

# Installation, Use and Maintenance Manual

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## **AY00-120**

Condensing boiler  
for heating

gas powered



Revision: K

Code: D-LBR531

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## I INTRODUCTION



### Manual

This Manual is an integral part of the AY00-120 unit and must be handed to the end user together with the appliance.

### I.1 RECIPIENTS

This Manual is intended for:

- ▶ end user, for appropriate and safe use of the appliance;
- ▶ qualified installer, for correct appliance installation;
- ▶ planner, for specific information on the appliance.

### I.2 CONTROL DEVICE

In order to be able to work, the AY00-120 unit needs a control device (DDC, CCP/CCI or external requests), which must be connected by the installer.

## II SYMBOLS AND DEFINITIONS

### II.1 KEY TO SYMBOLS



#### DANGER



#### WARNING



#### NOTE



#### PROCEDURE



#### REFERENCE (to other document)

### II.2 TERMS AND DEFINITIONS

**Appliance/Unit AY** = equivalent terms, both used to designate the AY00-120 gas fired condensing boiler.

**TAC** = Technical Assistance Centre authorised by Robur.

**External request** = generic control device (e.g. thermostat, timer or any other system) equipped with a voltage-free NO contact

and used as control to start/stop the AY00-120 unit.

**CCI Controller** (Comfort Controller Interface) = optional Robur control device which lets you manage up to three modulating heat only GAHP units (A, WS, GS).

**CCP Controller** (Comfort Control Panel) = Robur control device which lets you manage in modulation mode up to three GAHP units and all system components (probes, diverter/mixing valves, circulating pumps), including any integration boiler.

**DDC Control** (Direct Digital Controller) = optional Robur device to control one or more Robur appliances (GAHP heat pumps, GA chillers and AY boilers) in ON/OFF mode.

**RB100/RB200 Devices** (Robur Box) = optional interface devices complementary to DDC, which may be used to broaden its functions (heating/cooling/DHW production service demands, and control of system components such as third party generators, adjustment valves, circulators, probes).

**Heat generator** = equipment (e.g. boiler, heat pump, etc..) producing heating and/or DHW.

**First Switch-On** = appliance commissioning operation which may only and exclusively be carried out by a TAC.

**AY10/S70 boards** = electronic boards on the AY00-120 unit, to control all functions and to provide interface with other devices and with the user.

## III WARNINGS

### III.1 GENERAL AND SAFETY WARNINGS



#### Installer's qualifications

Installation must exclusively be performed by a Qualified Firm and by Skilled Personnel, with specific knowledge on heating, cooling, electrical systems and gas appliances, in compliance with the laws in force in the Country of installation.



#### Declaration of Conformity

Upon completing installation, the installing firm shall issue to the owner/client the appliance's Workmanlike Conformity Declaration, according to national/local regulations in force and the manufacturer's instructions/provisions.



#### Misuse

The appliance must only be used for the purposes for which it has been designed. Any other use is deemed hazardous. Incorrect use may affect operation, duration and safety of the appliance. Adhere to the manufacturer's instructions.



#### Hazardous situations

- Do not start the appliance in hazardous conditions, such as: gas smell, problems with the plumbing/electrical/gas system, parts of the appliance under water or damaged, malfunctioning, disabling or bypassing control and safety devices.
- In case of danger, request intervention by skilled personnel.
- In case of danger, switch off the electrical power and gas supplies only if this can be done in total safety.
- Do not entrust children, persons with physical, sensory or mental disabilities or persons with poor knowledge

and experience with use of the appliance.



### Gas component tightness

- Before performing any operation on gas ducting components, close the gas cock.
- Upon completing any procedure, perform the tightness test according to regulations in force.



### Gas smell

If you smell gas:

- Do not use electrical devices such as telephones, multimeters or other equipment that may cause sparks next to the appliance.
- Shut off the gas supply by turning the cock off.
- Disconnect electrical power supply by means of the external isolation switch in the power supply electrical panel.
- Use a telephone away from the appliance to ask for intervention from skilled personnel.



### Poisoning

- Ensure the flue gas ducts are tightness and compliant with the regulations in force.
- Upon completing any procedure, ensure components are tightness.



### Moving parts

The appliance contains moving parts.

- Do not remove guards during operation, and in any case prior to disconnecting the power supply.



### Burn hazard

The appliance contains very hot parts.

- Do not open the appliance and do not touch internal components before the appliance has cooled down.
- Do not touch the flue gas exhaust before it has cooled down.



### Electrocution hazard

- Disconnect the electrical power supply before any work/procedure on appliance components.
- For electrical connections exclusively use compliant components and according to the specifications provided by the manufacturer.
- Ensure the appliance cannot be accidentally switched back on.



### Earthing

Electrical safety depends on effective earthing system, correctly connected to the appliance and installed according to the regulations in force.



### Distance from combustible or flammable materials

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



### Limescale and corrosion

Depending on the chemical/physical properties of the system water, limescale or corrosion may damage the

appliance (Paragraph 3.7 p. 15).

- Check system sealing.
- Avoid frequent top-ups.



### Chloride concentration

The concentration of chlorides or free chlorine in the system water must not exceed the values in Table 3.2 p. 15.



### Aggressive substances in air

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



### Acid flue gas condensate

- Discharge the acid condensate of combustion flue gas, as indicated in Paragraph 3.11 p. 17, in compliance with current exhaust regulations.



### Switching the appliance off

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

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



### In the event of failure

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

- In the event of failure of the appliance and/or breakage of any component, do not attempt to repair and/or restore and immediately contact the TAC.



### Routine maintenance

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

- Maintenance must be performed according to the manufacturer's instructions (see Chapter 7 p. 25) and in compliance with current regulations.
- Appliance maintenance and repairs may only be entrusted to firms legally authorised to work on gas appliances and systems.
- Enter into a maintenance contract with an authorised specialised firm for routine maintenance and for servicing in case of need.
- Only use original parts.



### Decommissioning and disposal

If the appliance is to be disposed of, contact the manufacturer for its disposal.



### Keep the Manual

This "Installation, Use and Maintenance Manual" must always accompany the appliance and must be handed to the new owner or installer in the event of sale or removal.

## III.2 CONFORMITY

### EU Directives and standards

The appliance is CE certified and conforms with all essential requirements of the following Directives:

- ▶ Efficiency Directive 92/42/EEC and subsequent modifications and additions.
- ▶ 2009/142/EC "Gas Appliances Directive" as amended and added.
- ▶ 2014/30/EC "Electromagnetic Compatibility Directive" as amended and added.
- ▶ 2014/35/EC "Low Voltage Directive" as amended and added.
- ▶ 2006/42/EC "Machine Directive" as amended and added.

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

- ▶ UNI EN 677 Specific requirements for condensing boilers with nominal heating capacity up to 70 kW.
- ▶ UNI EN 483 Type C boilers with nominal thermal capacity no greater than 70 kW.

### Other applicable provisions and standards

The design, installation, operation and maintenance of the systems shall be carried out in compliance with current applicable regulations, depending on the Country and location, and in accordance with the manufacturer's instructions. In particular, regulations regarding the following shall be complied with:

- ▶ Gas systems and equipment.
- ▶ Electrical systems and equipment.
- ▶ Heating systems employing condensing boilers.
- ▶ Environmental protection and combustion products exhaust.
- ▶ Fire safety and prevention.
- ▶ Any other applicable law, standard and regulation.

## III.3 EXCLUSIONS OF LIABILITY AND WARRANTY



Any contractual or extra-contractual liability of the manufacturer for any damage caused by incorrect installation and/or improper use and/or failure to comply with regulations and with the manufacturer's directions/instructions shall be disclaimed.



In particular, the warranty on the appliance may be rendered void by the following conditions:

- Incorrect installation.
- Misuse.
- Failure to comply with the manufacturer's indications on installation, use and maintenance.
- Alteration or modification of the product or any part thereof.
- Extreme operational conditions or however outside of the operational ranges set forth by the manufacturer.
- Damages caused by external agents such as salts, chlorine, sulphur or other chemical substances contained in the installation water or present in the air of the installation site.
- Abnormal actions transmitted by the plant or installation to the appliance (mechanical stresses, pressure, vibrations, thermal dilations, power surges...).
- Accidental damages or due to force majeure.

## 1 FEATURES AND TECHNICAL DATA

### 1.1 FEATURES

AY00-120 unit is a high efficiency condensing boiler suitable for supply hot water up to 80 °C. The appliance is provided with an internal heat exchanger to separate internal hydraulic circuit from system hydraulic circuit.

#### Mechanical and thermo-hydraulic components

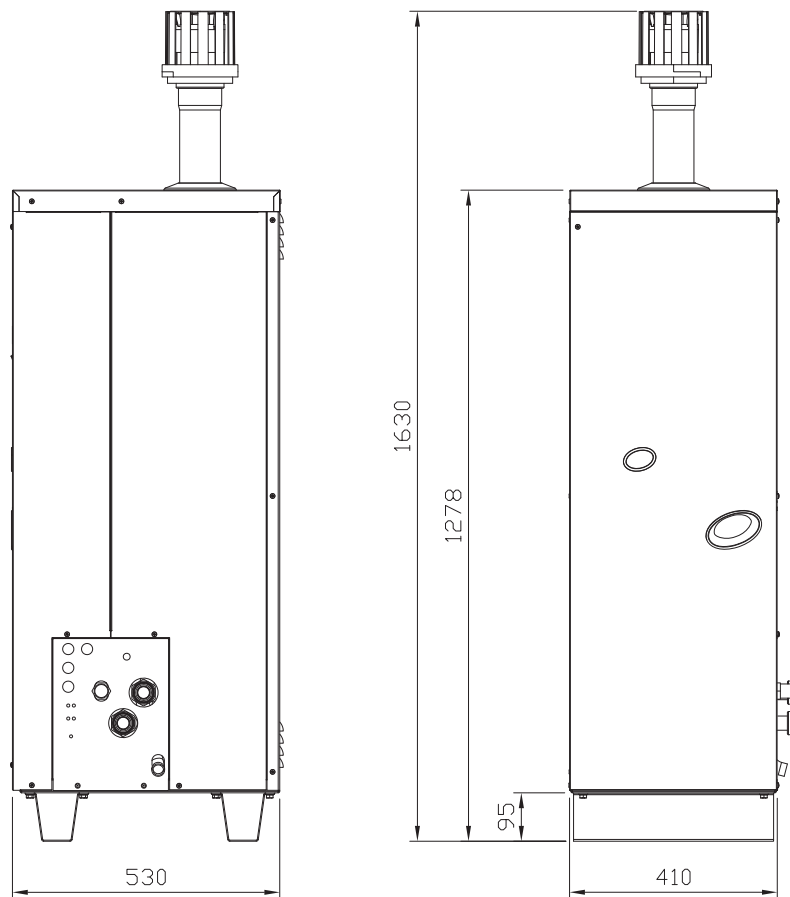
- ▶ premixed multi-gas burner with low NOx and CO emissions;
- ▶ stainless steel plate heat exchanger, combining a hydraulic separator;
- ▶ automatic and manual air bleeds on the internal circuit;
- ▶ flue gas discharge duct with relevant terminal, for type B53P configuration;
- ▶ condensate discharge siphon (with antifreeze function).

#### Control and safety devices

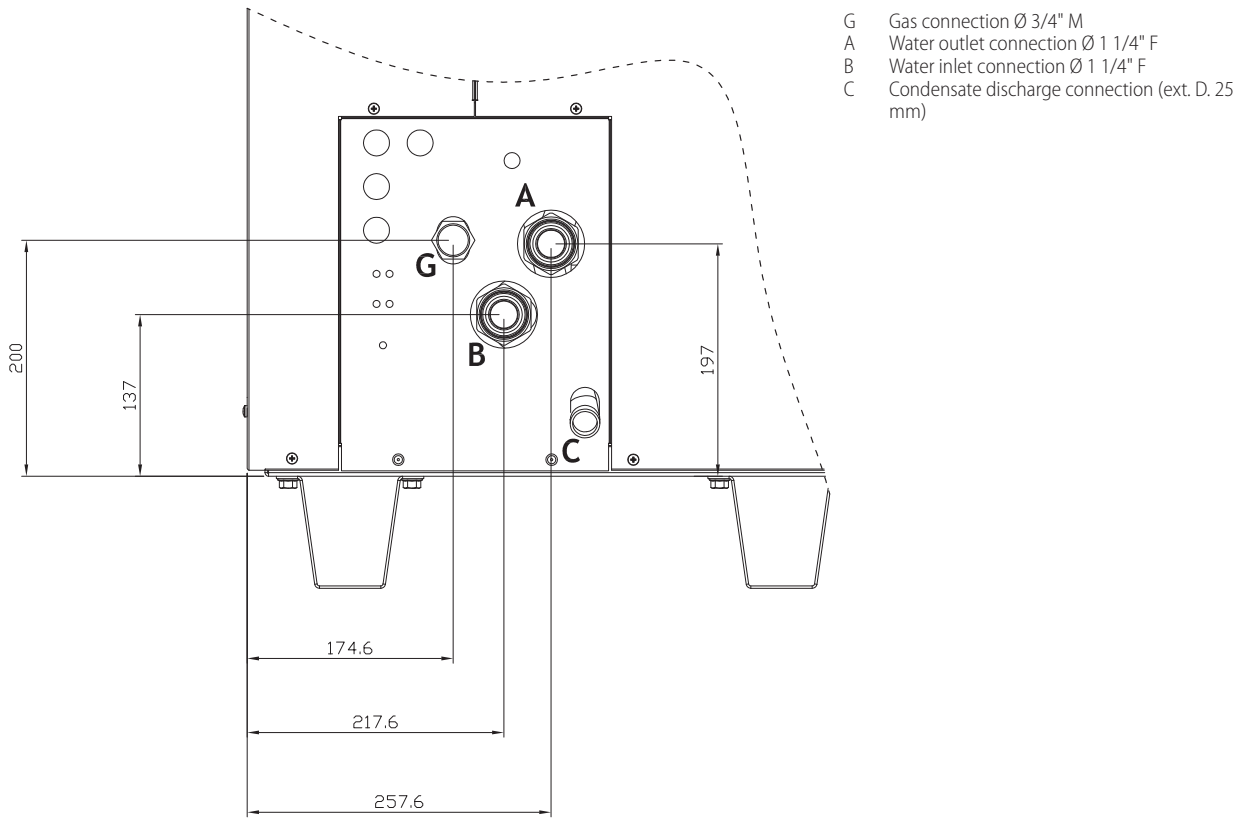
- ▶ electronic board with microprocessor;
- ▶ automatically resettable water temperature limiting thermostat;
- ▶ flue gas limit thermostat, for single use (thermal switch);
- ▶ system circuit water differential pressure switch (PD1);
- ▶ internal circuit water differential pressure switch (PD2) with anti-sticking function;
- ▶ overpressure valve on internal circuit, set to trip at 3 bar;
- ▶ internal circuit expansion tank;
- ▶ ionisation flame controller;
- ▶ gas solenoid valve with double shutter;
- ▶ antifreeze function for water circuit;
- ▶ anti-freezing thermostat used for the activation of the heating element on the condensate drain.

### 1.2 DIMENSIONS

Figure 1.1 Dimensions (front and right side views)



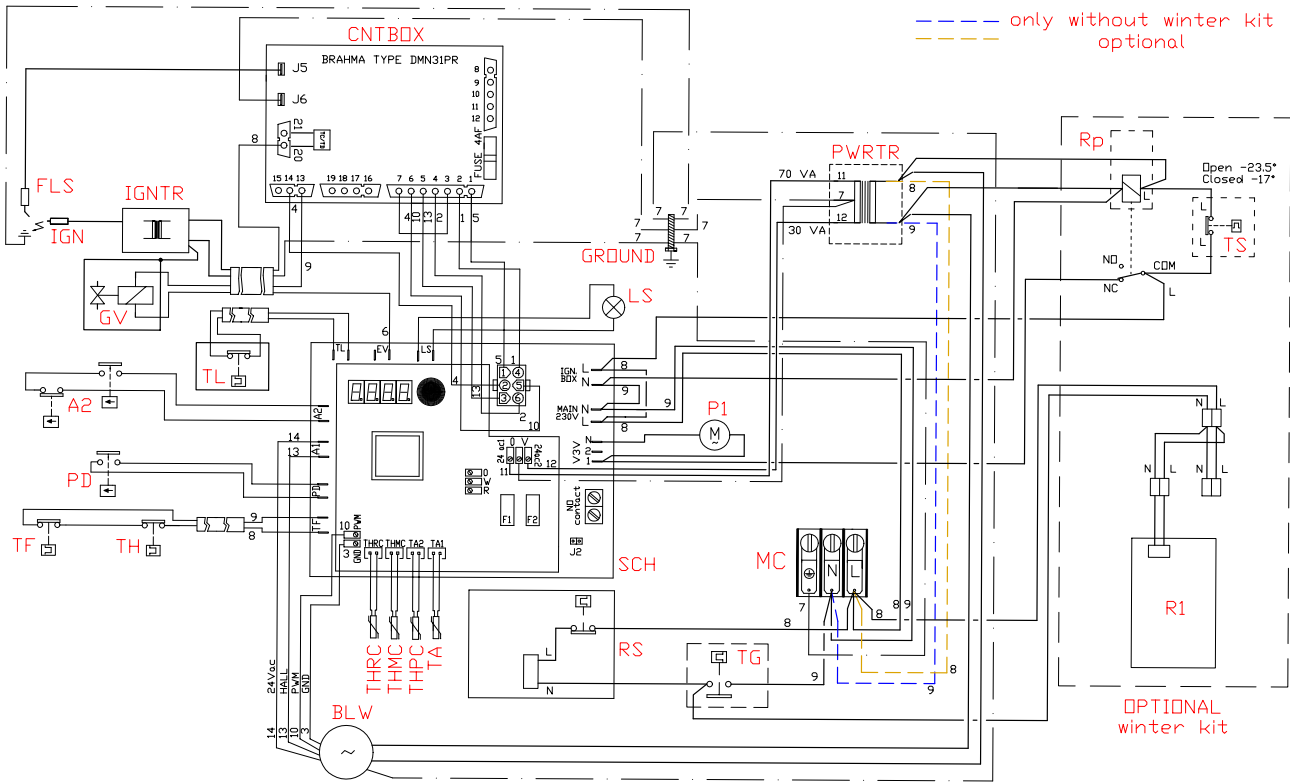
**Figure 1.2** Service plate - Hydraulic/gas unions detail





1.3 ELECTRICAL WIRING DIAGRAM

Figure 1.3 Wiring diagram AY00-120 unit



SCH	Electronic boards AY10/S70	GV	Gas solenoid valve
TA	Ambient air temperature sensor	IGNTR	Ignition transformer
THPC	Delivery water temperature probe (appliance internal circuit)	IGN	Ignition electrodes
THMC	Hot water flow temperature probe	FLS	Flame sensor
THRC	Hot water return temperature probe	CNTBOX	Flame controller
TH	Combustion unit limit thermostat (appliance internal circuit)	BLW	Blower
TF	Flue gas thermostat	MC	Appliance power terminal block
A2	Differential water pressure switch (appliance internal circuit)	PWRTR	Board transformer
PD	Differential water pressure switch (system circuit)	TS	Safety thermostat
TL	Water limit thermostat	TG	Antifreeze thermostat for syphon resistance
P1	Water circulating pump (appliance internal circuit)	RS	Syphon resistance
LS	Gas valve ON indicator lamp		

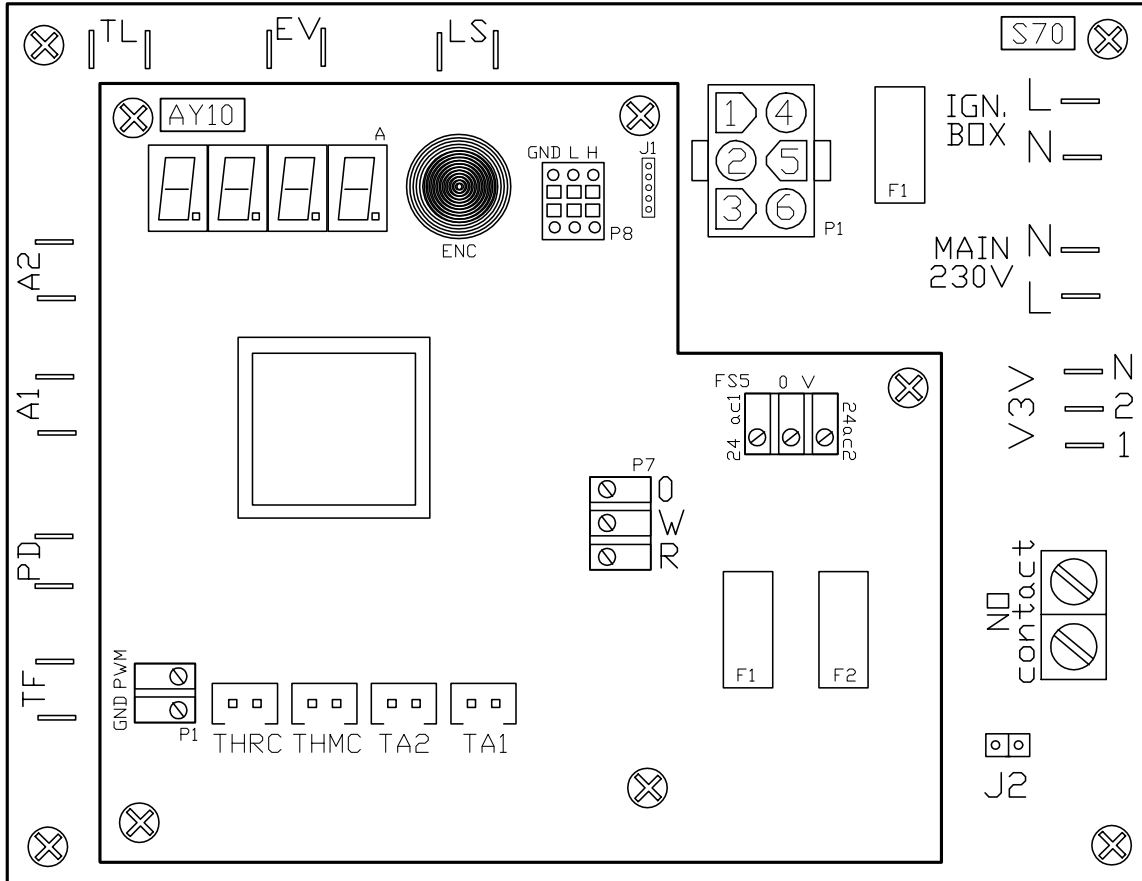
### 1.4 ELECTRONIC BOARDS

#### Electronic boards (AY10+S70)

The unit's electrical board contains:

- ▶ **AY10 Electronic Board** (Figure 1.4 p. 10), with microprocessor, it controls the appliance and displays data, messages and operative codes. The appliance is monitored and programmed by interacting with the display and the knob.
- ▶ **Auxiliary S70 electronic board** (Figure 1.4 p. 10).

Figure 1.4 AY10+S70 electronic boards



TL	limit thermostat connector	MAIN	230V (L, N) Board power supply 230 Vac
ENC	Knob	IGN.BOX (L, N)	Flame controller power supply 230 Vac
EV	gas solenoid valve connector	P1	connector for blower drive
LS	gas valve ON signal lamp connector	THRC	Return hot water temperature connector
P1	6 pole flame controller connector	THMC	Delivery hot water temperature connector
TF	exhausted gas thermostat connector	TA2-TA1	auxiliary temperature probes connector
PD	system water differential pressure switch	J1	CAN BUS Jumper
A1, A2	Auxiliary inputs	P8	(GND, L, H) CAN BUS connector
J2	system water circulating pump jumper	P7	(R, W, 0) Enable input
N.O. CONTACT	System water circulating pump control terminals (max 700 W)	FS5	board supply connector
V3V (1-2-N)	appliance circulating pump connecting terminals	F1-F2	fuses

### 1.5 CONTROLS

#### Control device

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

- ▶ (1) **DDC control**
- ▶ (2) **CCP/CCI control**
- ▶ (3) **external request**

#### 1.5.1 Adjustment system (1) with DDC control (ON/OFF unit)

The DDC controller is able to control appliances, a single AY00-120 unit, or even several Robur GAHP/GA/AY units in cascade, only in ON/OFF mode (non modulating). For more details refer to the DDC, RB100, RB200 Manuals and the Design Manual.

#### DDC Controller

The main functions are:

- ▶ setup and control of one (or more) Robur units of the absorption line (GAHP, GA, AY);
  - ▶ parameter figures display and setting;
  - ▶ hourly programming;
  - ▶ climate curve control;
  - ▶ diagnostics;
  - ▶ reset errors;
  - ▶ possibility to interface with a BMS;
- DDC functionality may be extended with auxiliary Robur devices RB100 and RB200 (e.g. service requests, DHW production, Third Party generator control, probe control, system valves or circulating pumps, ...).

### 1.5.2 Adjustment system (2) with CCP/CCI (modulating GAHP unit)

The CCP/CCI control is able to control up to 3 GAHP units in modulating mode (therefore A/WS/GS only, excluding AR/ACF/AY), plus any AY00-120 integration ON/OFF boiler. For additional details and diagrams refer to the CCP/CCI Manual and the Design Manual.

#### CCP/CCI Control

See CCP/CCI device Manual.

### 1.5.3 Adjustment system (3) with external request (GAHP unit ON/OFF)

The appliance may also be controlled via generic request devices (e.g. thermostats, clocks, buttons, contactors...) fitted with voltage-free NO contact. This system only provides elementary control (on/off, with fixed set-point temperature), thus without the important system functions (1). It is advisable to limit its possible use only to simple applications and with a single appliance.



For connection of the selected device to the appliance's electronic board please refer to Paragraph 4.4 p. 19.

## 1.6 TECHNICAL CHARACTERISTICS

Table 1.1 Technical specifications AY00-120

				AY00-120
<b>Heating mode</b>				
<b>Seasonal space heating energy efficiency class (ErP)</b>				A
<b>Operating point 80/60</b>	Nominal thermal capacity	effective power	kW	34,4
		efficiency	%	98,6
	Mean thermal capacity	efficiency	%	98,3
	Minimal thermal capacity	efficiency	%	97,3
<b>Operating point 70/50</b>	Nominal thermal capacity	efficiency	%	100,6
<b>Operating point 50/30</b>	Nominal thermal capacity	efficiency	%	104,6
<b>Operating point Tr = 30 °C</b>	Thermal capacity 30%	efficiency	%	107,5
<b>Operating point Tr = 47 °C</b>	Thermal capacity 30%	efficiency	%	100,3
<b>Heating capacity</b>	nominal (1013 mbar - 15 °C)		kW	34,9
	average		kW	21,5
	minimum		kW	8,0
<b>Hot water delivery temperature</b>	maximum		°C	80
	minimum		°C	25
	nominal		°C	60
<b>Hot water inlet temperature</b>	maximum		°C	70
	minimum		°C	20
	nominal		°C	50
<b>Heating water flow</b>	nominal		l/h	2950
	maximum		l/h	3200
	minimum		l/h	1500
<b>Pressure drop heating mode</b>	at nominal water flow		bar	0,40 (1)
<b>Efficiency class</b>				****
<b>Heat loss</b>	to jacket in operation		kW	0,15
	to jacket in operation		%	0,44
	to flue in operation		kW	0,86
	to flue in operation		%	2,54
	in off mode		kW	0,058
	in off mode		%	0,17
<b>Ambient air temperature (dry bulb)</b>	maximum		°C	45
	minimum		°C	-20
<b>Electrical specifications</b>				
<b>Power supply</b>	voltage		V	230
	type		-	single-phase
	frequency		50 Hz supply	50
<b>Electrical power absorption</b>	nominal		kW	0,18
<b>Degree of protection</b>	IP		-	XSD
<b>Installation data</b>				
<b>Gas consumption</b>	methane G20 (nominal)		m <sup>3</sup> /h	3,69
	methane G20 (min)		m <sup>3</sup> /h	0,85
	G25 (nominal)		m <sup>3</sup> /h	4,35
	G25 (min)		m <sup>3</sup> /h	1,00
	G30 (nominal)		kg/h	2,75
	G30 (min)		kg/h	0,63
	G31 (nominal)		kg/h	2,71
	G31 (min)		kg/h	0,62

(1) For flows other than nominal see Design Manual, Pressure losses Paragraph.

		AY00-120	
<b>NO<sub>x</sub> emission class</b>		-	5
<b>NO<sub>x</sub> emission</b>		ppm	19,5
<b>CO emission</b>		ppm	8,4
<b>Minimum storage temperature</b>		°C	-30
<b>Maximum water pressure in operation</b>		bar	4
<b>Maximum flow flue condensate</b>		l/h	5,5
<b>Water content inside the apparatus</b>	hot side	l	1
<b>Water fitting</b>	type	-	F
	thread	" G	1 1/4
<b>Gas connection</b>	type	-	M
	thread	" G	3/4
<b>Fume outlet</b>	diameter (Ø)	mm	80
	residual head	Pa	100
	product configuration		B53P
<b>Type of installation</b>		-	B32P, B33, B35P, C13, C33, C34, C53, C63, C83
<b>Dimensions</b>	width	mm	410
	depth	mm	530
	height	mm	1278
<b>Weight</b>	in operation	kg	71

(1) For flows other than nominal see Design Manual, Pressure losses Paragraph.

## 2 TRANSPORT AND POSITIONING

### 2.1 WARNINGS



#### Damage from transport or installation

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



#### On-site inspection

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



#### Packing

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



#### Weight

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

### 2.2 HANDLING

#### Handling and lifting

- ▶ Always handle the appliance in its packing, as delivered by the factory.
- ▶ Do not remove the protective cap on the top panel as this can allow dirt and water to enter the interior of the appliance.
- ▶ Comply with safety regulations at the installation site.



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

### 2.3 APPLIANCE POSITIONING

#### Where to install the appliance

- ▶ It can be installed either inside a suitable technical room, or outside buildings, out of the dripping line of rain gutters or the like. It does not require protection from weathering.
- ▶ The appliance may be installed at ground level, on a terrace or on a roof, compatibly with its dimensions and weight.
- ▶ The appliance's flue gas exhaust must not be immediately close to openings or air intakes of buildings, and must comply with environmental regulations.
- ▶ No obstruction or overhanging structure (e.g. protruding roofs, eaves, balconies, ledges, trees) may obstruct the exhaust fumes outlet at the top of the appliance.
- ▶ Do not install near the exhaust of flues, chimneys or hot polluted air. In order to work correctly, the appliance needs clean air.
- ▶ The installation premises must meet all requirements set forth by laws, standards and regulations of the Country and place of installation concerning gas appliances.

### 2.4 MINIMUM CLEARANCE DISTANCES

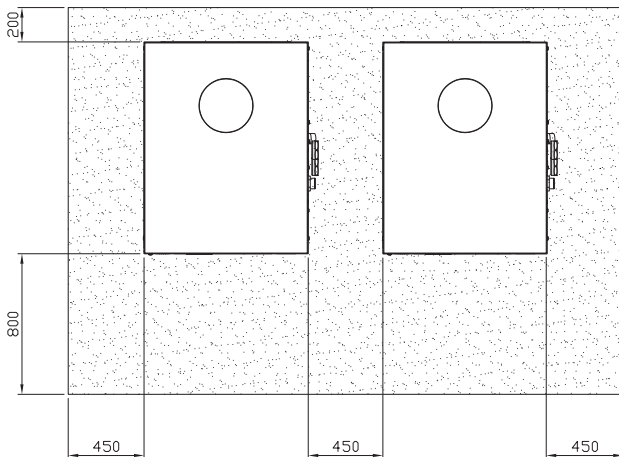
#### Distances from combustible or flammable materials

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

#### Clearances around the appliance

The **minimum clearance distances** shown in Figure 2.1 p. 13 (bar any stricter regulations) are required for safety, operation and maintenance.

Figure 2.1 Clearances



## 2.5 MOUNTING BASE

### Mounting base constructive features

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

#### (1) - installation at ground level

- ▶ Failing a horizontal supporting base, make a flat and levelled concrete base, at least 100-150 mm larger than the appliance dimensions per side.

#### (2) - installation on terrace or roof

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

### Anti-vibration connections

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

## 3 HEATING ENGINEER

### 3.1 WARNINGS

#### General warnings



Read the warnings in Chapter III.1 p. 4, providing important information on regulations and on safety.



#### Compliance with installation standards

Installation must comply with applicable regulations in force, based on the installation Country and site, in matters of safety, design, implementation and maintenance of:

- heating systems;
- gas systems;
- flue gas exhaust;
- flue gas condensate discharge.



Installation must also comply with the manufacturer's provisions.

### 3.2 INSTALLATION

#### Primary and secondary circuit

The appliance is provided with an internal heat exchanger who separates the system in two parts:

- ▶ water circuit inside the appliance (inside);
- ▶ system water circuit (primary).

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

### 3.3 HYDRAULIC CONNECTIONS

#### Plumbing fittings

on the right, at the bottom, **connection plate** (Figure 1.2 p. 8).

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

#### Hydraulic pipes, materials and features

- ▶ Use pipes for heating/cooling systems, protected from weathering, insulated for thermal dispersion.



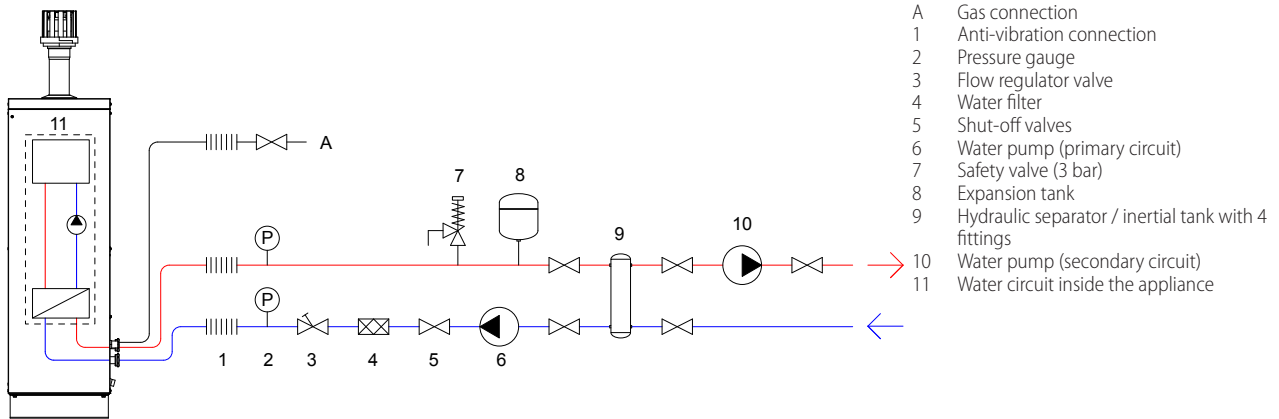
#### Pipe cleaning

- Before connecting the appliance, accurately wash the water and gas piping and any other system component, removing any residue.

#### Minimum components of primary water circuit

- ▶ Always provide, near the appliance:
  - on water piping, both output and input (m/r)
    - 2 ANTIVIBRATION JOINTS on water fittings;
    - 2 PRESSURE GAUGES;
    - 2 ISOLATION BALL VALVES;
  - on the input water piping (r)
    - 1 SEPARATOR FILTER;
    - 1 FLOW ADJUSTMENT VALVE, if the circulating pump is constant flow;
  - on the output water piping (m)
    - 1 WATER CIRCULATION PUMP, towards the appliance;
    - 1 EXPANSION TANK of the individual unit.

Figure 3.1 Hydraulic plan



- A Gas connection
- 1 Anti-vibration connection
- 2 Pressure gauge
- 3 Flow regulator valve
- 4 Water filter
- 5 Shut-off valves
- 6 Water pump (primary circuit)
- 7 Safety valve (3 bar)
- 8 Expansion tank
- 9 Hydraulic separator / inertial tank with 4 fittings
- 10 Water pump (secondary circuit)
- 11 Water circuit inside the appliance



The appliance is equipped with its own expansion tank and safety valve exclusively dedicated to the machine's internal circuit. The system circuit thus requires a suitable expansion tank to be installed.

### 3.4 WATER CIRCULATION PUMP

The circulation pump (flow and head) must be selected and installed based on pressure losses of plumbing/primary circuit (piping + components + exchange terminals + appliance). For the appliance's pressure losses refer to Table 1.1 p. 11 and Design Manual.

### 3.5 ANTI-ICING FUNCTION

#### Active anti-icing self-protection

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

The function is double, both for the water circuit inside the appliance, and for the system's water circuit.

The function concerning the internal circuit cannot be disabled as it is also used to protect the electronic components.



#### Electrical and gas continuity

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

### 3.6 ANTI-ICING LIQUID



#### Precautions with glycol

The manufacturer disclaims any liability for any damage caused by improper glycol use.

- Always check product suitability and its expiry date with the glycol supplier. Periodically check the product's preservation state.
- Do not use car-grade anti-icing liquid (without inhibitors), nor zinc-coated piping and fittings (incompatible with glycol).
- Glycol modifies the physical properties of water (density, viscosity, specific heat...). Size the piping, circulation pump and thermal generators accordingly.
- With automatic system water filling, a periodic check of the glycol content is required.



#### With high glycol percentage (> 20...30%)

If the glycol percentage is  $\geq 30\%$  (for ethylene glycol) or  $\geq 20\%$  (for propylene glycol) the TAC must be alerted before first start-up.



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

#### Type of anti-icing glycol

- **Inhibited type glycol** is recommended to prevent oxidation phenomena.

#### Glycol effects

The Table 3.1 p. 14 shows, indicatively, the effects of using a glycol depending on its %.

Table 3.1 Technical data for filling the hydraulic circuit

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

### Water circuit inside the appliance

The water circuit inside the appliance is factory charged to 2 bar with a water/glycol mix which enables the appliance to be safely stored down to -30 °C.

You must always ensure adequate glycol antifreeze content.

### 3.7 SYSTEM WATER QUALITY



#### Responsibility of the user/operator/installer

The installer, operator and user must assure system water quality (Table 3.2 p. 15). Failure to comply with the manufacturer's guidelines may affect operation, integrity and life of the appliance, voiding the warranty.

#### System water features

Free chlorine or water hardness may damage the appliance. Adhere to the chemical-physical parameters in Table 3.2 p. 15 and the regulations on water treatment for residential and industrial heating systems.

**Table 3.2** Chemical and physical parameters of water

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

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

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

(3) in compliance with applicable rules.

#### Water topping up

The chemical-physical properties of the system's water may alter over time, resulting in poor operation or excessive topping up.

- ▶ Ensure there are no leaks in the installation.
- ▶ Periodically check the chemical-physical parameters of the water, particularly in case of automatic topping up.



#### Chemical conditioning and washing

Water treatment/conditioning or system washing carried out carelessly may result in risks for the appliance, the system, the environment and health.

- Contact specialised firms or professionals for water treatment or system washing.
- Check compatibility of treatment or washing products with operating conditions.
- Do not use aggressive substances for stainless steel or copper.
- Do not leave washing residues.

### 3.8 INSTALLATION FILLING



#### How to fill up the system

After completing all water, electrical and gas connections:

1. Pressurise (at least 1.5 bar) and vent the hydraulic circuit.
2. Let water flow (with appliance off).
3. Check and clean the filter on the inlet pipe.
4. Repeat items 1, 2 and 3 until the pressure has stabilised (at least 1.5 bar).



To vent the system do not use the appliance's vent, exclusively intended for the internal exchanger (see detail A Figure 3.2 p. 16).

#### Water circuit inside the appliance

The water circuit inside the appliance is factory charged to 2 bar with a water/glycol mix which enables the appliance to be safely stored down to -30 °C.

The pressure gauge (detail B) will display the charging pressure when the front panel of the appliance is removed. The optimal pressure value is between 1 and 2 bar.



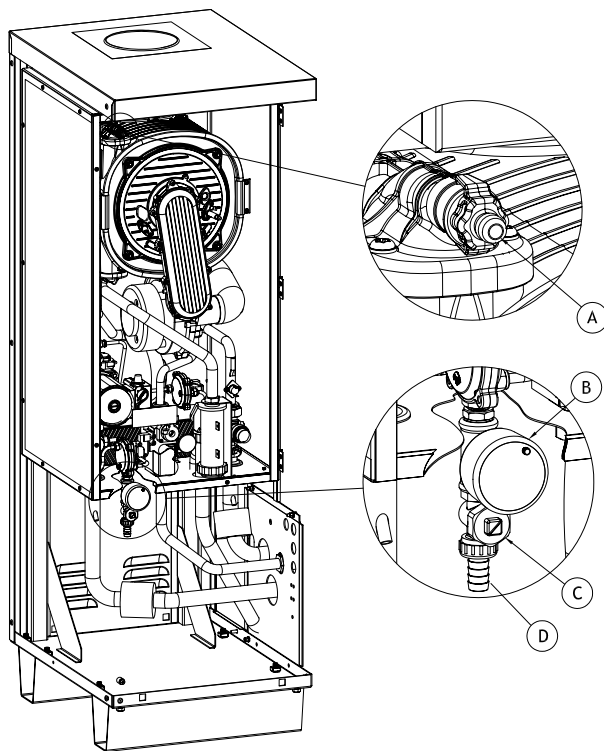
#### How to restore the charge of the water circuit inside the appliance

Figure 3.2 p. 16

1. Remove the front panel.
2. Identify any leakage points and restore the tightness (e.g. seal replacement).
3. Remove the cap closing the filling cock and fix the supplied hose fitting (detail D).
4. Open the filling cock, with a flathead screwdriver, and charge the circuit with enough glycol solution to achieve the specified optimal pressure range.
5. Open the cap on the automatic bleed valve on the internal circuit and run the machine for 3 minutes to bleed the circuit.
6. If there still is air, manually open the venting valve.
7. Stop the circuit operating, close the charging cock with a flathead screwdriver and close the automatic bleed valve on the circuit.
8. Remove the hose fitting and reposition the cap of the filling cock.
9. Close the front panel with its retainer bolts.
10. Restore the appliance and put away the union.



**Figure 3.2** Filling the appliance's internal circuit - Detail of filling operative stages



- A manual air vent cock
  - B pressure gauge
  - C filling cock \*
  - D D.13 hose fitting supplied
- \* cut in horizontal position: cock closed;  
cut in vertical position: cock open.

### 3.9 FUEL GAS SUPPLY

#### Gas connection

- ▶ 3/4" M on the right, at the bottom, connection plate (Figure 1.2 p. 8).
- ▶ Install an anti-vibration connection between the appliance and the gas piping.

#### Mandatory shut-off valve


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

#### Gas pipes sizing

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

#### Supply gas pressure

The appliance's gas supply pressure, both static and dynamic, must comply with Table 3.3 p. 16, with tolerance  $\pm 15\%$ .

 Non compliant gas pressure (Table 3.3 p. 16) may damage the appliance and be hazardous.

**Table 3.3** Gas network pressure

AY00-120		Gas supply pressure						
Product category	Countries of destination	G20 [mbar]	G25 [mbar]	G30 [mbar]	G31 [mbar]	G25.1 [mbar]	G27 [mbar]	G2,350 [mbar]
II <sub>2</sub> H3B/P	AL, BG, CZ, DK, EE, FI, GR, LT, NO, SE, SI, SK, TR	20		30	30			
	AT, CH	20		50	50			
	HR, MK, RO	25		30	30			
	IT	20		28-30	37			
II <sub>2</sub> H3P	AL, BG, CZ, ES, GB, IE, LT, PT, SI, SK	20			37			
	HR, MK, RO	25		37	37			
II <sub>2</sub> H53B/P	HU	25		30	30	25		
II <sub>2</sub> E3P	LU	20			50			
II <sub>2</sub> ELL3B/P	DE	20	20	50	50			
II <sub>2</sub> ESi3P*	FR	20	25		37			
II <sub>2</sub> E3B/P	PL	20		37	37			
II <sub>2</sub> ELWLS3B/P		20		37	37		20	13
II <sub>2</sub> ELWLS3P		20			37		20	13
I <sub>2</sub> E(S); I <sub>3</sub> P	BE	20	25		37			
I <sub>2</sub> H	LV	20						
I <sub>3</sub> B	MT			30				
I <sub>3</sub> B/P	CY, MT			30	30			
I <sub>3</sub> P	IS				30			

#### Vertical pipes and condensate

- ▶ Vertical gas pipes must be fitted with siphon and discharge of the condensate that may form inside the pipe.
- ▶ If necessary, insulate the piping.



### LPG pressure reducers

With LPG the following must be installed:

- ▶ a first stage pressure reducer, close to the liquid gas tank;
- ▶ a second stage pressure reducer, close to the appliance.

## 3.10 COMBUSTION PRODUCTS EXHAUST

### Flue gas exhaust kit

The appliance, supplied in B53P configuration, is standard supplied with a DN80 flue gas kit, to be set up by the installer. The fitting (DN80) for connecting the flue gas kit is located in the upper part of the appliance with vertical outlet.

#### How to install the flue gas kit



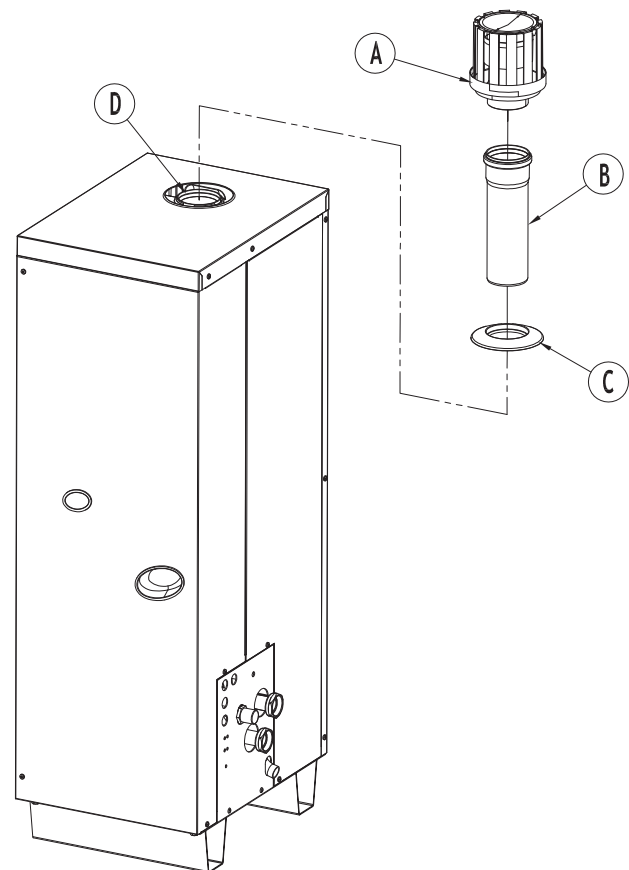
Figure 3.3 p. 17:

1. Fix the terminal (detail A) on the DN 80 extension pipe (detail B) inside the dedicated socket.
2. Fit the rain cover (detail C) onto the DN 80 extension pipe (detail B).
3. Remove the protective cap on the top panel of the appliance.
4. Fix the kit (details A+B+C) into the dedicated socket of the DN 80 flanged union which can be accessed via the appliance's top panel (detail D).



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

Figure 3.3 Flue gas exhaust kit



- A roof terminal (DN80)
- B extension pipe (DN80)
- C rain cover (DN80)
- D flanged fitting (DN80) on upper panel
- A+B+C flue gas exhaust duct kit

### Possible flue

If necessary, the appliance may be connected to a flue.

- ▶ To size the flue refer to Table 1.1 p. 11 and Design Manual.
- ▶ If several appliances are connected to a single flue, it is obligatory to install a check valve on the exhaust of each.
- ▶ The flue must be designed, sized, tested and constructed by a skilled form, with materials and components complying with the regulations in force in the country of installation.
- ▶ Always provide a socket for flue gas analysis, in an accessible position.

## 3.11 FLUE GAS CONDENSATE DISCHARGE

The AY00-120 unit is a condensing appliance and therefore produces condensation water from combustion flue gases.



### Condensate acidity and exhaust regulations

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

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



### Do not use gutters to discharge the condensate

Do not discharge the fume condensate in gutters, due to

the risk of materials corrosion and ice formation.

### Flue gas condensate connection

The fitting for flue gas condensate discharge is located on the right side of the appliance (Figure 1.2 p. 8) at the connection plate.

### Flue gas condensate discharge manifold

To make the condensate discharge manifold:

- ▶ Size the ducts for maximum condensation capacity (Table 1.1 p. 11).
- ▶ Use plastic materials resistant to acidity pH 3-5.
- ▶ Provide for min. 1% slope, i.e. 1 cm for each m of the length

(otherwise a booster pump is required).

- ▶ Prevent icing.
- ▶ Dilute, if possible, with domestic waste water (e.g. bathrooms, washing machines, dish washers...), basic and neutralising.

### Charging the siphon

Robur uses condensate collection siphons with float, which blocks the passage of fumes and odours deriving therefrom in case the equipment remains turned off for a long time and the liquid contained in the siphon evaporates or in case of commissioning.

Thanks to this system, it is not necessary to fill the siphon at commissioning.

## 4 ELECTRICAL INSTALLER

### 4.1 WARNINGS



#### General warnings

Read the warnings in Chapter III.1 p. 4, providing important information on regulations and on safety.



#### Compliance with installation standards

Installation must comply with applicable regulations in force, based on the installation Country and site, in matters of safety, design, implementation and maintenance of electrical systems.

Installation must also comply with the manufacturer's provisions.



#### Live components

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



#### Earthing

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



#### Cable segregation

Keep power cables physically separate from signal ones.



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

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



#### Control of water circulation pump

The water circulation pump of the water/primary circuit must mandatorily be controlled by the appliance's

electronic boards (AY10 + S70). It is not admissible to start/stop the circulating pump with no request from the appliance.

### 4.2 ELECTRICAL SYSTEMS

Electrical connections must provide:

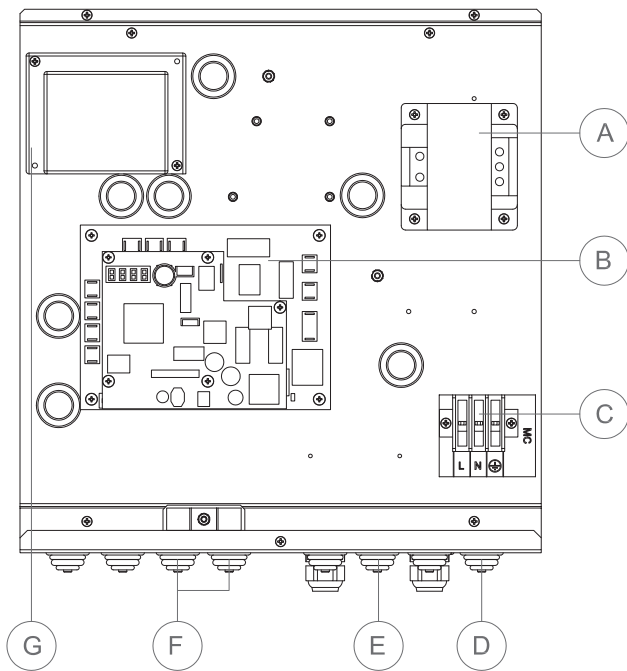
- ▶ (a) power supply (Paragraph 4.3 p. 19);
- ▶ (b) control system (Paragraph 4.4 p. 19).



#### How to perform connections

All electrical connections must be made in the appliance's Electrical Board (Figure 4.1 p. 19):

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

**Figure 4.1** Electrical Panel

- A Transformer 230/23 V AC
- B AY10+S70 electronic boards
- C MC terminal block
- D Power supply cable gland
- E Circulating pump cable gland
- F CAN-BUS cable gland
- G Flame control box

### 4.3 ELECTRICAL POWER SUPPLY

#### Power supply line

Provide (by the installer) a protected single phase line (230 V 1-N 50 Hz) with:

- ▶ 1 three-pole cable type FG7(O)R 3Gx1.5;
- ▶ 1 two-pole switch with 2 2A type T fuses, (GS) or 1 4A magnetothermic breaker.



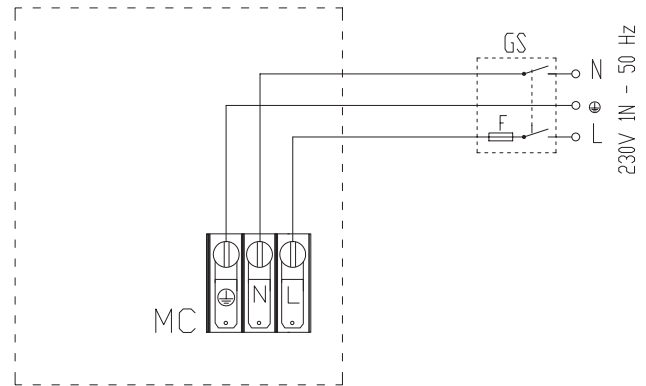
The switches must also provide disconnect capability, with min contact opening 3 mm.

#### How to connect the power supply



To connect the three-pole power supply cable (Figure 4.2 p. 19):

1. Access the Electrical Board of the appliance according to the Procedure 4.2 p. 18.
2. Connect the three wires to terminal board (MC) in the electrical panel on the machine.
3. Provide the earth lead-in wire longer than live ones (last to be torn in the event of accidental pulling).

**Figure 4.2** Electrical wiring diagram - Example of connection of appliance to 230 V 1 N - 50 Hz electricity supply

- MC power terminal block
- GS General switch
- F Fuse(s)
- N Neutral terminal
- Ground Earth terminal
- L Single phase line terminal

### 4.4 SET-UP AND CONTROL

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

Three separate adjustment systems are provided, each with specific features, components and diagrams (see 4.4 p. 20, 4.5 p. 21):

- ▶ System (1), with **DDC control** (with CAN-BUS connection).
- ▶ System (2), with **CCP/CCI control** (with CAN-BUS connection).
- ▶ System (3), with an **external request**.

#### CAN-BUS communication network

The CAN-BUS communication network, implemented with the cable of the same name, makes it possible to connect and remotely control one or more Robur appliances with the DDC or CCP/CCI control devices.

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

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

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

#### CAN-BUS signal cable

The DDC controller is connected to the appliance through the CAN-BUS signal cable, shielded, compliant to Table 4.1 p. 20 (admissible types and maximum distances).

For lengths  $\leq 200$  m and max 4 nodes (e.g. 1 DDC + 3 GAHP), a simple 3x0.75 mm shielded cable may even be used.

**Table 4.1** CAN BUS cables type

CABLE NAME	SIGNALS / COLOR			MAX LENGTH	Note	
<b>Robur</b>						
ROBUR NETBUS	H= BLACK	L= WHITE	GND= BROWN	450 m	Ordering Code OCVO008	
<b>Honeywell SDS 1620</b>						
BELDEN 3086A	H= BLACK	L= WHITE	GND= BROWN	450 m	In all cases the fourth conductor should not be used	
TURCK type 530						
<b>DeviceNet Mid Cable</b>						
TURCK type 5711	H= BLUE	L= WHITE	GND= BLACK	450 m		
<b>Honeywell SDS 2022</b>						
TURCK type 531	H= BLACK	L= WHITE	GND= BROWN	200 m		



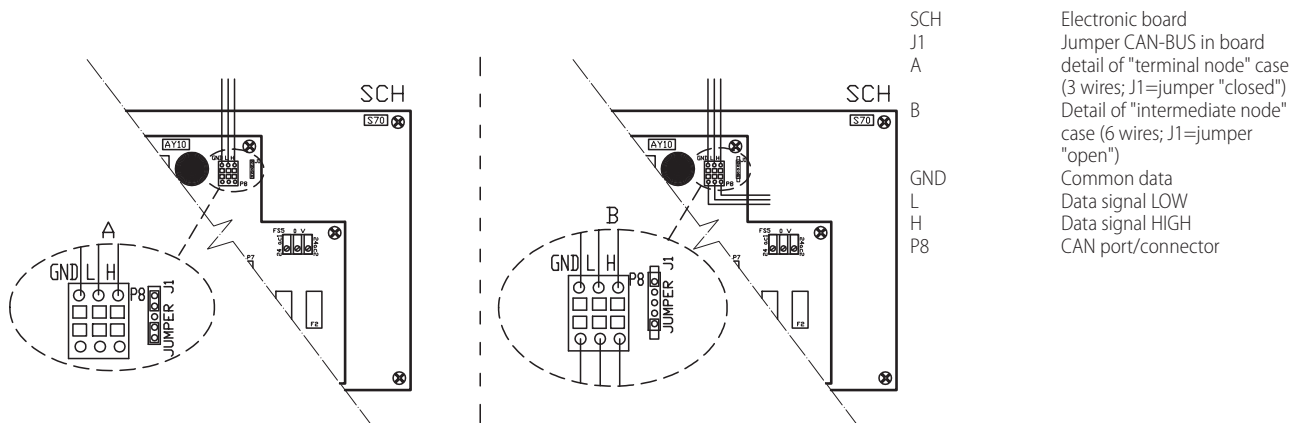
**How to connect the CAN BUS cable to the appliance**

To connect the CAN-BUS cable to the AY10 electronic board (Paragraph 1.4 p. 10), located in the Electrical Panel inside the appliance (Figure 4.3 p. 20):

1. Access the Electrical Board of the appliance according to the Procedure 4.2 p. 18);
2. Connect the CAN-BUS cable to terminals GND, L and H

- (shielding/earthing + two signal conductors);
3. Place the CLOSED J1 Jumpers (Detail A) if the node is terminal (one connected CAN-BUS cable section only), or OPEN (Detail B) if the node is intermediate (two connected CAN-BUS cable sections);
4. Connect the DDC to the CAN-BUS cable according to the instructions of the following Paragraphs and DDC Manual.

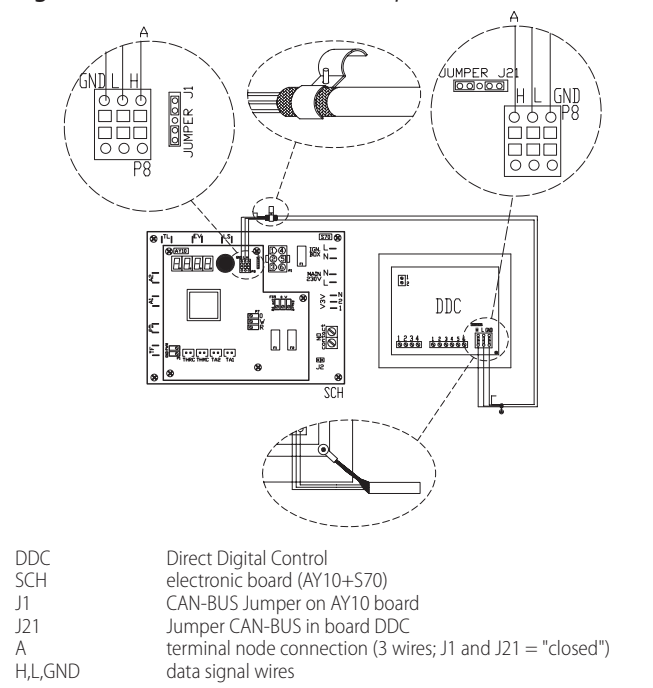
**Figure 4.3** Electrical wiring diagram - Connection cable CAN BUS to electronic board



**AY configuration (AY10) + DDC**

(System (1) see also Paragraph 1.5 p. 10)

**Figure 4.4** Connexion cable CAN BUS for plants with one unit



### External request

(System (3) see also Paragraph 1.5 p. 10)

It is required to arrange:

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

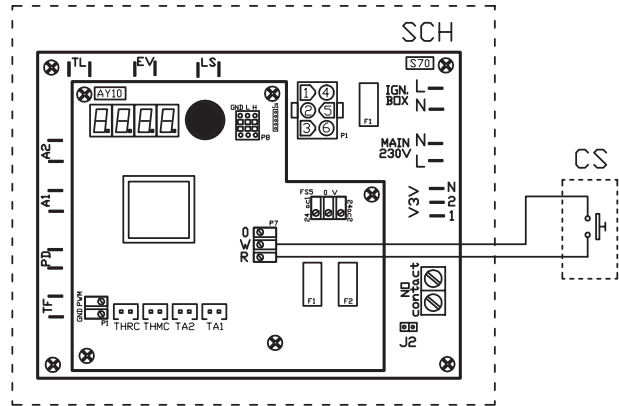


#### How to connect the external request

Connection of external request is effected on the AY10 board located in the Electrical Panel inside the appliance (Figure 4.5 p. 21).

1. Access the Electrical Board of the appliance according to the Procedure 4.2 p. 18.
2. Connect the voltage free contact of the external device (Detail CS), through two wires, to **terminals R and W** (respectively: common 24 V AC and heating request) of AY10 electronic board.

**Figure 4.5** Wiring diagram, external heating enable connection



SCH	Electronic board
R	Common
W	Terminal consensus warming

#### Components NOT SUPPLIED

CS	external request
----	------------------

## 4.5 WATER CIRCULATION PUMP

It must be mandatorily controlled from the S70 electronic board. The diagram in Picture 4.6 p. 22 is for pumps < 700 W. For pumps > 700 W it is required to add a control relay and set up Jumper J2 OPEN.

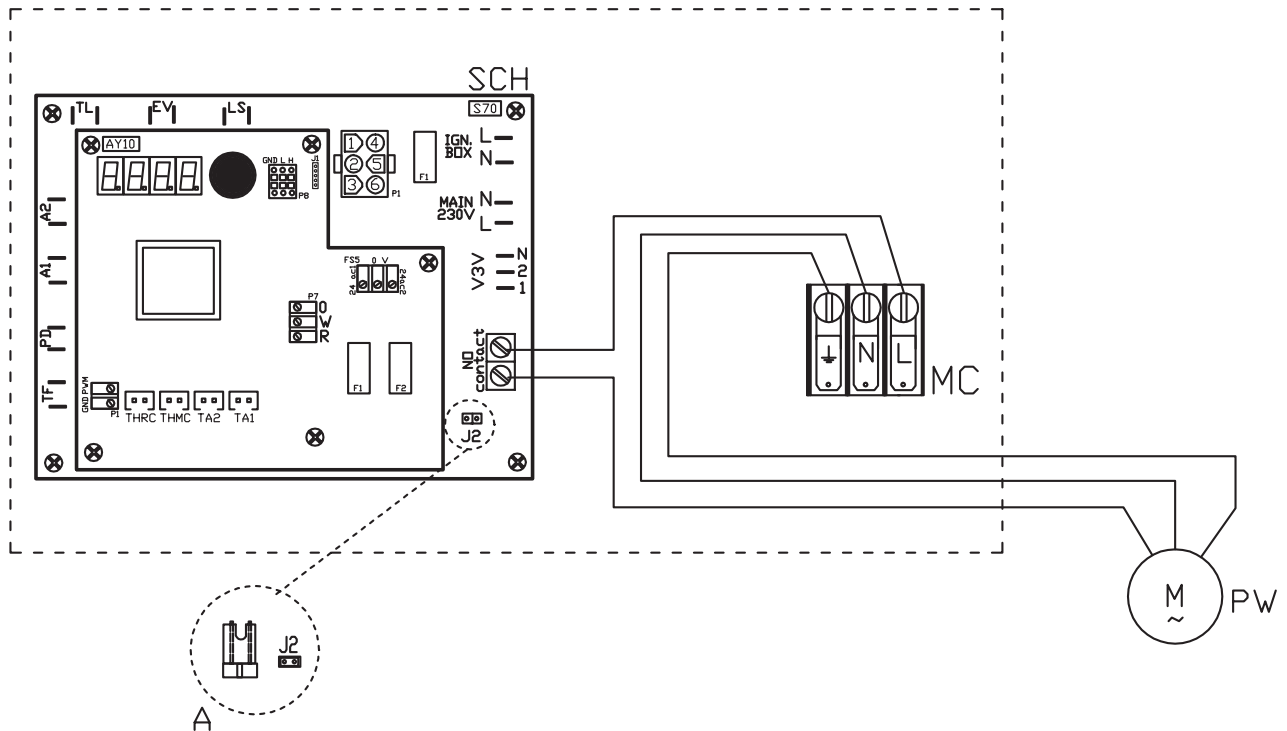


#### How to connect the CONSTANT FLOW circulating pump

Access the Electrical Board of the appliance according to the Procedure 4.2 p. 18:

1. connect to S70 board, to terminals NO-Contact;
2. Jumper J2 CLOSED.

**Figure 4.6** Water circulation pump connection - Connection of plant water circulation pumps (power absorption less than 700W), controlled directly by the appliance.



SCH	electronic board	A	"closed" jumper detail
NO contact	system water circulating pump control terminals (voltage-free normally open contact, maximum absorbed power 700 W)	MC	230 VAC power supply terminal block
J2	system water circulating pump control jumper	Components NOT SUPPLIED	
		PW	water pump < 700 W

## 5 FIRST START-UP



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

### 5.1 PRELIMINARY CHECKS

#### Preliminary checks for First start-up

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

- ▶ water-heating, electrical and gas systems suitable for the required capacities and equipped with all safety and control devices required by the regulations in force;
- ▶ absence of leaks in the water and gas systems;
- ▶ type of gas for which the appliance is designed (methane or LPG);
- ▶ supply gas pressure complying with the values of Table 3.3 p. 16, with max tolerance  $\pm 15\%$ ;
- ▶ Power supply mains complying with the appliance's rating plate data;
- ▶ appliance correctly installed, according to the manufacturer's instructions;
- ▶ system installed in a workmanlike manner, according to national and local regulations.

#### Abnormal or hazardous installation situations

Should any abnormal or hazardous installation situations be found, the TAC shall not perform First start-up and the appliance shall not be commissioned.

These situations may be:

- ▶ failed compliance with minimum clearances;
- ▶ insufficient distance from combustible or flammable materials;
- ▶ conditions that do not warrant access and maintenance in safety;
- ▶ appliance switched on/off with the main switch, instead of the control device provided (DDC, CCP/CCI or external request);
- ▶ appliance defects or faults caused during transport or installation;
- ▶ gas smell;
- ▶ non-compliant mains gas pressure;
- ▶ non-compliant combustion air and flue gas exhaust ducts;
- ▶ all situations that may involve operation abnormalities or are potentially hazardous.

#### Non-compliant system and corrective actions

Should the TAC find any non conformities, the user/installer is bound to perform any corrective procedures required by the TAC.

After performing the remedial actions (the installer's responsibility), if the TAC deems that safety and conformity conditions



are in place, "First start-up" may be effected.

## 6 NORMAL OPERATION

This section is for the end user.

### 6.1 WARNINGS



#### General warnings

Prior to using the appliance carefully read the warnings in Chapter III.1 p. 4, providing important information on regulations and on safety.



#### First start-up by TAC

First start-up may exclusively be carried out by a Robur TAC (Chapter 5 p. 22).



#### Never power the appliance off while it is running

NEVER power the appliance off while it is running (except in the event of danger, Chapter III.1 p. 4), since the appliance or system might be damaged.

### 6.2 SWITCH ON AND OFF



#### Routine switching on/off

The appliance may exclusively be switched on/off by means of the suitably provided control device (DDC, CCP/CCI or external requests).



#### Do not Switch On/Off with the power supply switch

Do not switch the appliance on/off with the power supply switch. This may be harmful and dangerous for the appliance and for the system.



#### Inspections before switching on

Before switching on the appliance, ensure that:

- gas cock open;
- appliance electrical power supply (main switch (GS) ON);
- DDC or CCP/CCI power supply (if present);
- water circuit ready.

#### How to switch on/off

- ▶ If the appliance is controlled by a DDC or by a CCP/CCI (systems (1) and (2) see Paragraph 1.5 p. 10), refer to the respective manuals.
- ▶ If the appliance is controlled by external request (e.g. thermostat, clock, button, ... with voltage-free NO contact), (system (3) see Paragraph 1.5 p. 10), the appliance is switched on/off by the ON/OFF positions of the external control device.

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



Although the external request is in the "ON" position, this does not mean the appliance will start immediately, but

it will only start when there are actual service demands.

### 6.3 MESSAGES ON THE DISPLAY

#### 4 digit display

AY10 board of the appliance (Paragraph 1.4 p. 10, Figure 1.4 p. 10) is fitted with a 4-digit display, visible through the sight glass of the front panel.

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

#### Signals in normal operation

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

#### Signals in the event of fault

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

- ▶ If it is only a temporary warning, the appliance may continue working.
- ▶ If it is a permanent error or warning the appliance stops. (Table 8.1 p. 28).

### 6.4 ELECTRONIC ADJUSTMENT ON THE MACHINE – MENUS AND PARAMETERS

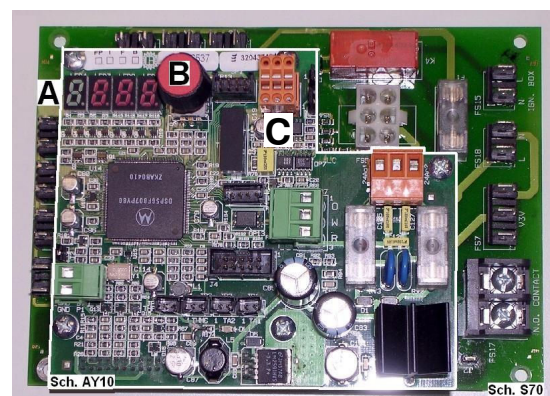


#### Firmware

The instructions on the use of the AY10 electronic board concern the **firmware version 3.106**.

#### The electronic board (AY10) of the appliance

Figure 6.1 AY00-120 unit electronic board (AY10+S70)



- A 4 digit display
- B Knob
- C CAN port

#### Display

The 4-digit display of the AY10 board (detail A Figure 6.1 p. 23) is as follows:

- ▶ the **first digit** (on the left, green) indicates the menu **number** (e.g. "0.", "1.", "2.", ... "8.");
  - ▶ the **last three digits** (on the right, red) indicate a **code** or a **value** for a parameter, among those included in the selected menu (e.g. " \_\_6" "\_20", "161").
- (e.g. menu+parameter "1.\_\_6", "2.\_20", "3.161").

### Knob

One of the following actions may be done with the AY10 board knob (Detail B Figure 6.1 p. 23):

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

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

### Menus and Parameters

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

**Menu for the user** (but for the installer and TAC as well)

- ▶ the menu "0.", display only, for functional data detected in real time;
- ▶ the menu "1.", display only, for current values of appliance parameters;
- ▶ menu "2.", control, to execute flame control unit reset operations, reset errors (Paragraph 6.6 p. 25);
- ▶ menu "3.", display and setting, to set the value of some system parameters (e.g. water set point temperature); the values are initialised by the TAC at First Switch-On.

It is accessed without password.

**Menu for the installer or TAC** (not accessible to the user)

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



#### Special key for the knob

- ▶ To access the menus and parameters of the AY10 board, use the special standard supplied key, included in the kit provided with the appliance. The key allows the knob to be operated through the suitable hole in the Electrical Panel cover, operating safely away from live components.
- ▶ Always keep the key for future uses.



#### How to access the Menus and Parameters

Before Starting:

- (1) Power supply switch "ON";
- (2) Display of the AY10 board showing in sequence the detected water temperature data (if the appliance is in normal operation), or the flashing malfunction and failure codes (if the appliance is in failure).

To access the menus and parameters of the AY10 board, proceed as follows:

1. Remove the front panel by removing the fixing screws.
2. Remove the cover of the electrical panel to access the

AY10 board knob.

3. Act on the knob by means of the special key through the suitable hole.
4. Press the knob once to display the menus: the first menu is displayed, "0." (= menu 0).
5. Turn the knob clockwise to scroll down and display the other/subsequent menus; the menu numbers will be displayed in order, "1.", "2.", ... , "6." ... or "E" (= exit).
6. Select the menu of interest (e.g. display "2.\_\_\_" = menu 2) by pressing the knob; the first parameter code will be displayed, in menu order (e.g. display "2.\_20" = parameter 20 in menu 2).
7. Turn the knob clockwise to scroll down the other parameters in the menu; the codes will be displayed in order (e.g. display "2.\_20", "2.\_21", ... "2.\_25" = parameters 20, 21, ... 25 in menu 2), or letter "E" (= exit) at the end of the list.
8. Select the parameter of interest (e.g. with code 161 in menu 3) by pressing the knob; the figure previously assigned to the parameter will be displayed, read only or to be set (e.g. the figure "45" for parameter 161 in menu 3 = water temperature set-point at 45 °C); if instead of a figure/setting it is a command, a flashing code is displayed (e.g. "reS1" for the flame block reset command).
9. Press the knob to reconfirm the figure; or rotate the knob to modify the figure, and press at the end to confirm or set the new figure; if however, it is a matter of controlling an appliance operation, press the knob to execute it.
10. To exit a parameter menu or the menu list and go back to the higher level, turn the knob to display the letter "E" for exit, then press the knob again.
11. Place the cover back on the electrical panel opening and fit the appliance's front panel back on.

## 6.5 MODIFYING SETTINGS



### Modify the settings through the DDC or CCP/CCI

If the appliance is connected to the DDC or to the CCP/CCI control, refer to the relevant manual to modify settings.

### How to raise/lower the water temperature set-point

The water temperature set-point establishes the delivery temperature to the system (water output from the appliance), or return from the system (water input in the appliance). The temperature is pre-set by the TAC upon First Switch-On.



If the appliance is not connected to a DDC or CCP/CCI control, to raise/lower the water temperature setpoint with the AY10 board, proceed as follows:

1. Access menu 3 under parameter 161 (= water temperature set-point) by rotating and pressing the knob; "3.161" must be displayed (procedure Paragraph 6.4 p. 23);
2. Display the parameter value by pressing the knob; the previously set value is displayed (from 25 to 80 °C); to reconfirm the pre-existing value press the knob again, otherwise go to step 3.
3. Turn the knob to modify the value, increasing or decreasing it, and press it to set the new value;
4. Exit menu 3, and from the menu list, by selecting and pressing letter "E" twice, and go back to the normal



display of detected temperature data.



### Do not modify complex settings

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

### Thermal input setting

The appliance is Range Rated. The thermal power can be adjusted by regulating the gas flow. The adjustment is made with parameter 180, from a maximum power of 34,9 kW to a minimum power of 8,0 kW. If multiple appliances are connected to the same system, the parameter value must be the same for all appliances.

## 6.6 RESTARTING A LOCKED-DOWN UNIT

### Fault signals on the display

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

- ▶ To restart the appliance you must know and perform the procedure concerning the issue signalled and identified by the code (Paragraph 8.1 p. 28).
- ▶ Only act if you are familiar with the issue and with the procedure (technical expertise and professional qualifications might be required).
- ▶ If you do not know the code, the problem, or the procedure, or you do not have sufficient skills, and in any case of doubt, contact the TAC.

### Locked-down appliance

An external intervention (reset or repair) is required due to an appliance fault or problem with the system.

- ▶ A reset may be enough for a temporary and provisional anomaly.
- ▶ For a fault or breakdown, alert the maintenance technician

## 7 MAINTENANCE

### 7.1 WARNINGS



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



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



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



Before performing any operation, switch off the appliance by means of the control device (DDC, CCP/CCI or external request) and wait for the end of the switching off cycle, then disconnect power and gas supply, by acting on the electrical disconnecter and gas cock.

or TAC.

### Reset

There are two options for resetting a fault:

- (1) If the appliance is connected to a DDC or to a CCP/CCI you may act through the control device, as described in the relevant manual.
- (2) You may act directly from the AY10 board as described below (if the appliance is controlled with external enable, this is the only option).



### How to perform reset from the AY10 boards

To perform the reset directly from the AY10 board:

1. Access Menu 2 under Parameter "\_20", to reset flame lock-out (Error E.112), or Parameter "\_21", for any other generic reset, turning and pressing the knob; "2.\_20"/"2.\_21" must be displayed (procedure Paragraph 6.4 p. 23);
2. Press the knob to display the flashing reset request (e.g. "reS1" to reset flame block).
3. Press the knob again (the second time) to perform the reset; the reset request stops flashing, then "2.\_XX" is displayed again (e.g. "2.\_20"). The reset operation has been performed.
4. Exit menu 2 and the menu list, by selecting and pressing letter "E" twice, and go back to the normal display of detected temperature data.

## 6.7 EFFICIENCY

For increased appliance efficiency:

- ▶ Adjust the maximum water temperature to the actual system requirements;
- ▶ Reduce repeated switch-ons to the minimum (low loads);
- ▶ Program appliance activation for actual periods of use;
- ▶ Keep water and air filters on plumbing and ventilation systems clean.



The efficiency checks and every other "check and maintenance operation" (see Tables 7.1 p. 26 and 7.2 p. 26) must be performed with a frequency according to current regulations or, if more restrictive, according to the provisions set forth by the manufacturer, installer or TAC.



Responsibility for efficiency checks, to be carried out for the aims of restricting energy consumption, lies with the system manager.



### Environmental or operational heavy conditions

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

## 7.2 PRE-EMPTIVE MAINTENANCE

For pre-emptive maintenance, comply with the recommendations in Table 7.1 p. 26.

Table 7.1

		GAHP A	GAHP GS/WS	AY00-120	GA ACF	GAHP-AR
<b>Guidelines for the preventive maintenance operations</b>						
<b>Check of the unit</b>	visually check of the general condition of the unit and of its air heat exchanger	√(1)	-	-	√(1)	√(1)
	check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
	check the % value of CO <sub>2</sub>	√	√	√	-	-
	check gas pressure to the burners	-	-	-	√	√
	check that the condensate discharge is clean (If necessary, frequency of the maintenance operation must be increased)	√	√	√	-	-
	replace the belts after 6 years or 12,000 hours of operation	√	√	-	√	√
	check/restore the pressure of the primary hydronic circuit	-	-	√	-	-
<b>Check for every DDC or CCI</b>	check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit	-	-	√	-	-
	Check that the plant is able to achieve the setpoint temperature	√	√	√	√	√
	download the hystorical events	√	√	√	√	√

(1) It is suggested to clean the finned coil once every 4 years (Optimal frequency of the cleaning operation is in any case strongly affected by the installation site).

## 7.3 SCHEDULED ROUTINE MAINTENANCE

For scheduled routine maintenance, perform the operations in Table 7.2 p. 26, at least once every 2 years.

Table 7.2

		GAHP A	GAHP GS/WS	AY00-120	GA ACF	GAHP-AR
<b>Routine scheduled maintenance (to be performed at least once every TWO YEARS)</b>						
<b>Check of the unit</b>	clean the combustion chamber	√(1)	√(1)	√	√	√(1)
	clean the burner	√(1)	√(1)	√	√	√(1)
	clean the electrodes of ignition and flame sensing	√	√	√	√	√
	check that the condensate discharge is clean	√	√	√	-	-
	replace the silicone gasket between the front plate and the exchanger	-	-	√	-	-

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

## 7.4 PERIODS OF INACTIVITY



### Avoid emptying the installation

Emptying the system may cause damage due to corrosion of the water pipes.



### Deactivate the system in winter

Should you intend to stop the appliance in the winter season, ensure at least one of the following conditions:

1. anti-icing function active (Paragraph 3.5 p. 14);
2. sufficient anti-icing glycol (Paragraph 3.6 p. 14).

### Prolonged periods of inactivity

- Should you foresee to leave the appliance inactive for a long period of time, disconnect it from the electrical and gas mains. These operations must be performed by Qualified Personnel.



### How to deactivate the appliance for long periods of time

1. Switch the appliance off (Paragraph 6.2 p. 23).
2. Only when the appliance is completely off, power it off with the main switch/disconnector switch (Detail GS in Figure 4.2 p. 19).

### 3. Close the gas valve

4. If necessary, add water with glycol (if the appliance is disconnected from the power and gas mains, the active anti-icing protection is missing, Paragraph 3.5 p. 14).



### How to reactivate the appliance after long periods of inactivity

Before reactivating the appliance, the operator/maintenance technician of the system must first of all:

- Check whether any maintenance operations are required (contact the TAC; see Paragraphs 7.2 p. 26 and 7.3 p. 26).
  - Check content and quality of the water in the system, and if necessary top it up (Paragraphs 3.8 p. 15, 3.7 p. 15 and 3.6 p. 14).
  - Ensure the flue gas exhaust duct is not obstructed, and that the condensate drain is clean.
- After completing the above checks:
1. Open the gas cock and ensure there are no leaks; should gas smell be noticed, close the gas cock again, do not switch any electrical devices on and request intervention by Skilled Personnel.
  2. Power on with the main power supply switch (GS, Figure 4.2 p. 19).
  3. Switch on the appliance by means of the provided control device (DDC, CCP/CCI or external request, Paragraph

4.4 p. 19).

## 8 DIAGNOSTICS

### 8.1 OPERATIVE CODES

**Table 8.1** Operative Codes AY00-120

CODES	DESCRIPTION	Warning (u)	Error (E)
100	FAULT ON RESET CIRCUIT OF FLAME CONTROL UNIT	NA	Power cycle the appliance. If the code persists, shows up again or in case of doubt, contact the TAC.
101	THERMOSTAT TRIP INTERNAL CIRCUIT LIMIT	Contact authorised Technical Assistance	
102	FLUE GAS THERMOSTAT AND/OR INTERNAL EXCHANGER THERMOSTAT TRIP	Contact authorised Technical Assistance	
103	HEATING BOARD (S70) ABSENT	NA	Contact authorised Technical Assistance
105	AMBIENT TEMPERATURE EXCEEDING OPERATIVE LIMITS	NA	Reset is automatic when the triggering condition ceases.
106	AMBIENT TEMPERATURE LOWER THAN OPERATIVE LIMITS	Non-blocking Warning (informative code). The code is reset automatically when the triggering condition ceases.	NA
107	SYSTEM CIRCUIT WATER PRESSURE SWITCH TRIP WITH SYSTEM IN COLD MODE	Reset is automatic when the triggering condition ceases.	NA
112	FLAME CONTROLLER UNIT ARREST	Reset is automatic up to 4 attempts (in about 5 minutes).	Gas supply check. Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 20). If the code persists or in case of doubt, contact the TAC.
127	FAULTY INTERNAL CIRCUIT WATER PRESSURE SWITCH OR INSUFFICIENT INTERNAL CIRCUIT WATER FLOW	Reset is automatic when the triggering condition ceases.	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists or in case of doubt, contact the TAC.
128	GAS SOLENOID VALVE EXCITED DURING FLAME CONTROLLER ARREST	NA	Power off the appliance. Contact the TAC.
129	GAS SOLENOID VALVE WITHOUT ELECTRICAL POWER	Reset occurs automatically if the gas solenoid valve switches on again within 10 minutes (with central flame control unit on).	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
135	FAULTY INTERNAL CIRCUIT DELIVERY TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
136	BLOWER FAULT	Reset occurs automatically 20 minutes after the code is generated.	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
175	INSUFFICIENT SYSTEM CIRCUIT WATER FLOW	Reset is automatic when the triggering condition ceases.	Check and clean water filters on the system. Check for air in the system. Check water flow pump. Power cycle the appliance. Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
176	FAULTY SYSTEM CIRCUIT DELIVERY TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
177	FAULTY SYSTEM CIRCUIT RETURN TEMPERATURE PROBE	NA	Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 21). If the code persists, shows up again or in case of doubt, contact the TAC.
178	HIGH HOT OUTLET WATER TEMPERATURE	Reset is automatic when the triggering condition ceases.	NA
179	DEFROST FUNCTION ACTIVATED	Non-blocking Warning (informative code). The code clears automatically when anti-icing function execution ends.	NA
80	INCOMPLETE OR INVALID PARAMETERS	Contact the TAC.	
81	INVALID P0 PARAMETERS	Reset is automatic when the triggering condition ceases.	Contact the TAC.
82	INVALID P1 PARAMETERS	Reset is automatic when the triggering condition ceases.	Contact the TAC.
84	FAULTY TRANSFORMER CONNECTION OR 24 V AC FUSES	NA	Contact the TAC.
85	INCORRECT MODULE TYPES	NA	Contact the TAC.
86	FAULTY BOARD, ROM	NA	Contact the TAC.

## 9 APPENDICES

### 9.1 PRODUCT FICHE

Figure 9.1

Table 7  
COMMISSION DELEGATED REGULATION (EU) No 811/2013

**Technical parameters for boiler space heaters, boiler combination heaters and cogeneration space heaters**

Model(s):				AY120			
Condensing boiler:				yes			
Low-temperature (**) boiler:				no			
B11 boiler:				no			
Cogeneration space heater:				no	If yes, equipped with a supplementary heater:		no
Combination heater:				no			
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
<b>Rated heat output</b>	$P_{rated}$	34,9	kW	<b>Seasonal space heating energy efficiency</b>	$\eta_s$	90,7	%
For boiler space heaters and boiler combination heaters: Useful heat output				For boiler space heaters and boiler combination heaters: Useful efficiency			
At rated heat output and high-temperature regime (*)	$P_4$	34,4	kW	At rated heat output and high-temperature regime (*)	$\eta_4$	98,6	%
At 30 % of rated heat output and low-temperature regime (**)	$P_l$	8,6	kW	At 30 % of rated heat output and low-temperature regime (**)	$\eta_l$	107,5	%
Auxiliary electricity consumption				Other items			
At full load	$el_{max}$	0,185	kW	Standby heat loss	$P_{stby}$	0,058	kW
At part load	$el_{min}$	0,080	kW	Ignition burner power consumption	$P_{ign}$	0	kW
In standby mode	$P_{SB}$	0,005	kW	Annual energy consumption	$Q_{HE}$	286,2	GJ
				Sound power level, indoors	$L_{WA}$	- / 57,0	dB

(\*) High-temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.

(\*\*) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

Additional information required by COMMISSION REGULATION (EU) No 813/2013, Table 1:

Emissions of nitrogen oxides:  $NO_x$ 

31
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 mg/kWh





## Robur mission

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



Robur S.p.A.  
advanced technologies  
for climate conditioning  
via Parigi 4/6  
24040 Verdellino/Zingonia (BG) Italy  
+39 035 888111 - F +39 035 884165  
[www.robur.it](http://www.robur.it) [robur@robur.it](mailto:robur@robur.it)

