



Installation, use and maintenance manual

AY00-120

Condensing boiler
for heating

gas powered



DISPOSAL

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



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

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I INTRODUCTION



Installation, use and maintenance 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 adjustment device to control one or more Robur appliances (GAHP heat pumps, GA chillers and AY00-120 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 start-up = 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 qualified personnel, with specific knowledge on heating, cooling, electrical systems and gas appliances, in compliance with the laws in force in the Country of installation.



Declaration of conformity

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



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 qualified 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 valve.
- Upon completing any procedure, perform the tightness test according to regulations in force.

**Gas smell**

If you smell gas:

- Do not use electrical devices such as telephones, multimeters or other equipment that may cause sparks next to the appliance.
- Shut off the gas supply by turning the valve off.
- Switch off the power supply via the external disconnect switch in the power supply electrical panel.
- Use a telephone away from the appliance to ask for intervention from qualified personnel.

**Poisoning**

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

**Moving parts**

The appliance contains moving parts.

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

**Burn hazard**

The appliance contains very hot parts.

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

**Electrocution hazard**

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

**Earthing**

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

**Distance from combustible or flammable materials**

- Do not deposit flammable materials (paper, diluents, paints, etc.) near the appliance.

**Limescale and corrosion**

Depending on the chemical/physical properties of the system water, limescale or corrosion may damage the appliance (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 the 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. 18, 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 provided control device (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, using only 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. 26) and in compliance with current regulations.
- Appliance maintenance and repairs may only be entrusted to firms legally authorised to work on gas appliances and systems.
- Enter into a maintenance contract with an authorised specialised firm for routine maintenance and for servicing in case of need.
- Use only original parts.

**Decommissioning and disposal**

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

**Keep the Manual**

This Installation, use and maintenance manual must always accompany the appliance and must be handed to the new owner or installer in the event of sale or removal.

III.2 CONFORMITY

EU directives and standards

The appliance is certified in accordance with European regulation GAR 426/2016/EU and meet the essential requirements of the following Directives:

- ▶ Efficiency Directive 92/42/EEC and subsequent modifications and additions.
- ▶ 2016/426/EU "Gas Appliances Regulation" as amended and added.
- ▶ 2014/30/EC "Electromagnetic Compatibility Directive" as amended and added.
- ▶ 2014/35/EC "Low Voltage Directive" as amended and added.
- ▶ 2006/42/EC "Machine Directive" as amended and added.

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

- ▶ EN 15502 Gas-fired central heating boilers.

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 to the appliance by the plant or installation (mechanical stresses, pressure, vibrations, thermal expansion, electrical surges...).
- Accidental damages or due to force majeure.

1 FEATURES AND TECHNICAL DATA

1.1 FEATURES

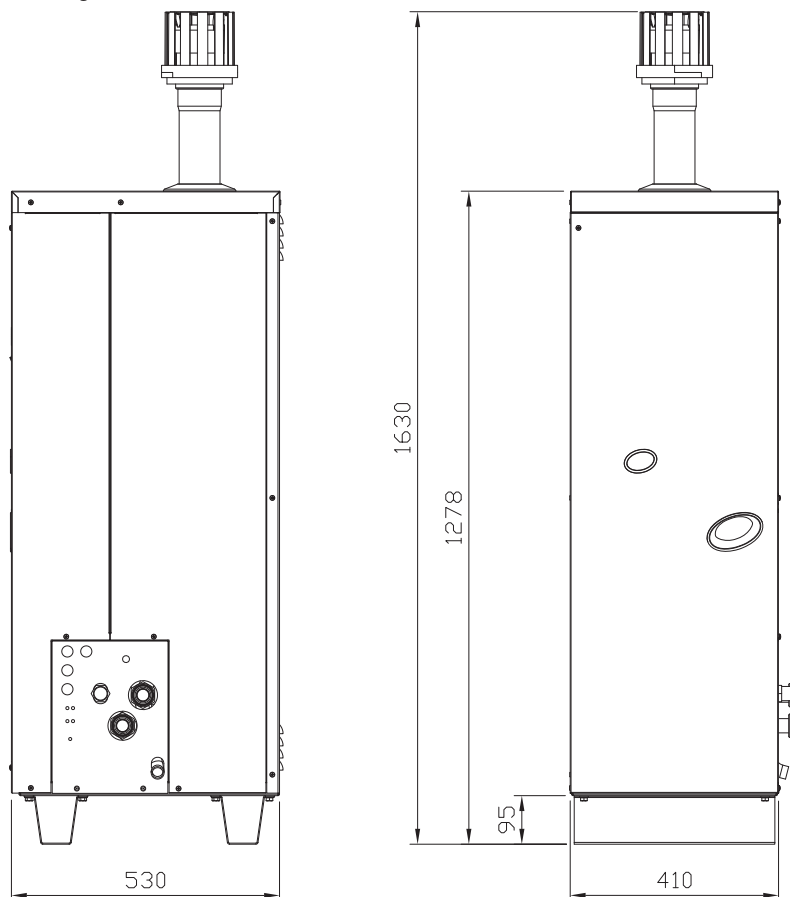
AY00-120 unit is a high efficiency condensing boiler suitable for supply hot water up to 80 °C. The appliance is provided with an internal heat exchanger to separate internal hydraulic circuit from system hydraulic circuit.

Mechanical and thermo-hydraulic components

- ▶ Premix multigas burner with low NOx and CO emissions.
- ▶ Stainless steel plate heat exchanger, which also acts as a hydraulic separator.
- ▶ Automatic and manual air vent devices on the appliance internal circuit.
- ▶ Flue gas exhaust duct with relevant terminal, for type B53P configuration.
- ▶ Condensate discharge siphon (with antifreeze protection).

1.2 DIMENSIONS

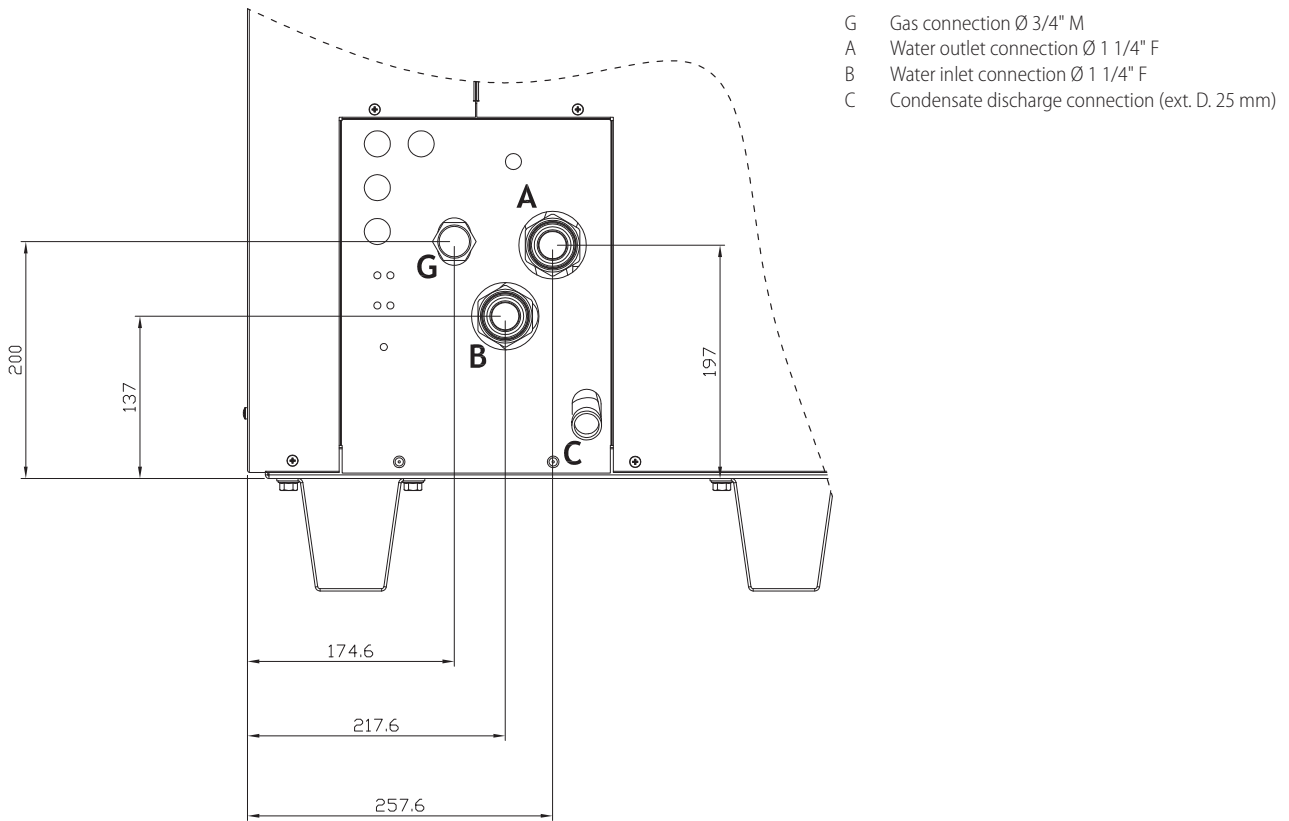
Figure 1.1 Dimensions (front and right side views)



Control and safety devices

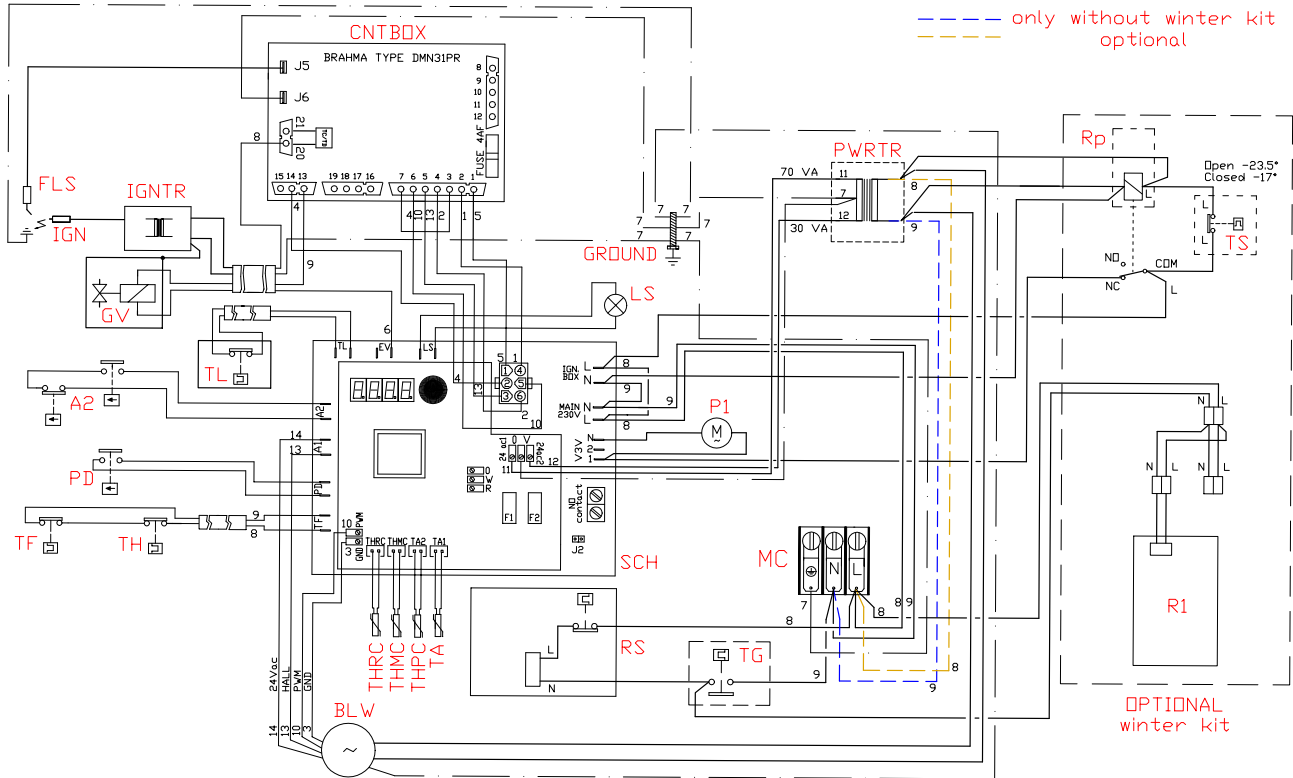
- ▶ Electronic board with microprocessor.
- ▶ Automatically resettable water temperature limit thermostat.
- ▶ Flue gas limit thermostat, for single use (thermal switch).
- ▶ System circuit water differential pressure switch (PD1).
- ▶ Appliance internal circuit water differential pressure switch (PD2) with anti-welding function.
- ▶ Overpressure valve for the appliance internal circuit, set to trip at 3 bar.
- ▶ Appliance internal circuit expansion tank.
- ▶ Ionization flame control box.
- ▶ Double shutter electric gas valve.
- ▶ Antifreeze functions for hydraulic circuit.
- ▶ Antifreezing thermostat for the heating element on the condensate siphon.

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	Power supply 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		

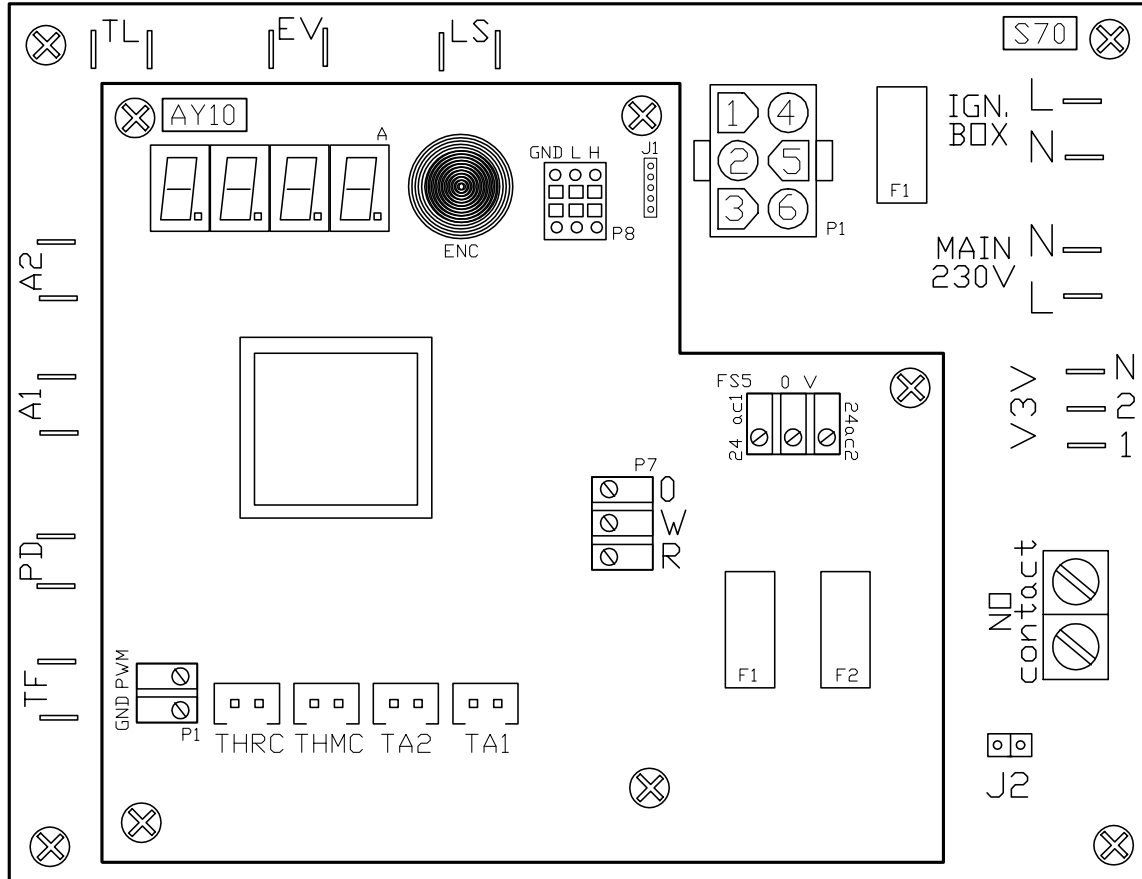
1.4 ELECTRONIC BOARDS

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.
- ▶ **S70 auxiliary 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 circulator 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 circulation 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:

- ▶ DDC controller
- ▶ CCP/CCI controller
- ▶ external request

1.5.1 Control 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).
- ▶ Data display and parameters setting.
- ▶ Hourly programming.
- ▶ Climatic curve control.
- ▶ Diagnostics.
- ▶ Errors reset.
- ▶ Possibility to interface with a BMS.

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

1.5.2 Control 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 integration ON/OFF boiler. For further details and diagrams refer to the CCP/CCI manual and the design manual.

CCP/CCI Control



See CCP/CCI device Manual.

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

The appliance may also be controlled via generic request devices (e.g. thermostat, timer, switch, contactor...) fitted with voltage-free NO contact. This system only provides elementary control (on/off, with fixed set-point temperature), hence without the important functions of systems (1) and (2). It is advisable to possibly limit its use to simple applications only and with a single appliance.



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

1.6 TECHNICAL DATA

Table 1.1 AY00-120 technical data

				AY00-120
Heating mode				
seasonal space heating energy efficiency class (ErP)		A		
Operating point 80/60	Nominal heat input	effective power	kW	34,4
		efficiency	%	98,6
	Mean heat input	efficiency	%	98,3
	Minimal heat input	efficiency	%	97,3
Operating point 70/50	Nominal heat input	efficiency	%	100,6
Operating point 50/30	Nominal heat input	efficiency	%	104,6
Operating point Tr = 30 °C	Heat input 30%	efficiency	%	107,5
Operating point Tr = 47 °C	Heat input 30%	efficiency	%	100,3
Heat input	nominal (1013 mbar - 15 °C) (1)		kW	34,9
	average		kW	21,5
	minimum (1)		kW	8,0
Hot water delivery temperature	maximum		°C	80
	minimum		°C	25
	nominal		°C	60
Hot water return temperature	maximum		°C	70
	minimum		°C	20
	nominal		°C	50
Heating water flow	nominal		l/h	2950
	maximum		l/h	3200
	minimum		l/h	1500
Pressure drop heating mode	at nominal water flow		bar	0,40 (2)
efficiency class		****		
Heat losses	to casing in operation		kW	0,15
	to casing in operation		%	0,44
	to flue in operation		kW	0,86
	to flue in operation		%	2,54
	with burner off		kW	0,058
	with burner off		%	0,17
Ambient air temperature (dry bulb)	maximum		°C	45
	minimum		°C	-20 (3)
Electrical specifications				
Power supply	voltage		V	230
	type		-	single-phase
	frequency		Hz	50
Electrical power absorption	nominal		kW	0,18
Degree of protection	IP		-	XSD
Installation data				

(1) Relative to NCV (net calorific value).

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

(3) As an option, a version for operation down to -40 °C is available.

			AY00-120
Gas consumption	G20 natural gas (nominal)	m ³ /h	3,69
	G20 natural gas (min)	m ³ /h	0,85
	G25 (nominal)	m ³ /h	4,35
	G25 (min)	m ³ /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
NO _x emission class		-	5
NO _x emission		ppm	19,5
CO emission		ppm	8,4
minimum storage temperature		°C	-30
maximum water pressure in operation		bar	4,0
maximum flow flue condensate		l/h	5,5
Water content inside the apparatus	hot side	l	1
Water fitting	type	-	F
	thread	"	1 1/4
Gas connection	type	-	M
	thread	"	3/4
Flue gas exhaust	diameter (Ø)	mm	80
	residual head	Pa	100
	product configuration	B53P	
type of installation		-	B32P, B33, B35P, C13, C33, C34, C53, C63, C83
Dimensions	width	mm	410
	depth	mm	530
	height	mm	1278
Weight	in operation	kg	71

(1) Relative to NCV (net calorific value).
 (2) For flows other than nominal see Design Manual, Pressure losses Paragraph.
 (3) As an option, a version for operation down to -40 °C is available.

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

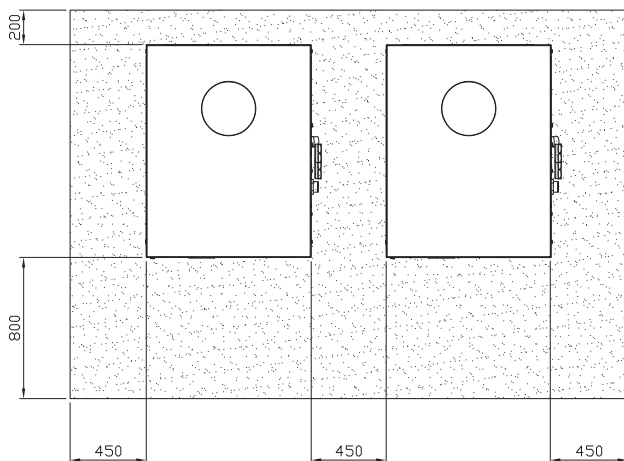
Distances from combustible or flammable materials

- ▶ 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 level flat surface made of fireproof material and able to withstand its weight.

(1) - installation at ground level

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

(2) - 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 HYDRAULIC SYSTEM

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 tank/buffer.

Minimum water content

High thermal inertia is conducive to efficient appliance operation. Very short ON/OFF cycles are to be avoided.

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

3.3 HYDRAULIC CONNECTIONS

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,

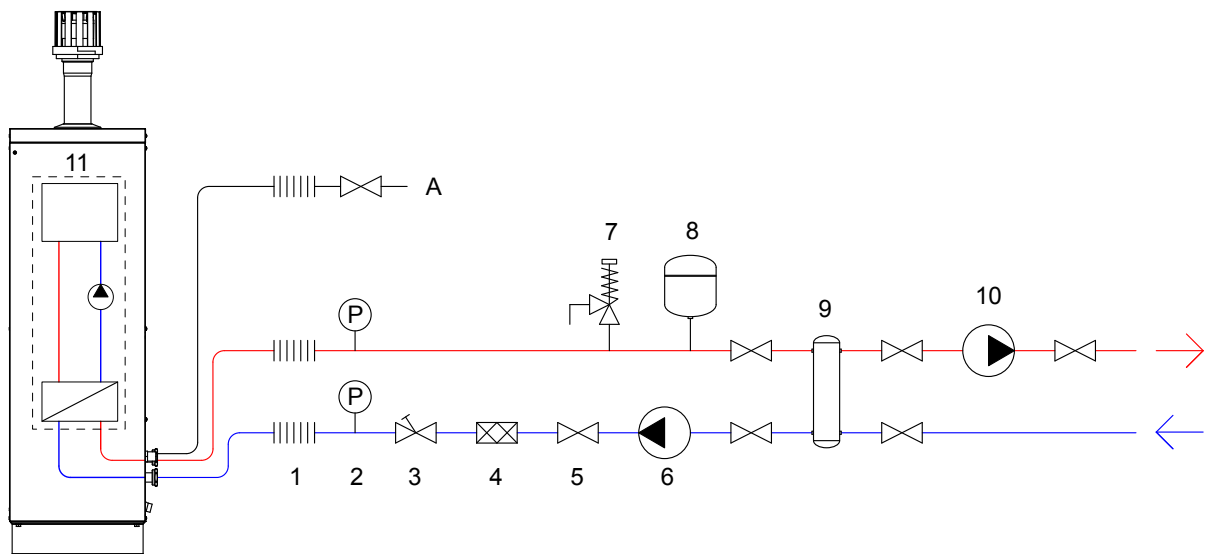
removing any residue.

Minimum components of water circuit


Always provide, near the appliance:

- ▶ on water piping, both output and input
 - 2 antivibration joints on water fittings
 - 2 pressure gauges
 - 2 isolation ball valves
- ▶ on the inlet water piping
 - 1 separator filter
 - 1 flow regulation valve, if the circulation pump is with constant flow
 - 1 water circulation pump, towards the appliance
- ▶ on the output water piping
 - 1 safety valve (3 bar)
 - 1 expansion tank of the individual unit

Figure 3.1 Hydraulic plan



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

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

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.

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 pressure losses refer to Table 1.1 p. 11 and Design Manual.

3.5 ANTIFREEZE FUNCTION

Active antifreeze self-protection

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

Electrical and gas continuity

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

3.6 ANTIFREEZE LIQUID

Precautions with glycol

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

- Always check product suitability and its expiry date with the glycol supplier. Periodically check the product's preservation state.

- Do not use car-grade antifreeze liquid (without inhibitors), nor zinc-coated piping and fittings (incompatible with glycol).
- Glycol modifies the physical properties of water (density, viscosity, specific heat...). Size the piping, circulation pump and thermal generators accordingly.
- With automatic system water filling, a periodic check of the glycol content is required.

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 antifreeze glycol

Inhibited type glycol is recommended to prevent oxidation phenomena.

Glycol effects

The Table 3.1 p. 15 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 characteristics

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	Measurement unit	Required value
pH	/	> 7 (1)
Chlorides	mg/l	< 125 (2)
Total hardness (CaCO ₃)	°f	< 15
	°d	< 8,4
Iron	mg/kg	< 0,5 (3)
Copper	mg/kg	< 0,1 (3)
Aluminium	mg/l	< 1
Langelier's index	/	0-0,4
Harmful substances		
Free chlorine	mg/l	< 0,2 (3)
Fluorides	mg/l	< 1
Sulphides		ABSENT

- 1 With aluminium or light alloys radiators, pH must also be lower than 8 (in compliance with applicable rules)
- 2 Value referred to the maximum water temperature of 80 °C
- 3 In compliance with applicable rules

Water topping up

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

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

Chemical conditioning and washing

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

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

3.8 SYSTEM FILLING

How to fill up the system

After completing all water, electrical and gas connections:

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



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.

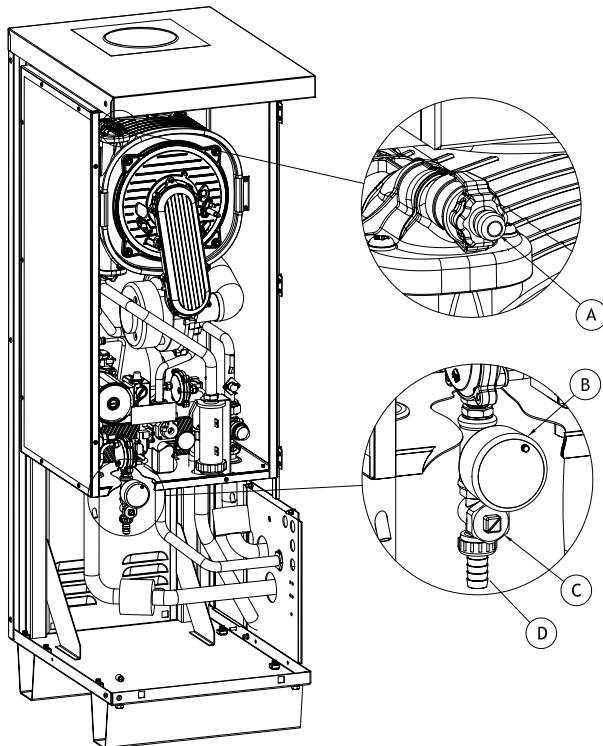


How to restore the charge of the water circuit inside the appliance

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 valve and fix the supplied hose fitting (detail D).
4. Open the filling valve, 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 valve 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 valve.
9. Close the front panel with its retainer bolts.
10. Restore the appliance and keep the hose fitting in a safe place.

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



- A manual air vent valve
 - B pressure gauge
 - C filling valve *
 - D D.13 hose fitting supplied
- * cut in horizontal position: valve closed;
cut in vertical position: valve 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 pressure drops and, consequently, insufficient gas pressure for the appliance.

Supply gas pressure



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

The appliance's gas supply pressure, both static and dynamic, must comply with Table 3.3 p. 17, with tolerance ± 15%.



Non compliant gas pressure (Table 3.3 p. 17) may damage the appliance and be hazardous.

Table 3.3 Network gas pressure

Product category	Countries of destination	Gas supply pressure							
		G20 [mbar]	G25 [mbar]	G30 [mbar]	G31 [mbar]	G25.1 [mbar]	G27 [mbar]	G2,350 [mbar]	G30 ↔ G31 [mbar]
II _{2H3B/P}	AL, BG, CZ, DK, EE, FI, GR, HR, 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, LT, MK, PT, SI, SK	20			37				
	RO	25			30				
II _{2H3+}	IT	20							28-30/37
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 _{2E3B/P}	PL	20		37	37				
II _{2ELWLS3B/P}		20		37	37	20	13	13	
II _{2ELWLS3P}		20			37	20	13	13	
I _{2E(S)}	BE	20	25						
I _{3P}	BE				37				
	IS				30				
I _{2H}	LV	20							
I _{3B}	MT			30					
I _{3B/P}	CY, MT			30	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



Compliance with standards

The appliance is approved for connection to a combustion products exhaust duct for the types shown in Table 1.1 p. 11.

3.10.1 Flue gas exhaust connection

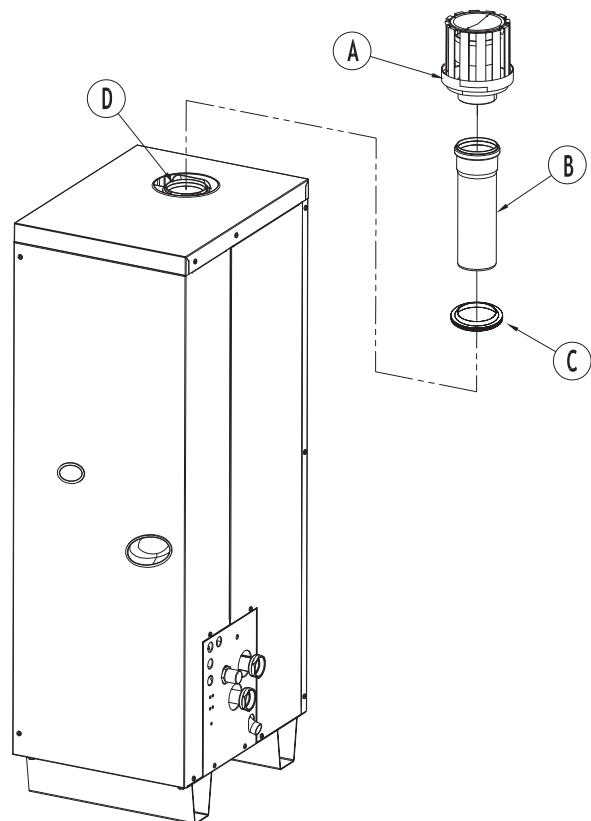
- ▶ Ø 80 mm (with gasket), at the top (Figure 1.1 p. 7).

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.

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

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

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 firm, with materials and components complying with the regulations in force in the country of installation.
- ▶ Always provide a socket for flue gas analysis, in an accessible position.

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.

The connection of the discharge to the sewerage system must be made at atmospheric pressure, i.e. by dripping into a siphoned container connected to the sewerage system.

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 freezing.
- ▶ 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 blackouts 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:

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

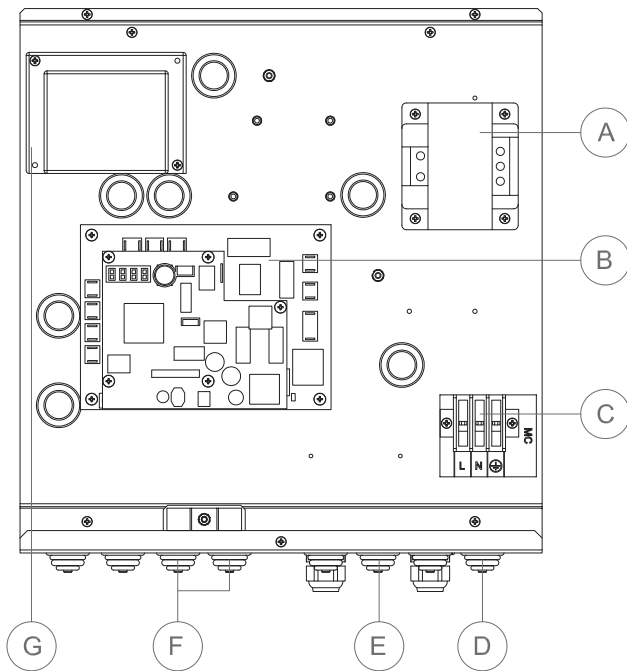


How to make connections

All electrical connections must be made in the appliance's electrical panel (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 panel.
3. Run the cables through the suitable holes in the connection plate.
4. Run the cables through the suitable cable glands in the electrical panel.
5. Identify the appropriate connection terminals.
6. Make the connections.
7. Close the electrical panel and fit the front panel back on.

Figure 4.1 Electrical panel



- A Transformer 230/24 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 2 A type T fuses, (GS) or 1 4 A magnetothermic breaker.



The switches must also provide disconnect capability,

with min contact opening 3 mm.

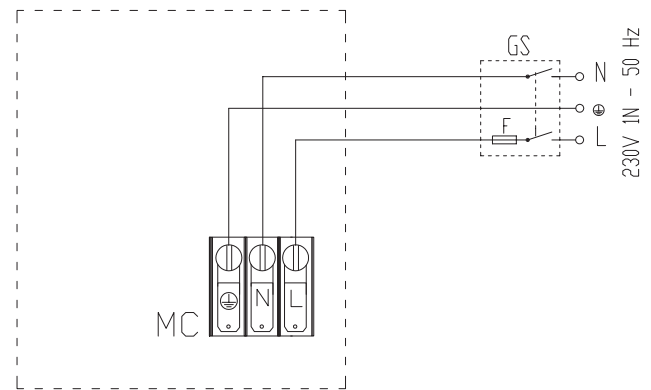
How to connect the power supply



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. 19.
2. Connect the three wires to terminal block (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 Power supply connection



MC Power supply terminal block
L Phase
N Neutral

Components NOT SUPPLIED

GS Main switch
F Fuse(s)

4.4 ADJUSTMENT 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. 21, 4.7 p. 23):

- ▶ 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 or CCP/CCI controllers are 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 ≤200 m and max 4 nodes (e.g. 1 DDC + 3 GAHP), a simple 3x0,75 mm² shielded cable may be used.

Table 4.1 CAN bus cables type

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

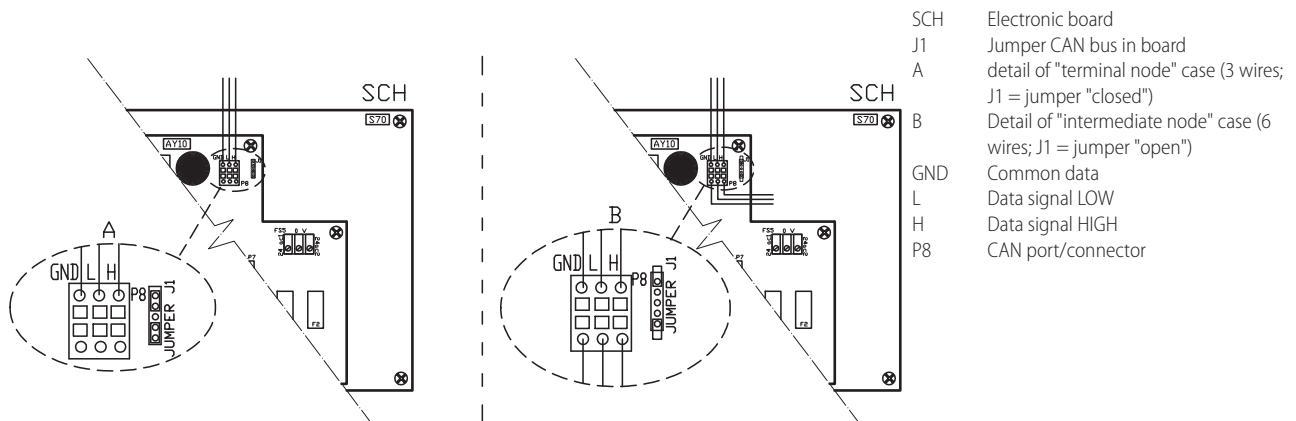


How to connect the CAN bus cable to the appliance

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. 19.
2. Connect the CAN bus cable to the GND (shielding/earthing)
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 or the CCP/CCI to the CAN bus cable according to the instructions in the following Paragraphs and the DDC or CCP/CCI Manuals.

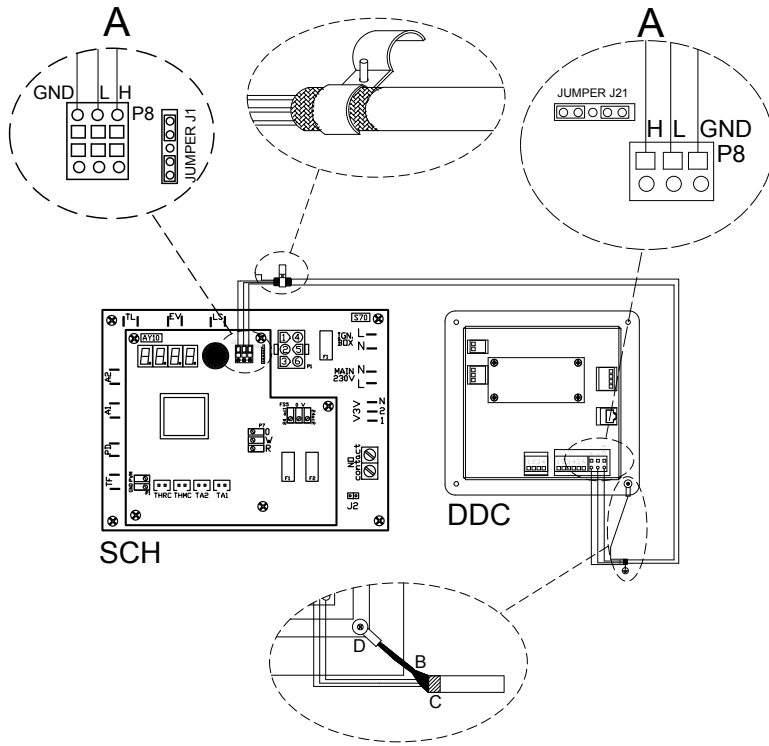
Figure 4.3 Connection of the CAN bus cable to the electronic board



AY configuration (AY10) + DDC

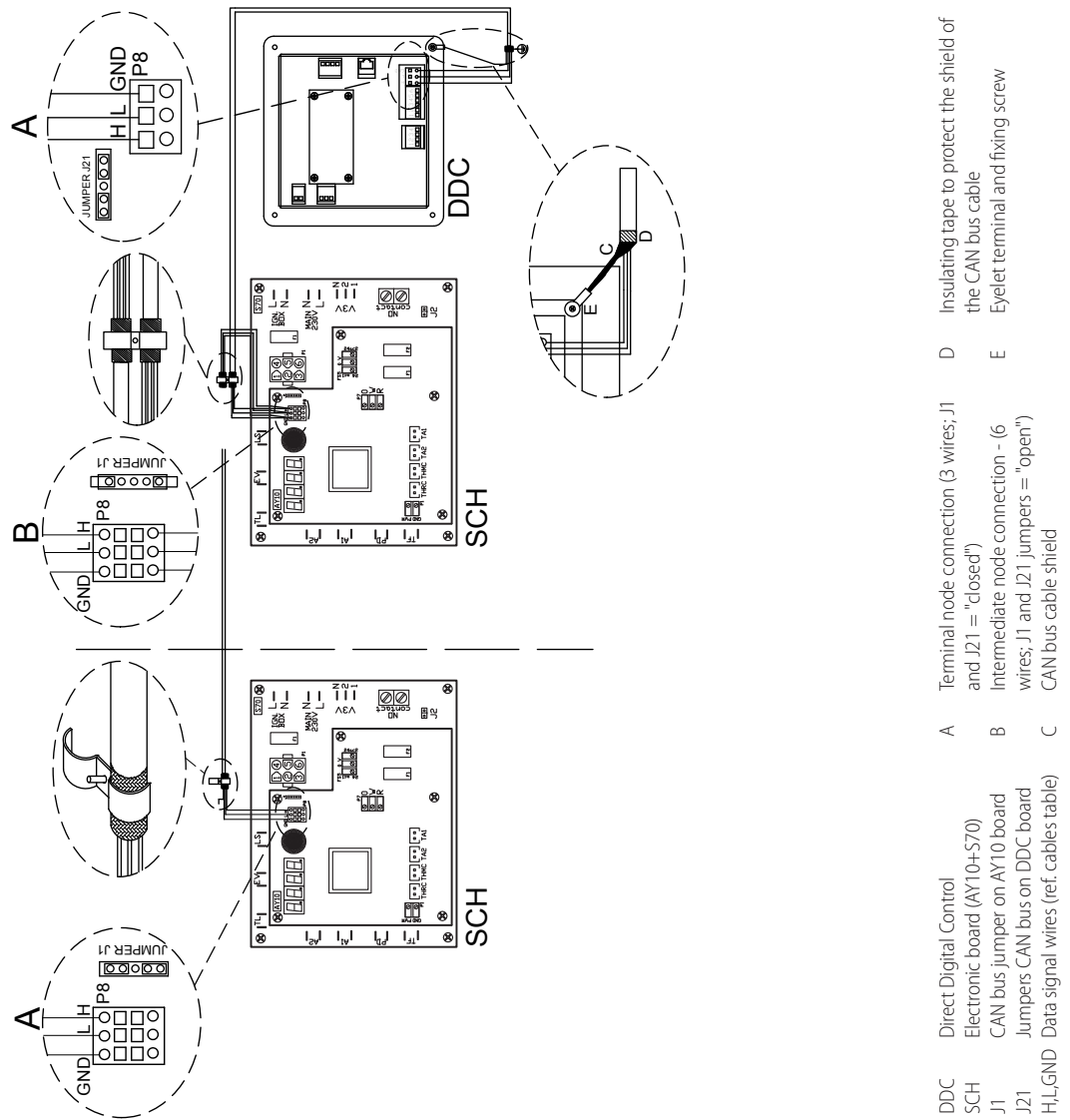
System (1) see also Paragraph 1.5 p. 10.

Figure 4.4 CAN-BUS connection for systems with one unit



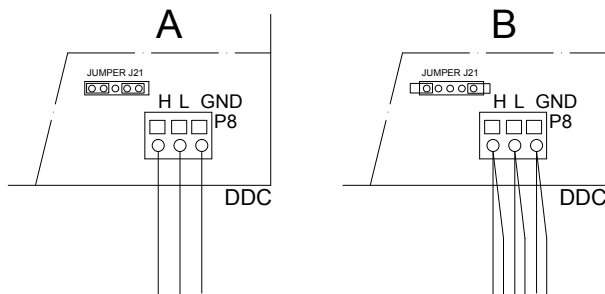
- DDC Direct Digital Control
- SCH Electronic board (AY10+S70)
- J1 CAN bus jumper on AY10 board
- J21 Jumpers CAN bus on DDC board
- H,L,GND Data signal wires (ref. cables table)
- A Terminal node connection (3 wires; J1 and J21 = "closed")
- B CAN bus cable shield
- C Insulating tape to protect the shield of the CAN bus cable
- D Eyelet terminal and fixing screw

Figure 4.5 CAN bus connection for systems with multiple single units



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

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



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

External request

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

It is required to arrange:

- Enable device (e.g. thermostat, timer, switch, ...) fitted with a voltage-free NO contact.

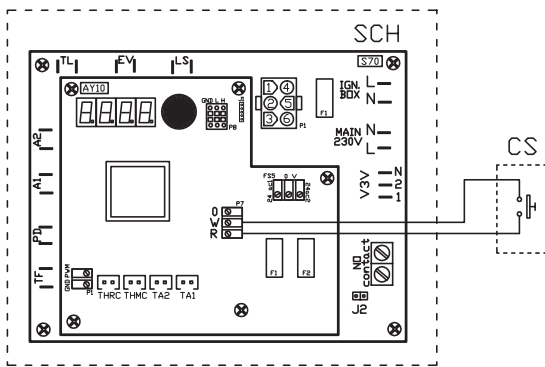


How to connect the external request

Connection of external request is effected on the AY10 board located in the electrical panel inside the appliance (Figure 4.7 p. 23).

1. Access the electrical board of the appliance according to the Procedure 4.2 p. 19.
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 4.7 External heating request connection



SCH Electronic board
R Common
W Heating request terminal

Components NOT SUPPLIED

CS External request

4.5 WATER CIRCULATION PUMP

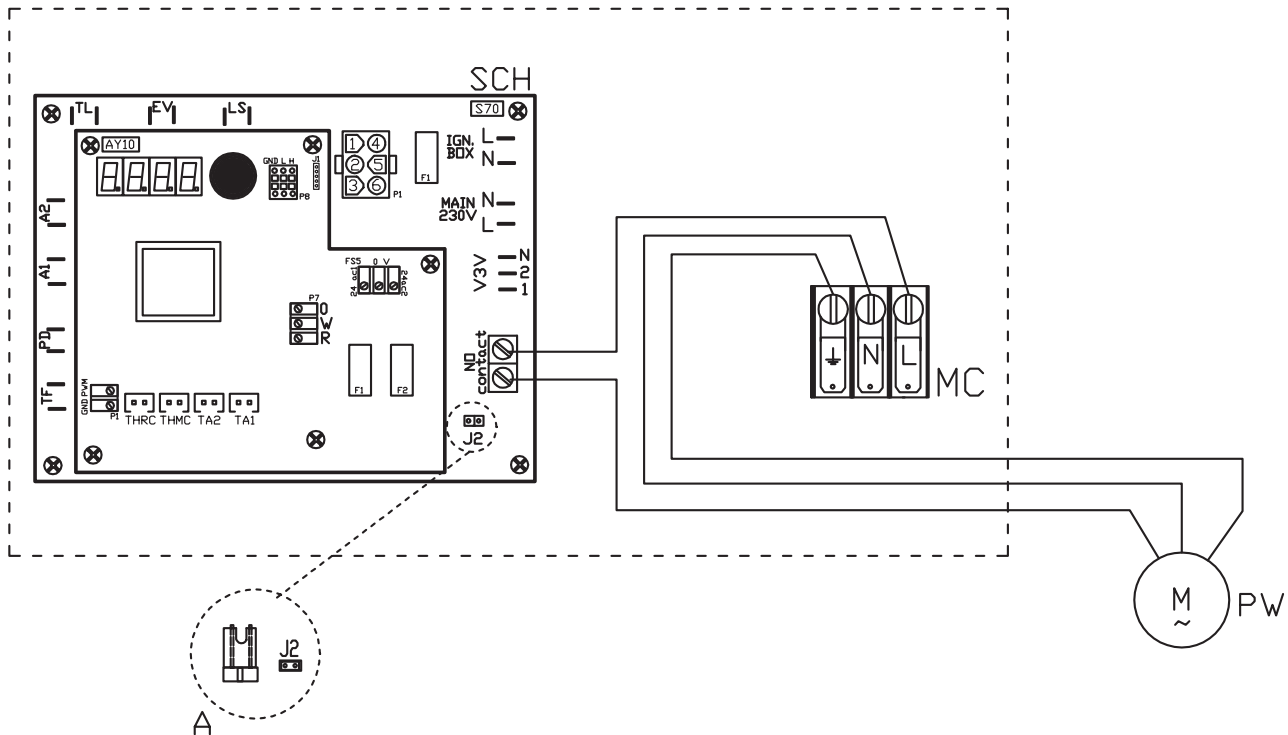
It must be mandatorily controlled from the S70 electronic board. The diagram in Picture 4.8 p. 23 is for pumps < 700 W. For pumps > 700 W it is required to add a control relay and set up Jumper J2 OPEN.



How to connect the constant flow circulating pump

1. Access the electrical board of the appliance according to the Procedure 4.2 p. 19.
2. Connect to S70 board, to terminals NO-Contact.
3. Jumper J2 open if the pump is > 700 W or is a Wilo electronic pump, otherwise closed.

Figure 4.8 Water circulation pump connection - Connection of plant water circulation pumps (power absorption less than 700W), controlled directly by the appliance.



SCH electronic board
NO contact system water circulating pump control terminals (voltage-free normally open contact, maximum absorbed power 700 W)
J2 system water circulating pump control jumper

A "closed" jumper detail
MC 230 VAC power supply terminal block
Components NOT SUPPLIED
PW water pump < 700 W

Note

- 1 Jumper J2 must be closed if the installed pump is not a Wilo electronic pump.

Jumper J2 must be opened if the installed pump is a Wilo electronic pump.

5 FIRST START-UP



First start-up entails checking/setting up the combustion parameters and may exclusively be carried out by a Robur TAC. NEITHER the user NOR the installation

technician is authorised to perform such operations, under penalty of voiding the warranty.

5.1 PRELIMINARY CHECKS

Preliminary checks for first start-up

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

- ▶ Water, electrical and gas systems suitable for the required capacities and equipped with all safety and control devices required by the regulations in force.
- ▶ Absence of leaks in the water and gas systems.
- ▶ Type of gas for which the appliance is designed (natural gas or LPG).
- ▶ Supply gas pressure complying with the values of Table 3.3 p. 17, with max tolerance $\pm 15\%$.
- ▶ Correct operation of the flue exhaust duct.
- ▶ Power supply mains complying with the appliance's rating plate data.
- ▶ Appliance correctly installed, according to the manufacturer's 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.

5.2 ELECTRONIC ADJUSTMENT ON THE MACHINE – MENUS AND PARAMETERS

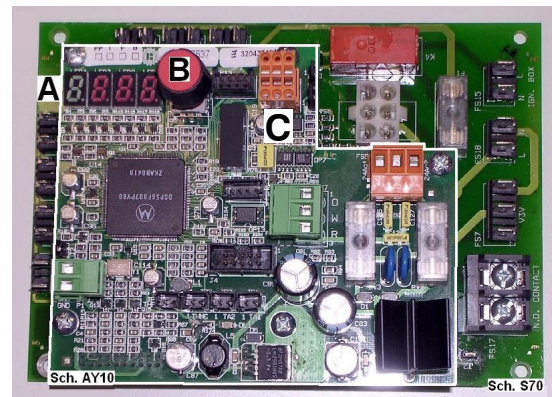


Firmware

The instructions on the use of the AY10 electronic board concern the **firmware version 3.108**.

The electronic board (AY10) of the appliance

Figure 5.1 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 5.1 p. 24) 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 5.1 p. 24):

- ▶ 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 7.5 p. 27).
- ▶ Menu "3.", display and setting, to set the value of some system parameters (e.g. water setpoint temperature); the values are initialised by the TAC at first start-up.

It is accessed without password.

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

- ▶ Menu "4.", "5." and "6." are password-protected. These are

specific sections, exclusively intended for qualified personnel (installer or TAC). For information see the Service manual.

- ▶ Menu "7." is display only and intended for the manufacturer.
- ▶ Menu "8." is empty, it may be selected but not used.

Special key for the knob

- ▶ To access the menus and parameters of the 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 (see also Figure 5.1 p. 24):

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 setpoint at 45 °C); if instead of a figure/setting it is a command, a flashing code is displayed (e.g. "reS1" for the flame lock-out reset command).
9. Press the knob to reconfirm the figure; or rotate the knob

to modify the figure, and press at the end to confirm or set the new figure; if however, it is a matter of controlling an appliance operation, press the knob to execute it.

10. To exit a parameter menu or the menu list and go back to the higher level, turn the knob to display the letter "E" for exit, then press the knob again.
11. Place the cover back on the electrical panel opening and fit the appliance's front panel back on.

5.3 MODIFYING SETTINGS



Modify 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 setpoint

The water temperature set-point establishes the outlet temperature to the system (water output from the appliance), or inlet from the system (water input in the appliance). The temperature is pre-set by the TAC upon first start-up.



If the appliance is not connected to a DDC 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 5.2 p. 24);
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 heat output 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.

on regulations and on safety.



First startup by TAC

First start-up may exclusively be carried out by a Robur TAC (Chapter 5 p. 23).



Never power the appliance off while it is running

NEVER power the appliance off while it is running (except

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

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.



Checks before switching on

Before switching on the appliance, ensure that:

- gas valve 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, timer, switch, ... 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 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.



Do not modify complex settings

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

6.4 EFFICIENCY

For increased appliance efficiency:

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

7 MAINTENANCE

7.1 WARNINGS



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



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



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



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



The efficiency checks and every other "check and maintenance operation" (see Tables 7.1 p. 27 and 7.2 p. 27) 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. 27.

Table 7.1

		GAHP A	GAHP GS/WS	AY00-120	GA ACF	GAHP-AR
Guidelines for the preventive maintenance operations						
Check of the unit	visually check of the general condition of the unit and of its finned coil	√ (1)	-	-	√ (1)	√ (1)
	check the correct operation of the device used for monitoring the water flow	√	√	√	√	√
	check the % value of CO ₂	√	√	√	-	-
	check gas pressure to the burners	-	-	-	√	√
	check that the condensate discharge is clean (If necessary, frequency of the maintenance operation must be increased)	√	√	√	-	-
	replace the belts after 6 years or 12000 hours of operation	√	√	-	√	√
	check/restore the pressure of the primary hydronic circuit	-	-	√	-	-
	check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit	-	-	√	-	-
Check for every DDC or CCI	replace the oil pump motor condenser every 3 years or every 10000 operating hours or whenever the condenser capacity is less than 95% of the nominal value	√	√	-	√	√
	check that the plant is able to achieve the setpoint temperature	√	√	√	√	√
	download the event history	√	√	√	√	√

(1) It is suggested to clean the finned coil once every 4 years (optimal frequency of the cleaning operation is in any case strongly affected by the installation site). Avoid excessively aggressive cleaning of the finned coil (e.g. high-pressure washer).

7.3 SCHEDULED ROUTINE MAINTENANCE

For scheduled routine maintenance, perform the operations in Table 7.2 p. 27, at least once every 2 years.

Table 7.2

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

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

7.4 MESSAGES ON THE DISPLAY

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).

The display rotates after the values of the outlet water temperature, the inlet and the difference between them.

If multiple events are active, they are shown in sequence, ordered by increasing code number.

If warning or error events are active, the left green symbol, shown together with water temperature data, blinks.

If it is a permanent error or warning the appliance stops.

(Table 8.1 p. 28).

7.5 RESTARTING A LOCKED-OUT UNIT

Fault signals on the display

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

- ▶ To restart the appliance you must know and perform the procedure concerning the issue signalled and identified by the code (Paragraph 8.1 p. 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-out appliance

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

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

Reset

There are two options for resetting a fault:

1. If the appliance is connected to a DDC you may act through the control device, as described in the relevant manual.
2. You may act directly from the AY10 board as described

below (if the appliance is controlled with external request, 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 lockout (Error E112), or Parameter "_21", for any other generic reset, turning and pressing the knob; "2._20"/"2._21" must be displayed (procedure Paragraph 5.2 p. 24).
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.

7.6 PERIODS OF INACTIVITY



Avoid emptying the installation

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



Deactivate the system in winter

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

1. antifreeze function active (Paragraph 3.5 p. 14)
2. sufficient antifreeze 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. 26).
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 antifreeze 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. 27).
- 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 valve and ensure there are no leaks; should gas smell be noticed, close the gas valve again, do not switch any electrical devices on and request intervention by qualified personnel.
2. Power on with the main power supply switch (GS, Figure 4.2 p. 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

Code	Description	Warning (u)	Error (E)
100	Flame controller reset circuit fault	NA	Power cycle the appliance. If the code persists, shows up again or in case of doubt, contact the TAC.
101	Limit thermostat trip	Contact authorised Technical Assistance	
102	Flue gas thermostat trip	Contact authorised Technical Assistance	
103	Missing S70 board	NA	Contact authorised Technical Assistance
105	Outdoor temperature exceeding operational limits	NA	Reset is automatic when the triggering condition ceases.
106	Outdoor temperature below operational limits	Non-blocking Warning (informative code). The code is reset automatically when the triggering condition ceases.	NA
107	Hot water flow while system in cooling mode	Reset is automatic when the triggering condition ceases.	NA
112	Flame controller lockout	Reset is automatic up to 4 attempts (in about 5 minutes).	Check gas supply. Reset may be performed from the DDC or from the AY10 board (menu 2, parameter 20). If the code persists or in case of doubt, contact the TAC.
127	Internal appliance circuit low 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	Flame controller error	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	Internal appliance circuit delivery water temperature probe fault	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	Low hot 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	Hot water delivery temperature probe fault	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	Hot water inlet temperature probe fault	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 water delivery temperature	Reset is automatic when the triggering condition ceases.	NA
179	Heating antifreeze function activated	Non-blocking Warning (informative code). The code clears automatically when antifreeze function execution ends.	NA
80	Incomplete functional parameters	Contact the TAC.	
81	Invalid bank 1 parameters	Reset is automatic when the triggering condition ceases.	Contact the TAC.
82	Invalid bank 2 parameters	Reset is automatic when the triggering condition ceases.	Contact the TAC.
84	Transformer or 24 Vac fuse fault	NA	Contact the TAC.
85	Invalid module type configuration parameters	NA	Contact the TAC.
86	ROM board fault	NA	Contact the TAC.
87	pRAM board fault	NA	Contact the TAC.
88	xRAM board fault	NA	Contact the TAC.
89	Registers board fault	NA	Contact the TAC.
90	Outdoor temperature probe fault	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.
91	Electronic board fault	NA	Contact the TAC.

NA: Not Applicable

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
Rated heat output	P_{rated}	34,9	kW	Seasonal space heating energy efficiency	η_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 (*)	η_4	98,6	%
At 30 % of rated heat output and low-temperature regime (**)	P_1	8,6	kW	At 30 % of rated heat output and low-temperature regime (**)	η_1	107,5	%
Auxiliary electricity consumption				Other items			
At full load	e_{lmax}	0,185	kW	Standby heat loss	P_{sby}	0,058	kW
At part load	e_{lmin}	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/outdoors	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).

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

Emissions of nitrogen oxides: NO_x 31 mg/kWh

Robur mission

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



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