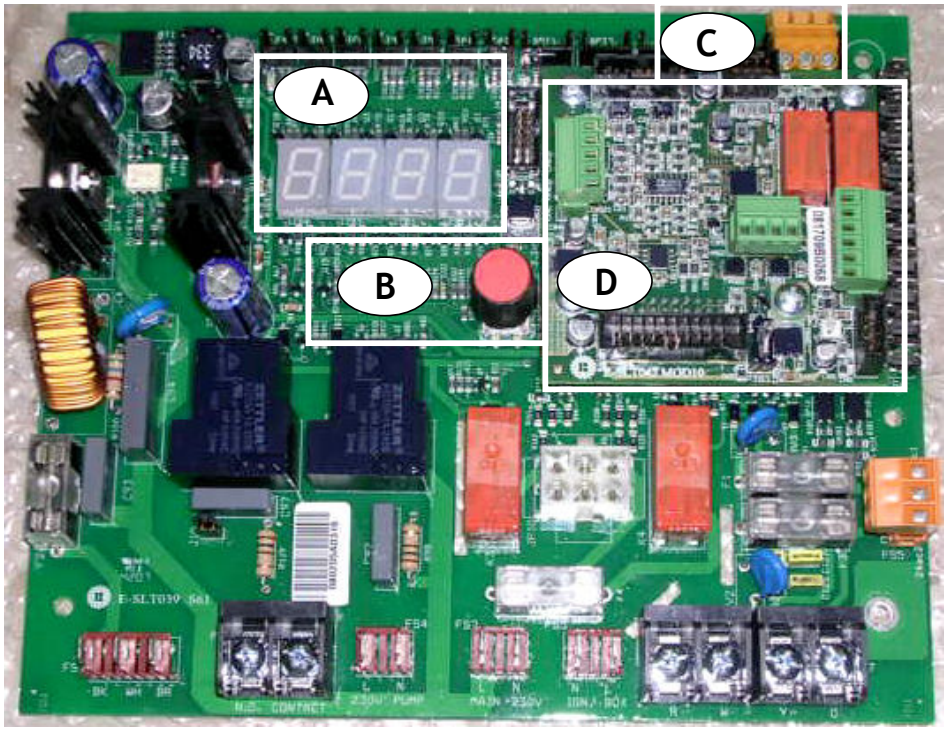
The on/off command is essential! Do not switch the appliance on or off by connecting it to or disconnecting it from the power supply directly, as this may be a source of danger and in any case damage the appliance or the plants connected to it.

7.2 ON-BOARD ELECTRONICS

The following descriptions refer to the S61 controller with firmware version 3.023.

The controller (see Figure 5.1 Electronic board S61 → 30) 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 appliance is fitted with an S61 microprocessor controller with Mod10 modulation controller mounted above it (see Figure 7.1 On-board controller → 53).
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 7.1 On-board controller → 53.
The Mod10 controller (see detail D in Figure 7.1 On-board controller → 53) is used for combustion modulation and variable rate pump control.

Figure 7.1 – 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 7.1 – 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 IMPUTS	7.
Menu 8	(MENU NOT USED)	8.
E	EXIT MENU	E.

Menu list of electronic board

Menus 0, 1 and 7 are Viewing Menus: they only allow the information displayed to be read, and not modified. 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 Technical Assistance.

To view the information contained in these menus, proceed as illustrated in the paragraph "How to acces the menus".
Menu 2 is an execution menu: it 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 7.5 RESET OPERATIONS → 57.
Menu 3 is a settings menu: it allows the values displayed to be set. The correct values of these parameters, for optimum performance of the appliance with the plant to be used

connected, have already been set during installation. In any case, to set new values for the parameters, see Paragraph Programming of hydraulic parameters.
Menus 4, 5, 6 and 7 exclusively concern the installation technician and authorized Technical Assistance.
Menu 8 may currently be selected, but not used.

Display and knob

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 7.2 Operating information → 54).

Table 7.2 – 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 1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 64.
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 7.1 Menu of electronic board → 53).
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 7.5 RESET OPERATIONS → 57. To set the parameters of menu 3, refer to Paragraph Programming of hydraulic parameters. 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 Technical Assistance.

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.

7.3 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 7.2 ON-BOARD ELECTRONICS → 52.

At first start-up the appliance is configured by the installer with the best setting. Changing configuration is possible but not recommended unless having specific knowledge and experience. Anyhow, in order to configure different settings for the appliance, check paragraph"Programmazione parametri idraulici".

PROGRAMMING OF HYDRAULIC PARAMETERS

If the appliance is connected to a controller, follow the instructions given in the controller's 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 7.2 ON-BOARD ELECTRONICS → 52.
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 7.3 – Menu 3 parameters

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

Description of parameters:

- 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 1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 64.

7.4 DISPLAYING AND RESETTING OPERATING CODES

Operating codes can be generated:

- by the S61 on-board controller;
- by a controller (if present).

The operating codes generated by the S61 controller are displayed on its screen and can also be viewed on the controller's screen (if present).
Operating codes generated by the controller can be cleared through the board itself or from the controller (if present).

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 1 TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.023) → 64.

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 1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 64) 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 1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING → 64). 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 7.5 RESET OPERATIONS → 57.
After it is reset, the appliance will make a new attempt to activate.
If the appliance locks out several times, contact Technical Assistance.
When activation is successful, the appliance is managed by the on-board controller (see following paragraph).

7.5 RESET OPERATIONS

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.

Reset appliance controller

The Table 7.4 Menu 2 → 58 shows the actions available in menu 2.

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

Table 7.4 – 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 Technical Assistance (for other information refer to Paragraph 6.1 PROCEDURE FOR FIRST START UP → 46).

RESET FLAME CONTROLLER

Reset flame controller arrest; this may be used when the appliance is first activated, see Paragraph 7.1 SWITCHING ON AND OFF → 52, when the appliance is in a permanent locked condition or after a long period of disuse (see Paragraph 7.7 PROLONGED PERIODS OF DISUSE → 59).

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

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.

7.6 MANUAL DI DEFROSTING

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.

7.7 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 and wait for the shutdown cycle to terminate completely (approximately 7 minutes).

2. Disconnect the appliance from the power supply, putting the external disconnection switch in the OFF position (see GS in Figure 5.3 Electrical wiring diagram → 32) 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 4.6 FILLING OF HYDRAULIC CIRCUIT → 28 and Table 4.2 Technical data for filling the hydraulic circuit → 27);
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:

- check if the appliance needs maintenance (please contact Technical Assistance or refer to Section 8 MAINTENANCE → 62);
- check that the water content of the plant is correct; if necessary, top up the circuit to at least the minimum quantity (see Paragraph 4.6 FILLING OF HYDRAULIC CIRCUIT → 28);
- if necessary add, to the water of the system (free of impurities), inhibited monoethylene glycol antifreeze in a quantity in proportion to the MINIMUM winter temperature in the area of installation (see Table 4.2 Technical data for filling the hydraulic circuit → 27);
- 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 saesonal 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 Remeha 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 precence of glycol, Remeha advices 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 5.3 Electrical wiring diagram → 32);
3. check that the hydraulic circuit is charged;
4. Check that the condensate discharge is clean;
5. check that exhaust duct is not obstructed;
6. switch on the appliance.

8 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 the Technical Assistance.

Any operation that regards internal components of units of the appliance must be carried out by the Technical Assistance, according to the instructions supplied by the manufacturer.

The "efficiency check" and every other "check and maintenance operation" (see Table 8.1 → 62 and 8.2 → 63), **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 responsable of the system**.

Before any maintenance operation, switch off the appliance through controls 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 MAINTENACE OPERATIONS

In Table 8.1 → 62 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 8.1

GUIDELINES FOR THE PREVENTIVE MAINTENACE OPERATIONS					
Check of the unit	**GAHP-A**	**GAHP-GS/WS**	**AY**	**ACF**	**GAHP-AR**
Visually check of the general condition of the unit and of its air heat exchanger. (1)	√	√	√	√	√
Check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
Check the % value of CO_2	√	√	√		
check gas pressure to the burners				√	√
Check that the condensate discharge is clean [If necessary, frequency of the maintenace 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			√		

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].

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 8.2

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			√		

OPERATING CODES/TROUBLESHOOTING

1 OVERVIEW AND OPERATING CODES/TROUBLESHOOTING

Table 1 – TABLE OF OPERATING CODES generated by the S61 electronic board (firmware version 3.023)

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.
u 405	HIGH AMBIENT TEMPERATURE	HIGH temperature detected by ambient temperature sensor.	Reset occurs automatically when the cause ceases or when the unit is switched off.
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 hot outlet 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, item163; and only with machine off). In this case the antifreeze function activates the plant water circulator. If this temperature falls further to below 3 °C, the function also activates the flame controller.	Resets automatically (defrost function disabled) if, with only the circulator operating, the hot water inlet/outlet temperature rises above 5°C (at which point the circulator switches off); or, if also the flame controller is on, when the temperature reaches 18 °C (in this case the flame controller and then the circulator switch off).
u 480	INCOMPLETE PARAMETERS	Incomplete parameters.	The code remains until operating parameters are entered and completed. Contact authorised 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 24 V AC FUSES	Damage to one of the 2 24-0-24 V AC transformer fuses, or one of 24-0-24 V AC wires to the board not supplying current.	Check fuses and 24-0-24 V AC electrical power connections on the controller. Reset may be performed from the 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.

ACCESSORIES

This section contains a list of the accessories that are available for the installation and use of the appliance.

Table 1 – Accessories

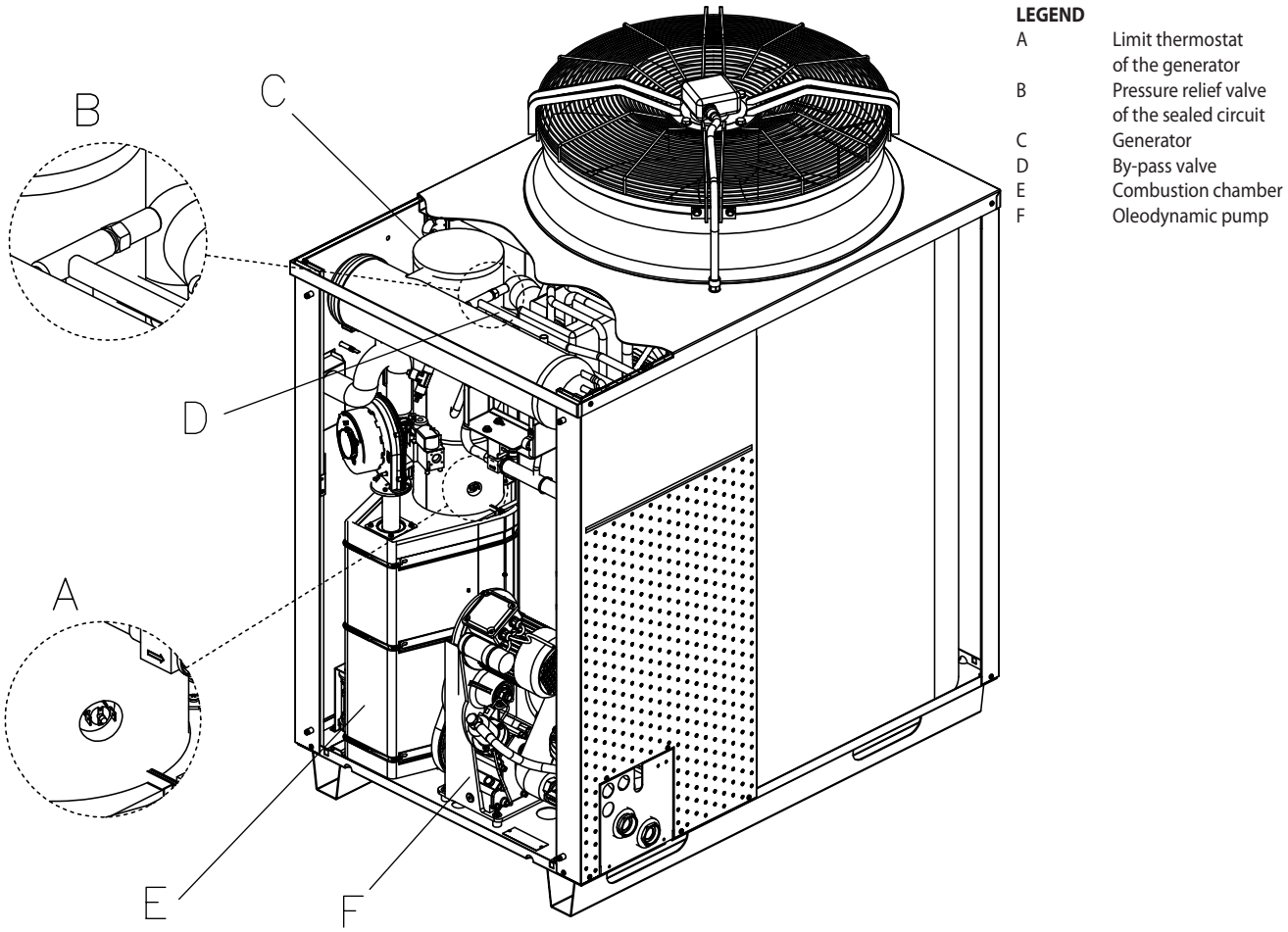
ACCESSORIES			
Name	**Description**	**Code**	**Notes**
CIRCULATION PUMPS	Wilo-Stratos Para 25-11.	O-PMP004	Variable rate pump for cold and hot water.
	Pompa Wilo-Stratos Para 30-12	O-PMP008	Max variable flow pump.
FILTERS	Sludge filter 1" 1/4	O-FLT014	
	Sludge filter 1" 1/2	O-FLT015	
	Air separator filter 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	
	Thermal tank, three fittings, 1000 l	O-SRB003	
VALVES	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 trasformer	O-TRS005	

APPENDIX

1 SAFETY DEVICES PRESCRIBED BY THE PED

The PED (Pressure Equipment Device) prescribes that the unit is supplied with a hermetic circuit safety valve (pos. B in the Figure 1 Main safety devices of the unit → 67).

Figure 1 – Main safety devices of the unit



Internal view of the unit

Table 1 – Safety valve

	TYPE	SETTING	MODEL	Part number
SEALED CIRCUIT SAFETY VALVE	Valve and actuator	507.6 PSIG (35 bar relativi) a 110°C ± 3 %	SAMI INSTRUMENTS code VDS 2000 or similar*	J-VLV023A
* The manufacturer guarantees the functioning and the safety of the unit only if it is equipped with original spare parts				

Sealed circuit safety valve characteristics

INSPECTION PROCEDURE

Before starting the inspection of the safety valve, the unit must be switched-off. Remove the electric and gas power supplies and operate on each unit of the appliance as follows:

Have: the appliance off (external master switch in OFF position) and without electric and gas power supply:

1. remove the front and upper panel of the unit;
2. identify the valve, which lies behind the levelling chamber;

3. inspect the component (if the valve must be replaced, refer to Paragraph 3 SAFETY VALVE REPLACEMENT OPERATIONS → 69);
4. re-mount the front and upper panel of the unit.

2 ADDITIONAL SAFETY DEVICES

The following additional safety devices are installed on the appliance:

- Generator limit thermostat (see pos. A in the Figure 1 Main safety devices of the unit → 67).
- By-pass valve (see pos. B in the Figure 1 Main safety devices of the unit → 67).

The main features of the two devices are given in Table 2 Caratteristiche dei due dispositivi supplementari → 68.

Table 2 – Caratteristiche dei due dispositivi supplementari

	TYPE	SETTING	MODEL	Part number
THERMOSTAT LIMIT OF GENERATOR	Thermostat, with bimetal disk inside, of manual reset type ed quick opening of the contact. N.C. contact type (normally closed)	180° C ± 7° C	CAMPINI COREL code 60R180H02/04154 or similar*	J-TLT015
BY-PASS VALVE	Valve and actuator	25,5 +0/-2 bar	ROBUR S.p.A. code H-VLV105	---
* The manufacturer guarantees the functioning and the safety of the unit only if it is equipped with original spare parts				

In the case of replacement, the use of original spare parts is recommended (see codes in Table 2 Caratteristiche dei due dispositivi supplementari → 68). The manufacturer is exempt from any contractual or extra-contractual responsibility for damage caused by the use of non-original spare parts.

INSPECTION PROCEDURE

Before starting the inspection of the generator limit thermostat, the unit must be switched-off. Remove the electric and gas power supplies and operate on each unit of the appliance as follows:

Have: the appliance off (external master switch in OFF position) and without electric and gas power supply:

1. move the appliance front panel;
2. identify the thermostat, which is found in the lower part of the generator pipe, on the right side above the combustion chamber (see figure 2 Inspection at generator limit thermostat → 69);
3. disconnect the cables (see Figure 2 Inspection at generator limit thermostat → 69);
4. inspect or replace the component (to disassemble the component, turn it anti-clockwise);
5. in the case of replacement, before re-mounting the new thermostat, spread an adequate quantity of thermal grease on the lower part of the thermostat in order to ensure correct heat conductivity;
6. re-connect the cables to the two connectors, paying attention to cover the contacts completely with the two red silicone protections;
7. re-mount the front panel of the unit.

Figure 2 – Inspection at generator limit thermostat

Thermostat detail

3 SAFETY VALVE REPLACEMENT OPERATIONS

This operation must be performed by professionally qualified staff. Before proceeding, visually check the integrity of the unit hermetic circuit.

Proceed as indicated below for the replacement operations:

OPERATIONS TO BE CARRIED OUT USING THE ENVISIONED INDIVIDUAL PROTECTION DEVICES (I.P.D.)

Material necessary for the intervention (see Figure 3 Safety valve kit → 69):

- n. 2 CH22 face spanners
- n. 1 CH8 box spanner
- spare parts kit made up from (see key in Figure 3 Safety valve kit → 69).

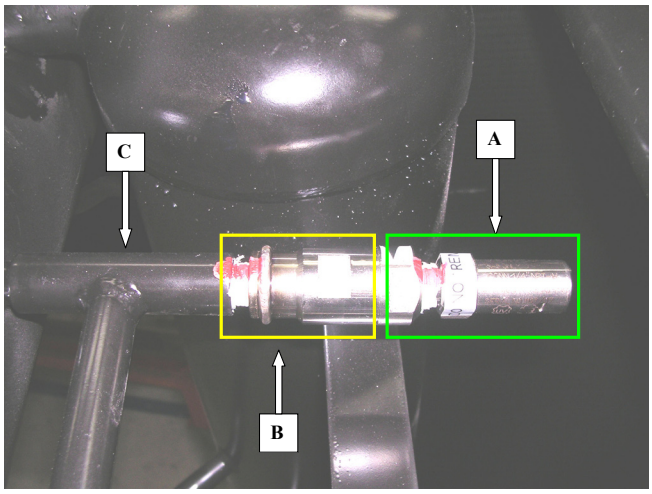
Figure 3 – Safety valve kit

LEGEND
n.1 safety valve
n.1 o-ring
n.1 litmus paper

Componenents required for service

The components subject of the intervention are represented in Figure 4 Detail of safety valve mounted on unit → 70.

Figure 4 – Detail of safety valve mounted on unit



LEGEND

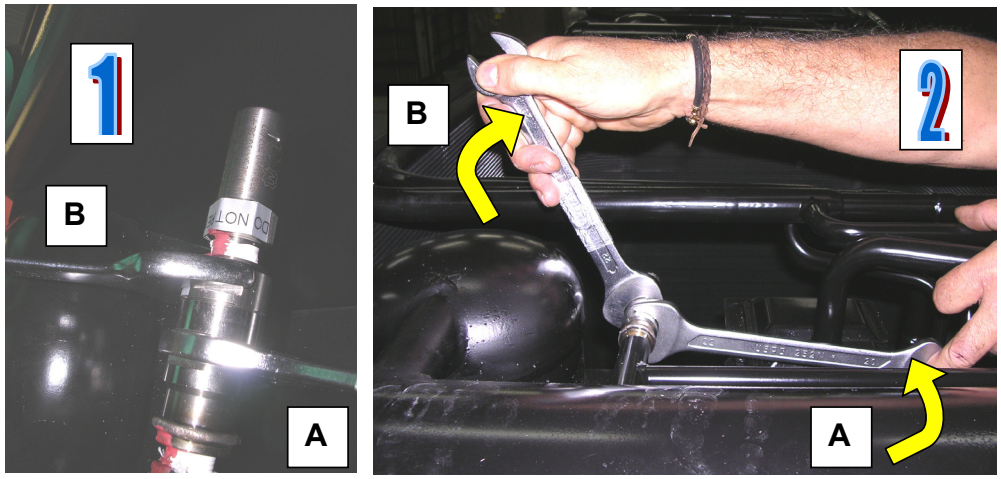
A	Safety valve
B	Inspection valve
C	Sealed circuit

Description of components involved in the operation

Stop the unit and wait for the end of the switch-off cycle.

1. Disconnect the unit electric power supply.
2. Remove the upper panel from the unit.
3. Position the n. 2 CH22 spanners in the relevant seat (see Figure 5 Safety valve disassembly → 70).
   WARNING! DO NOT REMOVE THE COMPONENTS DISTINGUISHED BY THE WAX SEAL.

Figure 5 – Safety valve disassembly



LEGEND

A	hold in place
B	turn counterclockwise

Details 1 and 2 of safety valve disassembly

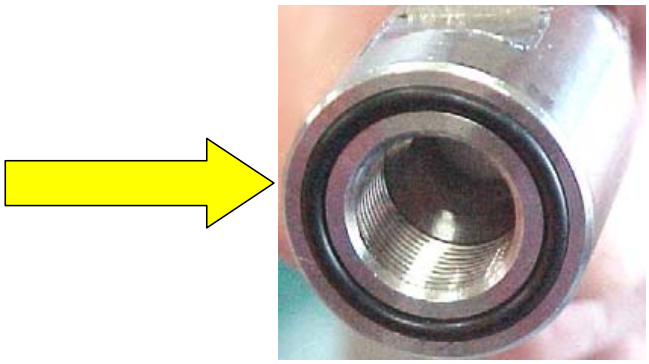
4. Loosen the inspection valve in the direction indicated in detail "2" of Figure 5 Safety valve disassembly → 70 until complete assembly as indicated in Figure 6 Removal of safety valve → 71 paying attention not to loosen part "B" of the inspection valve (see Figure 4 Detail of safety valve mounted on unit → 70);
   ATTENTION! if a consistent ammonia leak is detected during the removal phase, tighten the inspection valve immediately.

Figure 6 – Removal of safety valve

Removal of safety valve mobile part

5. Replace the o-ring as indicated in Figure 7 o-ring → 71.

Figure 7 – o-ring

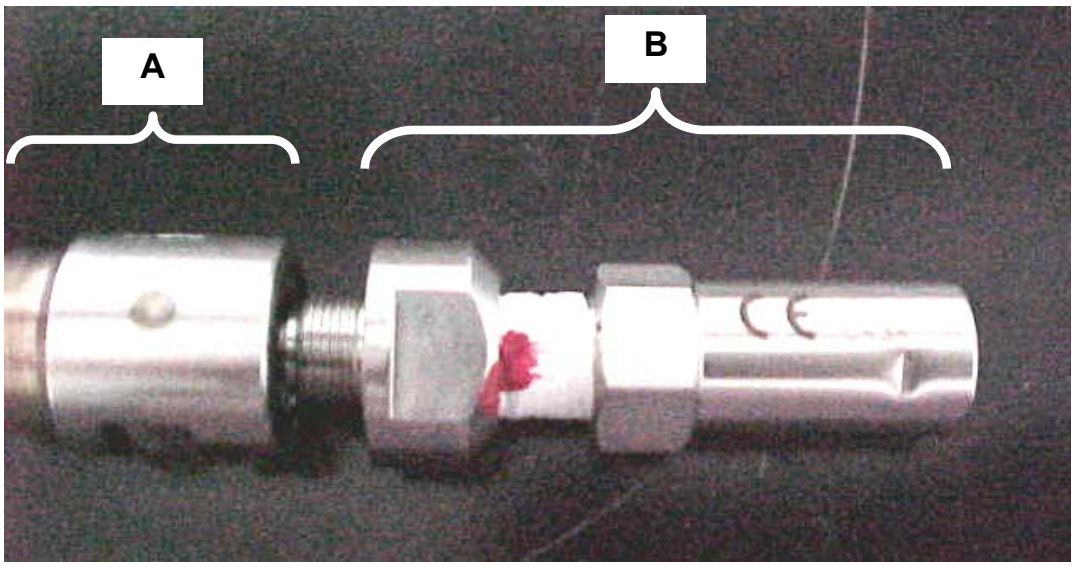


LEGEND
Detail o-ring

Down view

6. Tighten part "B" of the inspection valve to part "A" (see Figure 8 Inspection valve → 71)

Figure 8 – Inspection valve

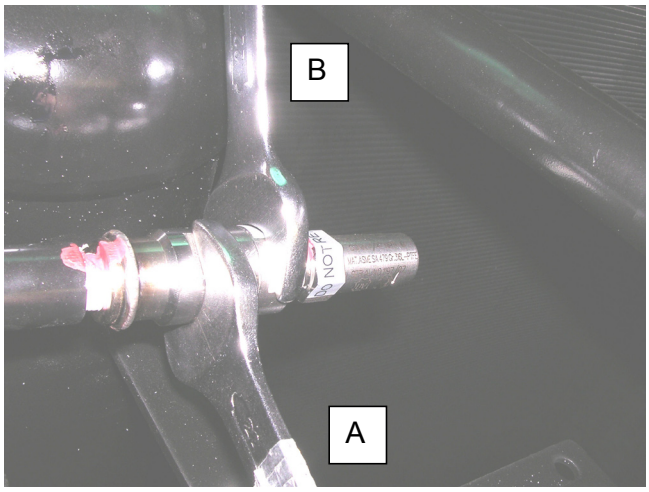


LEGEND
A fixed part
B removable part

Detail A of fixed part – detail B of removable part

7. Tighten the valve, applying a torque of 62 Nm.

Figure 9 – Inspection valve assembly



LEGEND

A	hold in place
B	turn clockwise

Assembly of removable part

8. Test for the absence of ammonia using a phenolphthalein test strip.
9. Mount the unit upper panel.

WARNING! DO NOT START THE APPLIANCE WITHOUT THE SAFETY VALVE.

4 NON-CONDENSABLE OR NON-ABSORBABLE GASES

Indirect control of the presence of non-condensable or non-absorbable gas in the hermetic circuit or internal corrosion phenomena

The presence of corrosion phenomena inside the hermetic circuit has immediate effect that cause machine anomalies that can be easily recognised:

1. development of a large amount of non-condensable and non-absorbable gas, produced of the corrosion reaction, which causes an accumulation of these gases in the generator and, consequently, immediate overheating of the generator. This is caused by the interruption of the water-ammonia solution evaporation process.
2. production of rust which, detaching from the internal walls of the hermetic circuit, rapidly blocks the circulation of refrigerant fluid, thus blocking the orifices of the restrictors. This situation leads to a lack of water-ammonia solution to be evaporated in the generator and causes the same over-heating phenomenon.

In both cases, the over-heating of the generator makes the manual-rearm safety thermostat intervene, which is installed on the wall of the generator.
As a consequence, if there are no generator thermostat interventions, all corrosion phenomena can be excluded and no inspection or additional action is necessary.
The possibility that internal corrosion phenomena are in progress must be taken into consideration only when a series of five (5) thermostat interventions are detected. In this case, contact the Technical Assistance.

Thank you for choosing this high efficiency product which is designed & manufactured to exacting standards to offer many years of service. Backed by a comprehensive warranty, in the unlikely event that you need after-sales attention our customer service centre offers full support & backed up with nationwide service.

remeha

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