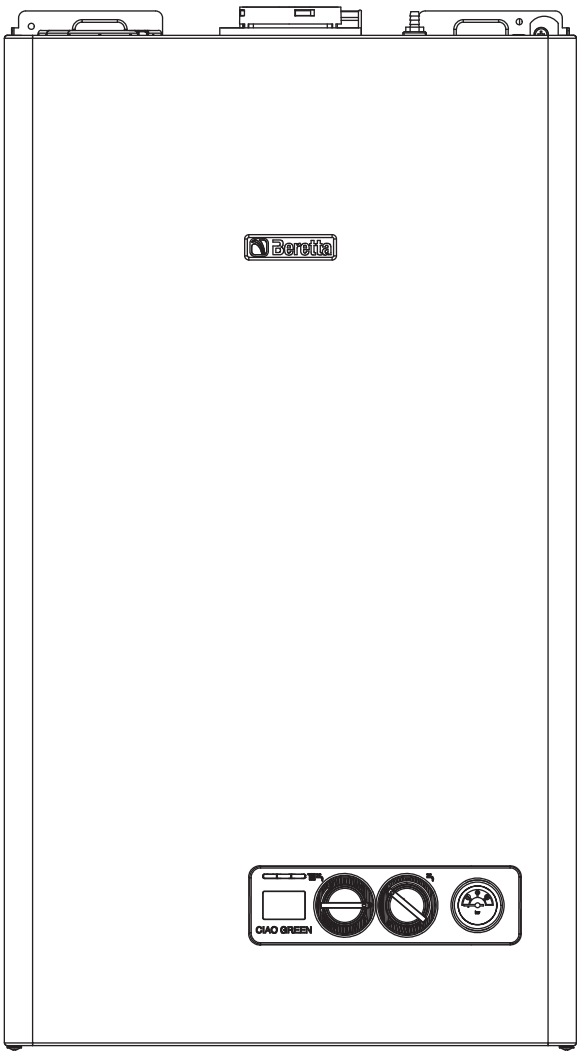
Installer and user manual

Beretta

Ciao Green 29 C.S.I



EN **INSTALLER AND USER MANUAL**

EN

Ciao Green C.S.I. boiler complies with basic requirements of the following Directives:

- Gas directive 2009/142/EC
- Efficiency directive: Article 7(2) and Annex III of directive 92/42/EEC
- Electromagnetic compatibility directive 2014/30/EU
- Low-voltage directive 2014/35/EU
- Directive 2009/125/EC Ecodesign for energy-using appliances
- Directive 2010/30/EU Indication by labelling of the consumption of energy by energy-related products
- Delegated Regulation (EU) No. 811/2013
- Delegated Regulation (EU) No. 813/2013
- Delegated Regulation (EU) No. 814/2013.

CE **0476CQ0857**

EN ENGLISH

INSTALLATION MANUAL

1 - WARNINGS AND SAFETY

The boilers produced in our plants are built with great attention to detail and every component is checked in order to protect users and installers from injury. After working on the product, qualified personnel must check the electrical wiring, in particular the stripped part of conductors, which must not stick out from the terminal board, avoiding possible contact with live parts of said conductor.

This instruction manual, together with the user manual, are integral parts of the product: make sure it remains with the appliance, even if it is transferred to another owner or user, or moved to another heating system. In case of loss or damage, please contact your local Technical Assistance Service for a new copy.

Boiler installation and any other assistance and maintenance operations must be carried out by qualified personnel according to the provisions of the legislation in force.

The installer must instruct the user about the operation of the appliance and about essential safety regulations.

This boiler must only be used for the application it was designed for. The manufacturer declines all contractual and non-contractual liability for injury to persons or animals or damage to property deriving from errors made during installation, adjustment and maintenance and from improper use.

After removing the packaging, make sure the contents are in good condition and complete. Otherwise, contact the dealer from whom you purchased the appliance.

When the product reaches the end of its life it should not be disposed of as solid urban waste but should be brought to a separated waste collection facility.

The safety valve outlet must be connected to a suitable collection and venting system. The manufacturer declines all liability for any damage caused due to any operation carried out on the safety valve.

Dispose of all the packaging materials in the suitable containers at the corresponding collection centres.

Dispose of waste by being careful not to harm human health and without employing procedures or methods which may damage the environment.

During installation, inform the user to:
- in the event of water leaks, the water supply must be shut off and the Technical Assistance Service must be contacted immediately.
- it is necessary to periodically check that the operating pressure of the hydraulic system is above 1 bar. If necessary, reset the pressure as indicated in the paragraph entitled “Filling the system”
- if the boiler is not used for a long time, the following operations are recommended:
  - turn the main switch of the appliance and the main switch of the system to the “off” position
  - close the fuel and water taps of the heating system
  - drain the heating system to prevent freezing.

For safety, always remember that:

the boiler should not be used by children or unassisted disabled people

it is dangerous to activate electrical devices or appliances (such as switches, home appliances, etc.) if you smell gas or fumes. In the event of gas leaks, ventilate the room opening doors and windows; close the main gas tap; contact the Technical Assistance Service or professionally qualified personnel immediately

do not touch the boiler while barefoot, or if parts of your body are wet or damp

before any cleaning operations, disconnect the boiler from the mains power supply by turning the two-position system switch and the main control panel switch to the “OFF” position

do not modify safety and adjustment devices without the manufacturer’s permission and relative instructions

do not pull, disconnect or twist the electric cables coming out of the boiler, even when it is disconnected from the mains power supply

avoid covering or reducing the size of the ventilation openings in the installation room

do not leave inflammable containers and substances in the installation room

keep packaging materials out of the reach of children

it is forbidden to obstruct the condensate drainage point.

In some parts of the manual, some symbols are used:

WARNING = for actions requiring special care and adequate preparation

FORBIDDEN = for actions that MUST NOT be performed

2 - DESCRIPTION

Ciao Green C.S.I. is a Type C wall-mounted condensing boiler designed for heating and production of domestic hot water: according to the flue gas discharge device, the boiler is classified in categories B23P, B53P, C13, C33, C43, C53, C63, C83, C93, C13x, C33x, C43x, C53x, C63x, C83x, C93x.
In configuration B23P and B53P (when installed indoors), the appliance cannot be installed in bedrooms, bathrooms, showers or where there are open fireplaces without a proper air flow. The room where the boiler is installed must have proper ventilation.
In configuration C, the appliance can be installed in any type of room and there are no limitations due to ventilation conditions or room volume.

3 - INSTALLATION

3.1 Installation regulations

Installation must be carried out by qualified personnel, in accordance with the regulations in law.

POSITION
The boiler can be installed indoor and outdoor, in a partially protected place (i.e. a place where the boiler is not exposed to direct contact or infiltration of rain, snow or hail). The boiler can operate in a temperature range from -3°C to +60°C. For further details, refer to “Anti-freeze system” section.

ANTI-FREEZE SYSTEM
The boiler is fitted as standard with an automatic anti-freeze system that actives when the water temperature in the primary circuit falls below 6°C. This system is always active, guaranteeing boiler protection down to an installation area temperature of -3°C. To take advantage of this protection, based on the burner operation, the boiler must be able to switch itself on; any lockout condition (i.e. due to a lack of gas or electrical supply, or the intervention of a safety device) therefore deactivates the protection. By using a specific accessory, the DHW circuit can be protected in case of temperatures lower than -3°C up to -10°C. This system is made by a series of electrical resistances. To use the anti-freeze protection, an electrical supply is required; this means that any blackout or disconnection will deactivate the protection. The anti-freeze protection is also active when the boiler is on stand-by. In normal operation conditions, the boiler can protect itself against freezing. In areas where temperatures may fall below 0°C, or when the machine is left unpowered for long periods, you are advised to use a good quality anti-freeze liquid in the primary circuit to avoid the risk of freezing if you do not want to drain the heating system.Carefully follow the manufacturer’s instructions with regards not only the percentage of anti-freeze liquid to be used for the minimum temperature at which you want to keep the machine circuit, but also the duration and disposal of the liquid itself. For the hot domestic water part, we recommend you drain the circuit. The boiler component materials are resistant to ethylene glycol based anti-freeze liquids.

MINIMUM DISTANCES
In order to have access to the boiler to perform regular maintenance operations, respect the minimum clearances foreseen for installation (fig. 9).
For correct appliance positioning:
- do not place it over a cooker or other cooking device
- do not leave inflammable products in the room where the boiler is installed
- heat sensitive walls (for example, wooden walls) must be protected with proper insulation.

IMPORTANT
Before installation, wash all system piping carefully in order to remove any residues that may impair the operation of the appliance.
Connect the drain manifold to a suitable drainage system (for details, refer to chapter 3.5). The domestic hot water circuit does not need a safety valve, but make sure that the pressure of waterworks does not exceed 6 bar. In case of doubts, install a pressure reducer. Prior to ignition, make sure that the boiler is designed to operate with the gas available; this can be checked by the message on the packaging and the adhesive label indicating the gas type. It is very important to highlight that in some cases the smoke pipes are under pressure and therefore, the connections of several elements must be airtight.

3.2 Cleaning the system and characteristics of the heating circuit water

In the case of a new installation or replacement of the boiler, it is necessary to clean the heating system.
To ensure the device works well, top up the additives and/or chemical treatments (e.g. antifreeze liquids, filming agents, etc.) and check the parameters in the table are within the values indicated.

Parameters	Unit of measurement	Hot water circuit	Filling water
pH value		7–8	-
Hardness	°F	-	15–20
Appearance		-	clear

3.3 Securing the boiler to the wall and hydraulic connections

To secure the boiler to the wall, use the crossbar (fig. 10) provided in the box.
The position and size of the hydraulic connections are indicated below:

M	heating outlet	3/4”
AC	DHW outlet	1/2”
G	gas connection	3/4”
AF	DHW inlet	1/2”
R	heating return line	3/4”

3.4 Installation of the external sensor (fig. 11)

The correct operation of the external sensor is fundamental for the good operation of the climate control.

INSTALLING AND CONNECTING THE EXTERNAL SENSOR

The sensor must be installed on an external wall of the building to be heated, observing the following indications:
it must be mounted on the side of the building most often exposed to winds (the SOUTH or SOUTHEAST facing wall), avoiding direct sunlight; it must be mounted about two thirds of the way up the wall; it must not be mounted near doors, windows or air outlet points, and must be kept away from smoke pipes or other heat sources.
The electrical wiring to the external sensor is made with a bipolar cable with a section from 0.5 to 1 mm^2 (not supplied), with a maximum length of 30 metres. It is not necessary to respect the polarity of the cable when connecting it to the external sensor. Avoid making any joints on this cable however; if joints are absolutely necessary, they must be watertight and well protected. Any ducting of the connection cable must be separated from live cables (230V AC).

FIXING THE EXTERNAL SENSOR TO THE WALL

The sensor must be fixed on a smooth part of the wall; in the case of exposed brickwork or an uneven wall, look for the smoothest possible area.
Loosen the plastic upper protective cover by turning it anticlockwise.
After deciding on the best fixing area of the wall, drill the holes for the 5x25 wall plug.
Insert the plug in the hole. Remove the board from its seat.
Fix the box to the wall, using the screw supplied.
Attach the bracket, then tighten the screw.
Loosen the nut of the cable grommet, then insert the sensor connection cable and connect it to the electric clamp.
To make the electrical connection between the external sensor and the boiler, refer to the “Electrical wiring” chapter.

⚠ Remember to close the cable grommet properly, to prevent any humidity in the air getting in through the opening.

Put the board back in its seat.
Close the plastic upper protective cover by turning it clockwise. Tighten the cable grommet securely.

3.5 Condensate collection

The system must be set up so as to avoid any freezing of the condensate produced by the boiler (e.g. by insulating it). **You are advised to install a special drainage collection basin** in polypropylene (widely available on the market) on the lower part of the boiler (hole Ø 42), as shown in fig.12.
Position the flexible condensate drainage hose supplied with the boiler, connecting it to the manifold (or another connection device which allows inspection) avoiding creating any bends where the condensate could collect and possibly freeze.
The manufacturer will not be liable for any damage resulting from the failure to channel the condensate, or from its freezing.
The drainage connection line must be perfectly sealed, and well protected from the risk of freezing.
Before the initial start-up of the appliance, check the condensate will be properly drained off.

3.6 Gas connection

Before connecting the appliance to the gas supply, check that:
- national and local installation regulations are complied with
- the gas type is the one suitable for the appliance
- the piping is clean.

The gas pipe must be installed outdoors. If the pipe goes through the wall, it must go through the central opening, in the lower part of the template.
It is advisable to install a filter of suitable dimensions on the gas line if the distribution network contains solid particles.
Once the appliance has been installed, check the connections are sealed according to current installation regulations.

3.7 Electrical wiring

To access the electrical wiring, proceed as follows:
To access the terminal board:
- turn off the main switch on the system
- undo the fixing screws (**D**) on the housing (fig. 13)
- move the base of the housing forwards and then upwards to unhook it from the chassis
- undo the fixing screws (**E**) from the instrument panel (fig. 14)
- lift then turn the instrument panel towards you (fig. 15)
- detach the cover on the board casing (fig. 16)
- insert the cable of any room thermostat to be fitted.

The room thermostat must be connected as indicated in the wiring diagram.

⚠ **Low voltage room thermostat input (24V DC).**

It must be connected to the mains power supply via a double-pole isolating switch with minimum contact gap of 3.5 mm (EN 60335/1 - category 3).
The appliance operates with an alternating current of 230 Volt/50 Hz and complies with the standard EN 60335-1.
It is obligatory to ensure the earth connection is safe, in compliance with the current directives.

⚠ The installer is responsible for ensuring the appliance is correctly earthed; the manufacturer will not be liable for any damage resulting from an incorrect or missing earth connection

⚠ It is also advisable to respect the live-neutral connection (L-N).

⚠ The earth conductor must be a couple of cm longer than the others.

The boiler can operate with a phase-neutral or phase-phase supply.
For power supplies that are not earthed, it is necessary to use an isolating transformer with earthed secondary.
Do not use gas and/or water pipes to earth electrical appliances.
Use the power cable supplied to connect the boiler to the mains power supply.
If the power cable needs to be replaced, use a cable of the HAR H05V2V2-F type, 3 x 0.75 mm^2, with a maximum external diameter of 7 mm.

3.8 Filling the heating system

Once the hydraulic connections have been carried out, fill the heating system.
This operation must be carried out with cold system, according to the following instructions (fig. 17):
- open the automatic air vent by turning the plug on the lower valve (**A**) two or three turns, to bleed the air continuously, leave valve plug **A** open
- ensure that the cold water inlet tap is open
- open the filling tap (**C**) until the pressure indicated by the water gauge is between 1 and 1.5 bar
- close the filling tap.

Note: the boiler is bled automatically via the two automatic bleed valves **A** and **E**, positioned on the circulator and inside the air distribution box respectively.
If you encounter problems bleeding the boiler, proceed as described in paragraph 3.11.

3.9 Draining the heating system

Before starting to drain the system, switch off the electrical supply by turning off the main switch of the system.
Close the shut-off devices on the heating system.
Manually loosen the system drain valve (**D**).

3.10 Draining the domestic hot water system

When there is risk of frost, the domestic hot water system must be emptied in the following way:
- close the main tap of the water mains
- open all the hot and cold water taps
- drain the lowest points.

3.11 Bleeding the air from the heating circuit and boiler

During the initial installation phase, or in the event of extraordinary maintenance, you are advised to perform the following sequence of operations:
1. Open the automatic air vent by turning the plug on the lower valve (**A**, fig. 18) two or three turns, to bleed the air continuously, leave valve plug **A** open.
2. Open the system filling tap located on the hydraulic unit and wait until water begins to drain out of the valve.
3. Switch on the electricity supply to the boiler, leaving the gas tap turned off.
4. Activate a heat request via the room thermostat or the remote control panel, so that the 3-way valve goes into heating mode.
5. Activate a DHW request as follows:

open a tap, for 30 seconds every minute so that the three-way valve switches from heating to domestic hot water and vice versa about ten times. In this situation, the boiler will go into alarm mode due to the absence of gas, so it must be reset every time this happens.
6. Carry on with the sequence until only water leaks out of the manual air vent valve, and the air flow has stopped. Close the manual air vent valve.
7. Check the system pressure level is correct (the ideal level is 1 bar).
8. Turn off the system filling tap.
9. Turn on the gas tap and ignite the boiler.

3.12 Flue gas discharge and air suction

Observe local legislation regarding flue gas discharge.
Flue gases are discharged from a centrifugal fan located inside the combustion chamber and the control board constantly checks that this is working correctly. The boiler is supplied without the flue gas discharge/air suction kit, since it is possible to use the accessories for appliance with a forced draught sealed chamber that better adapts to the installation characteristics. For flue gas extraction and the restoration of boiler combustion air, it is essential to only use certified piping. Connection must be carried out correctly as indicated in the instructions supplied as standard with the flue gas accessories.
Multiple appliances can be connected to a single smoke pipe provided that each is a sealed chamber-type appliance. The boiler is a Type C appliance (sealed chamber), and must therefore have a safe connection to the flue gas discharge pipe and to the combustion air suction pipe; these both carry their contents outside, and are essential for the operation of the appliance.

⚠ The maximum lengths of the ducts refer to flue systems available in the catalogue.

POSSIBLE OUTLET CONFIGURATIONS (fig. 23)
B23P/B53P Suction indoors and discharge outdoors
C13-C13x Discharge via concentric wall outlet. The pipes may leave the boiler independently, but the outlets must be concentric or sufficiently close together to be subjected to similar wind conditions (within 50 cm)
C33-C33x Discharge via concentric roof outlet. Outlets as for C13
C43-C43x Discharge and suction in common separate smoke pipes, but subjected to similar wind conditions
C53-C53x Separate discharge and suction lines on wall or roof and in areas with different pressures. The discharge and suction lines must never be positioned on opposite walls
C63-C63x Discharge and suction lines using pipes marketed and certified separately (1856/1)
C83-C83x Discharge via single or common smoke pipe and wall suction line
C93-C93x Discharge on roof (similar to C33) and air suction from a single existing smoke pipe

"FORCED OPEN" INSTALLATION (TYPE B23P/B53P)

Flue gas discharge pipe ø 80 mm (fig. 20)
The flue gas discharge pipe can be directed to the most suitable direction according to installation requirements. For installation, follow the instructions supplied with the kit. In this configuration, the boiler is connected to the flue gas discharge pipe (ø 80 mm) through an adaptor (ø 60-80 mm).

⚠ The B23P/B53P configuration is forbitten in case of installation in pressurised collective chimney (3CEp).

⚠ In this case, the combustion air is picked up from the boiler installation room (which must be a suitable technical room with proper ventilation).

⚠ Uninsulated flue discharge outlet pipes are potential sources of danger.

⚠ Arrange the flue gas discharge pipe so it slopes by 3° towards the boiler.

⚠ The boiler automatically adapts the purging to the type of installation and the length of the pipe.

maximum length of the flue gas discharge pipe ø 80 mm		pressure drop	
		45° bend	90° bend
25 C.S.I.	70 m	1 m	1,5 m
29 C.S.I.	65 m		

*"Straight length" means without bends, drainage terminals or joints.

"SEALED" INSTALLATION (TYPE C)
The boiler must be connected to concentric or twin flue gas discharge pipes and air suction pipes, both leading outdoors. The boiler must not be operated without them.

Concentric pipes (ø 60-100 mm) (fig.21)
The concentric pipes can be placed in the most suitable direction according to installation requirements, complying with the maximum lengths indicated in the table.

⚠ Arrange the flue gas discharge pipe so it slopes by 3° towards the boiler.

⚠ Non-insulated outlet pipes are potential sources of danger.

⚠ The boiler automatically adapts the purging to the type of installation and the length of the pipe.

⚠ Do not obstruct or choke the combustion air suction pipe in any way.

For installation, follow the instructions supplied with the kit.

Horizontal

straight length * concentric pipe ø 60-100 mm		pressure drop	
		45° bend	90° bend
25 C.S.I.	5,85 m	1,3 m	1,6 m
29 C.S.I.	4,85 m		

*"Straight length" means without bends, drainage terminals or joints.

Vertical

straight length * concentric pipe ø 60-100 mm		pressure drop	
		45° bend	90° bend
25 C.S.I.	6,85 m	1,3 m	1,6 m
29 C.S.I.	5,85 m		

*"Straight length" means without bends, drainage terminals or joints.

Concentric pipes (ø 80-125 mm)
For this configuration, the special adaptor kit must be fitted. The concentric pipes can face in the direction most suitable for installation requirements. For installation, follow the instructions supplied with the specific condensing boilers kits.

straight length * concentric pipe ø 80-125 mm		pressure drop	
		45° bend	90° bend
25 C.S.I.	15,3 m	1,0 m	1,5 m
29 C.S.I.	12,8 m		

*"Straight length" means without bends, drainage terminals or joints.

Twin pipes (ø 80 mm) (fig. 22)
The twin pipes can face in the direction most suited to the installation requirements. For installation, follow the instructions supplied with the specific accessory kit for condensing boilers.
To use the combustion air suction pipe, one of the two inlets (**A** and **B**) must be selected. Remove the closure plug which is fixed using screws, and use the specific adaptor relating to the inlet selected (**C** air inlet adaptor ø 80 - **D** air inlet adaptor from ø 60 to ø 80) available as an accessory.

⚠ Arrange the flue gas discharge pipe so it slopes by 3° towards the boiler.

⚠ The boiler automatically adapts the purging to the type of installation and the length of the pipes. Do not obstruct or choke the pipes in any way.

⚠ Refer to the graphs to find the maximum lengths of the single pipe.

⚠ The use of longer pipes reduces the boiler output.

maximum straight length * twin pipes ø 80 mm		pressure drop	
		45° bend	90° bend
25 C.S.I.	45 + 45 m	1,0 m	1,5 m
29 C.S.I.	40 + 40 m		

*"Straight length" means without bends, drainage terminals or joints.

PRESSURISED COLLECTIVE CHIMNEY 3CEp

⚠ 3CEp installations are available only with the dedicated accessory (optional).

⚠ The B23P/B53P configuration is forbitten in case of installation in pressurised collective chimney.

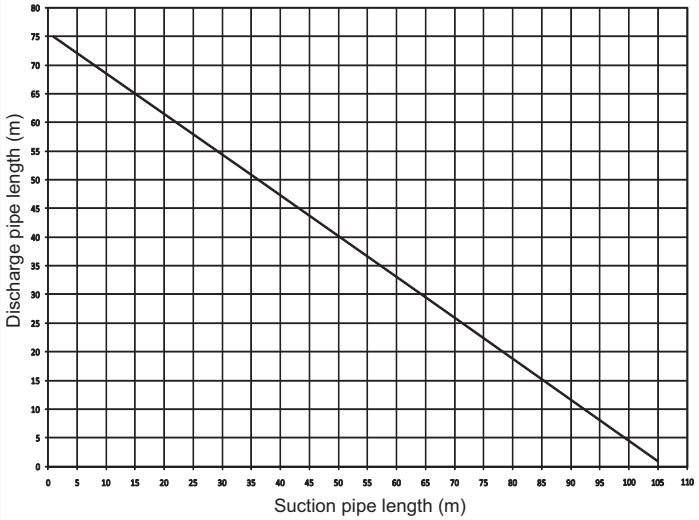
⚠ Maximum pressure of the pressurised collective chimney must not exceed the 35 Pascal.

⚠ Maintenance in case of pressurised collective chimney must be performed as indicated in the specific chapter "Maintenance instructions".

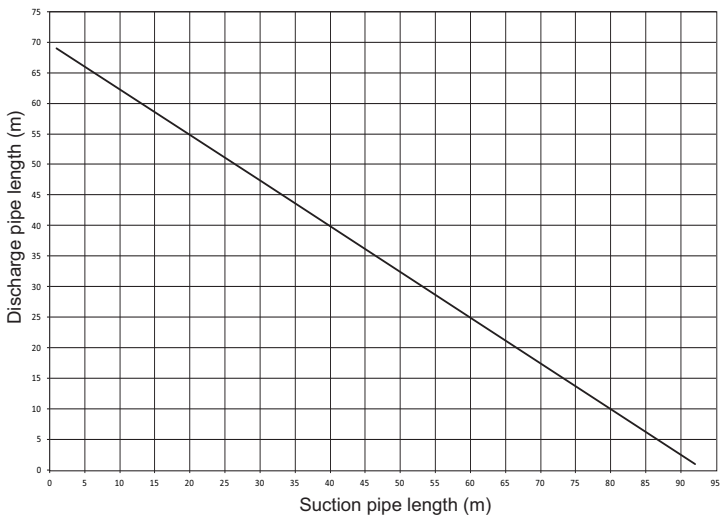
⚠ For 3CEp installations with dedicated accessory, it is necessary change the setting of minimum fan speed according the accessory instructions.

MAXIMUM STRAIGHT LENGTH Ø 80

Ciao Green 25 C.S.I.



Ciao Green 29 C.S.I.



Twin pipes ø 80 with ducting Ø50 - Ø60 - Ø80 (fig. 24)

Thanks to the boiler characteristics, a flue gas discharge pipe ø 80 can be connected to the ducting ranges Ø50 - Ø60 - Ø80.

⚠ For the ducting, you are advised to make a project calculation in order to respect the relevant standards in force.

The table shows the standard configurations allowed.

Table of standard pipe configurations (*)

Air suction	1 bend 90° ø 80
	4,5m pipe ø 80
Flue gas discharge	1 bend 90° ø 80
	4,5m pipe ø 80
	Reduction from ø 80 to ø50, from ø 80 to ø 60
	stack base bend 90°, ø 50 or ø 60 or ø 80
	For ducting pipe lengths see table

(*) Use flue gas system accessories in plastic (PP) for condensing boilers: Ø50 and Ø80 H1 class and Ø60 P1 class.

The boilers are factory set to:

25 C.S.I.: 4.900 r.p.m. (CH) and 6.100 r.p.m. (DHW) and the maximum length that can be reached is 7 m for the ø 50 pipe, 25 m for the ø 60 pipe and 75 m for the ø 80 pipe.

29 C.S.I.: 5.300 r.p.m. (CH) and 6.200 r.p.m. (DHW) and the maximum length that can be reached is 5 m for the ø60 pipe and 67 m for the ø 80 pipe (not applicable for the ø 50 pipe).

Should it be necessary to achieve greater lengths, compensate the pressure drop with an increase in the r.p.m.of the fan, as shown in the adjustments table, to ensure the rated heat input.

⚠ The minimum calibration is not modified.

Adjustments table

	Maximum number of fan rotations r.p.m.		Ducting pipes Ø 50 (*) maximum length (m)
	CH	DHW	
25 C.S.I.	4.900	6.100	7
	5.000	6.200	9
	5.100	6.300	12 (**)
29 C.S.I.	5.300	6.200	not applicable
	5.400	6.300	2

	Maximum number of fan rotations r.p.m.		Ducting pipes Ø 60 (*) maximum length (m)
	CH	DHW	
25 C.S.I.	4.900	6.100	25
	5.000	6.200	30
	5.100	6.300	38 (**)
29 C.S.I.	5.300	6.200	5
	5.400	6.300	13

	Maximum number of fan rotations r.p.m.		Ducting pipes Ø 80 (*) maximum length (m)
	CH	DHW	
25 C.S.I.	4.900	6.100	75
	5.000	6.200	90
	5.100	6.300	113 (**)
29 C.S.I.	5.300	6.200	67
	5.400	6.300	182

(*) Use fumes exhaust plastic systems (PP) for condensing boilers.

(**) Maximum installable length ONLY with exhaust pipes in H1 class.

Configurations Ø50 or Ø60 or Ø80 show test data verified in the laboratory. In the case of installations that differ from those indicated in the “standard configuration” and “adjustments” tables, refer to the equivalent linear lengths below.

⚠ In any case, the maximum lengths declared in the booklet are guaranteed, and it is essential not to exceed them.

COMPONENT Ø 50	Linear equivalent in metres Ø80 (m)
Bend 45° Ø 50	12,3
Bend 90° Ø 50	19,6
Extension 0.5m Ø 50	6,1
Extension 1.0m Ø 50	13,5
Extension 2.0m Ø 50	29,5

COMPONENT Ø 60	Linear equivalent in metres Ø80 (m)
Bend 45° Ø 60	5
Bend 90° Ø 60	8
Extension 0.5m Ø 60	2,5
Extension 1.0m Ø 60	5,5
Extension 2.0m Ø 60	12

4 - SWITCHING ON AND OPERATION

4.1 Switching on the appliance

⚠ When the boiler is first started the siphon for collecting the condensate is empty.
it is therefore indispensable to create a head of water filling the siphon before starting up, following these instructions:
- remove the siphon by releasing it from the plastic pipe connecting to the combustion chamber
- fill the siphon about 3/4” full with water, making sure it is free of any impurities
- check the float of the plastic cylinder
- put back the siphon, being careful not to empty it, and secure it with the clip.

The plastic cylinder inside the siphon has the job of preventing combustible gas coming out into the surroundings if the appliance is started without first creating the head of water in the siphon.

Repeat this operation during routine and extraordinary maintenance operations.
Every time the appliance is powered up, a series of data is shown on the display including the flue gas sensor meter reading (-C- XX) (see paragraph 4.3 - fault A09); the automatic purge cycle then starts, lasting around 2 minutes. During this phase the symbol is shown on the monitor (fig. 25).
To interrupt the automatic purge cycle proceed as follows:
access the electronic board by removing the housing, turning the instrument panel towards you and opening the board casing (fig. 16).
Then:
- using a small screwdriver included, press the CO button (fig. 26).

Live electrical parts (230 V AC).

To start up the boiler it is necessary to carry out the following operations:
- power the boiler
- open the gas tap to allow the flow of fuel
- set the room thermostat to the required temperature (~20°C)
- turn the mode selector to the desired position:

Winter mode: by turning the mode selector (fig. 27) within the area marked + and -, the boiler provides domestic hot water and heating. If there is a heat request, the boiler switches on. The digital monitor indicates the heating water temperature, the icon to indicate heating and the flame icon (fig. 29).
If there is a domestic hot water request, the boiler switches on.
The digital display shows the hot water system temperature, the icon to indicate the hot water supply and the flame icon (fig. 30).

Adjustment of the heating water temperature
To adjust the heating water temperature, turn the knob with symbol (fig. 27) within the area marked + and -.

Depending on the type of system, it is possible to pre-select the suitable temperature range:
- standard systems 40-80°C
- floor systems 20-45°C.

For further details, consult the “Boiler configuration” section.

Adjusting heating water temperature with an external probe connected
When an external probe is connected, the value of the delivery temperature is automatically chosen by the system which rapidly adjusts ambient temperature to the changes in external temperature.
To increase or decrease the temperature with respect to the value automatically calculated by the electronic board, turn the heating water selector clockwise to increase and anticlockwise to decrease.
Adjustment settings range from comfort levels - 5 to + 5 which are indicated on the digital display when the knob is turned.

Summer mode: turning the selector to the summer mode symbol (fig. 28) activates the traditional **domestic hot water only** function.
If there is a domestic hot water request, the boiler switches on. The digital display shows the hot water system temperature, the icon to indicate the hot water supply and the flame icon (fig. 30).

Pre-heating (faster hot water): turning the domestic hot water temperature adjustment knob to the ☺ symbol (fig. 31) activates the pre-heating function, the monitor indicates the fixed P symbol. Bring the domestic hot water temperature adjustment knob back to the required position.
This function keeps the water in the domestic hot water exchanger hot, to reduce standby times when a request is made.
The monitor indicates the delivery temperature of the heating water or the domestic hot water, according to the current request. During burner ignition following a pre-heating request, the monitor indicates the flashing P symbol and the flame icon.
To deactivate the pre-heating function, rotate the domestic hot water temperature adjustment knob back to the ☺ symbol. Bring the domestic hot water temperature adjustment knob back to the required position.
This function cannot be activated when the boiler is OFF: function selector (fig.32) to ⏻ (OFF).

Adjustment of the domestic hot water temperature
To adjust the domestic hot water temperature (bathrooms, shower, kitchen, etc.), turn the knob with the symbol (fig. 28) rotate clockwise to increase the temperature and anticlockwise to reduce it.
The boiler is standby status until, after a heat request, the burner switches on. The boiler continues to operate until the temperatures set on the boiler are reached, or the heat request is met; after which it goes back on standby.

If the symbol (fig. 34) on the control panel lights up, this means the boiler is in temporary shutdown status (see the chapter on “Light signals and faults”). The digital monitor indicates the fault code detected (fig. 34).

Automatic Temperature Control System function (S.A.R.A.) fig. 35
Setting the heating water temperature selector to the area marked “AUTO” (temperature range 55 to 65°C), activates the automatic temperature control system: according to the temperature set on the room thermostat and the time taken to reach it, the boiler varies automatically the heating water temperature reducing the operating time, allowing greater ease of operation and energy saving.

Reset function
To restore operation, set the function selector to ⏻ (fig. 32), wait 5-6 seconds then set the function selector to the required position.
N.B. If the attempt to reset the appliance does not activate operation, contact the Technical Assistance Service.

4.2 Switching off

Temporary switch-off
In case of absence for short periods of time, set the mode selector (fig. 32) to ⏻ (OFF).
In this way (leaving the electricity and fuel supplies enabled), the boiler is protected by the following systems:
Anti-frost device: when the temperature of the water in the boiler falls below 5°C, the circulator and, if necessary, the burner are activated at minimum output levels to bring the water temperature back to the values for safety (35°C). During the anti-frost cycle, the symbol ❄ (fig. 36) appears on the digital monitor.
Circulator anti-blocking function: an operation cycle is activated every 24 hours.

Switching off for long periods
In case of absence for long periods of time, set the mode selector (fig. 32) to ⏻ (OFF). Turn the main system switch OFF. Close the fuel and water taps of the heating and domestic hot water system. In this case, anti-frost device is deactivated: drain the systems, in case of risk of frost.

4.3 Light signals and faults

BOILER STATUS	DISPLAY	TYPES OF ALARMS
Off status (OFF)	OFF	None
Stand-by	-	Signal
ACF alarm lockout module	A01	Definitive lockout
ACF electronics fault alarm		
Limit thermostat alarm	A02	Definitive lockout
Tacho fan alarm	A03	Definitive lockout
Water pressure switch alarm	A04	Definitive lockout
NTC domestic water fault	A06	Signal
NTC heating outlet fault	A07	Temporary stop
Heating outlet probe overtemperature		Temporary then definitive
Outlet/return line probe differential alarm		Definitive lockout
NTC heating return line fault	A08	Temporary stop
Heating return line probe overtemperature		Temporary then definitive
Outlet/return line probe differential alarm		Definitive lockout
Cleaning the primary heat exchanger	A09	Signal
NTC flue gases fault		Temporary stop
Flue gases probe overtemperature		Definitive lockout
False flame	A11	Temporary stop
Low temperature system thermostat alarm	A77	Temporary stop
Temporary pending ignition	80°C flashing	Temporary stop
Water pressure switch intervention	flashing	Temporary stop
Calibration service	ADJ	Signal
Calibration installer		
Chimney sweep	ACO	Signal
Vent cycle		Signal
Preheating active function	P	Signal
Preheating heat request	P flashing	Signal
External probe presence		Signal
Domestic water heat request	60°C	Signal
Heating heat request	80°C	Signal
Antifreeze heat request	❄	Signal
Flame present		Signal

To restore operation (deactivate alarms):
Faults A 01-02-03
Position the function selector to ⏻ (OFF), wait 5-6 seconds then set it to the required position (summer mode) or (winter mode).
If the reset attempts do not reactivate the boiler, contact the Technical Assistance Service.

Fault A04
In addition to the fault code, the digital display shows the symbol .
Check the pressure value indicated by the water gauge: if it is less than 0.3 bar, position the function selector to ⏻ (OFF) and adjust the filling tap until the pressure reaches a value between 1 and 1.5 bar. Then position the mode selector to the desired position (summer) or (winter). The boiler will perform one purge cycle lasting approximately 2 minutes. If pressure drops are frequent, request the intervention of the Technical Assistance Service.

Fault A06
The boiler operates normally but cannot reliably maintain a constant domestic hot water temperature, which remains set at around 50°C. Contact the Technical Assistance Service.

Fault A07 - A08
Contact the Technical Assistance Service.

Fault A09
Position the function selector to ⏻ (OFF), wait 5-6 seconds then set it to the required position (summer mode) or (winter mode). If the reset attempts do not reactivate the boiler, request the intervention of the Technical Assistance Service.

Fault A09
The boiler is equipped with an auto-diagnostic system which, based on the total number of hours in certain operating conditions, can signal the need to clean the primary exchanger (flue gas meter >2,500). Once the cleaning operation has been completed, using the special kit supplied as an accessory, the total hour meter will need to be reset to zero as follows:
- switch off the power supply
- remove the housing
- loosen the fixing screw then turn the instrument panel
- loosen the fixing screws on the cover (**F**) to access the terminal board (fig. 16)
- while the boiler is powered up, using a small screwdriver included, press the CO button (fig. 26) for at least 4 seconds, to check the meter has been reset, power down then power up the boiler; the meter reading is shown on the monitor after the "-C-" sign.

⚠ **Live electrical parts (230 V AC).**

Note: the meter resetting procedure should be carried out after each in-depth cleaning of the primary exchanger or if this latter is replaced. To check the status of the total hour meter, multiply the reading by 100 (e.g. reading of 18 = 1800 total hours; reading of 1 = 100 total hours).
The boiler continues to operate normally even when the alarm is activated.

Fault A77
This is an automatic-reset fault, if the boiler does not restart, contact the Technical Assistance Service.

4.4 Boiler configuration

There is a series of jumpers (JPX) available on the electronic board which enable the boiler to be configured.
To access the board, proceed as follows:
- turn off the main switch on the system
- loosen the fixing screws on the housing, move the base of the housing forwards and then upwards to unhook it from the chassis
- undo the fixing screws (**E**) from the instrument panel (fig. 14)
- loosen the screws (**F** - fig. 16) to remove the cover of the terminal board (230V).

JUMPER JP7 - fig. 38:
preselection of the most suitable heating temperature adjustment field according to the installation type.

Jumper not inserted - standard installation
Standard installation 40-80°C

Jumper inserted - floor installation
Floor installation 20-45°C.

In the manufacturing phase, the boiler is configured for standard installations.

JP1 Calibration (see paragraph on "Adjustments")
JP2 Reset heating timer
JP3 Calibration (see paragraph on "Adjustments")
JP4 Absolute domestic hot water thermostat selector
JP5 Do not use
JP6 Enable night-time compensation function and continuous pump (only with external sensor connected)
JP7 Enable management of low temperature/standard installations (see above)
JP8 Do not use

4.5 Setting the thermoregulation (graphs 1-2-3)

The thermoregulation only operates with the external sensor connected; once installed, connect the external sensor (accessory available on request) to the special terminals provided on the boiler terminal board (fig. 5).
This enables the THERMOREGULATION function.

Selecting the compensation curve
The compensation curve for heating maintains a theoretical temperature of 20°C indoors, when the external temperature is between +20°C and -20°C. The choice of the curve depends on the minimum external temperature envisaged (and therefore on the geographical location), and on the delivery temperature envisaged (and therefore on the type of system). It is carefully calculated by the installer on the basis of the following formula:

$$KT = \frac{\text{envisaged delivery T. - Tshift}}{\text{20- min. envisaged external T.}}$$

Tshift = 30°C standard installations
25°C floor installations

If the calculation produces an intermediate value between two curves, you are advised to choose the compensation curve nearest the value obtained. Example: if the value obtained from the calculation is 1,3 this is between curve 1 and curve 1,5. Choose the nearest curve, i.e. 1,5.
Select the KT using trimmer **P3** on the board (see multiwire wiring diagram).
To access **P3**:
- remove the housing,
- loosen the fixing screw on the instrument panel
- turn the instrument panel towards you
- loosen the fixing screws on the terminal board cover
- unhook the board casing.

⚠ **Live electrical parts (230 V AC).**

The KT values which can be set are as follows:
standard installation: 1,0-1,5-2,0-2,5-3,0
floor installation 0,2-0,4-0,6-0,8
and these are displayed for approximately 3 seconds after rotation of the trimmer P3.

TYPE OF HEAT REQUEST
Boiler connected to room thermostat (JUMPER 6 not inserted)
The heat request is made by the closure of the room thermostat contact, while the opening of the contact produces a switch-off. The delivery temperature is automatically calculated by the boiler, although the user may modify the boiler settings. Using the interface to modify the HEATING, you will not have the HEATING SET-POINT value available, but a value that you can set as preferred between 15 and 25°C. The modification of this value will not directly modify the delivery temperature, but will automatically affect the calculation that determines the value of that temperature, altering the reference temperature in the system (0 = 20°C).

Boiler connected to a programmable timer (JUMPER JP6 inserted)
With the contact closed, the heat request is made by the delivery sensor, on the basis of the external temperature, to obtain a nominal indoor temperature on DAY level (20°C). With the contact open, the boiler is not switched off, but the weather curve is reduced (parallel shift) to NIGHT level (16°C). This activates the night-time function. The delivery temperature is automatically calculated by the boiler, although the user may modify the boiler settings. Using the interface to modify the HEATING, you will not have the HEATING SET-POINT value available, but a value that you can set as preferred between 25 and 15°C. The modification of this value will not directly modify the delivery temperature, but will automatically affect the calculation that determines the value of that temperature, altering the reference temperature in the system (0 = 20°C for DAY level, and 16°C for NIGHT level).

4.6 Adjustments

The boiler has already been adjusted by the manufacturer during production. If the adjustments need to be made again, for example after extraordinary maintenance, replacement of the gas valve, or conversion from methane gas to LPG, observe the following procedures.
The adjustment of the maximum and minimum output, and of the maximum and minimum heating and of slow switch-on, must be made strictly in the sequence indicated, and only by qualified personnel only:
- disconnect the boiler from the power supply
- turn the heating water temperature selector to its maximum
- loosen the fixing screws (**E**) on the instrument panel (fig. 14)
- lift then turn the instrument panel towards you
- loosen the fixing screws on the cover (**F**) to access the terminal board (fig. 16)
- insert the jumpers JP1 and JP3 (fig. 40)
- power up the boiler.

The display shows ADJ for approximately 4 seconds, next change the following parameters:
1. Domestic hot water/absolute maximum
2. Minimum
3. Heating maximum
4. Slow switch-on

as follows:
- turn the heating water temperature selector to set the required value
- press the CO button using a small screwdriver included (fig. 26) and then skip to the calibration of the next parameter.

Live electrical parts (230 V AC).

The following icons light up on the monitor:
1. during domestic hot water/absolute maximum calibration
2. during minimum calibration
3. during heating maximum calibration
4. P during slow switch-on calibration

End the procedure by removing jumpers JP1 and JP3 to store these set values in the memory. The function can be ended at any time without storing the set values in the memory and retaining the original values as follows:
- remove jumpers JP1 and JP3 before all 4 parameters have been set
- set the function selector to ⏻ (OFF/RESET)
- cut the power supply 15 minutes after it is connected.

Calibration can be carried out without powering up the boiler.

By turning the heating selection knob, the monitor automatically shows the number of rotations, expressed in hundreds (e.g. 25 = 2,500 rpm).

For 3CEp installations with dedicated accessory, it is necessary change the setting of minimum fan speed according the accessory instructions.

The function for visualizing the setting parameters is activated by the function selector in summer and in winter, by pressing the CO button on the circuit board, either with or without request for heat. This function cannot be activated when connected to a remote control. Upon activating the function the setting parameters are visualized in the order given below, each for 2 seconds. Each parameter is displayed together with its corresponding icon and fan rotation speed measured in hundreds

1. Maximum
2. Minimum
3. Max. heating
4. Slow ignition P
5. Max. preset heating

GAS VALVE CALIBRATION
- Connect the boiler to the power supply
- Open the gas tap
- Set the function selector to ⏻ (OFF/RESET) (monitor off)
- Loosen the screws (**E**), remove the housing, then lower the instrument panel towards you (fig. 14)
- Loosen the fixing screws on the cover (**F**) to access the terminal board (fig. 16)
- Using a small screwdriver included, press the CO button (fig. 26).

Live electrical parts (230 V AC).

- Wait for burner ignition.
  The display shows “ACO”. The boiler operates at maximum heat output. The “combustion analysis” function remains active for a limited time (15 min); if a delivery temperature of 90°C is reached, the burner is switched off. It will be switched back on when this temperature drops below 78°C.
- Insert the analyser probe in the ports provided in the air distribution box, after removing the screws from the cover (fig. 41)
- Press the “combustion analysis” button a second time to reach the number of rotations corresponding to the maximum domestic hot water output (**table 1**).
- Check the CO_2 value: (**table 3**) if the value does not match the value given in the table, use the gas valve maximum adjustment screw
- Press the “combustion analysis” button a third time to reach the number of rotations corresponding to the minimum output (**table 2**).
- Check the CO_2 value: (**table 4**) if the value does not match the value given in the table, use the gas valve minimum adjustment screw
- To exit the “combustion analysis” function, turn the control knob
- Remove the flue gas probe and refit the plug
- Close the instrument panel and refit the housing.

The “combustion analysis” function is automatically deactivated if the board triggers an alarm. In the event of a fault during the combustion analysis cycle, carry out the reset procedure.

table 1

MAXIMUM NUMBER OF FAN ROTATIONS	METHANE GAS (G20)	LIQUID GAS (G31)	
25 C.S.I. heating - DHW	49 - 61	49 - 61	rpm
29 C.S.I. heating - DHW	53 - 62	52 - 60	rpm

table 2

MINIMUM NUMBER OF FAN ROTATIONS	METHANE GAS (G20)	LIQUID GAS (G31)	
	14	14	rpm

table 3

Max. CO_2	METHANE GAS (G20)	LIQUID GAS (G31)	
	9,0	10,5	%

table 4

Min. CO_2	METHANE GAS (G20)	LIQUID GAS (G31)	
	9,5	10,5	%

table 5

SLOW IGNITION	METHANE GAS (G20)	LIQUID GAS (G31)	
	40	40	rpm

4.7 Gas conversion (fig. 42-43)

Gas conversion from one family of gases to another can also be easily performed when the boiler is installed.
This operation must be carried out by professionally qualified personnel.
The boiler is designed to operate with methane gas (G20) according to the product label.
It is possible to convert the boiler to propane gas, using the special kit.
For disassembly, refer to the instructions below:
- switch off the power supply to the boiler and close the gas tap
- remove in sequence: housing and air distribution box cover
- remove the fixing screw from the instrument panel
- unhook and turn the instrument panel forwards
- remove the gas valve (**A**)
- remove the nozzle (**B**) inside the gas valve and replace it with the nozzle from the kit
- refit the gas valve
- remove the silencer from the mixer
- open the two half-shells by prising apart the corresponding hooks (**C**)
- replace the air diaphragm (**D**) in the silencer
- refit the air distribution box cover
- re-power the boiler and turn on the gas tap

Adjust the boiler as described in the chapter “Adjustments” with reference to the information on LPG.

Conversion must be carried out by qualified personnel.

Once the conversion is complete, affix the new identification label supplied in the kit.

4.8 Checking the combustion parameters

- Position the function selector on ⏻ to switch off the boiler
- Turn the DHW temperature selector on ☺.
  Wait until the ignition of the burner (about 6 seconds). The display shows “ACO”, the boiler operates at full power heating.
- Remove the screw **C** and the cover **E** on the air box (fig. 41).
- Insert the probes of the analyzer in the positions provided on the air box.

The flue gas analysis probe must be fully inserted as far as possible.

- Check that the CO_2 values match those given in the table, if the value shown is different, change it as indicated in the chapter entitled “Gas valve calibration”.

Max. CO_2	METHANE GAS (G20)	LIQUID GAS (G31)	
	9,0	10,5	%

Min. CO_2	METHANE GAS (G20)	LIQUID GAS (G31)	
	9,5	10,5	%

- Perform the combustion check.
- Check the flue combustion.

The “combustion analysis” remains active for a time limit of 15 min; in the event it is reached in a flow temperature of 90 °C the burner shutdown.
It will turn back when this temperature falls below 78 °C.
If you wish to stop the process turn the hot water temperature in the area between the “+” and “-”.

Then:
- remove the analyser probe and close the sockets for combustion analysis with the special screw
- close the instrument panel and refit the housing.

5 - MAINTENANCE

The appliance must be systematically controlled at regular intervals to make sure it works correctly and efficiently and conforms to legislative provisions in force.
The frequency of controls depends on the conditions of installation and usage, it being anyhow necessary to have a complete check carried out by authorized personnel from the Technical Assistance Service every year.
- Check and compare the boiler's performance with the relative specifications. Any cause of visible deterioration must be immediately identified and eliminated.
- Closely inspect the boiler for signs of damages or deterioration, particularly with the drainage and aspiration system and electrical apparatus.
- Check and adjust – where necessary – all the burner's parameters.
- Check and adjust – where necessary – the system's pressure.
- Analyze combustion. Compare results with the product's specification. Any loss in performance must be identified and corrected by finding and eliminating the cause.
- Make sure the main heat exchanger is clean and free of any residuals or obstruction; if necessary, clean it.
- Check and clean – where necessary – the condensation tray to make sure it works properly.

⚠ **After routine and extraordinary maintenance operations have been carried out, fill the siphon, following the instructions in the section "First commissioning".**

IMPORTANT: always switch off the power to the appliance and close the gas by the gas cock on the boiler before carrying out any maintenance and cleaning jobs on the boiler.
Do not clean the appliance or any latter part with flammable substances (e.g. petrol, alcohol, etc.).
Do not clean panelling, enamelled and plastic parts with paint solvents.
Panels must be cleaned with ordinary soap and water only.

MAINTENANCE FOR PRESSURISED COLLECTIVE CHIMNEY (3CEp)
In the event of maintenance operations on the boiler which require the flue gas pipes to be disconnected, a cap should be placed on the open element originating from the pressurised smoke pipe.
Failure to adhere to the guidelines provided can compromise the security of persons and animals due to potential leakages of carbon monoxide from the smoke pipe.

BURNER CLEANING
The flame side of the burner is made with an innovative material of the latest generation.
- Be especially careful during the dismantling, handling and installation of the burner and the components next to it (e.g.. electrodes, insulation panels, etc.)
- Avoid direct contact with any cleaning device (e.g. brushes, vacuum cleaners, blowers, etc.).

In general, the burner does not require maintenance, but particular cases may occur where cleaning is necessary (e.g.. distribution network of gas containing solid particles and in the absence of a filter on the line, suction air containing excessively adhesive particulates, etc.).
For this reason, perform a visual control of the burner in order to ensure the proper functioning of the product:
- Remove the front cover of the air box
- Unscrew the fastening nut of the gas train to the valve, remove the gas train spring clip to the mixer and turn the gas train outwards
- Remove the silencer from the mixer
- Disconnect the connectors of the wiring from the fan and the connecting cables of the electrodes
- Unscrew the fixing screws and remove the exchanger-fan cover assembly from its seat
- Unscrew the fixing screws and remove the burner from its seat checking it condition.

⚠ **If necessary, clean the burner with compressed air, blowing from the metal side of the burner.**

⚠ **It is possible that with ageing, the fibres constituting the flame side of the burner can tone the colour.**

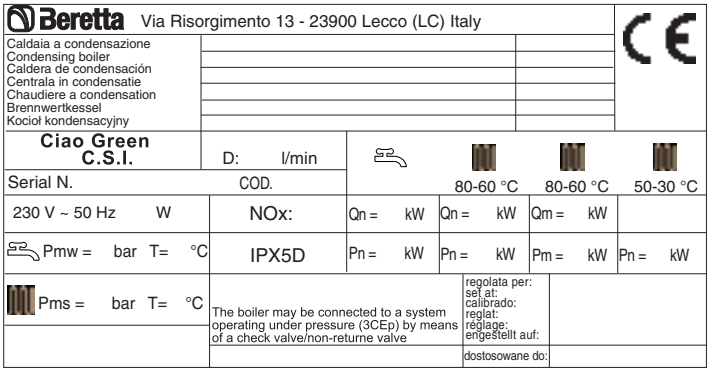
- Reassemble everything in reverse order

⚠ **If necessary, proceed with the replacement of the sealing gaskets.**

The manufacturer declines all responsibility for any damage caused from the failure to observe that stated above.

6 SERIAL NUMBER PLATE

Domestic hot water function
Heating function
Qn Nominal heat delivery
Pn Nominal heat output
Qm Reduced heat delivery
Pm Reduced heat output
IP Degree of Protection
Pmw Maximum DHW pressure
Pms Maximum heating pressure
T Temperature
D Specific flow rate
NOx NOx class
3CEp The boiler may be connected to a system operating under pressure (3CEp) by means of a check valve/non-return valve



USER GUIDE

1a GENERAL WARNINGS AND SAFETY

The instruction manual is an integral part of the product and it must therefore be kept carefully and must accompany the appliance; if the manual is lost or damaged, another copy must be requested from the Technical Assistance Service.

- Boiler installation and any other assistance and maintenance operations must be carried out by qualified personnel according to the provisions of local legislation.
- For installation, it is advisable to contact specialised personnel.
- The boiler must only be used for the application foreseen by the manufacturer. The manufacturer shall not be liable for any damage to persons, animals or property due to errors in installation, calibration, maintenance or due to improper use.
- The safety and automatic adjustment devices must not be modified, during the system life cycle, by the manufacturer or supplier.
- This appliance produces hot water, therefore it must be connected to a heating system and/or a domestic hot water mains, compatible with its performance and output.
- In case of water leakage, close the water supply and contact the Technical Assistance Service immediately.
- In case of absence for long periods time, close the gas supply and switch off the electrical supply main switch. If there is a risk of frost, drain the boiler.
- From time to time check that the operating pressure of the hydraulic system does not go below 1 bar.
- In case of failure and/or malfunctioning, deactivate the appliance, and do not try to repair or operate directly on it.
- Appliance maintenance must be carried out at least once a year: scheduling it with the Technical Assistance Service will avoid wasting time and money
- When the product reaches the end of its life it should not be disposed of as solid urban waste but should be brought to a separated waste collection facility.

Boiler use requires strict observation of some basic safety rules:

- Do not use the appliance in any manner other than its intended purpose.
- It is dangerous to touch the appliance with wet or damp body parts and/or when barefoot.
- Under no circumstances cover the intake grids, dissipation grids and ventilation vents in the installation room with cloths, paper or any other material.
- Do not use electrical switches, telephone or any other object that causes sparks if there is a smell of gas. Ventilate the room by opening doors and windows and close the central gas tap.
- Do not place anything in the boiler.
- Do not perform any cleaning operation if the appliance is not disconnected from the mains power supply.
- Do not cover or reduce ventilation opening of the room where the generator is installed.
- Do not leave containers and inflammable products in the installation room.
- Do not attempt to repair the appliance in case of failure and/or malfunctioning.
- It is dangerous to pull or twist the electric cables.
- Children or unskilled persons must not use the appliance.
- Do not carry out operations on sealed elements.

For better use, remember that:
- periodic external cleaning with soapy water not only improves its appearance but also preserves panelling from corrosion, extending its life cycle;
- if the wall-mounted boiler is enclosed in a hanging unit, leave at least 5 cm for ventilation and maintenance;
- installation of a room thermostat will greatly improve comfort, a more rational use of the heat and energy saving; the boiler can also be connected to a programmable timer in order to control the switching on and off of the appliance during the day or week.

2a SWITCHING ON THE APPLIANCE

Every time the appliance is powered up, a series of data is shown on the display including the flue gas sensor meter reading (-C- XX) (see paragraph 4a - fault A09); the automatic purge cycle then starts, lasting around 2 minutes. During this phase the symbol is shown on the monitor (fig. 25).

To start up the boiler it is necessary to carry out the following operations:
- power the boiler
- open the gas tap to allow the flow of fuel
- set the room thermostat to the required temperature (~20°C)
- turn the mode selector to the desired position:

Winter mode: by turning the mode selector (fig. 27) within the area marked + and -, the boiler provides domestic hot water and heating. If there is a heat request, the boiler switches on. The digital monitor indicates the heating water temperature, the icon to indicate heating and the flame icon (fig. 29). If there is a domestic hot water request, the boiler switches on.
The digital display shows the hot water system temperature, the icon to indicate the hot water supply and the flame icon (fig. 30).

Adjustment of the heating water temperature
To adjust the heating water temperature, turn the knob with symbol (fig. 27) within the area marked + and -.

Adjusting heating water temperature with an external probe connected
When an external probe is connected, the value of the delivery temperature is automatically chosen by the system which rapidly adjusts ambient temperature to the changes in external temperature.
To increase or decrease the temperature with respect to the value automatically calculated by the electronic board, turn the heating water selector clockwise to increase and anticlockwise to decrease.
Adjustment settings range from comfort levels - 5 to + 5 which are indicated on the digital display when the knob is turned.

Summer mode: turning the selector to the summer mode symbol (fig. 28) activates the traditional **domestic hot water only** function.
If there is a domestic hot water request, the boiler switches on. The digital monitor indicates the domestic hot water temperature, the icon to indicate the hot water supply and the flame icon (fig. 30).

Pre-heating (faster hot water): turning the domestic hot water temperature adjustment knob to the ☺ symbol (fig. 31) activates the pre-heating function, the monitor indicates the fixed P symbol. Bring the domestic hot water temperature adjustment knob back to the required position.
This function keeps the water in the domestic hot water exchanger hot, to reduce standby times when a request is made.
The monitor indicates the delivery temperature of the heating water or the domestic hot water, according to the current request. During burner ignition following a pre-heating request, the monitor indicates the flashing P symbol and the flame icon.
To deactivate the pre-heating function, rotate the domestic hot water temperature adjustment knob back to the ☺ symbol. Bring the domestic hot water temperature adjustment knob back to the required position.
This function cannot be activated when the boiler is OFF: function selector (fig.32) to ⏻ (OFF).

Adjustment of domestic hot water temperature
To adjust the domestic hot water temperature (bathrooms, shower, kitchen, etc.), turn the knob with the symbol (fig. 28) rotate clockwise to increase the temperature and anticlockwise to reduce it.
The boiler is standby status until, after a heat request, the burner switches on. The boiler continues to operate until the temperatures set on the boiler are reached, or the heat request is met; after which it goes back on standby.
If the symbol (fig. 34) on the control panel lights up, this means the boiler is in temporary shutdown status (see the chapter on “Light signals and faults”). The digital monitor indicates the fault code detected (fig. 34).

Automatic Temperature Control System function (S.A.R.A.) fig. 35
Setting the heating water temperature selector to the area marked “AUTO”, activates the automatic temperature control system: according to the temperature set on the room thermostat and the time taken to reach it, the boiler varies automatically the heating water temperature reducing the operating time, allowing greater ease of operation and energy saving.

Reset function
To restore operation, set the function selector to ⏻ (fig. 32), wait 5-6 seconds then set the function selector to the required position.

N.B. If the attempt to reset the appliance does not activate operation, contact the Technical Assistance Service.

3a SWITCHING OFF

Temporary switch-off
In case of absence for short periods of time, set the mode selector (fig. 32) to ⏻ (OFF).
In this way (leaving the electricity and fuel supplies enabled), the boiler is protected by:
Anti-frost device: when the temperature of the water in the boiler falls below 5°C, the circulator and, if necessary, the burner are activated at minimum output levels to bring the water temperature back to the values for safety (35°C). During the anti-frost cycle, the symbol ❄ (fig. 36) appears on the digital monitor.
Circulator anti-blocking function: an operation cycle is activated every 24 hours.

Switching off for long periods
In case of absence for long periods of time, set the mode selector (fig. 32) to ⏻ (OFF). Turn the main system switch OFF. Close the fuel and water taps of the heating and domestic hot water system. In this case, anti-frost device is deactivated: drain the systems, in case of risk of frost.

4a LIGHT SIGNALS AND FAULTS

The operating status of the boiler is shown on the digital display, below is a list of the types of displays.

BOILER STATUS	DISPLAY	TYPES OF ALARMS
Off status (OFF)	OFF	None
Stand-by	-	Signal
ACF alarm lockout module	A01 🔔	Definitive lockout
ACF electronics fault alarm		
Limit thermostat alarm	A02 🔔	Definitive lockout
Tacho fan alarm	A03 🔔	Definitive lockout
Water pressure switch alarm	A04 🔔	Definitive lockout
NTC domestic water fault	A06 🔔	Signal
NTC heating outlet fault	A07 🔔	Temporary stop
Heating outlet probe overtemperature		Temporary then definitive
Outlet/return line probe differential alarm		Definitive lockout
NTC heating return line fault	A08 🔔	Temporary stop
Heating return line probe overtemperature		Temporary then definitive
Outlet/return line probe differential alarm		Definitive lockout
Cleaning the primary heat exchanger	A09 🔔	Signal
NTC flue gases fault		Temporary stop
Flue gases probe overtemperature		Definitive lockout
False flame	A11 🔔	Temporary stop
Low temperature system thermostat alarm	A77 🔔	Temporary stop
Temporary pending ignition	80°C flashing	Temporary stop
Water pressure switch intervention	🔔 flashing	Temporary stop
Calibration service	ADJ 🔔	Signal
Calibration installer		
Chimney sweep	ACO 🔔	Signal
Vent cycle		Signal
Preheating active function	P	Signal
Preheating heat request	P flashing	Signal
External probe presence		Signal
Domestic water heat request	60°C	Signal
Heating heat request	80°C	Signal
Antifreeze heat request	❄	Signal
Flame present		Signal

To restore operation (deactivate alarms):
Faults A 01-02-03
Position the function selector to ⏻ (OFF), wait 5-6 seconds then set it to the required position (summer mode) or (winter mode).
If the reset attempts do not reactivate the boiler, contact the Technical Assistance Service.

Fault A04
In addition to the fault code, the digital display shows the symbol .
Check the pressure value indicated by the water gauge:
if it is less than 0.3 bar, position the function selector to ⏻ OFF (fig. 32) and adjust the filling tap (**C**- fig 17) until the pressure reaches a value between 1 and 1.5 bar.
Then position the mode selector to the desired position (summer) or (winter).
The boiler will perform one purge cycle lasting approximately 2 minutes.
If pressure drops are frequent, request the intervention of the Technical Assistance Service.

Fault A06
The boiler operates normally but cannot reliably maintain a constant domestic hot water temperature, which remains set at around 50°C. Contact the Technical Assistance Service.

Fault A07
Contact the Technical Assistance Service.

Fault A08
Contact the Technical Assistance Service.

Fault A09
Position the function selector to ⏻ (OFF), wait 5-6 seconds then set it to the required position (summer mode) or (winter mode).
If the reset attempts do not reactivate the boiler, request the intervention of the Technical Assistance Service.

Fault A09
Contact the Technical Assistance Service.

Fault A77
This is an automatic-reset fault, if the boiler does not restart, contact the Technical Assistance Service.

TECHNICAL DATA

DESCRIPTION			CIAO GREEN 25 C.S.I.	CIAO GREEN 29 C.S.I.
Heating	Heat input	kW	20,00	25,00
		kcal/h	17.200	21.500
	Maximum heat output (80/60°)	kW	19,50	24,45
		kcal/h	16.770	21.027
	Maximum heat output (50°/30°)	kW	20,84	26,23
		kcal/h	17.922	22.554
	Minimum heat input	kW	5,00	6,00
		kcal/h	4.300	5.160
	Minimum heat output (80°/60°)	kW	4,91	5,90
		kcal/h	4.218	5.072
	Minimum heat output (50°/30°)	kW	5,36	6,40
		kcal/h	4.610	5.506
	Nominal Range Rated heat output (Qn)	kW	20,00	25,00
		kcal/h	17.200	21.500
	Minimum Range Rated heat output (Qm)	kW	5,00	6,00
		kcal/h	4.300	5.160
DHW	Heat input	kW	25,00	29,00
		kcal/h	21.500	24.940
	Maximum heat output (*)	kW	25,00	29,00
		kcal/h	21.500	24.940
	Minimum heat input	kW	5,00	6,00
		kcal/h	4.300	5.160
	Minimum heat output (*)	kW	5,00	6,00
		kcal/h	4.300	5.160
(*) average value of various DHW operating conditions				
Useful efficiency Pn max - Pn min (80°/60°)		%	97,5-98,1	97,8-98,3
Efficiency 30% (47° return)		%	102,2	102,0
Combustion performance		%	97,9	98,1
Useful efficiency Pn max - Pn min (50°/30°)		%	104,2-107,2	104,9-106,7
Efficiency 30% (30° return)		%	108,9	108,4
Average Range Rated efficiency Pn (80°/60°)		%	97,8	98,0
Average Range Rated efficiency Pn (50°/30°)		%	106,0	106,1
Electric power (CH)		W	69	78
Electric power (DHW)		W	83	90
Circulator electric power (1.000 l/h)		W	40	40
Category ● Country of destination			II2H3P ● (+)	II2H3P ● (+)
Power supply voltage		V - Hz	230-50	230-50
Degree of Protection		IP	X5D	X5D
Pressure drops on flue with burner on		%	2,10	1,93
Pressure drops on flue with burner off		%	0,06	0,04
Heating operation				
Pressure - maximum temperature		bar-°C	3-90	3-90
Minimum pressure for standard operation		bar	0,25-0,45	0,25-0,45
Selection field of heating water temperature		°C	20/45-40/80	20/45-40/80
Pump: maximum head available		mbar	297	297
for system capacity		l/h	800	800
Membrane expansion tank		l	8	8
Expansion tank pre-charge		bar	1	1
DHW operation				
Maximum pressure		bar	6	6
Minimum pressure		bar	0,15	0,15
Hot water quantity with Δt 25°C		l/min	14,3	16,6
with Δt 30°C		l/min	11,9	13,9
with Δt 35°C		l/min	10,2	11,9
DHW minimum output		l/min	2	2
Selection field of DHW temperature		°C	37-60	37-60
Flow regulator		l/min	10	12
Gas pressure				
Methane gas nominal pressure (G20)		mbar	20	20
LPG liquid gas nominal pressure (G31)		mbar	37	37
Hydraulic connections				
Heating input - output		Ø	3/4”	3/4”
DHW input-output		Ø	1/2”	1/2”
Gas input		Ø	3/4”	3/4”

DESCRIPTION		CIAO GREEN 25 C.S.I.		CIAO GREEN 29 C.S.I.	
Boiler dimensions					
Height	mm	715		715	
Width	mm	405		405	
Depth of housing	mm	250		250	
Boiler weight	kg	27		28	
Flow rate (G20)					
Air capacity	Nm^3/h	24,908	31,135	31,135	36,116
Flue gas capacity	Nm^3/h	26,914	33,642	33,642	39,025
Mass flow of flue gas (max-min)	g/s	9,025-2,140	11,282-2,140	11,282-2,568	13,087-2,568
Flow rate (G31)					
Air capacity	Nm^3/h	24,192	30,240	30,240	35,078
Flue gas capacity	Nm^3/h	24,267	31,209	31,209	36,203
Mass flow of flue gas (max-min)	g/s	8,410-2,103	10,513-2,103	10,513-2,523	12,195-2,523
Fan performance					
Residual head of concentric pipes 0.85m	Pa	30		25	
Residual head of separate pipes 0.5m	Pa	90		100	
Residual head of boiler without pipes	Pa	100		110	
Concentric flue gas discharge pipes					
Diameter	mm	60-100		60-100	
Maximum length	m	5,85		4,85	
Drop due to insertion of a 45°/90° bend	m	1,3/1,6		1,3/1,6	
Hole in wall (diameter)	mm	105		105	
Concentric flue gas discharge pipes					
Diameter	mm	80-125		80-125	
Maximum length	m	15,3		12,8	
Losses for a 45°/90° bend	m	1/1,5		1/1,5	
Hole in wall (diameter)	mm	130		130	
Separate flue gas discharge pipes					
Diameter	mm	80		80	
Maximum length	m	45+45		40+40	
Losses for a 45°/90° bend	m	1/1,5		1/1,5	
Installation B23P–B53P					
Diameter	mm	80		80	
Maximum length of drainage pipe	m	70		65	
NOx class		class 5		class 5	
Emission values at max. and min. rate of gas G20*					
Maximum - Minimum CO s.a. less than	ppm	180 - 20		160 - 20	
CO_2	%	9,0 - 9,5		9,0 - 9,5	
NOx s.a. lower than	ppm	30 - 20		35 - 25	
Flue gas temperature	°C	65 - 58		63 - 58	
Emission values at max. and min. rate of gas G31*					
Maximum - Minimum CO s.a. less than	ppm	190 - 20		250 - 25	
CO_2	%	10,5 - 10,5		10,5 - 10,5	
NOx s.a. lower than	ppm	35 - 35		50 - 40	
Flue gas temperature	°C	62 - 55		62 - 56	

(+) The installation of this product is allowed only in the destination Countries contained in the data plate, regardless of the present translation language.

* Check performed with concentric pipe ø 60-100, length 0.85m - water temperature 80-60°C.

Multigas table

DESCRIPTION		Methane gas (G20)		Propane (G31)	
Lower Wobbe index (at 15°C-1013 mbar)	MJ/m³S	45,67		70,69	
Net Calorific Value	MJ/m³S	34,02		88	
Supply nominal pressure	mbar (mm W.C.)	20 (203,9)		37 (377,3)	
Supply minimum pressure	mbar (mm W.C.)	10 (102,0)			
Diaphragm (number of holes)	Number	1		1	
		25 C.S.I.	**29 C.S.I.**	**25 C.S.I.**	**29 C.S.I.**
Diaphragm (diameter of holes)	mm	4,8	5,1	3,8	3,9
Silencer diaphragm (diameter)	mm	31	-	27	29
Heating maximum gas capacity	Sm³/h	2,12	2,64		
	kg/h			1,55	1,94
DHW maximum gas capacity	Sm³/h	2,64	3,07		
	kg/h			1,94	2,25
Heating minimum gas capacity	Sm³/h	0,53	0,63		
	kg/h			0,39	0,47
DHW minimum gas capacity	Sm³/h	0,53	0,63		
	kg/h			0,39	0,47
Number of fan rotations with slow switch-on	rpm	4.000	4.000	4.000	4.000
Maximum number of fan rotations (heating)	rpm	4.900	5.300	4.900	5.200
Maximum number of fan rotations (DHW)	rpm	6.100	6.200	6.100	6.000
Minimum number of fan rotations (heating)	rpm	1.400	1.400	1.400	1.400
Minimum number of fan rotations (DHW)	rpm	1.400	1.400	1.400	1.400

Parameter	Symbol	CIAO GREEN 25 C.S.I.	CIAO GREEN 29 C.S.I.	Unit
Seasonal space heating energy efficiency class	-	A	A	-
Water heating energy efficiency class	-	A	A	-
Rated heat output	Pnominal	20	24	kW
Seasonal space heating energy efficiency	ηs	93	93	%
Useful heat output				
At rated heat output and high-temperature regime (*)	P4	19,5	24,5	kW
At 30% of rated heat output and low-temperature regime (**)	P1	6,5	8,1	kW
Useful efficiency				
At rated heat output and high-temperature regime (*)	η4	88,1	88,2	%
At 30% of rated heat output and low-temperature regime (**)	η1	98,1	97,6	%
Auxiliary electricity consumption				
At full load	elmax	29,0	38,0	W
At part load	elmin	10,4	13,1	W
In Stand-by mode	PSB	2,4	2,4	W
Other parameters				
Stand-by heat loss	Pstby	40,0	35,0	W
Pilot flame energy consumption	Pign	-	-	W
Annual energy consumption	QHE	38	47	GJ
Sound power level, indoors	LWA	53	56	dB
Emissions of nitrogen oxides	NOx	20	23	mg/kWh
For combination heaters				
Declared load profile		XL	XL	
Water heating energy efficiency	ηwh	85	85	%
Daily electricity consumption	Qelec	0,109	0,120	kWh
Daily fuel consumption	Qfuel	22,920	23,021	kWh
Annual electricity consumption	AEC	24	26	kWh
Annual fuel consumption	AFC	17	17	GJ

(*) 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).

[EN] - Functional elements of the boiler

1 - Filling tap
2 - Drain valve
3 - Three-way valve motor
4 - Safety valve
5 - Water pressure switch
6 - Circulation pump
7 - Lower air vent valve
8 - Main exchanger
9 - Flue gas probe
10 - Fan + mixer
11 - Silencer
12 - Flue gas discharge
13 - Flue gas analysis plug
14 - Upper air vent valve
15 - Ignition transformer
16 - Detection electrode
17 - Delivery NTC sensor
18 - Ignition electrode
19 - Burner
20 - High limit thermostat
21 - Expansion tank
22 - Return NTC sensor
23 - Gas nozzle
24 - Gas valve
25 - Domestic hot water NTC sensor
26 - DHW exchanger
27 - Siphon
28 - Flow switch

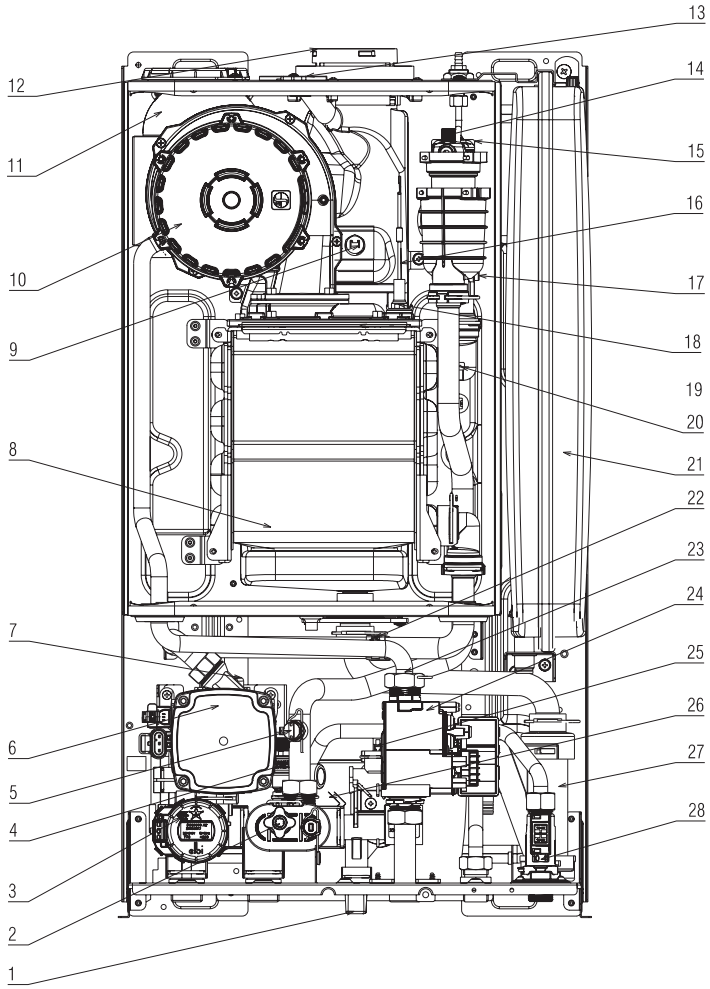


fig. 2

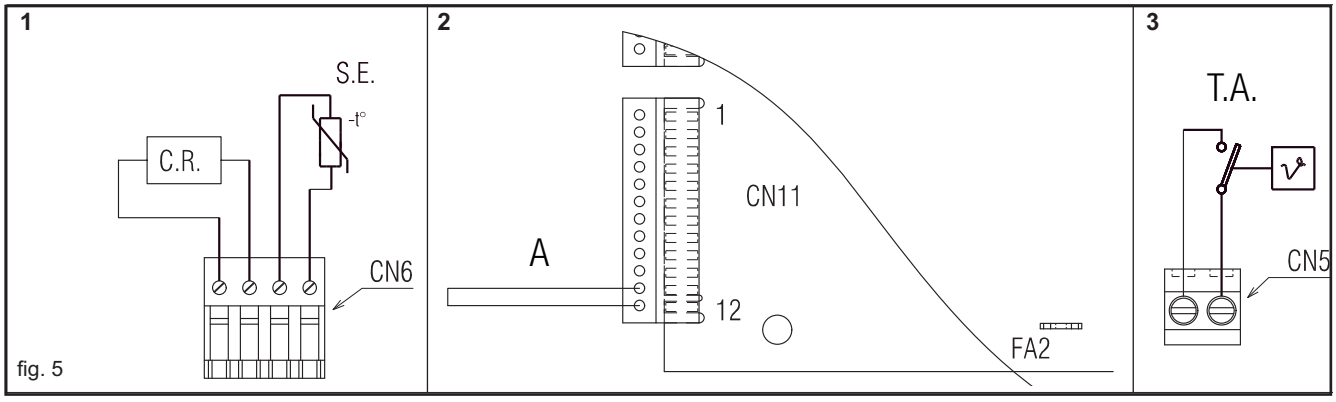


fig. 5

[EN] - External connections

1 - Low voltage devices should be connected to a CN6 connector, as shown in fig.:
C.R. = Remote control / **S.E. =** External sensor

2 - To connect the following devices:
T.B.T. = low temp. thermostat / **A.G. =** generic alarm
the white jumper on the 12-pole CN11 connector marked “TBT” must be cut in half;
strip the wires and use a 2-pole electric clamp for the connection.

3 - The room thermostat (24V) (T.A.) should be connected as indicated in the diagram once the U-bolt on the 2-way connector (CN5) has been removed.

[EN] - Hydraulic circuit

A DHW input
B DHW output
C Heating delivery
D Heating return
1 - Drain valve
2 - Automatic by-pass
3 - Three-way valve
4 - Safety valve
5 - Circulator
6 - Lower air vent valve
7 - Expansion tank
8 - Return NTC sensor
9 - Primary exchanger
10 - NTC sensor (delivery)
11 - Upper air vent valve
12 - Air/water separator
13 - Manual vent valve
14 - Pressure switch
15 - DHW exchanger
16 - Domestic hot water NTC sensor
17 - Non-return valve
18 - Filling tap
19 - Delivery limiter
20 - Flow switch

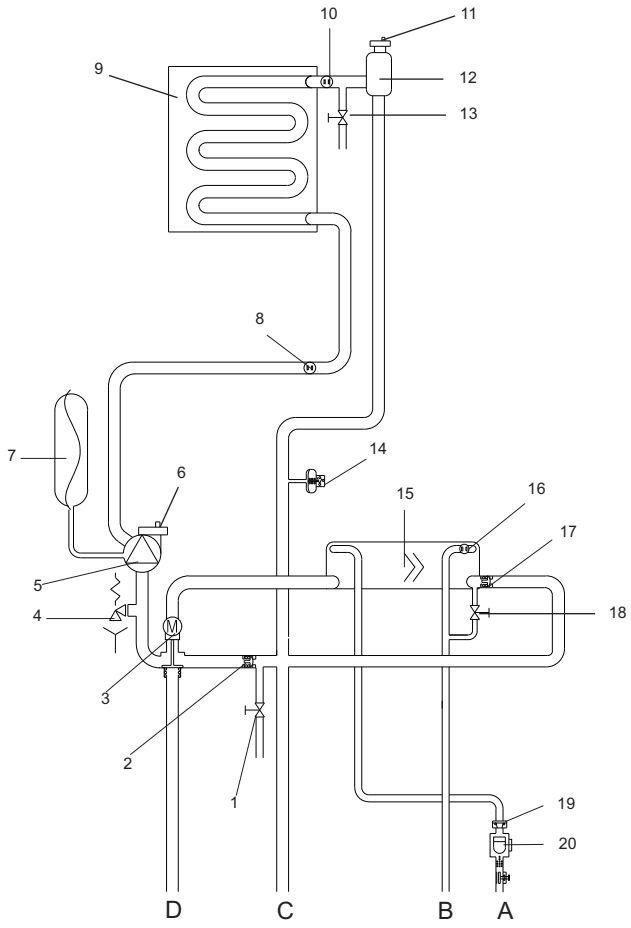


fig. 3

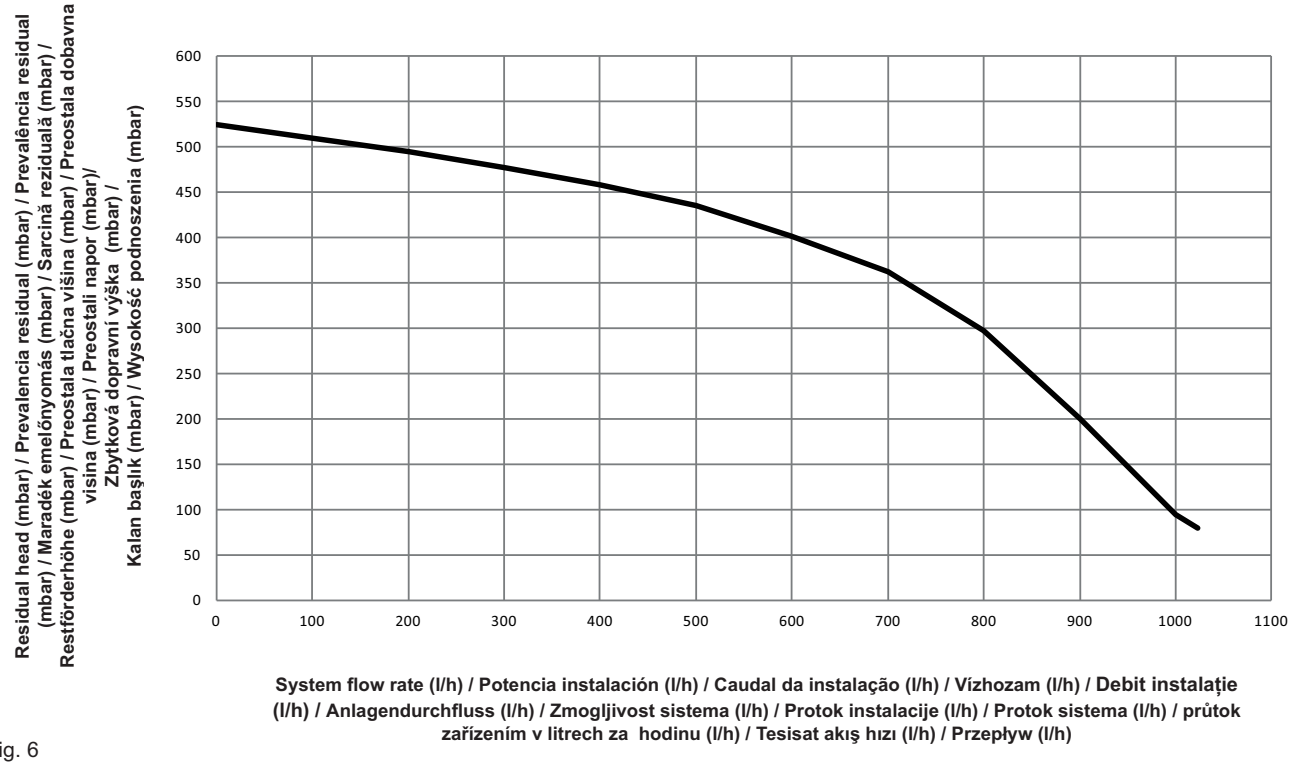


fig. 6

[EN] - RESIDUAL HEAD OF CIRCULATOR - 6-metre circulator

The residual head for the heating system is represented in graphic 1, according to the flow rate. The piping on the heating system must be sized taking into account the available residual head value. Bear in mind that the boiler will operate correctly if there is sufficient water circulation in the heat exchanger.
To this end, the boiled is fitted with an automatic by-pass which is designed to ensure water flow rate into the heat exchanger is correct under any installation conditions.

“L-N” POLARITY IS RECOMMENDED

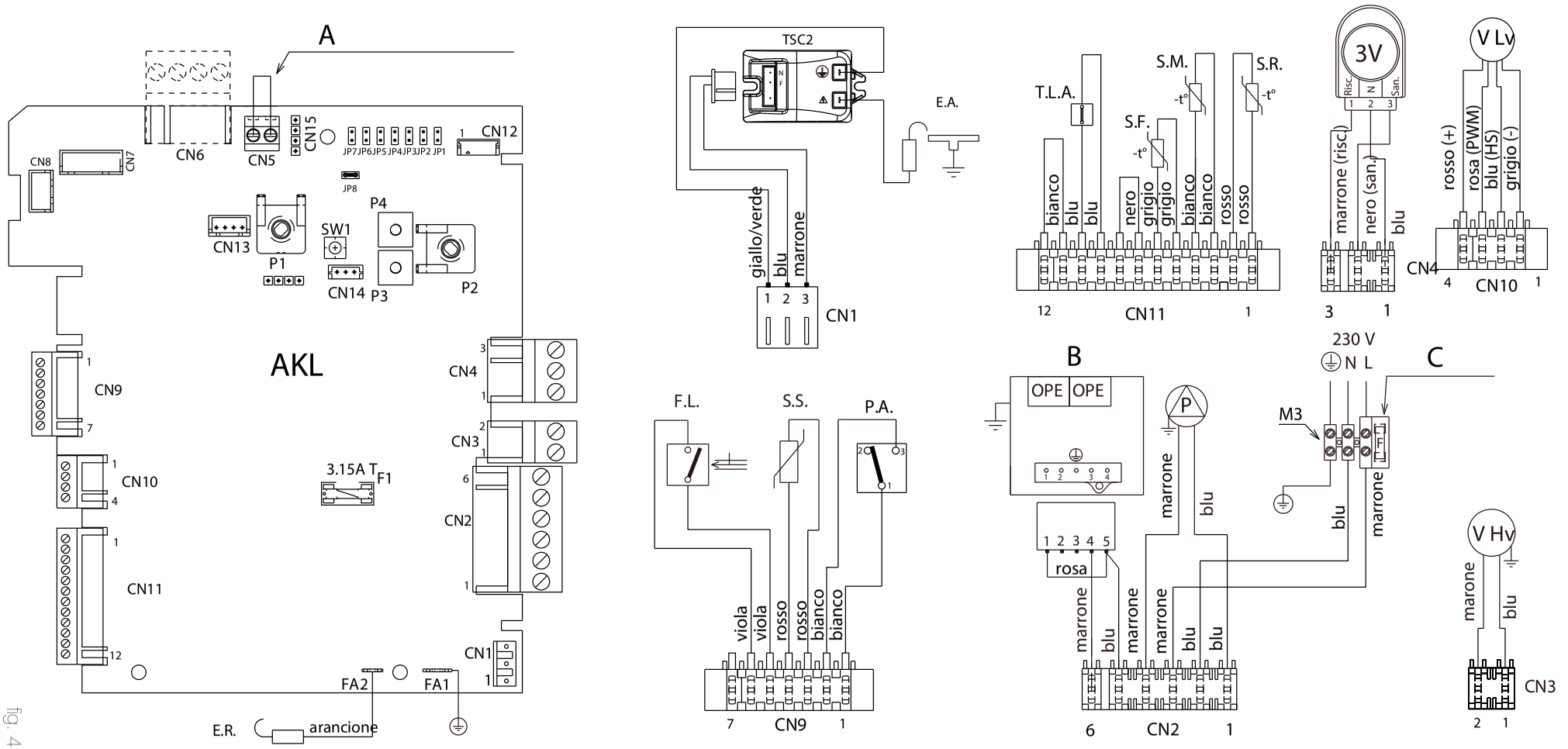


fig. 4

[EN] - Multiwire wiring diagram

Blu=Blue/Marrone=Brown/Nero=Black/Rosso=Red/Bianco=White/Viola=Violet/Rosa=Pink/Arancione=Orange/Grigio=Grey/Giallo=Yellow/Verde=Green

A = 24V Low voltage ambient thermostat jumper

B = Gas valve

C = Fuse 3.15A F

AKL	Control board
P1	Potentiometer to select off - summer - winter – reset / heating temperature
P2	Potentiometer to select domestic hot water set point, and enable/disable heating function
P3	Thermoregulation curve preselection
P4	Not used
JP1	Enable front knobs for calibration of maximum heat only (MAX_CD_ADJ)
JP2	Reset heating timer
JP3	Enable front knobs for calibration in service (MAX, MIN, MAX_CH, RLA)
JP4	Absolute domestic hot water thermostat selector
JP5	Not used
JP6	Enable night-time compensation function and continuous pump (only with external sensor connected)
JP7	Enable management of low temperature/standard installations
JP8	Jumper inserted - Flow switch
CN1-CN15	Connectors (CN6 control panel /outer sensor kit – CN7 local valve kit) - CN5 room thermostat (24 VDC)
S.W.	Chimney sweep function, interruption of purge cycle and calibration when enabled.
E.R.	Flame detection electrode
F1	Fuse 3.15A T
F	External fuse 3.15A F
M3	Terminal board for external connections
P	Pump
OPE	Gas valve operator
V Hv	Fan power supply 230V
V Lv	Fan control signal
3V	3-way servomotor valve
E.A.	Ignition electrode
TSC2	Ignition transformer
F.L.	Domestic hot water flow switch
S.S.	Domestic hot water circuit temperature sensor (NTC)
P.A.	Water pressure switch
T.L.A.	Water limit thermostat
S.F.	Flue gas probe
S.M.	Delivery temperature sensor on primary circuit
S.R.	Return temperature sensor on primary circuit

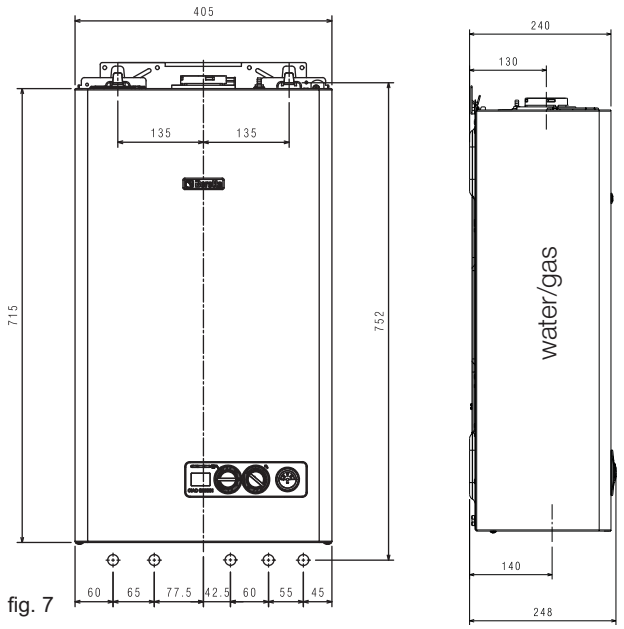


fig. 7

fig. 8

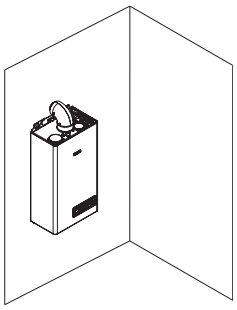
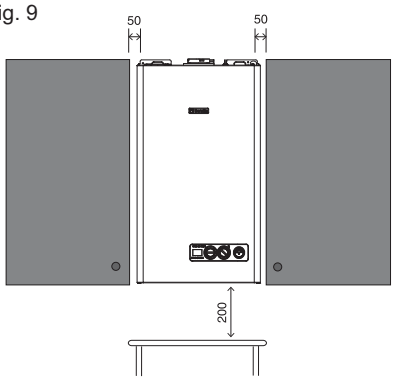


fig. 9



all measurements in mm

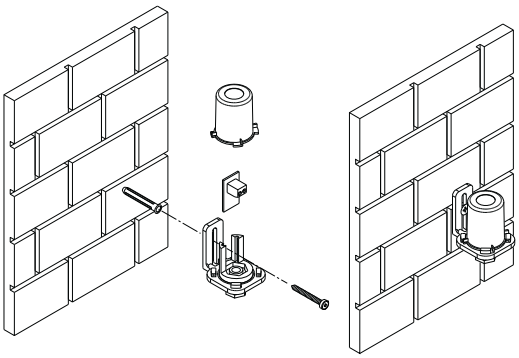


fig. 11

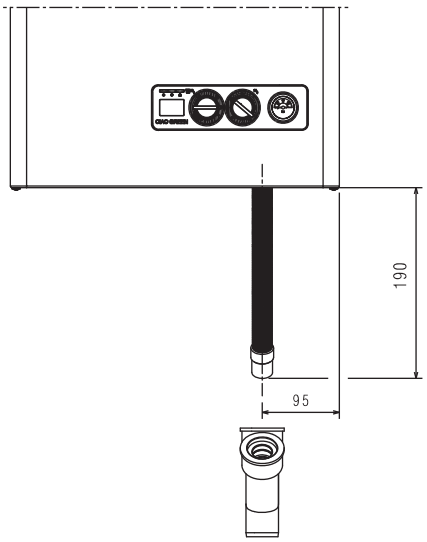
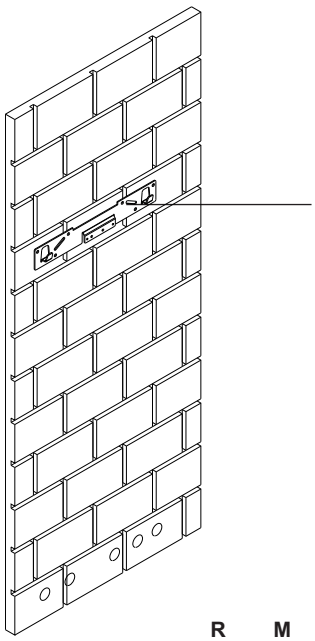
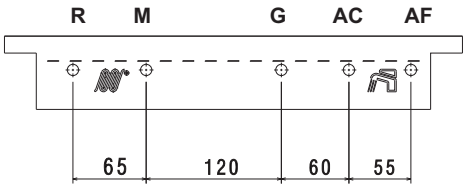


fig. 12

fig. 10



boiler support plate



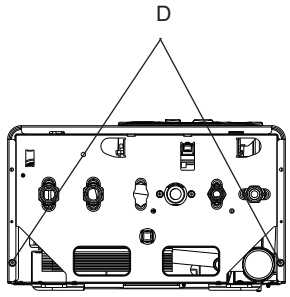


fig. 13

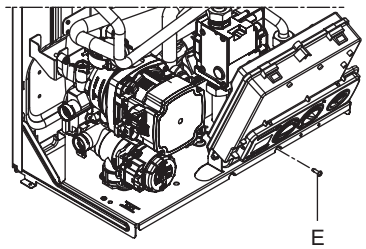


fig. 14

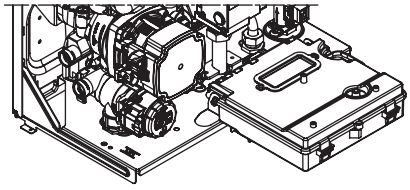


fig. 15

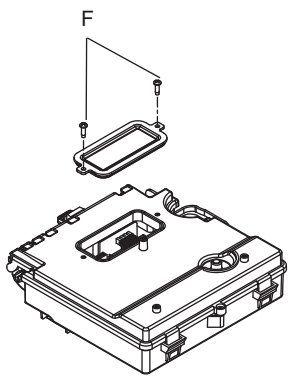


fig. 16

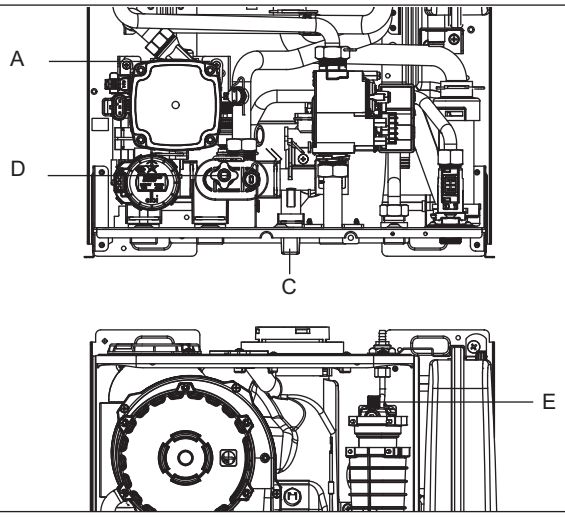


fig. 17

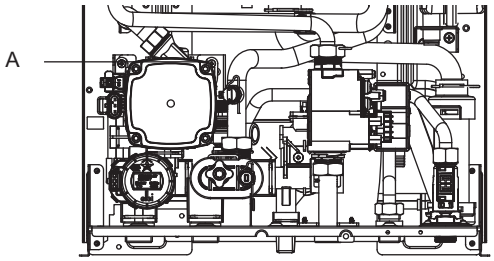


fig. 18

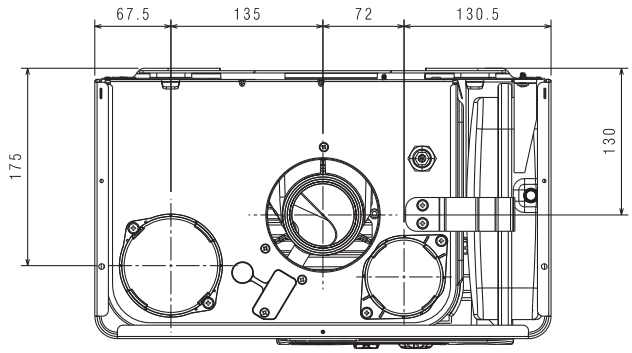
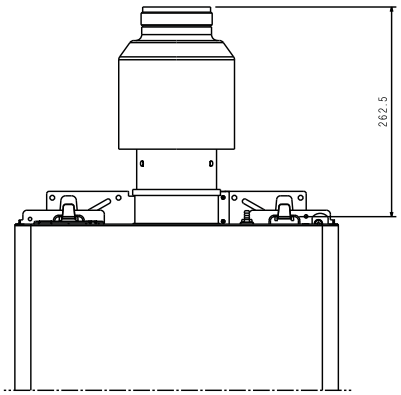


fig. 19

fig. 20



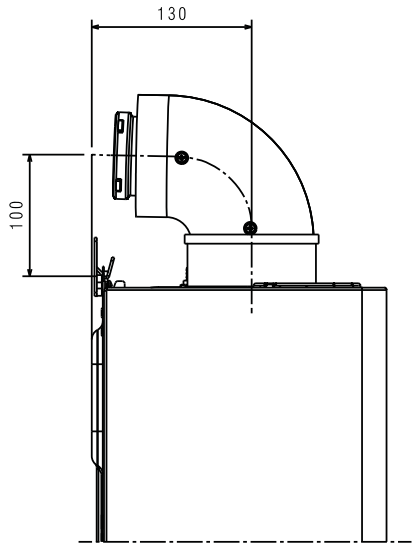


fig. 21

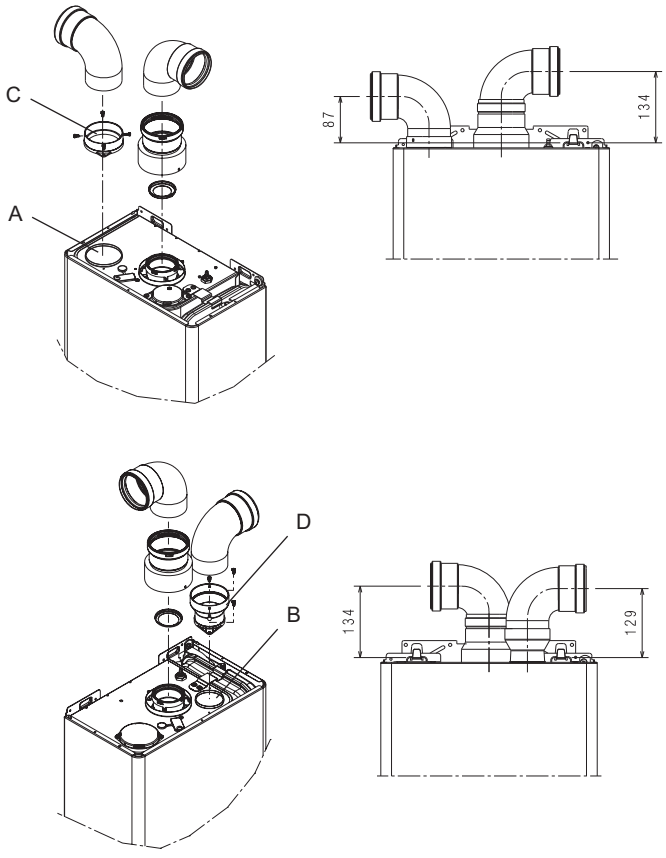


fig. 22

POSSIBLE OUTLET CONFIGURATIONS

A rear outlet **- B** max 50

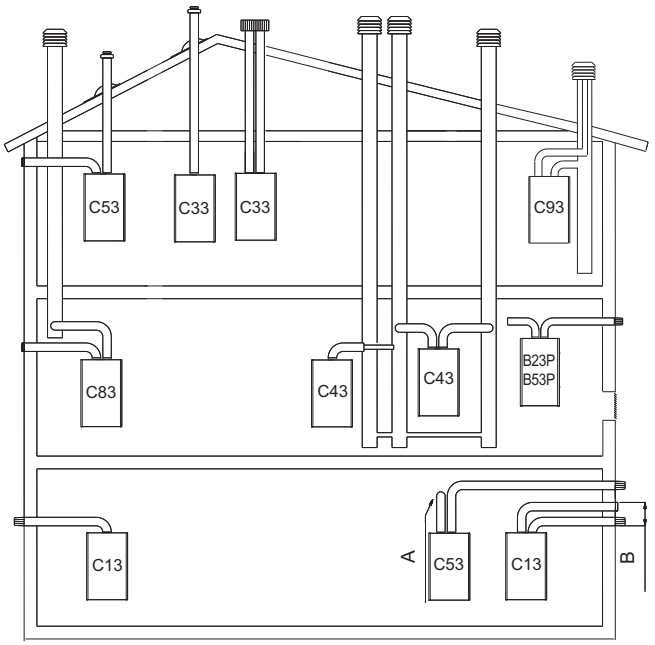


fig. 23

[EN] **A -** Smoke pipe for ducting Ø 60 mm-Ø 50 mm
B - Length
C - 90° bend Ø 80 mm
D - Ø 80-60 mm or Ø 80-50 mm reduction
E - 90° bend Ø 60 mm, Ø 50 mm or Ø 80 mm

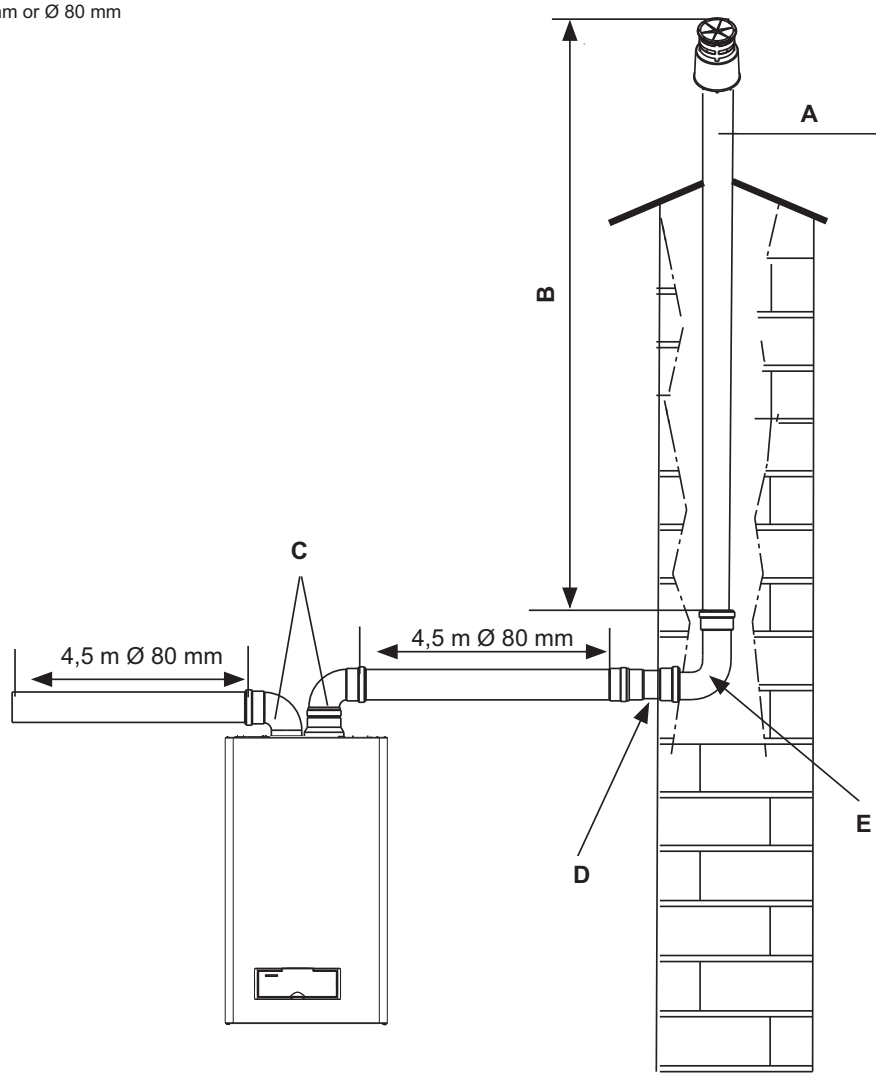


fig. 24

fig. 25

CO button

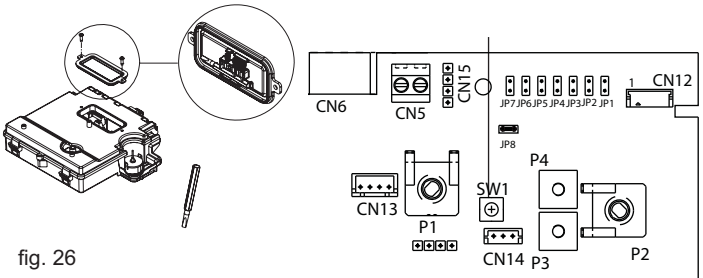


fig. 26

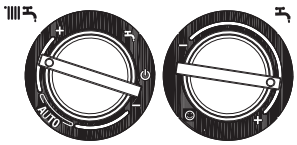


fig. 27

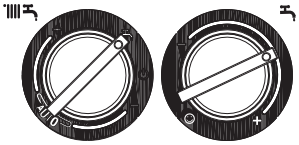


fig. 28

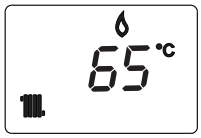


fig. 29

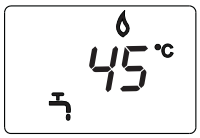
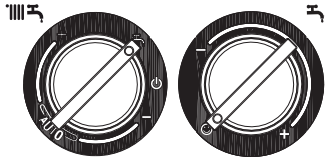


fig. 30

fig. 31



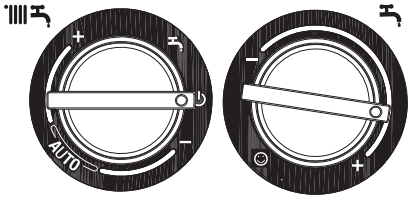


fig. 32

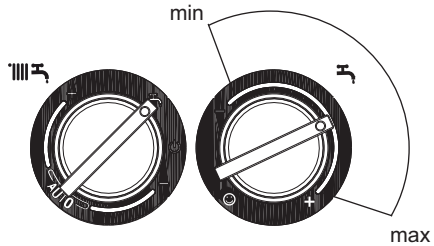
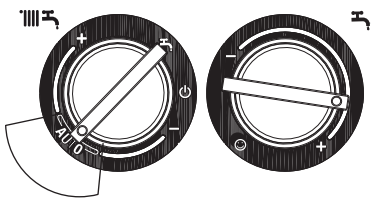


fig. 33

fig. 34

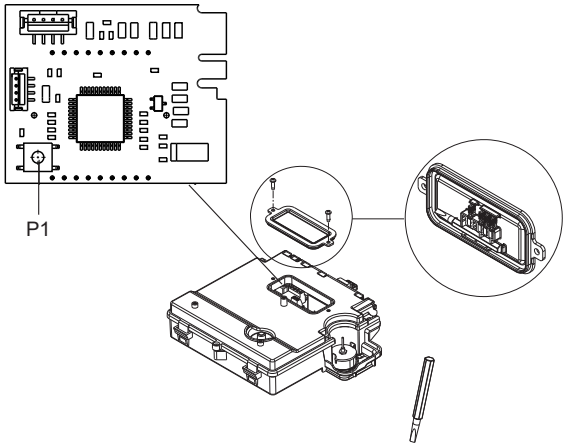
fig. 35



Automatic Temperature Control System (S.A.R.A.)/Función S.A.R.A./

fig. 36

fig. 37a



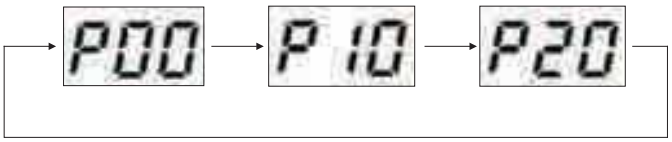
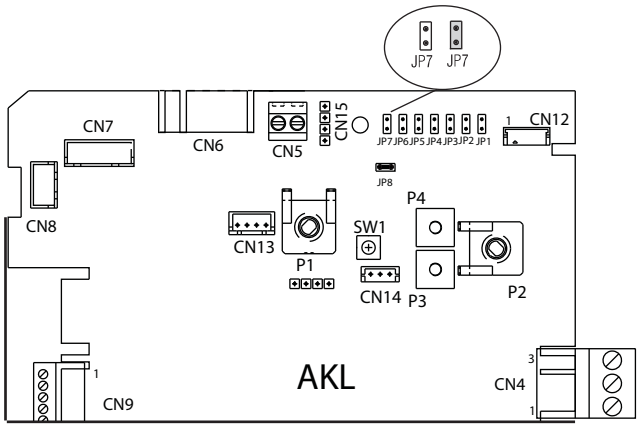


fig. 37b



Jumper not inserted - standard installation

Jumper inserted - floor installation

fig. 38

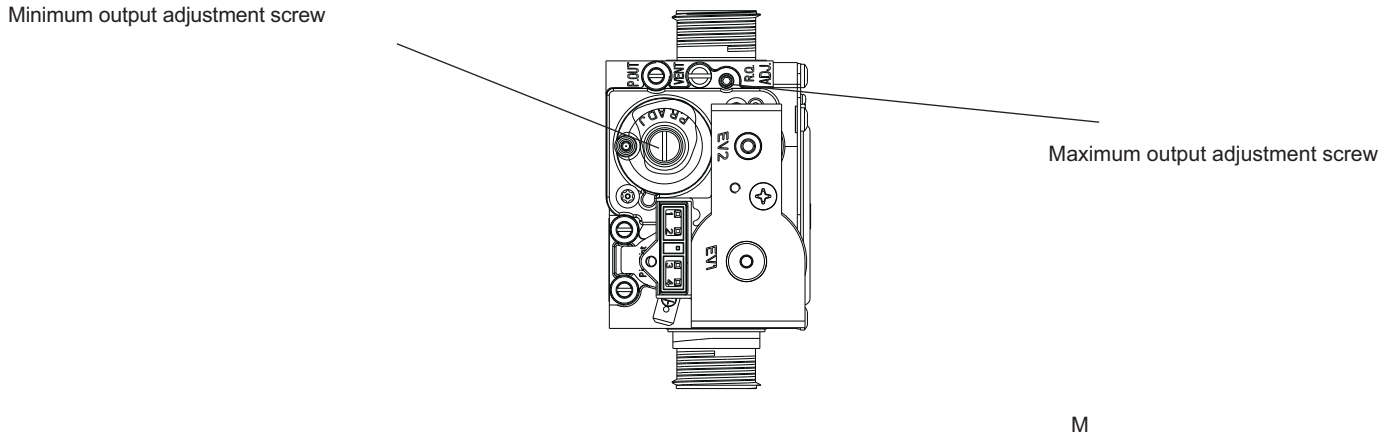


fig. 39

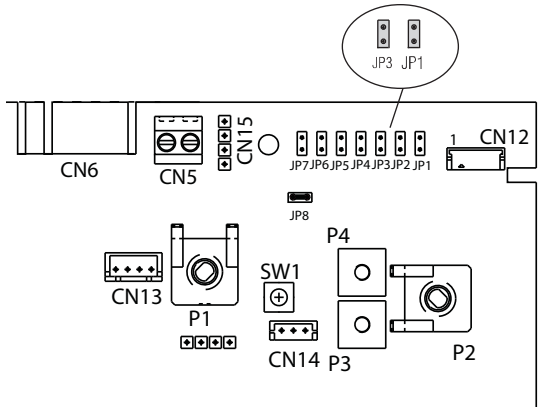


fig. 40

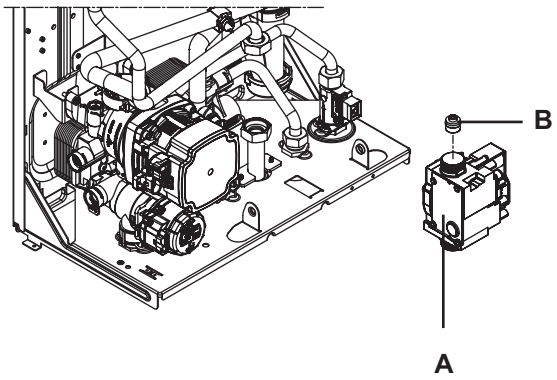


fig. 42

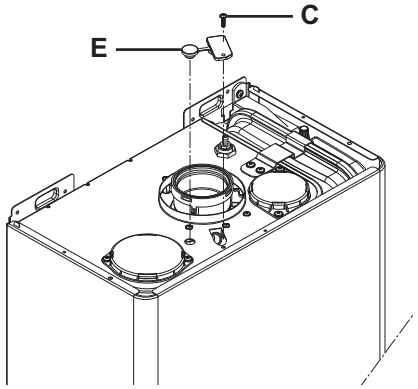


fig. 41

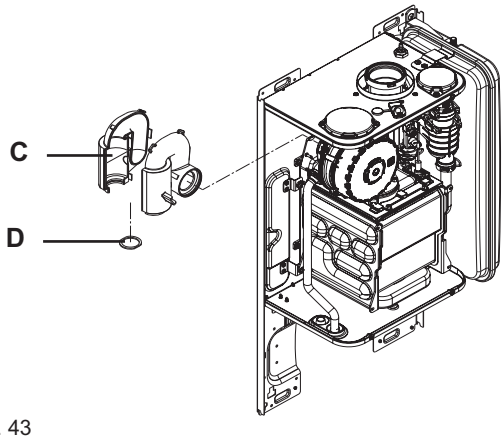
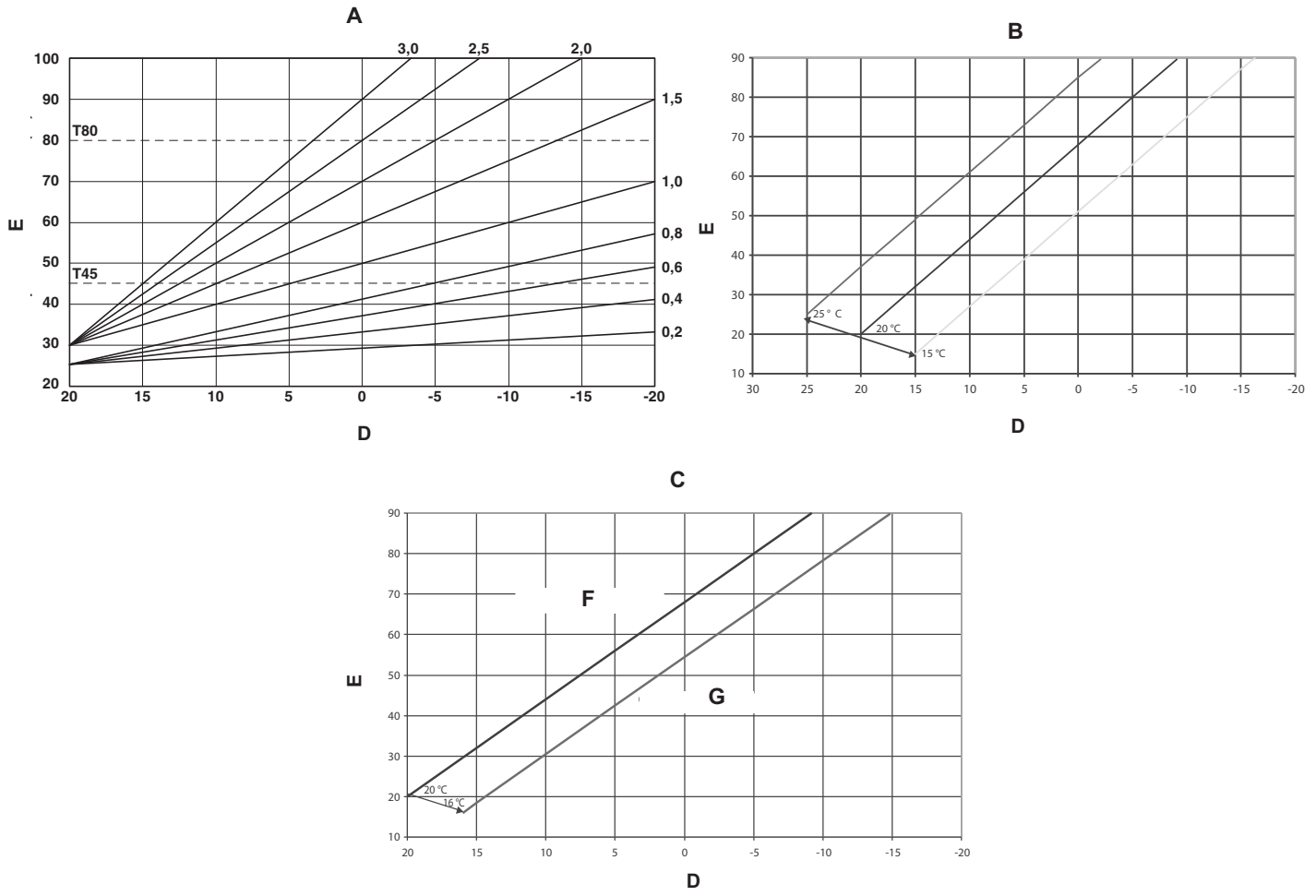


fig. 43



[EN]
A - GRAPH 1 THERMOREGULATION CURVES

Cod. 20095433 - 09/16 - Ed. 3

hurlcon hydronic heating

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