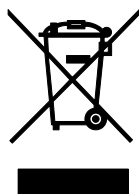


INSTALLATION, USE AND MAINTENANCE



CE
EN

Translation of the
original instructions
(in Italian)

It is compulsory to read this manual before proceeding with the boiler installation, use and maintenance operations.

This boiler is intended for production of hot technical water only:

- For heating of residential, commercial and industrial rooms.
- For heating of industrial process water.
- For indirect production of domestic hot water.

Any other use is forbidden.

Dear Sirs,
thank You for choosing and buying one of our products. Please read these instructions carefully in order to properly install, operate, and maintain the product.



WARNING

We inform users that:

- Boilers shall be installed by an authorised company under the requirements set forth by the prevailing rules, in full compliance with the prevailing regulations and standards.
 - Anyone entrusting installation to an unqualified installer will be subject to administrative sanctions.
 - Boilers must be maintained by qualified personnel only, under the requirements set forth by the prevailing rules.
-



WARNING

According to European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) the crossed-out wheelee bin symbol indicated on the boiler and on the package means that the boiler, at the time of its decommissioning, must be collected and disposed of separately from other waste (see *Decommissioning, disassembly and disposal*).

We hereby inform you that certain models, versions and/or accessories relevant to the products this manual refers to, might not be available in some countries.

Therefore, it is recommended to contact the manufacturer or the importer in order to get the necessary information about the actual availability of such models, versions and/or accessories.

The manufacturer reserves the right to modify the products and/or its components as deemed necessary, in any moment and without prior notice.

This instruction manual is available in two languages, Italian and English, without prejudice to the prevalence of Italian language in case of differences in translation and/or dispute on construction of the text.

General notes for installing and maintenance technicians, and users

This instruction manual is an integral and essential part of the product. It shall be supplied by the installer to the user who shall keep it carefully to consult it whenever necessary.

This document shall be supplied together with the equipment in case the latter is sold or transferred to others.



WARNING

This boiler is intended for production of hot technical water only:

- For heating of residential, commercial and industrial rooms.
- For heating of industrial process water.
- For indirect production of domestic hot water.

Any other use is forbidden.



DANGER

This boiler must be installed by qualified personnel.

The installation by unqualified personnel is forbidden.



DANGER

This boiler must be installed in compliance with the requirements of the technical standards and legislation in force relating to gas appliances, particularly with reference to ventilation of the premises.

Any installation that does not comply with the requirements of the technical standards and legislation in force is forbidden.



DANGER

This boiler must be installed according to the manufacturer's instructions given in this manual. Incorrect installation may cause injury to persons and/or animals and damage to property. The manufacturer shall not be held liable for any such injury and/or damage.



WARNING

This boiler must be installed inside the building or in a partially sheltered place.

A partially sheltered place is a place which is not directly exposed to atmospheric agents.

Any installation in a place that is not partially sheltered is forbidden.



DANGER

This boiler must be correctly and safely connected to an electrical system compliant with the existing technical standards.

Any incorrect and unsafe connection to the electrical system is forbidden.

It is forbidden to connect the boiler to an electrical system lacking a differential switch to protect the boiler power line.

Any connection to an electrical system lacking a proper grounding system is forbidden.



WARNING

The boiler is supplied with a three-pole power cable, already connected to the electronic board and it is provided with a safety clamp.

This boiler must be connected to a 230V power supply network, as indicated on the label affixed to the power cable.

**DANGER**

Carefully read the instructions relating to air intake and flue gas venting systems in the specific section of this manual.

**DANGER**

This boiler must be connected to a gas distribution system which complies with the existing technical standards.

Check the gas system state of conservation before installing the boiler.

Any connection to a gas system which does not comply with the existing technical standards is forbidden.

When connecting the boiler to gas supply network, it is compulsory to install an appropriately sized gasket made from suitable material.

The boiler gas inlet coupling is not suitable for hemp, teflon tape or similarly made gaskets.

After connecting the boiler, check the connection for tightness.

Once gas is in the pipes, leak test by a naked flame is forbidden; use specific products available on the market.

**DANGER**

With gas fired boilers, take the following measures if you smell gas:

- **Do not turn on or off electric switches and do not turn on electric appliances.**
- **Do not ignite flames and do not smoke.**
- **Close the main gas cock.**
- **Open doors and windows.**
- **Contact a Service Centre, a qualified installer or the gas supply company.**

Never use a flame to locate a gas leak.

The boiler is designed for installation in the countries indicated on the technical data plate applied both to the package and to the boiler itself: installation in any other country may be a source of danger for people, animals and/or property.

The manufacturer will bear no contractual and tortious liability for failure to comply with all the instructions above.

Before installing the boiler, check that the technical data correspond to the requirements for its correct use in the system.

Check that the boiler is intact and it has not been damaged during transport and handling. Do not install equipment which is clearly damaged and/or faulty.

Damage and/or injury caused by incorrect installation or use and/or damage and/or injury due to non-observance of the manufacturer's instructions shall release the manufacturer from any and all contractual and extra-contractual liability.

Do not obstruct the air intake openings.

Only original accessories or optional kits (including the electric ones) are to be installed.

Properly dispose of the packaging as all the materials can be recycled. The packaging must therefore be sent to specific waste management sites.

After removing the packaging, make sure that its elements (clips, plastic bags, foam polystyrene etc.) are not left within the reach of children as they are potential hazard sources.

In the event of failure and/or faulty functioning, switch off the boiler. Do not attempt to make repairs: contact qualified technicians.

Original parts must be used for all repairs to the boiler.

Non-observance of the above requirements may affect the safety of the boilers and endanger people, animals and/or property.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

**DANGER**

Before starting the boiler, and each time it is at a standstill for several days, make sure the trap is full of water. If the trap is empty, fill it by pouring water into the boiler through the flue gas venting duct.

**WARNING**

The boiler must be serviced periodically as indicated in the relevant section of this manual. Appropriate boiler maintenance ensures efficient operation, environment preservation, and safety for people, animals and objects. Incorrect and irregular maintenance can be a source of danger for people, animals and property.

The user is strongly advised to have the system serviced and repaired by qualified personnel, satisfying all prevailing law requirements, and trained to properly carry out these operations.

In the event of long periods of inactivity of the boiler, disconnect it from the electrical power mains and close the gas cock.

**WARNING**

With the electrical power disconnected and the gas cock closed, the device's electrical anti-freeze function does not work.

Should there be a risk of freezing, add antifreeze: it is not advisable to drain the system as this may result in damage; use specific anti-freeze products suitable for multi-metal heating systems.

**DANGER**

Damage and/or injury caused by incorrect installation and/or incorrect use and/or unauthorized changes to the boiler and/or non-observance of the manufacturer's instructions and/or of the relative standards/laws in force in the country of installation, shall release the manufacturer from any and all liability.

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1. Instructions for the user

1.1 Control panel

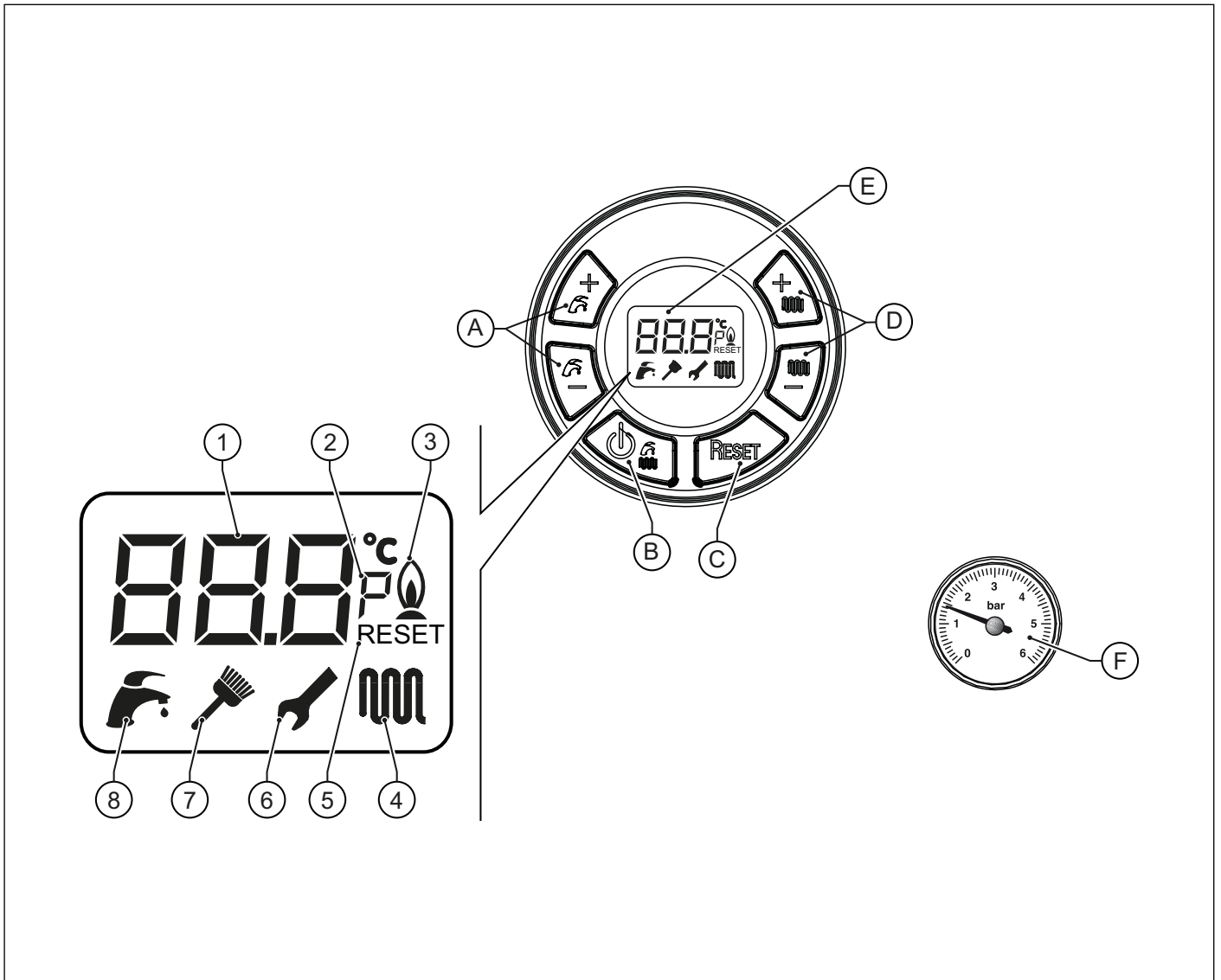


Fig. 1 Control panel

- A. Domestic hot water settings (+/- DHW).
- B. Select operating status and confirm parameters.
- C. Alarm reset and back to the starting page during parameter selection (**RESET**).
- D. Central heating water temperature settings and parameter settings (+/- CH).
- E. LCD display.
- F. Heating system water pressure gauge.

| Ref. | Description | Steady on | Flashing |
|-------------|--|--|--|
| 1 | Alphanumeric indicator | Temperature, parameter values and fault indication. | Not used. |
| 2 | Parameter indicator | Indication of "parameter" inside the parameter menu. | Not used. |
| 3 | Flame lighting indicator | Lit flame indication. | Not used. |
| 4 | Central heating indicator | CH function activated. | Displaying of the heating temperature set-point or heating function in progress. |
| 5 | RESET indicator | The boiler can be reset. | Not used. |
| 6 | Parameter editing indicator | During parameter editing, the wrench symbol stays on until the set datum is confirmed. | When edited parameter value is confirmed. |
| 7 | Flue cleaning function indicator (for the installer) | Flue cleaning function in progress. | Indicates that you are accessing the flue cleaning function. |
| 8 | DHW indicator | DHW function activated. | Displaying of the DHW temperature set-point or DHW function in progress. |

1.2 Interpreting boiler status from display indications

1.2.1 Normal operation

Boiler in STANDBY mode



Boiler in SUMMER mode
No active function
Flow temperature displayed



Boiler in WINTER mode
No active function
Flow temperature displayed



Boiler in CENTRAL HEATING ONLY mode
No active function
Flow temperature displayed



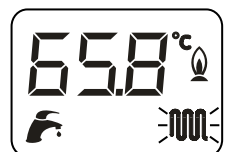
Boiler in SUMMER mode
Domestic hot water withdrawal
DHW temperature displayed



Boiler in WINTER mode
Domestic hot water withdrawal
DHW temperature displayed



Boiler in WINTER mode
CH function active
Flow temperature displayed



Boiler in CENTRAL HEATING ONLY mode
CH function active
Flow temperature displayed



1.2.2 Malfunction

To identify any malfunctions, refer to paragraph *Troubleshooting* on page [57](#).

1.3 Boiler operation

1.3.1 Switching on



DANGER

It is presumed that the boiler has been installed by a qualified installer, it has been commissioned and is ready to operate correctly.

- Open the gas shut-off cock.
- Turn the master switch installed ahead of the boiler to ON.
- The display turns on and indicates the function currently active (see *Interpreting boiler status from display indications* on page 11).
- Select the boiler operating mode: OFF/SUMMER/WINTER/CH ONLY (see *Selecting the operating mode* on page 12).
- Set desired CH temperature (see *CH function* on page 12).
- Set desired DHW temperature (see *DHW function* on page 13).
- Set the desired temperature on the ambient thermostat in the building (if installed).
- If the ambient probe or external probe is present, set the desired ambient temperature value.



WARNING

After a prolonged period with the boiler not in use, and with LPG fired boilers in particular, some starting difficulty may be encountered.

Before starting the boiler switch on another gas powered device (e.g. kitchen range).

Beware that even by following this procedure, the boiler might still experience some starting difficulties and shut down once or twice. Press the "RESET" button to restore boiler operation.

1.3.2 Selecting the operating mode

To select the boiler operation mode press **B** Operating mode selection.

Whenever button is pressed, the following modes are enabled in sequence: "SUMMER", "WINTER", "CH ONLY", "OFF".

"SUMMER" operating status

When the "SUMMER" mode is enabled, only the DHW production function is active.

"WINTER" operating status

When the "WINTER" mode is enabled, both DHW and CH functions are active.

"CH ONLY" operating status

When the "CH ONLY" mode is enabled, only the heating water production function is active.

"OFF" operating status

When the "OFF" mode is enabled, no function is active.


1.3.3 CH function


To set the water temperature for central heating, press the +/- **CH** buttons.

Heating temperature adjustment range depends on the selected operating range.:

- standard range: from 20°C to 78°C (pressing +/- **CH**);
- reduced range: from 20°C to 45°C (pressing +/- **CH**).


Operation range selection is to be implemented by an installer or a qualified Service Centre (see par. *Selecting the operating range in heating mode* on page 40).

During temperature setting, the  symbol flashes on the screen and the CH current temperature setting is displayed.

When the central heating system requests heat, the CH symbol flashes  and the current heating flow water temperature is displayed.

The waiting time between one boiler ignition and the following one, used to prevent boiler frequent turning on and off during heating, ranges between 0 and 30 minutes (default value: 4 min.), and can be edited with the **P11** parameter.

Should water temperature in the system fall below set minimum value, between 20°C and 78°C (default value 40°C for standard range, 20°C for reduced range) to be edited with the **P27** parameter, the waiting time is reset and the boiler re-ignites.


The burner ON symbol  shows while the burner is operating.

1.3.4 DHW function

DHW production function is enabled in one of the following operating modes: SUMMER or WINTER.

Such function has always priority over CH water supply.

To set the domestic hot water temperature, press +/- **DHW** buttons.

During temperature setting, the  symbol flashes on the screen and the DHW current temperature setting is displayed. The DHW temperature setting range is from +35 °C to +57 °C.



WARNING

**A flow limiter is installed within the boiler, which limits DHW output flow rate.
This limit is set to 10 litres per minute.**

1.3.5 Freeze protection function

This boiler is fitted with a freeze protection system, which works when the following functions are activated: OFF/SUMMER/WINTER/CH ONLY.



DANGER

The freeze protection function only protects the boiler, not the whole heating system.

The central heating system can be effectively protected against icing by using specific anti-freeze products that are suitable for multi-metal systems.



WARNING

Do not use anti-freeze products for car engines, and check the effectiveness of the product used over time.

In case burner cannot be ignited due to the lack of gas, the freeze protection functions are anyway enabled through the circulation pumps.

1.3.5.1 Flow freeze protection function

When the heating water temperature sensor detects a water temperature of +5 °C, the boiler switches on and stays on at its minimum heat output until the temperature reaches +30 °C or 15 minutes have elapsed.

The pump continues to operate even if the boiler shuts down.

1.3.5.2 DHW plate exchanger freeze protection function

When the DHW temperature sensor detects a water temperature of +5°C, the boiler switches on and stays on at its minimum heat output until the DHW temperature reaches +10°C or 15 minutes have elapsed (the deviating valve is in the DHW position).

During the DHW freeze protection operation the temperature detected by the flow probe is constantly checked, and in case it reaches +60 °C the burner is switched off.

The burner is switched on again if the operation request in anti-freeze mode is still present and the flow temperature is below +60°C. The pump continues to operate even if the boiler shuts down.

1.3.5.3 Ambient probe freeze protection function

If the ambient probe detects a temperature below +5°C, a heating request to heat the probe-controlled room is launched.

The heating function ends when the probe ambient temperature reading reaches +6°C.

1.3.6 Anti-seize function

If the boiler remains inactive and connected to the power mains, the circulation pump and the deviating valve will be shortly enabled every 24 hours so as to avoid any shut-down.

The same applies to the relay which can be freely programmed whenever this latter is used to power a recirculation pump or a deviating valve.

1.3.7 Timed post-circulation function

After each central heating, DHW or freeze protection request, the pump continues to be powered for 30 seconds.

If a new central heating, DHW or freeze protection request is received during this period, the post-circulation function is cancelled in order to fulfil the request.

1.3.8 Timed post-ventilation function

After each central heating, DHW or freeze protection request, the fan continues to work for 10 seconds.

If a new operating request is received during this period, the post-ventilation function is cancelled in order to fulfil the request.

1.3.9 Operation with ambient probe

Boiler can be connected to an ambient probe (optional not compulsory, supplied by the manufacturer).

Once the ambient temperature value is known, the boiler automatically regulates the heating water temperature, increasing it as the ambient temperature decreases and decreasing it when the ambient temperature gets close to the set temperature.

Heating water temperature varies based on a programme written inside boiler electronic microprocessor.

When the ambient probe is connected, the +/- CH buttons are no longer used to set heating water temperature, but to edit ambient temperature.

During temperature setting, the °C icon flashes on the display and the value being set is shown.

As soon as button is released, icon will continue flashing for approx. 3 seconds, and set value will flash as well.

After this time, value is stored and display standard operation will be restored.

To connect the ambient probe see *Ambient probe installation (optional)* on page 39.



WARNING

Only original ambient temperature probes supplied by the manufacturer must be used.

The use of non-original ambient probes, not supplied by the manufacturer, may affect the operation of the ambient probe itself and of the boiler.

1.3.10 Operation with external probe (optional)

Boiler can be connected to a probe measuring the external temperature (optional - not compulsory, supplied by the manufacturer)

Once the external temperature value is known, the boiler will automatically adjust the heating water temperature: increasing it as the external temperature decreases and decreasing it as the external temperature increases. This will both improve room comfort and reduce fuel consumption. Standard and reduced range max. temperature values will nevertheless be respected.

This boiler operating mode is called "sliding temperature operation".

Heating water temperature varies based on a programme written inside boiler electronic microprocessor.

With an external sensor, the +/- CH buttons no longer set the heating water temperature, and become buttons for changing the fictitious ambient temperature, namely the desired theoretical temperature in the rooms to be heated.

During temperature setting, the °C symbol flashes on the display and the value being set is shown.

For optimal curve adjustment, a position close to +20 °C is recommended.

For further details on sliding temperature operation, refer to paragraph *Installation of the (optional) external probe and sliding temperature operation* on page 41.



WARNING

Only original external temperature probes supplied by the manufacturer must be used.

The use of non-original external probes, not supplied by the manufacturer, may affect the operation of the external probe itself and of the boiler.

1.3.11 Operation with (optional) remote control

The boiler can also be connected to a Remote Control (optional - not compulsory, supplied by the manufacturer) so as to manage several boiler parameters, such as:

- boiler status selection.
- ambient temperature selection.
- CH system water temperature selection.
- DHW temperature selection.
- CH system activation time programming.
- boiler diagnostics display.
- boiler reset and other parameters.

To connect the Remote Control, see *Installation and operation with Open Therm Remote Control (optional)* on page 40.



WARNING

Only use original Remote Controls supplied by the manufacturer.

The use of non-original remote controls, not supplied by the manufacturer, may affect Remote Control and boiler operation.

1.4 Boiler shut-down

The boiler shuts down automatically if a malfunction occurs.

To determine the possible causes of malfunction, see *Troubleshooting* on page 57.

Below is a list of shut-down types and the procedure to follow in each case.

1.4.1 Burner shut-down

Fault code **E01** is displayed flashing on the display in the event of burner shut-down due to missing flame.

If this happens, proceed as follows:

- check that the gas cock is open and light a kitchen gas ring for example to check the gas supply;
- once having checked if the fuel is available, press the **Reset** button to restore burner operation: if, after two starting attempts, the boiler still fails to start and enters the shut-down mode again, contact a service centre or qualified personnel for maintenance.



WARNING

If the burner shuts down frequently, there is a recurring malfunction, so contact a service centre or a qualified service engineer to carry out the maintenance.

1.4.2 Shut-down due to overheating

Fault code **E02** is shown on the LCD display in the event of flow water temperature overheating. Contact a service centre or a qualified service engineer to carry out the maintenance.

1.4.3 Shut-down due to incorrect air/flue gas system draught

The boiler is equipped with a safety device for flue gas exhaustion check.

Should an air intake/flue gas venting system malfunction occur, the control device will shut down the boiler by interrupting the gas supply to the boiler and the LCD will display the code **E03**:

In this case, contact a Service Centre or a qualified service engineer to carry out the maintenance.

1.4.4 Shut-down due to low water pressure

Fault code **E04** is displayed on the LCD display in the event of shut-down triggered by the water pressure switch.

Fill the system by working on filler cock (A) (see Fig. 2 Filler cock).

Water pressure must be 1±1.3 bars while the boiler is cold.

In order to restore water pressure, proceed as follows:

- Turn the filler cock anticlockwise to allow water to enter the boiler;
- Keep the filler cock open until the pressure gauge shows a value of 1±1.3 bar;
- Turn cock clockwise to close it.

Should the boiler shut down frequently, contact qualified personnel or an authorised service centre for maintenance.



DANGER

Make sure you close filler cock (A) carefully after filling procedure is completed.
If you do not, when the pressure increases, the safety valve may activate and discharge water.

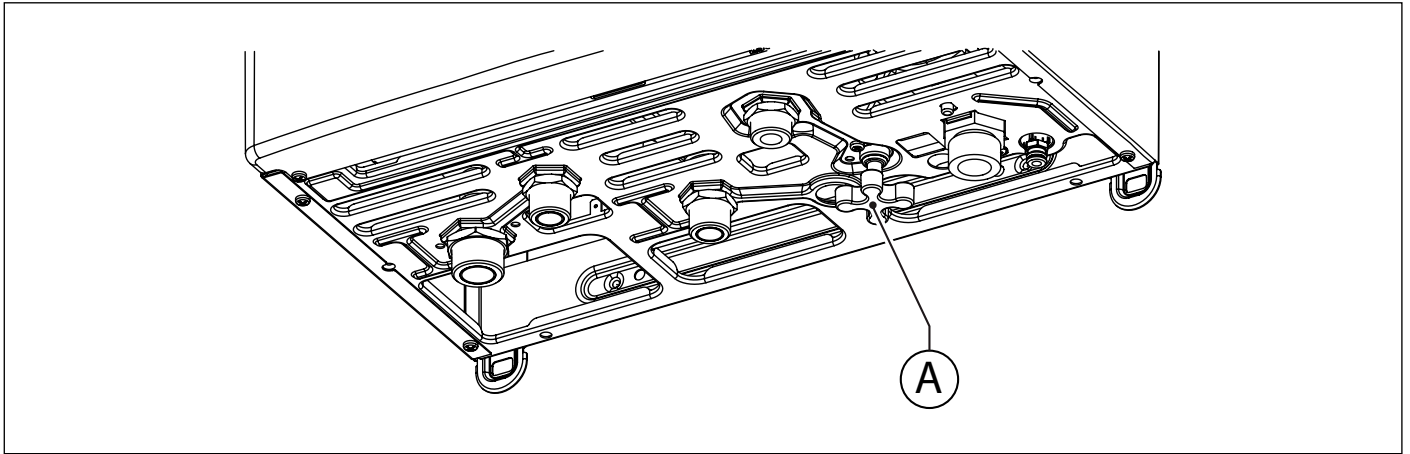


Fig. 2 Filler cock

1.4.5 Alarm due to temperature probe malfunction

The following fault codes are shown on the display in the event of burner shut-down due to a temperature probe fault:

- **E05** in this case, the boiler does not work.
- **E06** in this case, the boiler functions in central heating mode only, and the DHW function is disabled.
- **E15** for the return probe; in this case the boiler functions normally.
- **E23** for the external probe; in this case the boiler works normally. Operation with external probe is disabled.
- **E44** for the ambient probe; in this case the boiler works normally. Operation with ambient probe is disabled.



WARNING

In any case, contact a service centre or qualified personnel for maintenance.

1.4.6 Alarm due to (optional) Remote Control connection malfunction

The boiler recognises whether or not there is a Remote Control (optional, not compulsory).

If the boiler does not receive information from the Remote Control after the Remote Control itself is connected, the boiler attempts to re-establish communication for 60 seconds, after which the fault code **E31** is shown on the remote control display.

The boiler will continue to operate according to the settings on the touch screen and ignore the Remote Control settings.



WARNING

Contact a service centre or a qualified service engineer to carry out the maintenance.

The remote control can indicate faults or shut-down conditions and can also restore boiler operation after shut-down up to a maximum of 3 times in a 24 hour period.

If the maximum number of attempts is reached, fault code **E99** is shown on the boiler display.

To reset error **E99**, disconnect and reconnect the boiler from the mains power.

1.4.7 Shut-down for fan malfunction

The fan operation is constantly monitored and in case of malfunction the burner goes off; the code **E40** flashes on the display. This mode is maintained until the fan recovers normal working parameters. If the boiler does not start and remains in this mode, contact a service centre or a qualified service engineer to carry out the maintenance.

1.5 Maintenance



WARNING

The boiler must be serviced periodically as indicated in the relevant section of this manual. Appropriate boiler maintenance ensures efficient operation, environment preservation, and safety for people, animals and objects. Boilers must be maintained by qualified personnel only, under the requirements set forth by the prevailing rules.

1.6 Notes for the user



WARNING

The user may only clean the external casing of the boiler, employing common household products. Do not use water!



WARNING

The user may only access parts of the boiler that can be reached without using special equipment or tools. The user is not authorised to remove the boiler casing or to operate on any internal parts. No one, including qualified personnel, is authorised to modify the boiler. The manufacturer shall not be held responsible in case of damage to people, animals, or property due to failure to follow the above mentioned instructions.

2. Technical features and dimensions

2.1 Technical features

This boiler is equipped with a fully pre-mixed gas burner. The following models are available:

- **KC** condensing boiler with sealed chamber and forced draught, supplying CH water and instant DHW production;

The following power rates are available:

- **KC 24**: with heat input of 20.0 kW

All models are equipped with electronic ignition and ionisation flame control device.

The boilers meet local applicable Directives enforced in the country of destination, which are stated on their rating plate.

Installation in any other country may be a source of danger for people, animals and property.

The key technical features of the boilers are listed below.

2.1.1 Manufacturing characteristics

- IPX4D electrically protected control panel.
- Integrated, modulating electronic safety board.
- Electronic start-up with built-in igniter and ionisation flame detection.
- Stainless steel, fully pre-mixed burner.
- Mono-thermal, high efficiency stainless steel heat exchanger.
- Twin shutter modulating gas valve with constant air/gas ratio.
- Modulating, electronically managed combustion fan.
- High-efficiency CH circulation pump with built-in air purging device.
- Minimum pressure switch.
- Heating flow water temperature probe.
- Domestic hot water temperature probe.
- Limit thermostat.
- Flue gas thermostat on discharge tower
- Air pressure switch.
- Integrated, automatic by-pass.
- 9-lt- expansion vessel
- System filler cock.
- System water discharge tap.
- Stainless steel plate heat exchanger for DHW production.
- Motorised deviating valve.
- DHW priority flow switch.
- 10 litre/min DHW flow-limiting device.

2.1.2 User interface

- Liquid crystal LCD interface for displaying and setting the boiler operating status: OFF, SUMMER, WINTER and CH ONLY.
- CH water temperature regulator: 20-78°C (standard range) or 20-45°C (reduced range).
- DHW water temperature regulator: 35-57°C.
- System water pressure gauge.

2.1.3 Operating features

- CH electronic flame modulation with timer-controlled rising ramp (60 seconds, adjustable).
- Electronic flame modulation in DHW mode.
- DHW function priority.
- Flow freeze protection function: ON at 5°C; OFF at 30°C or after 15 minutes of operation if CH temperature > 5 °C.
- DHW freeze protection function (CTFS): ON 5°C; OFF 10 °C or after 15 minutes of operation if DHW temperature > 5 °C.
- Timer-controlled flue cleaning function: 15 minutes.
- CH Maximum heat input parameter adjustment.
- Ignition heat input adjustment parameter.
- Pre-selection of the heating range: standard or reduced.
- Ignition flame propagation function.
- CH thermostat timer: 240 seconds (adjustable).
- Heating pump post-circulation function, freeze protection and flue cleaning modes: 30 seconds (adjustable).
- DHW post-circulation function: 30 seconds.
- Post-circulation function for heating temperature > 78 °C: 30 seconds.
- Post-ventilation function after operation: 10 seconds.
- Post-ventilation function for CH temperature >95 °C.
- Circulation pump and deviating valve anti-seize function: 30 seconds of operation after 24 hours of inactivity.
- Anti-water hammer function: adjustable from 0 to 3 seconds via parameter **P15**.
- Ready for connection to an (optional) ambient thermostat.
- Ready for operation with an external probe (optional, supplied by the manufacturer).
- Ready for operation with an ambient probe (optional, supplied by the manufacturer).
- Ready for operation with an OpenTherm remote control (optional, supplied by the manufacturer).

2.2 Dimensions

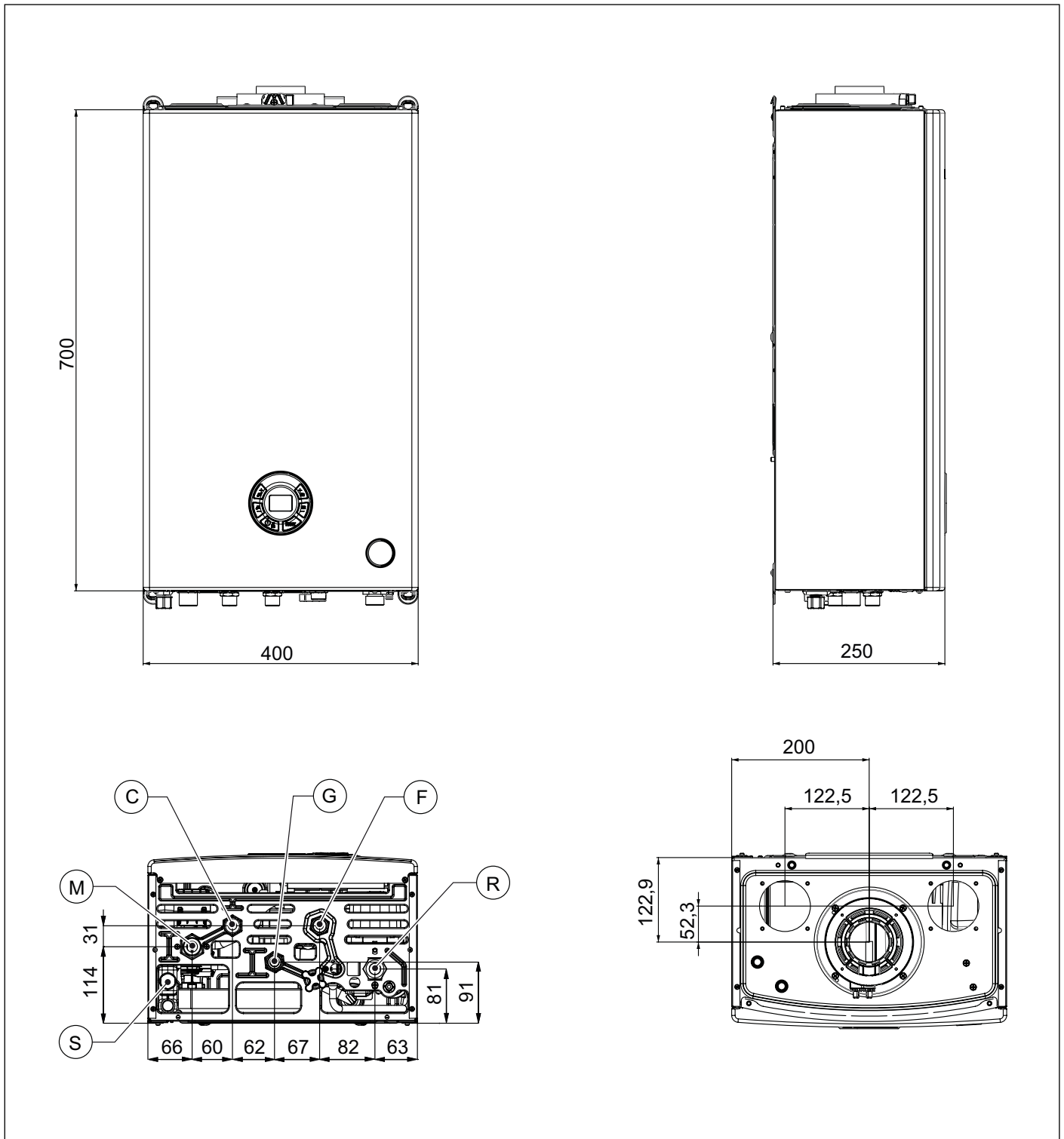


Fig. 3 Dimensions

- S Trap inspection cap
- M CH system flow (3/4")
- C DHW outlet (1/2")
- G Gas inlet (1/2")
- F Cold water inlet (1/2")
- R CH system return (3/4")

2.3 Hydraulic diagram

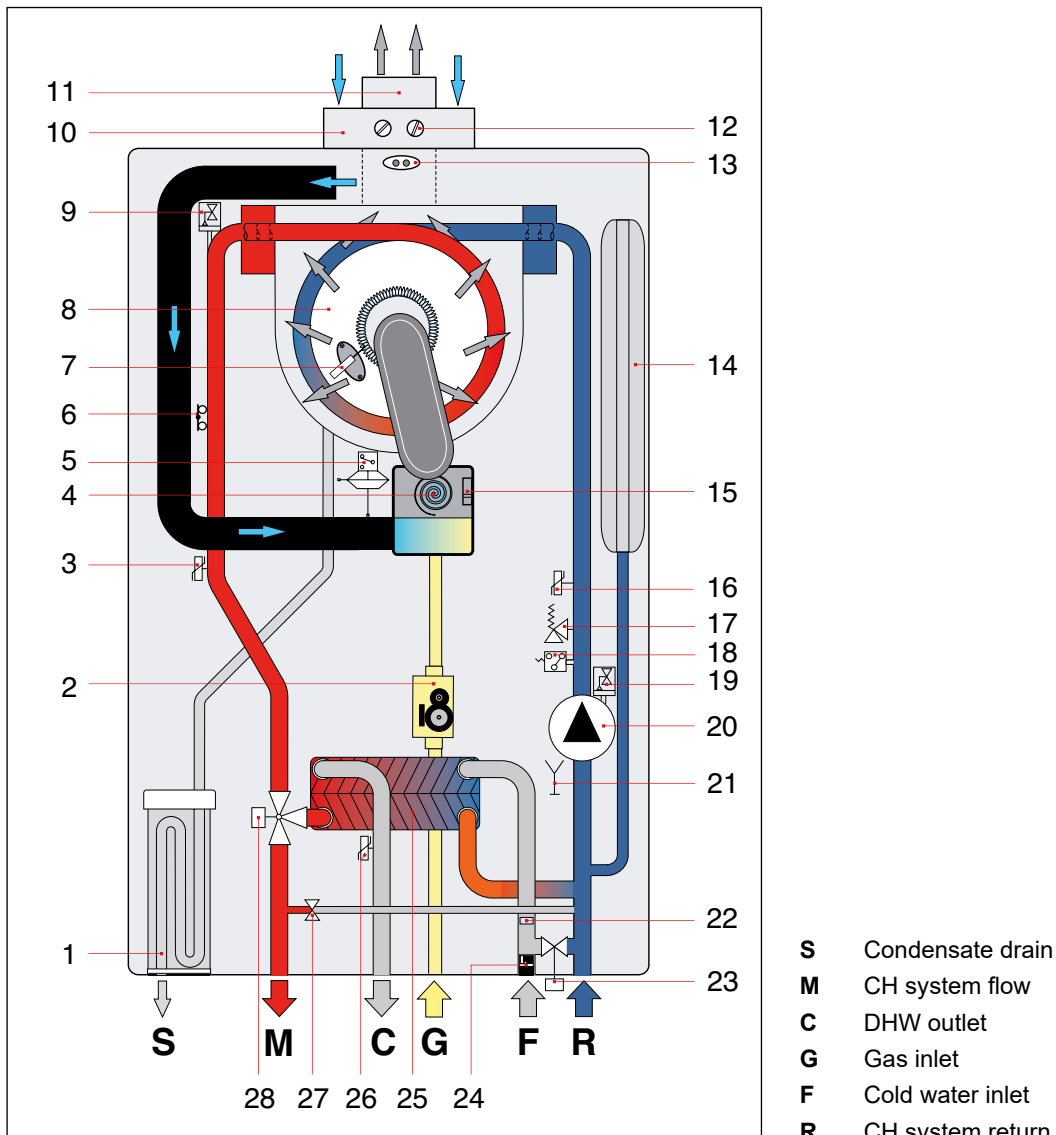


Fig. 4 Hydraulic diagram

- | | |
|---|--|
| 1. Condensate trap | 15. Fan check probe |
| 2. Modulating gas valve | 16. CH return water temperature probe |
| 3. CH flow water probe | 17. 3-bar safety valve |
| 4. Modulating fan | 18. Minimum pressure switch |
| 5. Air pressure switch | 19. Air-purging device |
| 6. Safety thermostat on CH flow | 20. Circulation pump |
| 7. Ignition/detection electrode | 21. System discharge cock. |
| 8. Primary condensing exchanger | 22. DHW flow rate limiting device |
| 9. Air-purging device | 23. Filler cock |
| 10. Air intake duct | 24. Cold water flow switch with filter |
| 11. Flue gas venting duct | 25. Secondary plate exchanger |
| 12. Flue gas analysis ports | 26. DHW temperature probe |
| 13. Flue gas thermostat on venting duct | 27. Automatic by-pass |
| 14. Expansion vessel | 28. Motorised 3-way valve |

2.4 Operating data

Burner pressures reported in the following page must be verified after the boiler has been operating for 3 minutes.

Gas category: II2H3P

| Fuel | Supply pressure [mbar] | Diaphragm diameter [mm] | Flue CO ₂ value Max. output ⁽¹⁾ [%] | Flue CO ₂ value Min. output [%] |
|-----------------|------------------------|-------------------------|---|--|
| Natural gas G20 | 20 | 5,7 | 9.0 ± 0.3 | 9.3 ± 0.3 |
| Propane Gas G31 | 37 | 4,3 | 10.0 ± 0.3 | 10.0 ± 0.3 |

Tab. 1 Adjustment specifications

(1) DHW maximum heat input

2.5 General characteristics

| Description | um | KC 24 |
|---|---------|---------|
| CH nominal heat input | kW | 20,0 |
| Minimum heat input | kW | 5,0 |
| Maximum heat output (80-60°C) - CH | kW | 19,4 |
| Minimum heat output (80-60°C) - CH | kW | 4,8 |
| Maximum heat output (50-30°C) - CH | kW | 21,2 |
| Minimum heat output (50-30°C) - CH | kW | 5,4 |
| Minimum CH system pressure | bar | 0,5 |
| Maximum CH system pressure | bar | 3,0 |
| DHW maximum heat input | kW | 24,0 |
| DHW minimum heat input | kW | 5,0 |
| Maximum heat output - DHW | kW | 23,3 |
| Minimum heat output - DHW | kW | 4,7 |
| DHW circuit min. pressure | bar | 0,5 |
| DHW circuit max. pressure | bar | 6,0 |
| DHW specific flow rate (Δt=30K) | l/min | 12,0 |
| Electric power supply – voltage / frequency | V - Hz | 230 -50 |
| Power mains supply fuse | A | 3,15 |
| Maximum power consumption | W | 104 |
| Pump absorption | W | 43 |
| Electric protection rating | IP | X4D |
| Net weight | kg | 27,5 |
| Natural gas consumption at maximum CH output (Value referred to 15 °C - 1013 mbar) | cu. m/h | 2,12 |
| Propane gas consumption at maximum CH output | kg/h | 1,55 |
| Maximum CH working temperature | °C | 83 |
| Maximum DHW working temperature | °C | 62 |
| Total capacity of expansion vessel | l | 9 |
| Maximum recommended system capacity (Maximum water temperature 83°C, expansion vessel pressure 1 bar) | l | 100 |

Tab. 2 General specifications

| Description | um | Max. output | Min. output | 30% load |
|--|-----|-------------|-------------|----------|
| Casing heat loss with burner on | % | 0,16 | 1,65 | - |
| Casing heat loss with burner off | % | 0,38 | | |
| Flue system heat loss with burner on | % | 2,79 | 2,10 | - |
| Flue system mass capacity | g/s | 11,0 | 2,2 | - |
| Flue temp. – air temp. | °C | 73,3 | 58,1 | - |
| Heat output efficiency rating (80-60°C) | % | 97,1 | 96,3 | - |
| Heat output efficiency rating (50-30°C) | % | 106,1 | 107,1 | - |
| Heat output efficiency rating with 30% of the load | % | - | - | 108,1 |
| NOx emission class | - | 6 | | |

Tab. 3 Combustion specifications KC 24

| Additional specifications (EN 15502-1) | um | Value |
|---|----|-------|
| Maximum operating temperature of the combustion products | °C | 110 |
| Overheating temperature of the combustion products | °C | 120 |
| Installation type: C63 - Maximum air temperature on intake | °C | 40 |
| Installation type: C63 - Maximum flue gas recirculation at the terminal | % | 10 |

Tab. 4 Additional specifications

2.6 ERP and Labelling data

| Model(s): TENERIFE | | | KC 24 |
|--|--------------------|--------------|--------------|
| Condensing boiler | | | yes |
| Low-temperature (**) boiler | | | yes |
| B ₁ boiler | | | no |
| Cogeneration space heater | | | no |
| Combination heater | | | yes |
| Seasonal space heating energy efficiency class | | | A |
| Water heating energy efficiency class | | | A |
| Declared load profile | | | XL |
| Item | Symbol | Value | Unit |
| Rated heat output | P _{rated} | kW | 19 |
| Useful heat output: At rated heat output and high-temperature regime (*) | P ₄ | kW | 19,4 |
| Useful heat output: At 30 % of rated heat output and low-temperature regime (**) | P ₁ | kW | 6,5 |
| Seasonal space heating energy efficiency | η _s | % | 92 |
| Useful efficiency: At rated heat output and high-temperature regime (*) | η ₄ | % | 87,4 |
| Useful efficiency: At 30 % of rated heat output and low-temperature regime (**) | η ₁ | % | 97,3 |
| Auxiliary electricity consumption: At full load | e _{lmax} | kW | 0,036 |
| Auxiliary electricity consumption: At part load | e _{lmin} | kW | 0,013 |
| Auxiliary electricity consumption: In standby mode | P _{SB} | kW | 0,003 |
| Standby heat loss | P _{stby} | kW | 0,076 |
| Ignition burner power consumption | P _{ign} | kW | 0,000 |
| Annual energy consumption | Q _{HE} | GJ | 61 |
| Emissions of nitrogen oxides | NO _x | mg/kWh | 39 |
| Sound power level, indoors | L _{WA} | dBA | 51 |
| Water heating energy efficiency | η _{wh} | % | 87 |
| Daily electricity consumption | Q _{elec} | kWh | 0,135 |
| Annual electricity consumption | AEC | kWh | 29 |
| Daily fuel consumption | Q _{fuel} | kWh | 22,473 |
| Annual fuel consumption | AFC | GJ | 17 |
| Contact details: FONDITAL S.p.A. - Via Cerreto, 40 I-25079 VOBARNO (Brescia) Italia - Italy | | | |
| (*) 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). | | | |

Tab. 5 ERP and Labelling data

3. Instructions for the installer

3.1 Installation standards

This boiler must be installed in compliance with the laws and standards in force in the country of installation, which are herein considered as entirely transcribed.

To find out about the gas category and technical specifications, refer to operation data and general features specified in the previous pages.



DANGER

**Accessories and spare parts for installation and service procedures are to be supplied by the Manufacturer.
Should non-original accessories and spare parts be employed, boiler proper performance is not guaranteed.**

3.1.1 Packaging

Boiler is shipped in a sturdy cardboard box.

Remove boiler from cardboard box and check its integrity.

The packing materials can be recycled. Disposal must be managed via appropriate waste collection sites.

Keep packaging out of reach of children, as it may be dangerous.

The manufacturer shall not be held responsible in case of damage to people, animals, or property due to failure to follow the above mentioned instructions.

Packaging includes one plastic bag containing:

- » the present boiler installation, use and maintenance manual;
- » the template for mounting the boiler on a wall (see Fig. 5 Paper template);
- » 2 screws and relevant wall blocks for fixing the boiler to the wall;
- » a wall bracket.

3.2 Choosing where to install the boiler

The following must be taken into account when choosing where to install the boiler:

- indications contained in paragraph *Air intake and flue gas venting system* on page 28 and its sub-paragraphs.
- check the wall for sturdiness, avoiding weak areas.
- do not install the boiler over appliances which may affect boiler operation (e.g. cookers, which produce steam and grease, washing machines etc.).
- do not install boilers in locations with a corrosive or very dusty atmosphere, such as hairdresser salons, laundries etc., as this may severely reduce the lifespan of the components of the boiler.
- avoid installing the air intake terminal in rooms or areas with corrosive or very dusty atmosphere to protect the heat exchanger.

3.3 Positioning the boiler

Each boiler is supplied with a paper template, found inside the packaging (see Fig. 5 Paper template).

The template allows you to ensure that the pipes connected to the CH system, the DHW system and the gas mains, and the air intake/ flue gas venting ducts are all laid out correctly during the realisation of the water system and before installation of the boiler.

This template is made of heavy-duty paper and must be fixed, with the help of a level, onto the wall where the boiler is to be mounted. The template provides all the indications required to drill the boiler mounting holes to the wall, procedure which is done using two screws and expansion blocks.

The lower area of the template shows where to mark the exact point at which the couplings are to be positioned for boiler connection to the gas supply pipe, cold water mains supply pipe, hot water outlet, CH flow and return pipes.

The upper area of the template shows where air intake and flue gas venting pipes are to be positioned.

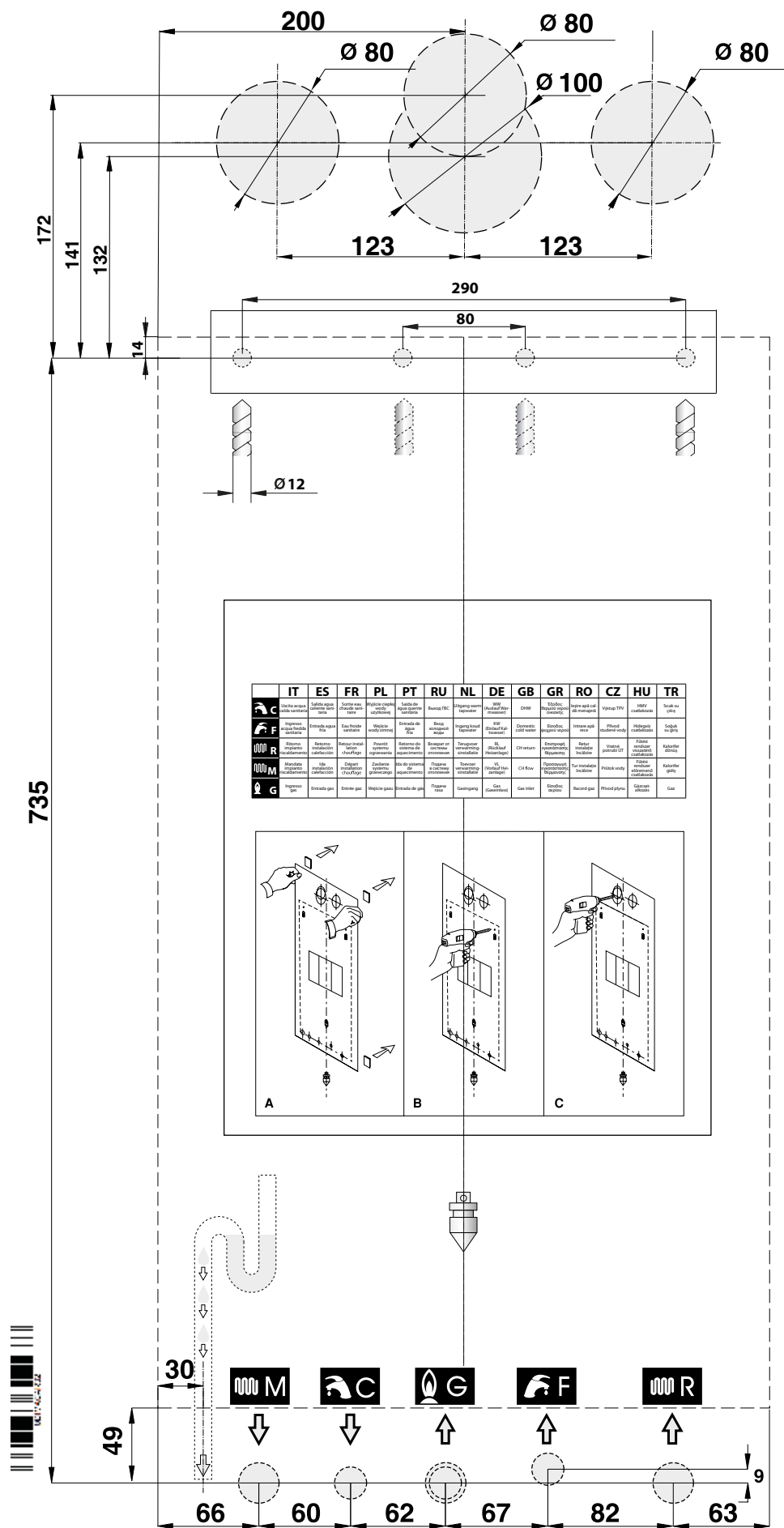


Fig. 5 Paper template

3.4 Installing the boiler



DANGER

Before connecting the boiler to CH and DHW system pipes, clean the latter carefully.

Before commissioning a NEW system, clean it to remove any metal chips due to machining and welding, and any oil and grease that might negatively affect boiler operation or even damage it in case they get inside it.

Before commissioning a RECONDITIONED system (where radiators have been added, the boiler has been replaced, etc.) thoroughly clean it to remove any sludge and residues.

Clean the system using standard non-acid products, available on the market.

Do not use solvents as they could damage system components.

Furthermore, in the central heating system (either new or reconditioned), it is always advisable to add to water a suitable percentage of corrosion protectants for multi-metal systems that will create a protective film onto all internal surfaces.

The manufacturer shall not be held responsible in case of damage to people, animals, or property due to failure to follow the above mentioned instructions.



DANGER

For all boiler installation types, it is necessary to install a filter which can be inspected (Y-shaped type) with Ø 0.4mm-mesh, on the return pipe before the boiler.

In order to install the boiler proceed as follows:

- Affix the template to the wall.
- Check that 1 cm to the right and 1 cm to the left of the boiler is left for casing removal.
- Drill two 12 mm diameter holes in the wall for the wall plugs, insert the wall plugs supplied with the boiler and apply and tighten the screws.
- If necessary, provide holes in the wall to allow air intake and/or flue gas venting ducts to pass through it.
- With reference to the lower part of the template, position the fittings for the connection of:
 - » gas supply pipe **G**;
 - » cold water supply pipe **F**;
 - » the hot water outlet pipe **C**;
 - » CH flow pipe **M**;
 - » CH return pipe **R**.
- Provide a condensate drain and an outlet for the 3-bar safety valve.
- Hook the boiler to the previously fitted screws.
- Connect the boiler to the feed pipes (see *Hydraulic connections* on page 37).
- Connect the boiler to an outlet for the 3-bar safety valve.
- Connect the boiler to pipe for condensate drain.
- Connect the boiler to the air intake and flue gas venting system (see *Air intake and flue gas venting system* on page 28).
- Connect power supply, ambient thermostat (when available) and other available accessories (refer to the following paragraphs).

3.5 Boiler room ventilation

The boiler has sealed combustion chamber. Combustion air is not drawn from boiler room, therefore no specific recommendations need to be applied concerning the boiler room or openings and ventilation provided to the boiler room.



DANGER

The boiler must be installed in a room that is compliant with the legislation and standards in force in the country of installation, which are herein considered as entirely transcribed.

3.6 Air intake and flue gas venting system

Flue gas discharge into the atmosphere and air intake/flue gas venting systems must comply with applicable laws and standards in the country of installation that are considered as fully transcribed herein.



DANGER

For the air intake/flue gas venting systems, specific, manufacturer-approved, condensate acid-resistant pipes and systems must be used, suitable for condensing boilers.



DANGER

In the case of passages through walls with split or coaxial air intake and gas venting ducts, always seal any space between pipes and walls.

If the wall is made of flammable material, apply fireproof insulating material around the flue gas venting pipe.



DANGER

For boilers with split air intake and flue gas venting ducts, in the case of passages through flammable walls, apply fireproof insulating material around the flue gas venting pipe.



DANGER

The boiler is equipped with a safety device for flue gas exhaustion check.

It is strictly forbidden to tamper with and/or prevent operation of such safety device.

Should an air intake/flue gas system malfunction occur, the device will shut down the boiler by interrupting the gas supply to the boiler and the LCD will display the E03 code.

In this case it is necessary to have safety device, boiler and the air intake/flue gas venting ducts promptly checked by a service centre or a qualified service engineer.

In case of repeated stops, it is necessary to have safety device, boiler and the air intake/flue gas venting ducts checked by a service centre or a qualified service engineer.

After each operation on the safety device or the air intake/flue gas venting system, it is necessary to perform a functional test of the boiler.

In case it is necessary to replace the safety device use only original spare parts supplied by the Manufacturer.

To reset the combustion gas exhaust control device operation it is necessary to press "Reset".

3.6.1 Starter kit installation

Refer to Fig. 6 Split kit installation and to Fig. 7 Coaxial kit installation.



DANGER

There must be no leakage of combustion by-products from any of the gaskets.

Split kit (optional)

Clean the boiler roof from dust and other debris due to any masonry works.

Fix the adhesive gasket under the flange connection for flue gas venting system (A). The gasket must adhere completely to the whole surface.

Fix the flange connection for flue gas venting system (A) on the boiler roof at the suitable hole, using the screws supplied. The gasket must adhere completely to the roof surface.

Remove one of the two flue gas closing caps (C) from the boiler roof eliminating any seal residues.

Fix the adhesive gasket under the flange connection for air intake system (B). The gasket must adhere completely to the whole surface.

Fix the flange connection for air intake system (B) on the boiler roof at the suitable hole, using the screws supplied. The gasket must adhere completely to the roof surface.

Coaxial kit (optional)

Clean the boiler roof from dust and other debris due to any masonry works.

Fix the adhesive gasket under the flange coaxial connection (D). The gasket must adhere completely to the whole surface.

Fix the flange coaxial connection (D) at the suitable hole on the boiler roof, using the screws supplied. The gasket must adhere completely to the roof surface.

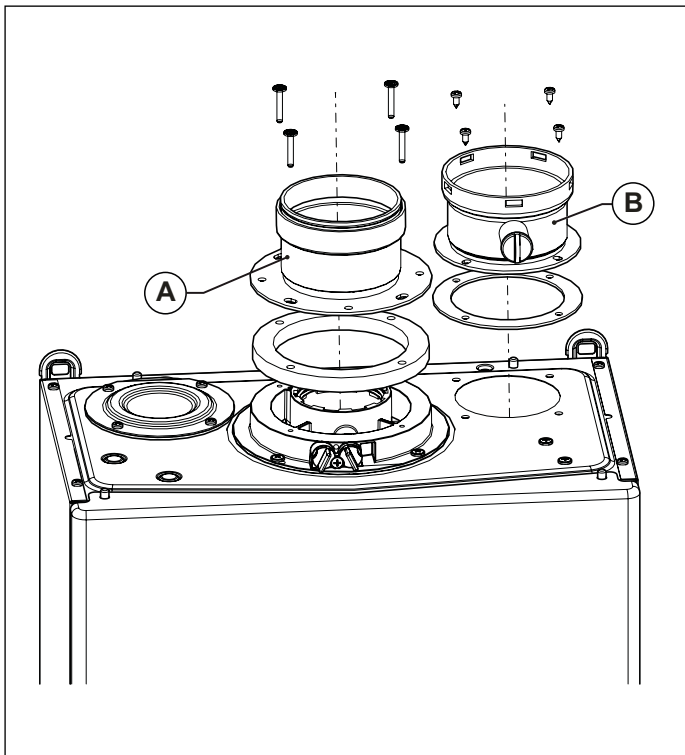


Fig. 6 Split kit installation

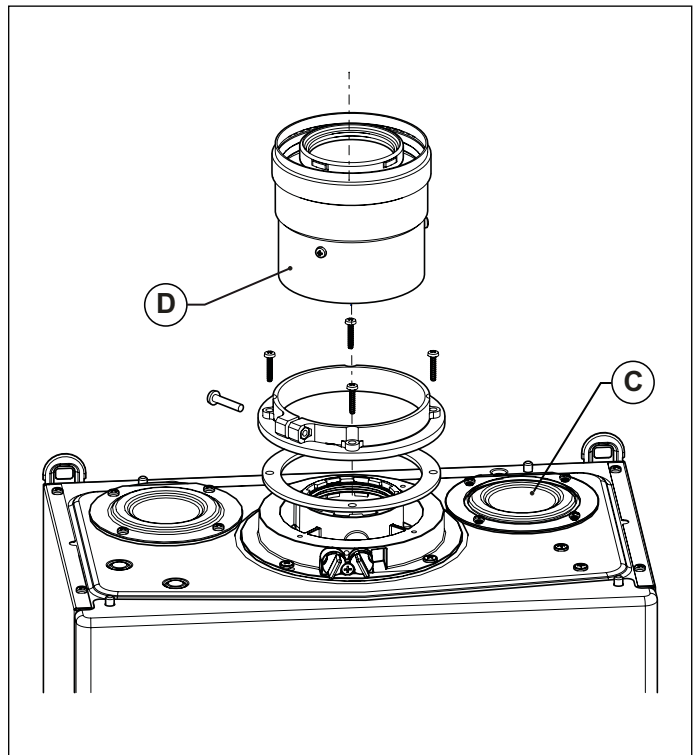


Fig. 7 Coaxial kit installation

3.6.2 Pipe and terminal installation



DANGER

Flue gas venting pipes are to be installed tilted toward the boiler so that condensate runs toward the combustion chamber, which is designed for condensate collection and drainage.

Should the above procedure not be possible, it is necessary to install, in condensate stagnation areas, devices designed for condensate collection and conveying to the condensate drain system.

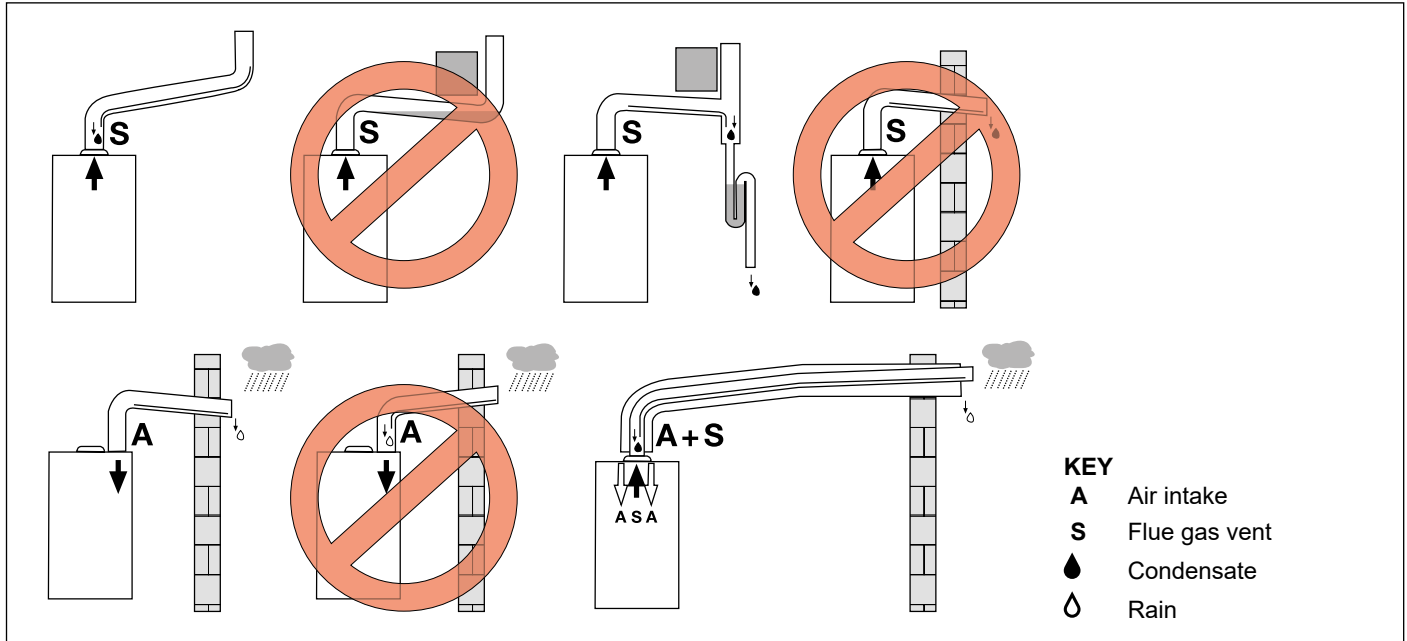


Fig. 8 Installation examples

To install pipes, elbows, terminals and other accessories for air intake and flue gas venting, proceed as follows (see Fig. 9 Pipe installation):

- Clean surfaces and gaskets of the components, removing any dust and debris.
- Apply a thin layer of lubricant on the gasket.
- Insert the components with a slight rotation, pushing until the spigot end stops.



DANGER

There must be no leakage of combustion by-products from any of the gaskets.

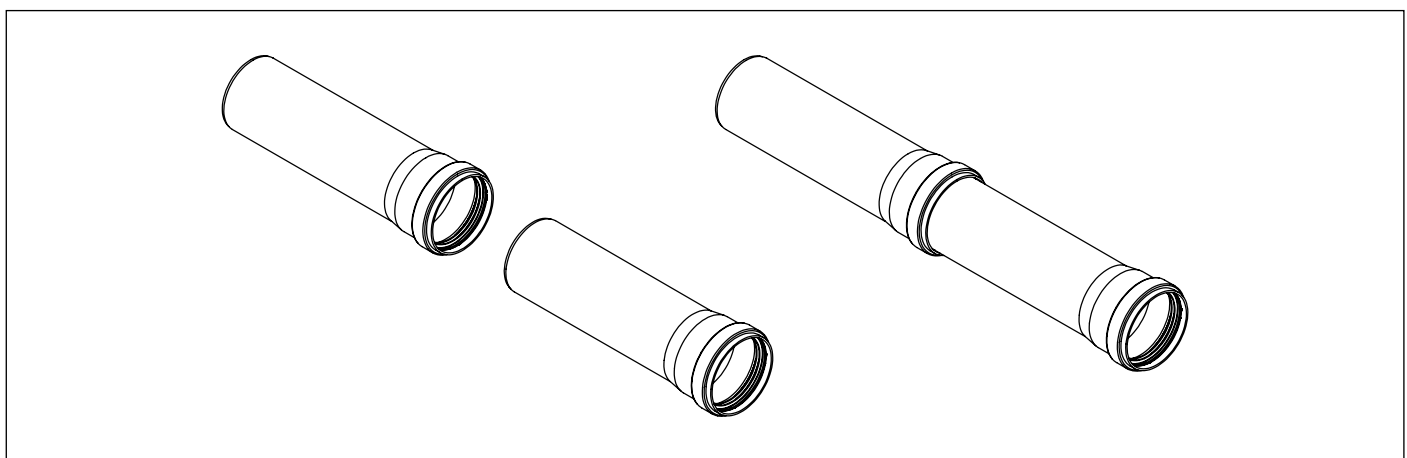


Fig. 9 Pipe installation

Wall-mounted terminals

The final parts of air intake and flue gas venting terminals, both split and coaxial, feature a groove (A) to fix the external collar (see Fig. 10 Wall-mounted terminal installation).

Insert the external collar into the terminal until reaching the groove.

Insert the terminal, from outside, making the external collar adhere to the wall. The terminal projection beyond the wall must be that imposed by the collar forced position.

Insert the internal collar, from inside, until it adheres to the wall.

Any pipes, elbows or other components must not be inserted at the passage through the wall.

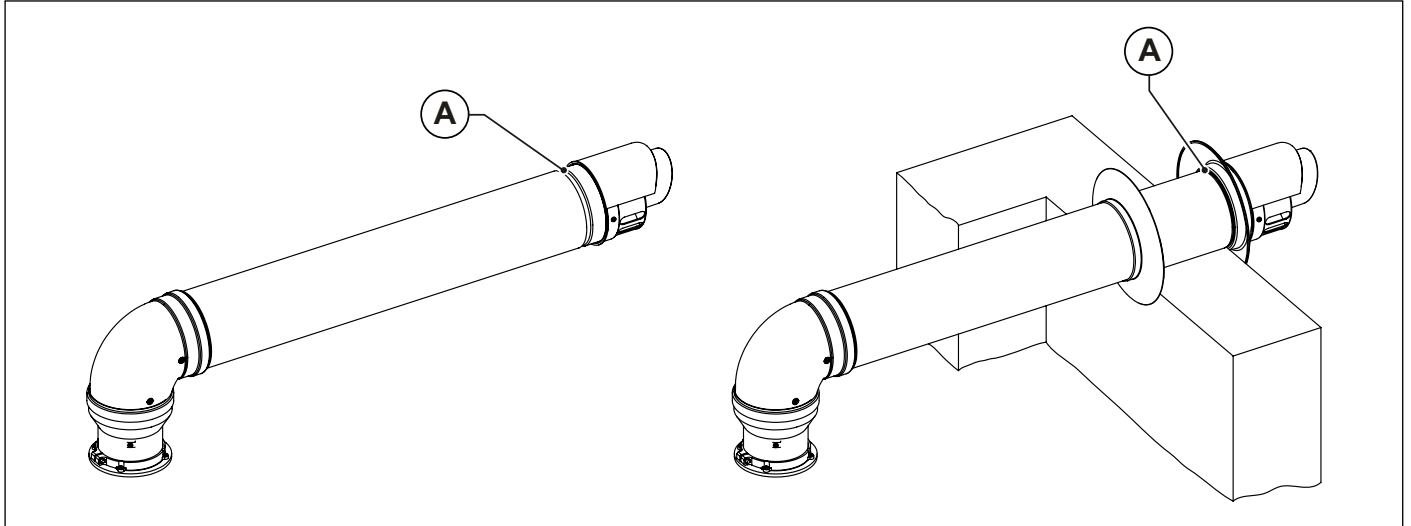


Fig. 10 Wall-mounted terminal installation

Tile for pitched roofs

The tile for pitched roofs can be used on roofs with an inclination between 18° and 44° (see Fig. 11 Tile for pitched roofs).

Remove the roofing elements (tiles, pantiles,...) from the roof area where the tile for pitched roofs will be installed.

Position the tile on the roof.

Position the roofing elements (tiles, pantiles,...) in such a way that rainwater drains over them.

Fit the cap (A) on the tile. The cap can be fitted in 2 positions, according to the roof inclination.

Insert the flue from above through the tile.

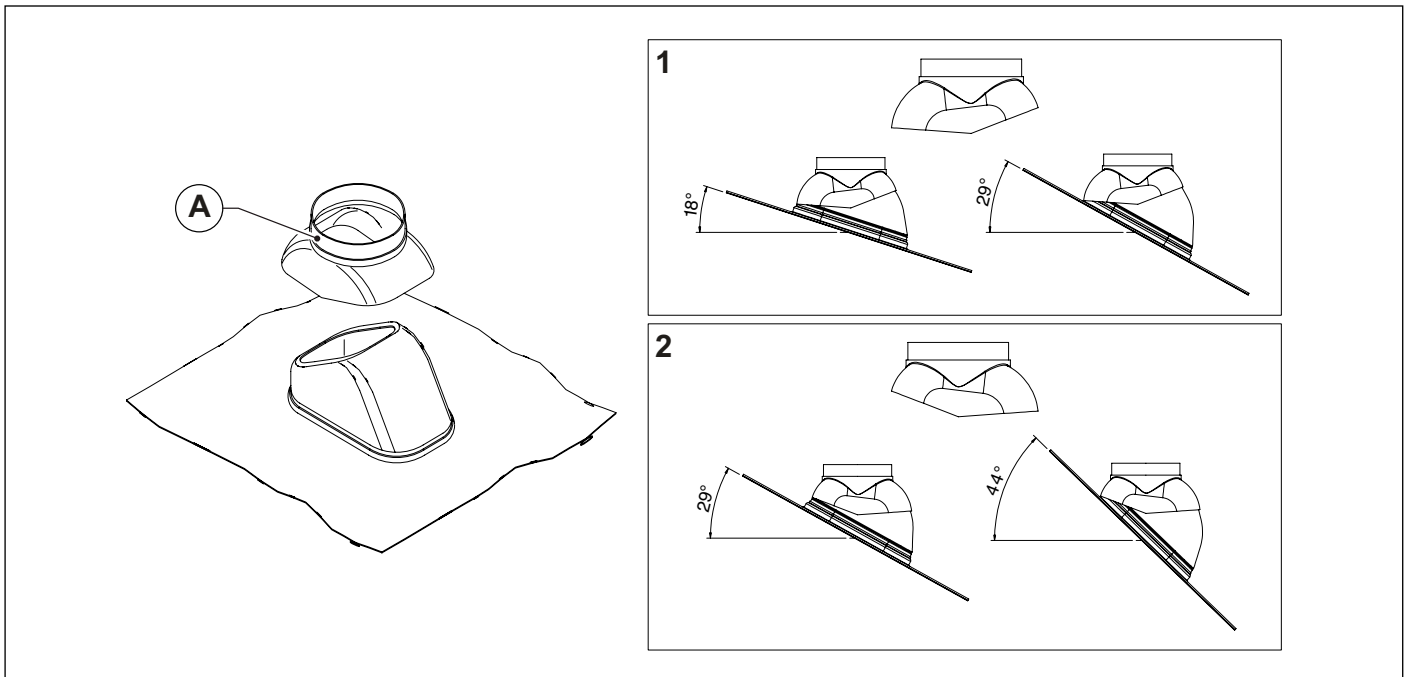


Fig. 11 Tile for pitched roofs

Roof flues

Insert the air intake and/or flue gas venting flue from above through the tile.

Position the rainproof collar (A) until it bottoms on the cap of the tile for roofs (B) and fix it with the screw supplied.

Keep the distance indicated in the figure between the rainproof collar and the terminal.

Check that the flue is in a vertical position and fix it to the structure with collars or other fixing systems.

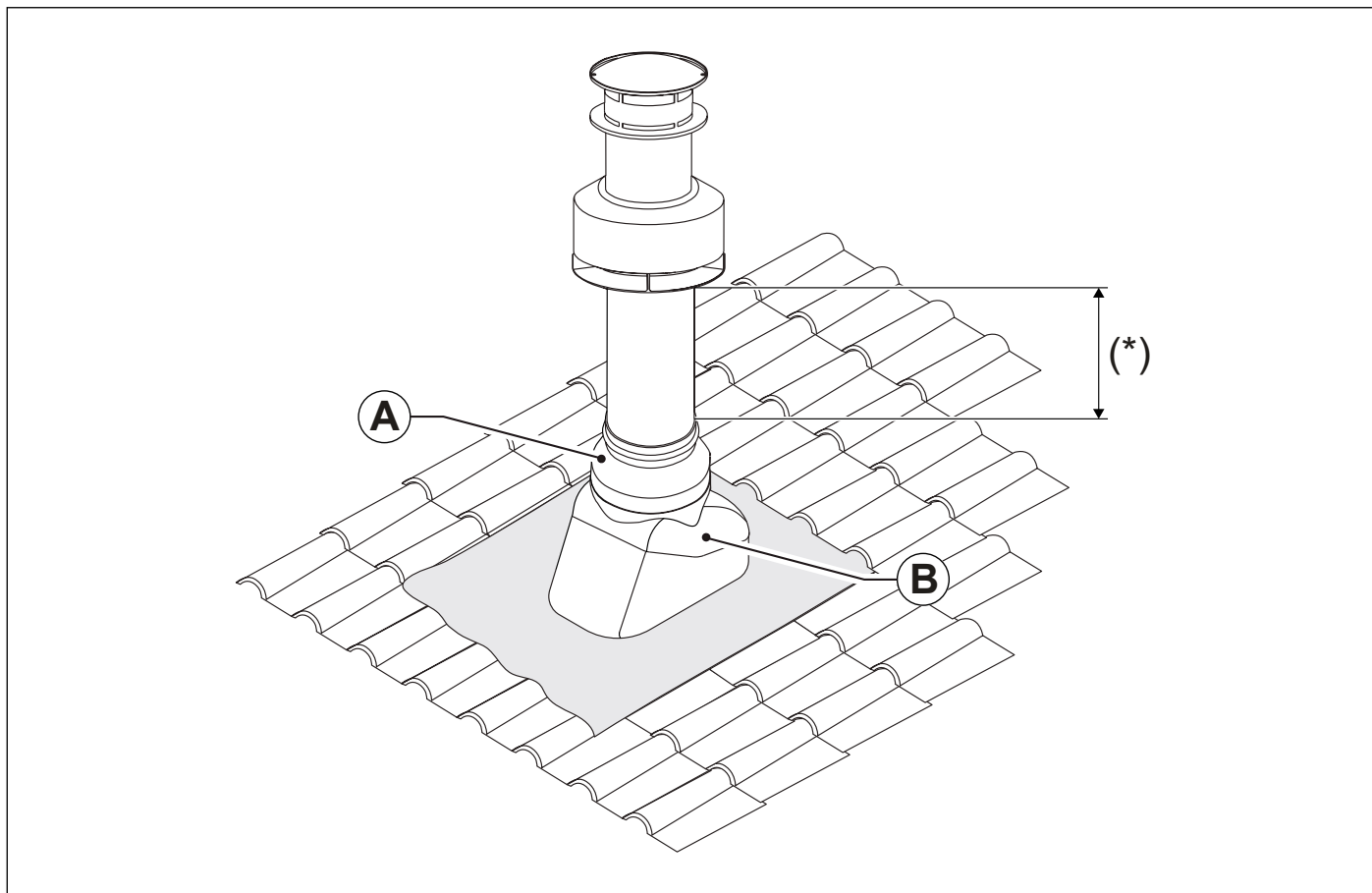


Fig. 12 Roof flue installation

(*) ≥ 370 mm for 0CAMISCA00 and 0CAMIASP00 accessories.
= 270 mm for 0KCAMASP00 accessory.

3.6.3 Possible configuration of air intake and flue gas venting ducts

Type B23/B23P

Boiler intended for connection to an existing flue system external to the boiler room.

Combustion air is taken directly from the boiler room itself while flue gas is conveyed to the outside.

The boiler is not to be fitted with anti-wind gust device; it has to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type B53

Boiler intended for connection, via an independent duct, to the flue gas venting terminal.

Combustion air is taken directly from the boiler room itself while flue gas is conveyed to the outside.

The boiler is not to be fitted with anti-wind gust device; it has to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type C13/C13X

Boiler intended for connection to horizontal outlet and intake ducts connected to the outside by means of coaxial or split ducts.

The minimum distance between the air intake duct and the flue gas venting duct must be at least 250 mm, whereas both terminals must be contained within a square measuring 500 x 500 mm.

The boiler is to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type C33/C33X

Boiler intended for connection to vertical outlet and intake ducts connected to the outside by means of coaxial or split ducts.

The minimum distance between the air intake duct and the flue gas venting duct must be at least 250 mm, whereas both terminals must be contained within a square measuring 500 x 500 mm.

The boiler is to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type C43/C43X

Boiler intended for connection to collective chimney pipe system that includes two ducts, one for air intake and the other for flue gas exhaustion. These ducts may be coaxial or split.

The chimney must be compliant with applicable legislation and standards.

The boiler is to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type C53

Boiler with separate pipes for combustion air intake and flue gas evacuation.

These pipes may discharge in areas at a different pressure.

The terminals may not face each other from opposed walls.

The boiler is to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type C63

Boiler designed to be sold without air intake or flue gas venting ducts.

Flue gas venting and air intake to be ensured by using commercially available pipes, which are to be certified separately.

The boiler is to be equipped with a fan mounted before the combustion chamber/heat exchanger.

Type C83

Boiler intended to be connected to combustion air terminal and to a single flue gas terminal or collective chimney.

The chimney must be compliant with applicable legislation and standards.

The boiler is to be equipped with a fan mounted before the combustion chamber/heat exchanger.

3.6.4 Ø 100/60 mm or Ø 125/80 mm air intake/flue gas venting coaxial duct system



WARNING

The information given above is with reference to air intake/flue gas venting ducts made from smooth, rigid pipes approved and supplied by the manufacturer.

C13/C13X installation type

- Minimum permissible length of horizontal coaxial pipes is 1 meter.
- Maximum permissible length of Ø100/60 mm horizontal coaxial pipes is 16 meters.
- Maximum permissible length of Ø125/80 mm horizontal coaxial pipes is 37 meters.
- For each additional 1 meter of straight pipe, maximum permissible length is to be reduced by 1 meter.
- For each additional 90° elbow, maximum permissible length is to be reduced by 1 meter.
- For each additional 45° (100/60) elbow, maximum permissible length is to be reduced by 0.5 meter.
- For each additional 45° (125/80) elbow, maximum permissible length is to be reduced by 1 meter.
- The wall terminal reduces maximum permissible length by 5.5 meters.
- The air intake duct is to be tilted down by 1% toward its exit, in order to avoid rain water to enter it.

C33/C33X installation type

- Minimum permissible length of vertical coaxial pipes is 1 meter.
- Maximum permissible length of Ø 100/60 mm vertical coaxial pipes is 16 meters.
- Maximum permissible length of 125/80 mm vertical coaxial pipes is 37 meters.
- For each additional 1 meter of straight pipe, maximum permissible length is to be reduced by 1 meter.
- For each additional 90° elbow, maximum permissible length is to be reduced by 1 meter.
- For each additional 45° (100/60) elbow, maximum permissible length is to be reduced by 0.5 meter.
- For each additional 45° (125/80) elbow, maximum permissible length is to be reduced by 1 meter.
- The roof vent terminal reduces maximum permissible length by 5 meters.

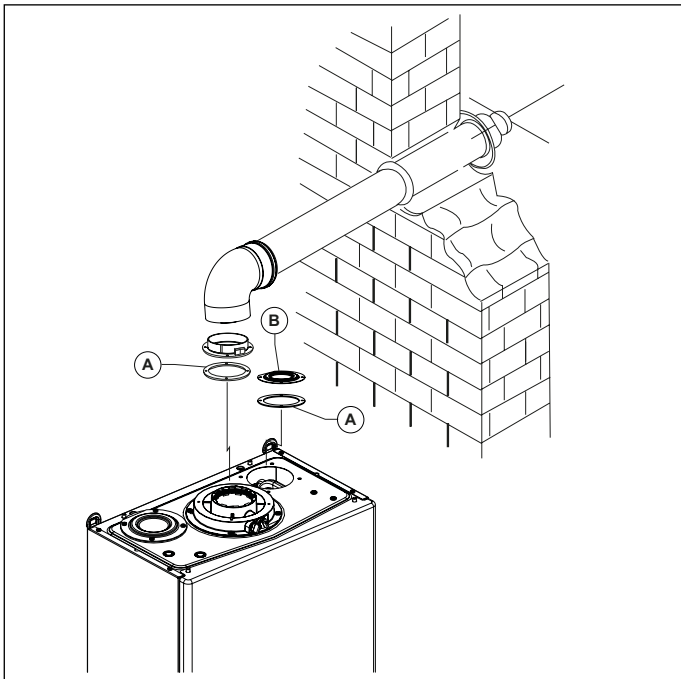


Fig. 13 Type C13 - C33 coaxial ducts

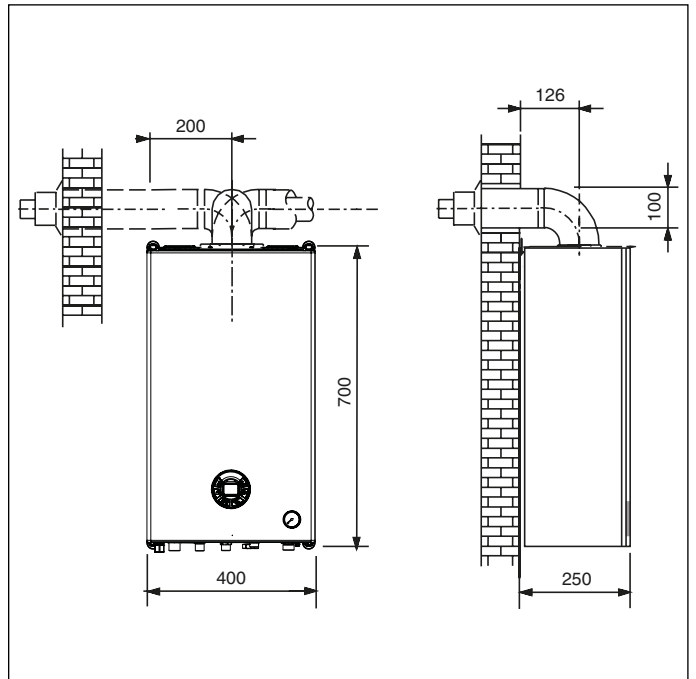


Fig. 14 Type C12 - C33 coaxial pipes dimensions

- A. Gasket
- B. Blanking cap

3.6.5 Air intake and flue gas venting via 80 mm split pipes



WARNING

The information given above is with reference to air intake/flue gas venting ducts made from smooth, rigid pipes approved and supplied by the manufacturer.

Installation types C43/C43X - C53/C53X - C83/C83X

- Minimum permissible length of air intake pipe is 1 meter.
- Minimum permissible length of flue gas venting pipe is 1 meter.
- Maximum permissible length of air intake/flue gas venting pipes is 114 meters (combined length of air intake and flue gas venting pipe).
- For each additional 1 meter of straight pipe, maximum permissible length is to be reduced by 1 meter.
- For each additional 90° elbow, maximum permissible length is to be reduced by 1 meter.
- For each additional 45° elbow, maximum permissible length is to be reduced by 1 meter.
- The roof terminal reduces maximum permissible length by 5.5 meters.
- The wall terminal reduces maximum permissible length by 5.5 meters.

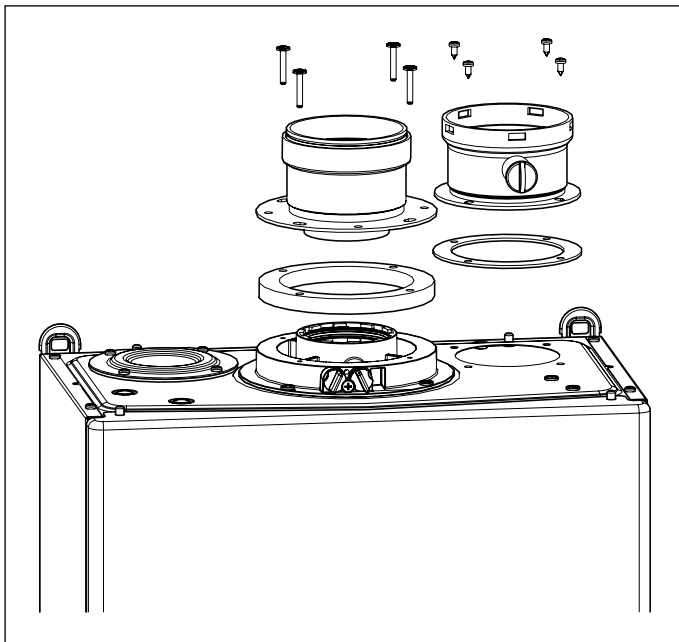


Fig. 15 Splitter kit

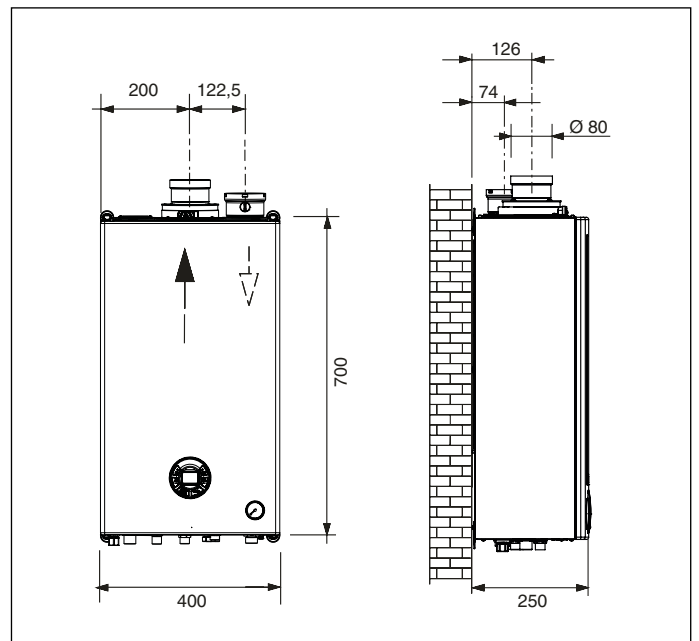


Fig. 16 Dimensions for split pipes

3.6.6 Air intake and flue gas venting via 60 mm split pipes



WARNING

The information given above is with reference to air intake/flue gas venting ducts made from smooth, rigid pipes approved and supplied by the manufacturer.


Installation types C43/C43X - C53/C53X - C83/C83X

- Minimum permissible length of air intake pipe is 1 meter.
- Minimum permissible length of flue gas venting pipe is 1 meter.
- Maximum permissible length of air intake/flue gas venting pipes is 27 meters (combined length of air intake and flue gas discharge pipe length).
- For each additional 1 meter of straight pipe, maximum permissible length is to be reduced by 1 meter.
- For each additional 90° elbow, maximum permissible length is to be reduced by 1 meter.
- For each additional 45° elbow, maximum permissible length is to be reduced by 0.5 meter.
- The wall terminal reduces maximum permissible length by 4 meters.

3.7 Measuring combustion efficiency during operation

3.7.1 Flue cleaning function

The boiler features a flue cleaning function which must be used to measure combustion efficiency during operation and to adjust the burner.

To activate the flue cleaning function, press and hold the buttons - **DHW** and **RESET** simultaneously for 5 seconds. The flow temperature and the  symbol are shown on the LCD.

With the boiler in "WINTER" or "HEATING ONLY" mode, by activating the chimney sweep mode the boiler carries out the turning on phase and then moves to fixed power operation pre-set by parameter **P7** (maximum heating power).

To exit the flue cleaning mode, press **RESET** or wait 15 minutes.

3.7.2 Measurement procedure

The boiler is equipped with a tower allowing for air intake/flue gas venting pipe connection (see Fig. 17 Caps position and Fig. 18 Hole position).

The tower is designed with two pre-arranged openings directly accessing air and flue gas ducts (see Fig. 18 Hole position).

Remove caps **A** and **B** from the pre-arranged openings on the tower, before taking the measurements (see. Fig. 17 Caps position).

In order to verify combustion efficiency the following measurements must be implemented:

- assess combustion air from opening **1** (see Fig. 18 Hole position).
- assess flue gas temperature and CO₂ from opening **2** (see Fig. 18 Hole position).

Allow boiler to reach working temperature before taking any measurement.

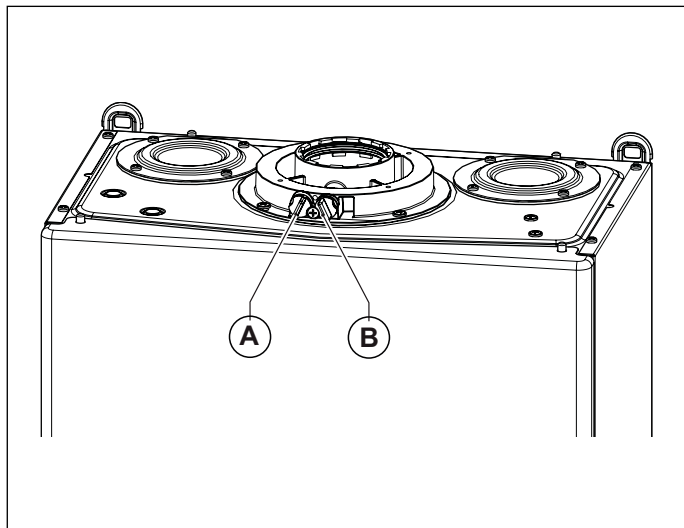


Fig. 17 Caps position

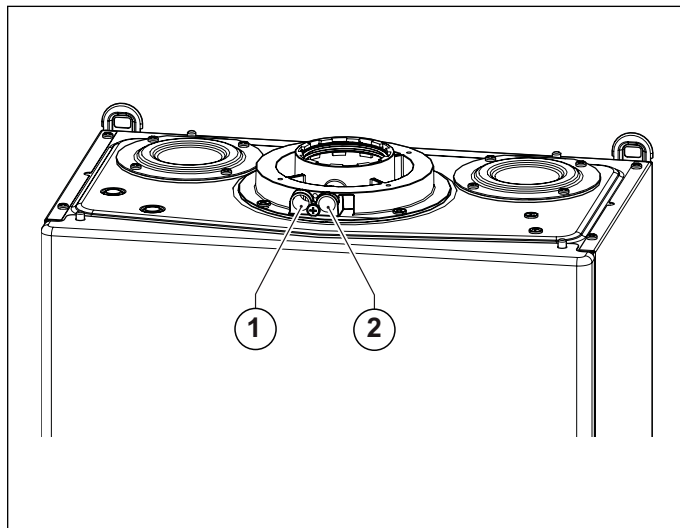


Fig. 18 Hole position

3.8 Connection to gas mains

Gas pipe cross-section must be chosen depending on its length, layout pattern, gas flow rate.
Gas supply pipe cross-section must be equal or greater than boiler pipe.



DANGER

Comply with installation standards enforced in the country where the boiler is installed which are considered as fully transcribed in this booklet.

Remember that before operating an indoor gas distribution system and before connecting it to a meter, it must be checked for leaks.

If some system parts are not visible, the leak test is to be carried out before the pipes are covered.

Leak test is **NOT** to be carried out employing flammable gas: use air or nitrogen for this purpose.

Once gas is in the pipes, leak test by a naked flame is forbidden; use specific products available on the market.

When connecting the boiler to gas supply network, it is **COMPULSORY** to install an appropriately sized gasket (A) made from suitable material (see Fig. 19 Connection to gas mains).

The boiler gas inlet coupling is **NOT** suitable for hemp, teflon tape or similarly made gaskets.

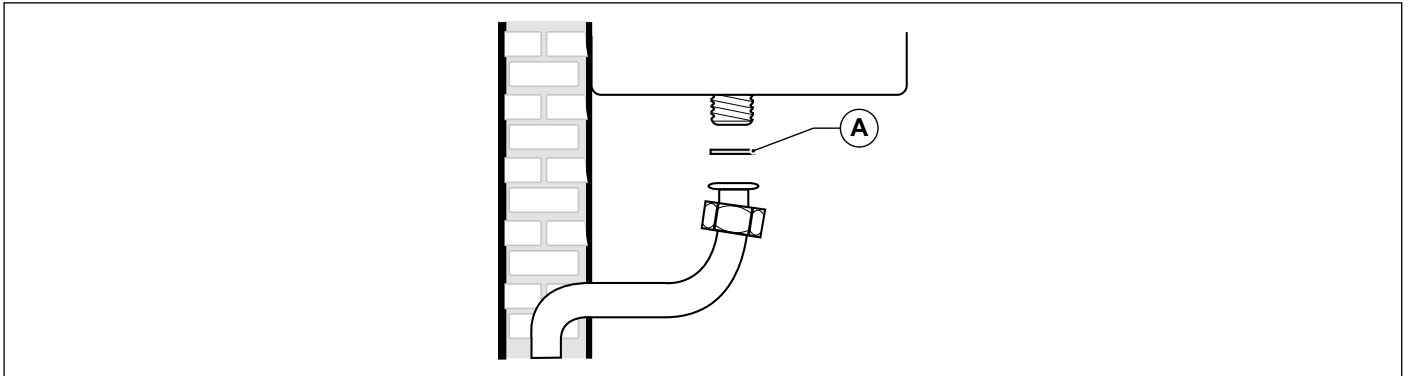


Fig. 19 Connection to gas mains

3.9 Hydraulic connections

3.9.1 Central heating

Prior to installing the boiler, the hydraulic system is to be cleaned in order to remove impurities; they could be present in system components and damage the pump and the heat exchanger.

The CH outlet and return pipes must be connected to the respective 3/4" connectors **M** and **R** on the boiler (see Fig. 5 Paper template). When calculating the cross section of CH system pipes, bear in mind load losses induced by radiators, thermostatic valves, radiator gate valves, and the configuration of the system itself.



WARNING

As for water treatment in the domestic heating systems in order to optimise efficiency and safety, ensure a long life, trouble-free operation of auxiliary equipment, minimise power consumption, thereby integrating the standards and rules in force in the country of installation, it is recommended to use specific products suitable for multi-metal heating systems.



WARNING

It is advisable to convey the discharge flow of boiler safety valve to the sewer system. Should the above precaution not be implemented and the safety valve be activated, boiler room flooding may occur.

The manufacturer shall not be held responsible in case of damage to people, animals, or property due to failure to follow the above mentioned instructions.

3.9.2 DHW

Prior to installing the boiler, the hydraulic system is to be cleaned in order to remove impurities; they could be present in system components and damage the pump and the heat exchanger.

Cold water inlet and DHW outlet shall be connected to the boiler through the dedicated 1/2" F and C fittings.

Hardness of water supplied to the boiler may increase the plate heat exchanger cleaning/replacement intervals.



WARNING

Depending on the hardness of the mains water supply, ascertain whether or not to install appropriate domestic water treatment systems using water treatment products suitable for drinking water and compliant with the regulations and standards in force in the country of installation.

Water treatment is always advisable when water supplied to the boiler has a hardness that is more than 15°F.

Water supplied by commonly marketed water softeners could, due to the chemical and physical characteristics that it takes, not be compatible with some heating system components as the loading of the system is done with DHW system water.

For this reason it is better to use polyphosphate feeders.

3.9.3 Condensate drain

Comply with condensate drain laws and standards applicable in the country of installation, which are considered herein integrally transcribed.

Unless forbidden, the condensate produced by combustion is to be routed via the condensate drain through a discharge system connected to the domestic sewer, which due to its basicity, counteracts flue gas condensate acidity. In order to avoid domestic sewer odour to reach the premises, it is advisable to install an appropriate device between the discharge system and the domestic sewer. The condensate drain system and the domestic discharge system is to be made of an adequate, condensate-resistant material.

Condensate drain system must be connected to specific fitting (A) in the boiler (see Fig. 20 Condensate drain).

It is strictly forbidden to connect condensate drain system in trap inspection point (B).

The condensate drain duct must be tight and have dimensions suitable for the trap. Moreover, it must not have any narrowing and must have a constant tilting $\geq 3\%$.



WARNING

The manufacturer shall not be held responsible in case of damage to people, animals, or property due to failure to follow the above mentioned instructions.

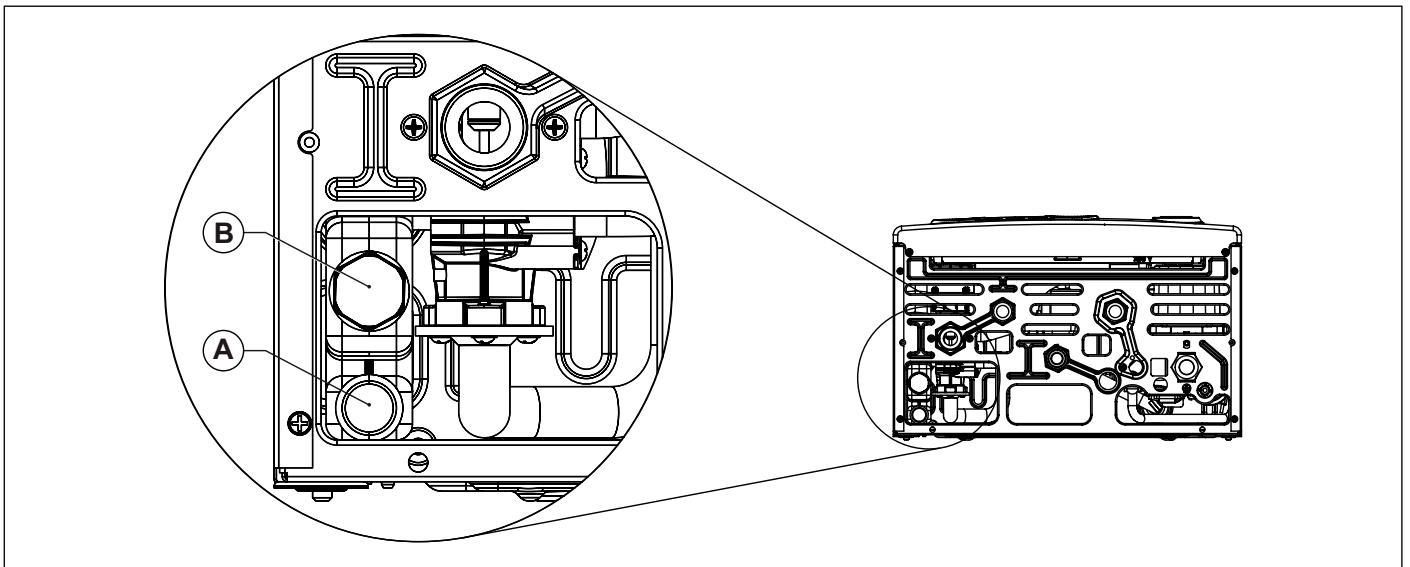


Fig. 20 Condensate drain

3.10 Connection to electrical mains

The boiler is supplied with a three-pole power cable, already connected to the electronic board and it is provided with a safety clamp. The boiler is to be connected to a 230V-50Hz electrical power supply.

When connecting it to power mains, follow correct phase / neutral polarity sequence.

Installation standards must be complied with and they are herein considered as entirely transcribed.

An easily accessible two-pole switch, with a minimum 3 mm distance between contacts, is to be installed ahead of the boiler. The switch is to allow power supply cut-off in order to safely perform maintenance and service procedures.

Power supply to the boiler must be fitted with a residual-current circuit breaker having suitable disconnection capacity. Power supply mains must be properly earthed.

The above mentioned safety measure must be verified. If in doubt, ask a qualified technician to thoroughly check the power network.



WARNING

The manufacturer cannot be held responsible for any damage caused by failure to earth the system correctly: gas, water, or CH system pipes are not suitable for grounding power networks.

3.11 Connection to ambient thermostat (optional)

The boiler is designed to be connected to an ambient thermostat (optional, not compulsory).

Ambient thermostat contacts must be properly sized in compliance with a load of 4 mA at 20 Vdc.

The ambient thermostat cables must be connected to terminals (3) and (4) of the electronic board (see *Wiring diagram* on page 49) after eliminating the jumper supplied as a standard with the boiler.

The ambient thermostat cables are not to be grouped together in the same sheath as power mains supply cables.

3.12 Ambient probe installation (optional)

Boiler can be connected to a probe measuring the ambient temperature (optional not compulsory, supplied by the manufacturer).

If an ambient probe is installed, the external probe cannot be installed



WARNING

Only original ambient temperature probes supplied by the manufacturer must be used.

If non-original ambient temperature probes are used, correct operation of the boiler and ambient probe cannot be guaranteed.

The ambient temperature probe must be connected by means of a double insulated wire, minimum cross-section of 0.35 mm².

The ambient probe must be connected to terminals (1) and (2) of boiler electronic board.



WARNING

The ambient temperature probe cables must NOT be routed together with power cables.

To install the ambient probe refer to the instructions attached to the probe.

The ambient probe must be installed on an indoor wall at a height of approximately 1.5 m from the floor and in a suitable location for measuring ambient temperature: do not install in recess or corners, behind doors or curtains, and install away from heat sources, direct sunlight, air draughts and water sprays.

The ambient probe automatically modifies the CH flow temperature in relation to:

- Measured ambient temperature.
- Selected ambient temperature.

The ambient temperature is set using +/- CH buttons that, with ambient probe installed, no longer work to set the heating water temperature.

Through boiler parameter **P43** it is possible to display the value of the ambient temperature detected by the probe.

3.13 Installation and operation with Open Therm Remote Control (optional)



WARNING

Only use original Remote Controls supplied by the manufacturer.

The correct operation of the Remote Control itself and of the boiler is not guaranteed if non-original Remote Controls not supplied by the manufacturer are used.

The boiler may be connected to an Open Therm Remote Control (non-compulsory optional accessory supplied by manufacturer).

The Remote Control must only be installed by qualified personnel.

To install the Remote Control, refer to the instructions provided with the Remote Control itself.

The Remote Control must be installed on an indoor wall at a height of approximately 1.5 m from the floor and in a suitable location for measuring ambient temperature: do not install in recess or corners, behind doors or curtains, and install away from heat sources, direct sunlight, air draughts and water sprays.

The Remote Control cables must be connected to terminals (3) and (4) of the electronic board (see *Wiring diagram* on page 49) after having eliminated the jumper supplied as a standard with the boiler.

The Remote Control connector is protected against inverted polarity, and the connections may be inverted.



WARNING

Do not connect the remote control to mains electrical power 230 V ~ 50 Hz.

The remote control wiring must not be grouped together in the same sheath as the power cables: if the cables are sheathed together, electrical interference from the power cables may compromise the functions of the Remote Control;

For complete instructions on how to program the Remote Control, refer to the instruction manual included in the Remote Control kit.

Board and Remote Control communicate in each operating mode: OFF, SUMMER, WINTER, CH ONLY.

Boiler display layout corresponds to the setting made from the Remote Control, as for the operating mode.

The remote control may be used to view and set a number of special parameters denominated **TSP** parameters and reserved solely for qualified technicians.

Setting the **TSP0** parameter sets the default data table and reloads all original data, cancelling any modifications previously made to individual parameters.

If a single parameter is found to be incorrect, the value given in the default value table is restored.

If the user attempts to set a value not within the permissible range for the parameter, the new value is rejected and the existing value is maintained.

3.14 Selecting the operating range in heating mode

Heating water temperature adjustment range depends on the selected operating range.:

- **standard range:** from 20°C to 78°C (pressing +/- CH);
- **reduced range:** from 20°C to 45°C (pressing +/- CH).

The standard range is active with parameter **P10** ≥ 1 , while the reduced range is active with parameter **P10** < 1 .

The two ranges can also be selected even with the external probe disconnected.

The waiting time between one boiler ignition and the following one, used to prevent boiler frequent turning on and off during CH operation is 4 minutes for both ranges, and can be edited with the parameter **P11**.

If system water temperature decreases below a certain value, the waiting time is reset and the boiler re-ignited, as shown in the following table:

| Selected range | Re-ignition temperature |
|----------------|---------------------------------------|
| Standard range | $< 40^{\circ}\text{C}$ (P27) |
| Reduced range | $< 20^{\circ}\text{C}$ |

Tab. 6 Burner re-ignition temperature

Operation range selection is to be implemented by a qualified installer or a Service Centre.

3.15 Installation of the (optional) external probe and sliding temperature operation

The boiler can be connected to an external temperature probe (optional, provided by the manufacturer) for sliding temperature operation.

If an external probe is installed, the ambient probe cannot be installed



WARNING

Only original external temperature probes supplied by the manufacturer must be used.

If non-original external temperature probes are used, correct operation of the boiler and external probe cannot be guaranteed.

The external temperature probe must be connected by means of a double insulated wire, minimum cross-section 0.35 sq.mm. The external probe must be connected to terminals (1) and (2) of boiler electronic board.



WARNING

The temperature probe cables must NOT be routed together with power cables.

The temperature probe must be installed on an outside wall facing NORTH - NORTH EAST, in a position protected from weather. Do not install near a window, ventilation openings or sources of heat.

The external temperature probe automatically modifies the CH flow temperature in relation to:

- Measured external temperature.
- Selected thermoregulation curve.
- Selected fictitious ambient temperature.

The thermoregulation curve is selected via parameter **P10**.

During adjustment, the set value will flash on LCD. Such value can also be read as parameter **TSP10** on the Remote Control (when installed).

The fictitious ambient temperature is set using **+/- CH** buttons that, with external temperature probe installed, no longer work to set the heating water temperature (see *Operation with external probe (optional)* on page 14).

Through boiler parameter **P29** it is possible to display the value of the outside temperature detected by the external probe.

The figure shows the curves for a fictitious ambient temperature of 20°C. Parameter **P10** allows selecting the curve value shown (see Fig. 21 Thermoregulation curves).

If fictitious ambient temperature value is edited on boiler display, the curves shift up or down, respectively, by the same amount.

With a fictitious ambient temperature setting of 20°C, for example, if you select the curve corresponding to parameter 1 and the outdoor temperature is - 4°C, the CH flow temperature will be 50°C.

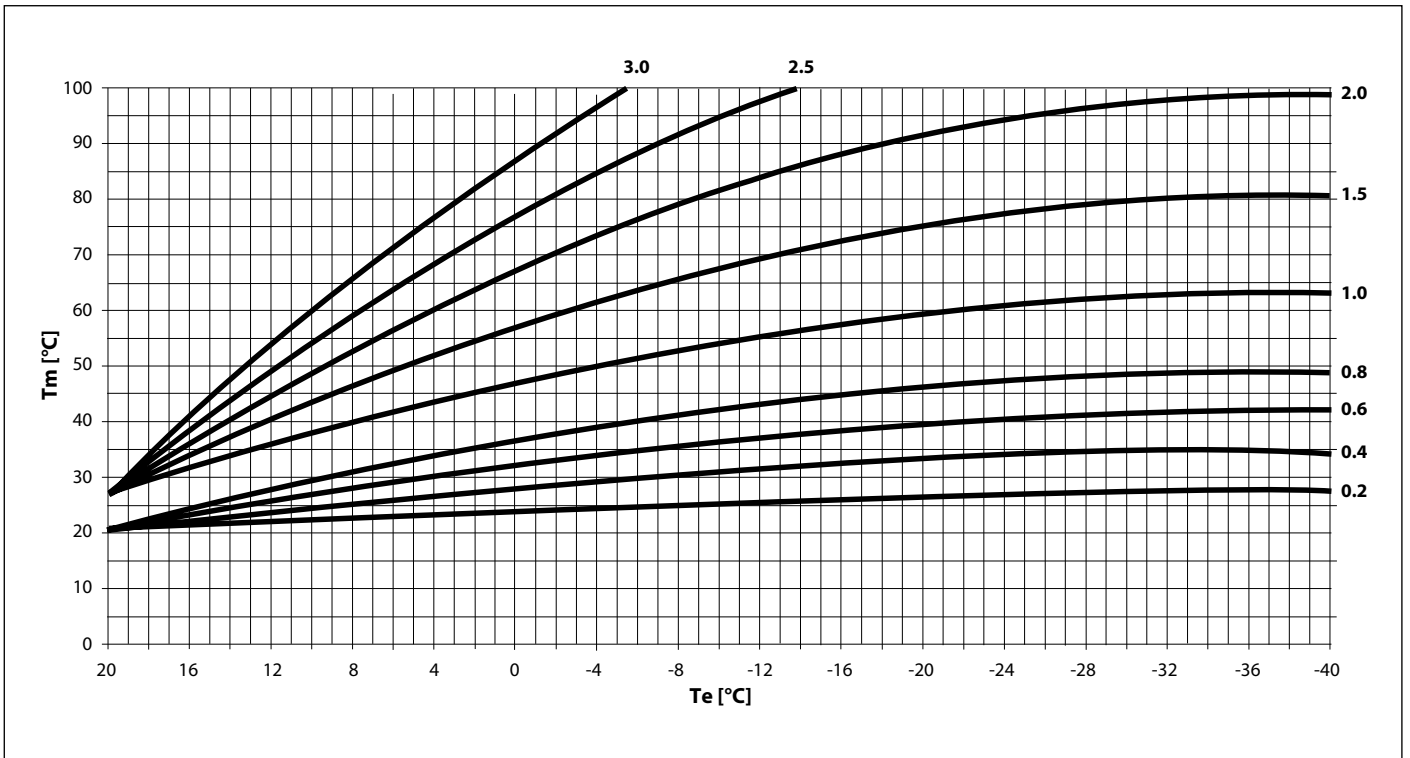


Fig. 21 Thermoregulation curves

Tm indicates flow water temperature in °C

Te indicates external temperature in °C

3.16 TSP parameters

The boiler operation is controlled by several parameters.

To display the parameters, press and hold the buttons **+ DHW** and **- DHW** simultaneously for 3 seconds.

The LCD display alternates the parameter number every 3 seconds (e.g. P03) with the parameter value (e.g. 01).

Scroll through the parameters by pressing **+/- DHW** buttons.


To quit the parameter viewing mode press the **Reset** button.

To change parameters, press the **Reset** and **- CH** buttons together for 3 seconds.

The LCD display alternates the parameter number every 3 seconds (e.g. P03) with the parameter value (e.g. 01).

Scroll through the parameters by pressing **+/- CH** buttons.

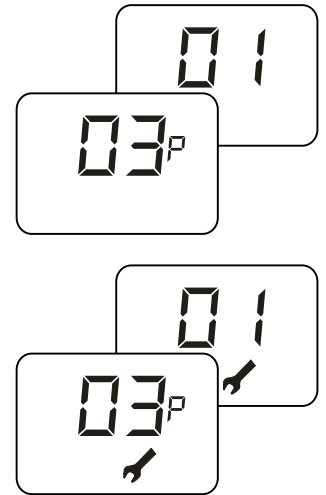
As soon as you reach the one to be modified, press **Select operating status**.

The  symbol turns on to indicate that you can edit the parameter value.

The parameter value can be changed with the **+/- CH** buttons.

To confirm modification press **Select operating status** button.

To quit the parameter editing mode press the **Reset** button.



| Parameter | Settable values | Default values | Notes |
|--|------------------------------------|------------------------|---|
| P0 - TSP0 Fuel gas type | 0, 1, 2, 3 | According to the model | 0, 1 = do not use 2 = methane 3 = propane |
| P3 - TSP3 Boiler type selection | 1 ÷ 3 | According to the model | 1 = combined instantaneous 2 = heating only 3 = with water heater |
| P4 - TSP4 Fan speed at burner maximum output | TSP5 ÷ 255 Hz (TSP5 ÷ 7650 rpm) | 200 (6000 rpm) | (1 Hz = 30 rpm) |
| P5 - TSP5 Fan speed at burner minimum output | 33 - 254 Hz (990 ÷ 7620 rpm) | 50 (1500 rpm) | (1 Hz = 30 rpm) |
| P6 - TSP6 Fan speed at ignition power | 33 - 255 Hz (990 ÷ 7650 rpm) | 100 (3000 rpm) | (1 Hz = 30 rpm) |
| P7 - TSP7 Fan speed at heating maximum output | 10 ÷ 100% | According to the model | 80 = methane 80 = propane |
| P8 - TSP8 Negative ramp start minimum speed | P5 ÷ P6 | 100 (3000 rpm) | (1 Hz = 30 rpm) |
| P9 - TSP9 Negative ramp time | 0 ÷ 255 (1 = 2 sec.) | 90 (180 s) | - |
| P10 - TSP10 Heating output curves | 0 ÷ 3 | 1,5 | resolution 0.1 |
| P11 - TSP11 Heating thermostat timer | 0 ÷ 30 min. | 4 | - |
| P12 - TSP12 CH output rising ramp timer | 0 ÷ 30 min. | 1 | - |
| P13 - TSP13 Timer for CH post-circulation, freeze protection and flue cleaning function | 30 ÷ 180 sec. | 30 | - |
| P15 - TSP15 Water hammer protection delay, configurable | 0 ÷ 10 sec. | 0 | - |

Tab. 7 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - I

| Parameter | Settable values | Default values | Notes |
|---|-----------------|----------------|---|
| P16 - TSP16 Ambient thermostat/remote control reading delay | 0 ÷ 199 sec. | 0 sec. | - |
| P17 - TSP17 Anti-seize function timer | 0 ÷ 30 sec. | 10 sec. | - |
| P18 - TSP18 Anti-legionella function timer | 0 ÷ 255 days | 15 days | - |
| P19 - TSP19 Anti-legionella function temperature | 35 ÷ 70 °C | 65 °C | - |
| P20 - TSP20 Anti-legionella function execution timer | 0 ÷ 255 minutes | 30 minutes | - |
| P21 - TSP21 Additional inlet matching | 0 ÷ 2 | 0 | 0 = no probe 1 = ambient probe 2 = external probe |
| P22 - TSP22 Ambient probe triggering differential OFF | 0.0 ÷ 1.0 °C | 0.0 °C | resolution 0.1 (only with connected ambient probe) |
| P23 - TSP23 Ambient probe triggering differential ON | -1.0 ÷ -0.1 °C | -0.5 °C | resolution 0.1 (only with connected ambient probe) |
| P24 - TSP24 Ambient probe correction range | -5.0 ÷ 5.0 °C | 0 °C | resolution 0.1 (only with connected ambient probe) |
| P25 - TSP25 Type of modulation with connected ambient probes | 0 ÷ 1 | 1 | 0 = on/off 1 = ambient probe modulation |
| P26 - TSP26 Flow temperature with P21=1 and P25=0 | 0 ÷ 78 °C | 60 °C | only with connected ambient probe |
| P27 - TSP27 Heating timer reset temperature | 20 ÷ 78 °C | 40 °C | - |
| P28 - TSP28 Type of temperature visualization on display | 0 ÷ 3 | 0 | 0 = flow temperature 1 = ambient probe temperature/external probe temperature 2 = return temperature 3 = DHW temperature |
| P29 Circulation pump minimum speed | 0 ÷ 100% | 72% | - |
| P30 Circulation pump fixed speed | P29 ÷ 100% | 100% | for all functions except for heating |
| P31 Circulation pump speed in heating mode | P29 ÷ 101% | 101% | With P31 = 101 automatic speed. With P31 < 101 fixed speed at set value. |
| P32 Flow/return differential heating | 0 ÷ 50 °C | 30 °C | with P32 = 0, the return probe is disabled |
| P33 Circulation pump algorithm time base | 0 ÷ 240 sec. | 5 sec. | - |

Tab. 8 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - II

| Parameter | Settable values | Default values | Notes |
|--|-----------------|----------------|--|
| P34 PWM circulation pump control | 0 ÷ 1 | 1 | With P34 = 0: PWM=100% pump stopped and PWM=0% maximum functioning pump. With P34 = 1: PWM=100% maximum functioning pump and PWM=0% pump stopped. |
| P35 Setting of default parameters (except P0, P1, P2, P3) | 0 ÷ 1 | - | 0 = user's parameters 1 = default parameters |
| P36 Display of reset shut-down and fault | 0 ÷ 1 | - | 0 = OFF 1 = shut-downs and faults reset |
| P37 Post ventilation timer | 0 ÷ 60 sec. | 10 sec. | - |
| P38 Water heater flow temperature | 0 ÷ 50 °C | 0 °C | With P38 = 0: automatic modulation water heater flow temperature. With P38 > 0: water heater flow temperature = P38 + water heater set-point. |
| P39 Heating temperature minimum limit for STANDARD range | 20 ÷ 59 °C | 20 °C | - |
| P40 Heating temperature maximum limit for STANDARD range | 60 ÷ 78 °C | 78 °C | - |
| P41 Heating temperature minimum limit for REDUCED range | 20 ÷ 30 °C | 20 °C | - |
| P42 Heating temperature maximum limit for REDUCED range | 31 ÷ 45 °C | 45 °C | - |
| P43 External or ambient temperature | - | - | only with external probe or connected ambient probe |
| P44 Flow temperature | - | - | - |
| P45 Nominal calculated flow temperature | - | - | only with external probe or connected ambient probe |
| P46 DHW temperature | - | - | - |
| P47 Boiler return temperature | - | - | - |
| P49 Display of boiler type | - | - | xyz x = P0 value y = P2 value z = P3 value |

Tab. 9 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - III

| Parameter | Settable values | Default values | Notes |
|--|-----------------|----------------|-------|
| P50 Display of most recent boiler shut-down | - | Shut-down code | - |
| P51 Displaying of days since last shut-down | - | - | - |
| P52 Display of penultimate boiler shut-down | - | Shut-down code | - |
| P53 Displaying of days since second last shut-down | - | - | - |
| P54 Display of third last boiler shut-down | - | Shut-down code | - |
| P55 Displaying of days since third from last shut-down | - | - | - |
| P56 Display of fourth last boiler shut-down | - | Shut-down code | - |
| P57 Displaying of days since fourth from last shut-down | - | - | - |
| P58 Display of fifth last boiler shut-down | - | Shut-down code | - |
| P59 Displaying of days since fifth from last shut-down | - | - | - |
| P60 Number of faults since last reset | - | - | - |
| P61 Board use month displaying | - | - | - |

Tab. 10 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - IV

3.17 Filling the system

Once all boiler connections have been completed, CH system can be filled.

The procedure is to be cautiously carried out, following each step:

- Open the bleeding valves on all radiators and verify the boiler automatic valve operation.
- Gradually open the relevant filler cock, checking that any automatic bleeding valves installed in the system properly work (see Fig. 2 Filler cock).
- Close all radiator bleeding valves as soon as water starts coming out.
- Check on the boiler's pressure gauge that water pressure reaches the 1±1.3 bar reading.
- Shut the filler cock and bleed any air out again, by opening the air bleeding valves on radiators.
- Start the boiler and bring the system to working temperature, stop the pump, and repeat air bleeding procedure.
- Allow the system to cool and restore water pressure to 1±1.3 bars.



WARNING

As for water treatment in the domestic heating systems in order to optimise efficiency and safety, ensure a long life, trouble-free operation of auxiliary equipment, minimise power consumption, thereby integrating the standards and rules in force in the country of installation, it is recommended to use specific products suitable for multi-metal heating systems.



WARNING

The low water safety pressure switch will not electrically enable the burner ignition when water pressure is below 0.4-0.6 bar.

The CH system water pressure must not be lower than 1 bar. Otherwise, fill the heating system.

The procedure is to be followed while the system is cold.

Pressure gauge is used to read pressure inside the heating circuit.

3.18 Filling the trap

Before starting the boiler, and each time it is at a standstill for several days, make sure the trap is full of water.

If the trap is empty, fill it by pouring water into the boiler through the flue gas venting duct.

3.19 Starting up the boiler

3.19.1 Preliminary checks

Before starting the boiler, check that:

- The flue gas venting duct and the relevant terminal are installed in conformity with the instructions: with the boiler operating, there must be no leakage of combustion by-products from any of the gaskets.
- The supply power to the boiler must be 230 V ~ 50 Hz.
- The heating system is correctly filled with water (pressure gauge reading 1±1.3 bar).
- Any shut-off cocks in the system pipes are open.
- The mains gas type is correct for the boiler calibration: convert the boiler to the available gas if necessary (see *Adaptation to other gas types* on page 51). This operation is to be exclusively carried out by qualified personnel.
- The gas supply cock is open.
- There are no fuel gas leaks.
- The main switch installed adjacent to the boiler is turned on.
- The safety valve is not blocked.
- There are no water leaks.
- The condensate trap installed on the boiler is discharging condensate correctly and is not stuck.

3.19.2 Switching on and switching off

To switch the boiler on and off, refer to the “**Instructions for the User**” (see *Instructions for the user* on page 9).

3.20 Available head

The boiler is equipped with a high-efficiency circulation pump with variable speed.

Circulation pump speed is automatically managed by the electronics, according to the settings of boiler parameters.

It is possible to choose between two pump working modes:

1 "Constant ΔT " operation

In the constant ΔT operating mode, circulation pump speed changes automatically to keep system delivery and return ΔT fixed at a value set in the boiler parameters.

2 "Fixed speed" operation

In the fixed speed operating mode, circulation pump speed remains constant at a value set in the boiler parameters.

During DHW phase, circulation pump works at a fixed speed set in the boiler parameters.



WARNING

Circulation pump is set to constant ΔT operating mode during production.

For a correct operation of the boiler, it is recommended not to change factory setting.

Should it be necessary to change circulation pump settings, contact a Service Centre.

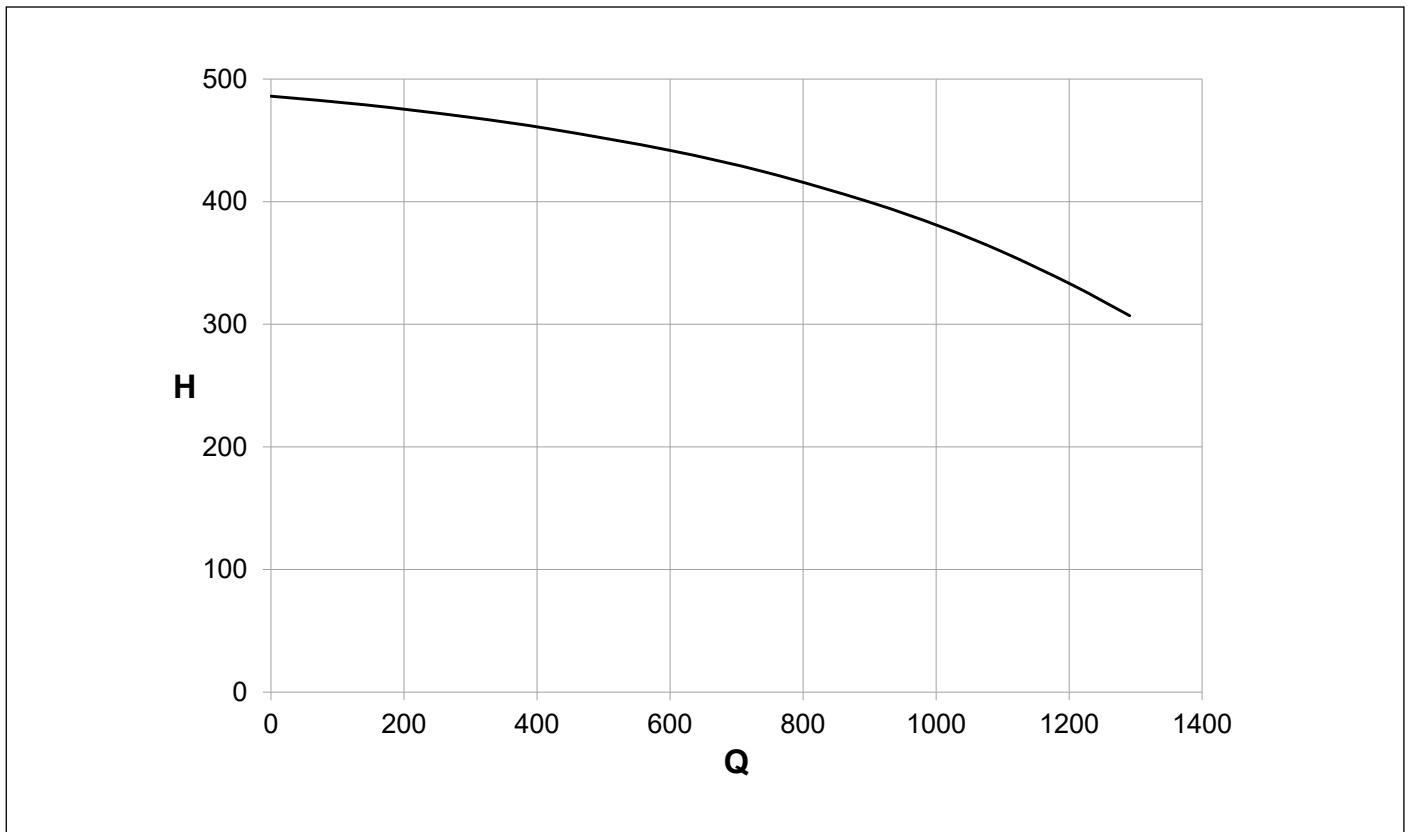


Fig. 22 Available head

Q Flow rate (l/h)

H Available head (mbar)

(*) Minimum curve that can be used in systems without hydraulic separator

(**) Minimum curve that can be used in systems with hydraulic separator

3.21 Wiring diagram

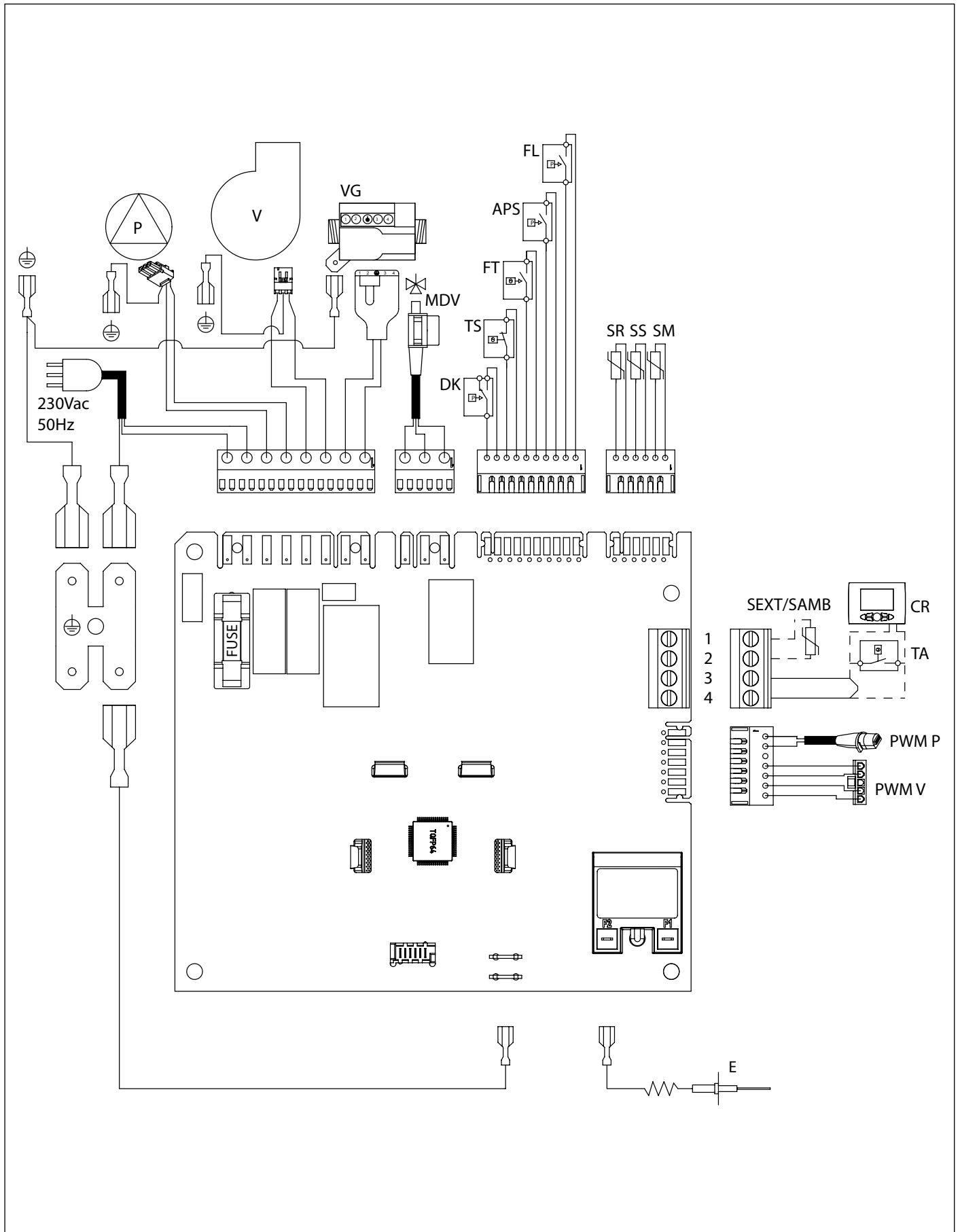


Fig. 23 Wiring diagram KC

Internal connections

- P:**..... boiler circulation pump
- V:**..... brushless fan
- VG:** gas valve
- MDV:** electric deviating valve
- DK:** low water pressure swich
- TS:**..... heating flow safety thermostat
- FT:**..... flue gas thermostat
- APS:** air pressure switch
- FL:**..... DHW flow switch
- SR:**..... return NTC temperature probe 10k Ohm at 25°C B=3435
- SS:**..... NTC DHW probe 10k Ohm at 25 °C B=3435
- SM:** CH NTC temperature probe 10k Ohm at 25°C B=3435
- PWM P:**..... PMW signal cable for circulation pump
- PWM V:**..... PMW signal cable for fan
- E:**..... ignition/flame detection electrode

Connections performed by the installer

- 1-2:** outdoor temperature probe NTC 10k Ohm at 25 °C B=3977 or ambient NTC probe 10k Ohm at 25°C B=3977 (SEXT/SAMB)
- 3-4:** room thermostat or Remote Control (TA-CR)

3.22 Adaptation to other gas types



WARNING

This boiler is built to run on the type of gas specified on the packaging and on the boiler rating plate. Any later transformation is to be exclusively carried out by qualified personnel, using manufacturer designed accessories and following the procedure and adjustment instructions for an accurate boiler setting-up.

- Disconnect the boiler from the electric power supply.
- Close the gas cock.
- Remove boiler outer front panel.
- Rotate the electronic board box downwards.
- Disconnect the gas pipe from the gas valve (see Fig. 24 Gas diaphragm replacement).
- Replace the gas diaphragm (A) with the new gas type (see Fig. 24 Gas diaphragm replacement and Tab. 11 Gas diaphragm diameter (mm)).

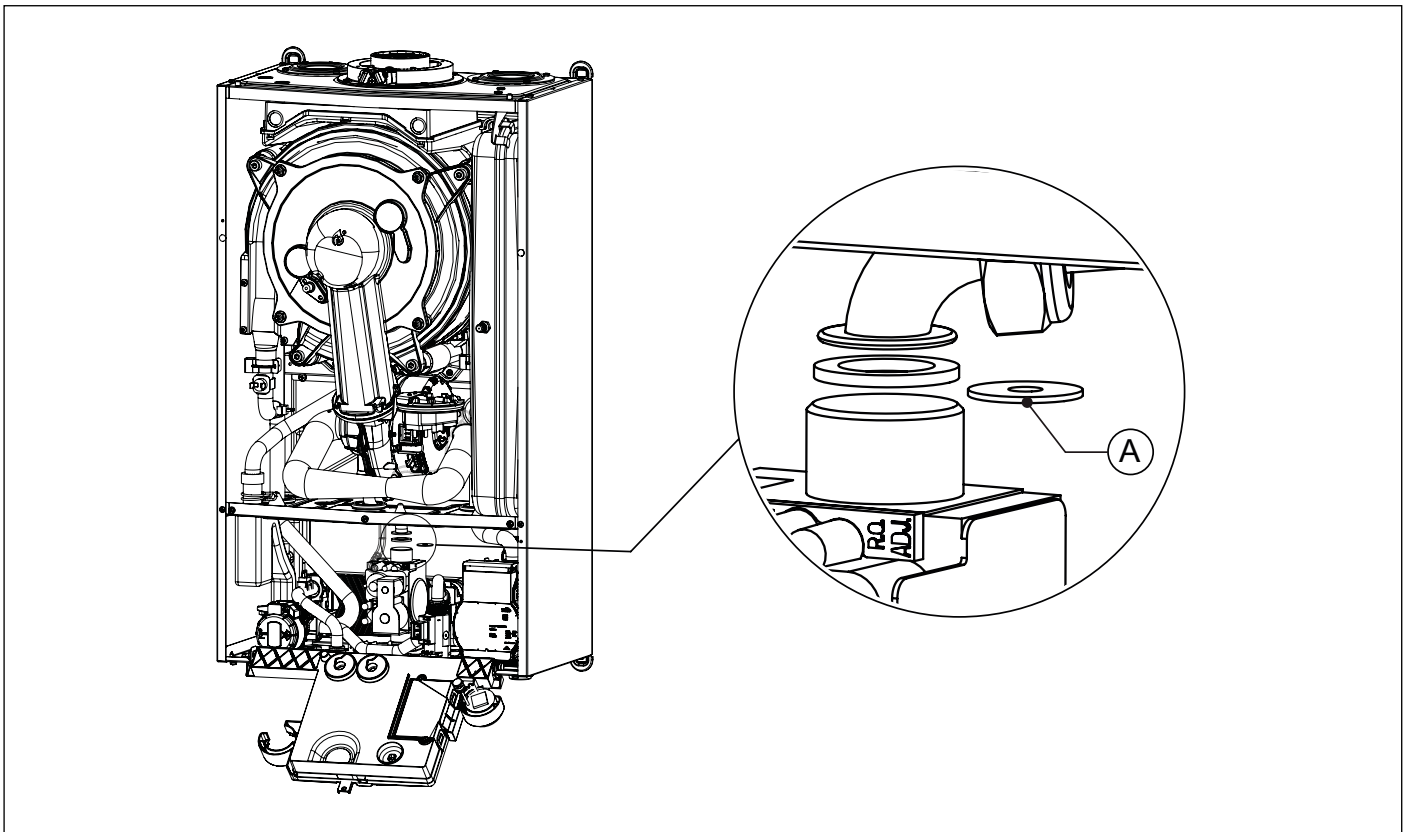


Fig. 24 Gas diaphragm replacement


| Fuel | Diaphragm diameter [mm] |
|-------------|-------------------------|
| Natural gas | 5,7 |
| Propane | 4,3 |

Tab. 11 Gas diaphragm diameter (mm)

- Reconnect the gas pipe to the gas valve.
- Refit the boiler outer front panel.
- Reconnect boiler to electric power supply, and open the gas cock.
- Edit value for parameter **P0-TSP0** depending on boiler output (see par. *TSP parameters* on page 43).
- Adjust the gas valve (see par. *Gas valve setting* on page 52).

3.23 Gas valve setting

Maximum heating output adjustment

- Make sure that the ambient thermostat (optional), if fitted, is set to **ON**.
- Select boiler operating mode "CH ONLY" by pressing the "Operating mode" button on the control panel until symbol  is shown.
- Start the "flue chimney" function (see *Flue cleaning function* on page 36). The boiler starts operating at maximum heat output.
- If a gas switching has been made, access the programming page and set the parameter **P0** based on the output and on the supply gas, as specified in Tab. 7 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - I.
- Check that **P4-P5-P6-P7-P8-P9** parameter values correspond to those specified in Tab. 7 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - I.
- Set flue gas CO₂ content by turning the ratio adjuster **B** (see Fig. 25 Adjusting CO₂ value) and ensure that reading falls within the limits of Tab. 12 Flue CO₂ content. Let boiler flue cleaning function on and continue with the next point "Minimum heating output adjustment".

Minimum heating output adjustment

- Set boiler min. output operation by keeping **DHW** - button pressed until the value corresponding to fan min. speed for the output and boiler gas is displayed, according to Tab. 7 Limits to be set for TSP parameters and default values in relation to boiler type (TSP0) - I.
- Boiler switches to min. output operation.
- Set flue gas CO₂ content by turning the offset control **C** (see Fig. 25 Adjusting CO₂ value) and ensure that reading falls within the limits of Tab. 12 Flue CO₂ content.
- To exit the flue cleaning mode, press "Reset".

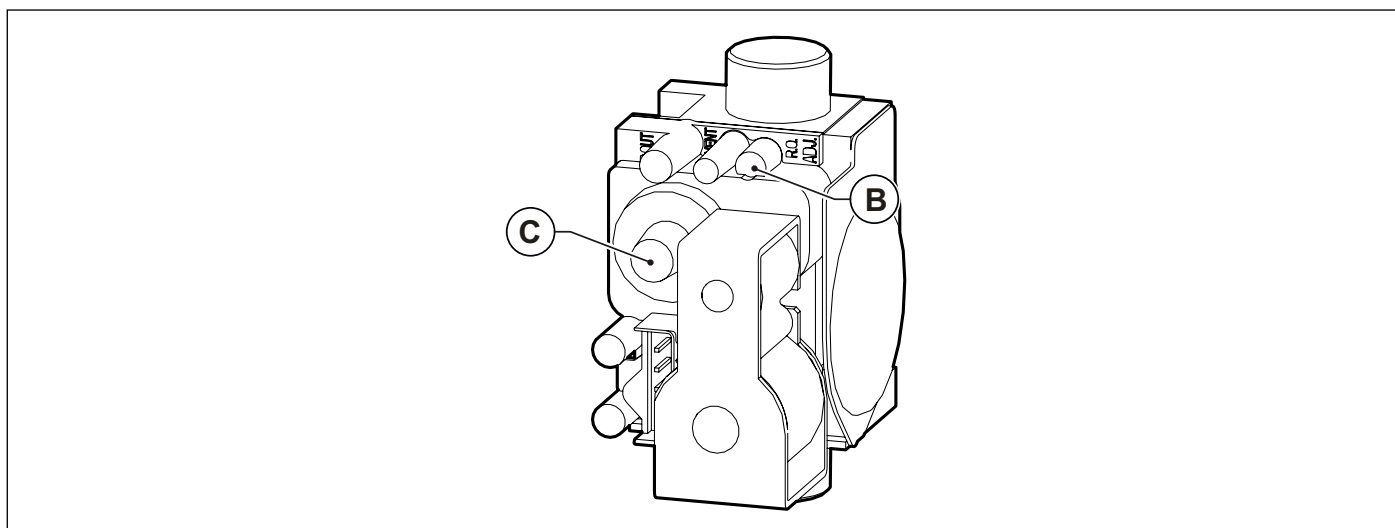


Fig. 25 Adjusting CO₂ value

| Fuel | Flue CO ₂ value Max. output ⁽¹⁾ [%] | Flue CO ₂ value Min. output [%] |
|-------------|---|--|
| Natural gas | 9.0 ± 0.3 | 9.3 ± 0.3 |
| Propane | 10.0 ± 0.3 | 10.0 ± 0.3 |

Tab. 12 Flue CO₂ content

(1) DHW maximum heat input

4. Testing the boiler

4.1 Preliminary checks

Before testing the boiler, it is recommended to check the following:

- the flue gas venting duct and the relative terminal are installed in conformity with the instructions: **with the boiler operating, there must be no leakage of combustion by-products from any of the gaskets.**
- the supply power to the boiler must be 230 V ~ 50 Hz;
- the system is correctly filled with water (pressure gauge reading 1 to 1.3 bar);
- any shut-off cocks in the system pipes are open;
- the mains gas type is correct for the boiler calibration: convert the boiler to the available gas when necessary; this operation must only be performed by qualified technical personnel;
- the gas supply cock is open;
- **there are no fuel gas leaks;**
- the main switch installed ahead of the boiler is turned on;
- the 3-bar safety valve is not stuck;
- there are no water leaks;
- the condensate trap installed on the boiler is discharging condensate correctly and is not stuck.



WARNING

Should the boiler not be installed in compliance with the prevailing laws and standards, notify the system supervisor and do not test the boiler.

4.2 Switching on and switching off

To switch the boiler on and off, refer to the “**Instructions for the User**”.

5. Maintenance



WARNING

Any maintenance (and repair) work must only be carried out by qualified personnel.



WARNING

A proper boiler routine maintenance is an essential requirement to ensure safety.

The user is strongly advised to have the product serviced and repaired by a service centre or qualified personnel. Appropriate boiler maintenance ensures efficient operation, environment preservation, and safety for people, animals and objects.



WARNING

Appropriate boiler maintenance ensures efficient operation, environment preservation, and safety for people, animals and objects.

The boiler must be serviced at least once every year.



WARNING

Disconnect electric power supply before starting any maintenance procedure, involving replacement of components and/or cleaning inside parts of boiler.

5.1 Maintenance schedule

Maintenance operations include check and cleaning procedures. In particular:

Inspections and checks

- Check general integrity of the boiler.
- Check boiler and network gas supply for leakage.
- Check gas supply pressure to boiler.
- Check boiler ignition sequence.
- Check boiler combustion parameters by flue gas analysis.
- Check the condition and seal integrity of the flue gas venting pipes.
- Check the state of combustion fan.
- Check integrity of safety devices of the boiler in general.
- Check for water leaks and oxidised areas on the boiler's couplings.
- Check efficiency of the system safety valves.
- Check expansion vessel filling pressure.
- Check correct draining of condensate from the condensate trap installed on the boiler.

The following cleaning is to be done

- Clean the general interior of the boiler.
- Clean the air intake and flue gas venting circuits.
- Clean the heat exchanger.
- Clean the condensate trap and discharge ducts.
- Cleaning system filters (if any).

When checking the boiler for the very first time, also verify:

- Boiler room suitability.
- Diameter and length of flue gas system ducts.
- Boiler installation in accordance to the instructions in this manual.



WARNING

Should the device not operate correctly, while not posing danger to people, animals or property, or should you find any discrepancy with reference to prevailing standards and regulations, notify the system supervisor both verbally and in writing.



WARNING

The manufacturer shall not be held responsible for damage to people, animals, or property due to tampering with or improper intervention to the boiler or failed/insufficient maintenance.

5.2 Combustion analysis

The combustion parameters of the boiler, which have to be checked in order to determine efficiency and emissions, must be measured in compliance with applicable legislation and standards.

5.3 Extraordinary maintenance

Extraordinary maintenance includes changing equipment components that are worn out or broken.



WARNING

Strictly comply with the instructions below.

Gas valve

The seals between gas valve and gas pipes must be replaced. And then checked for sealing.

The tightening torque for gas pipe fittings must be 23 Nm.

Gas valve calibration is mandatory: for calibration operations please strictly follow the procedures in paragraphs *Gas valve setting* on page 52, for details on these topics.

The perfect sealing of valve pressure taps must be checked.

Flame electronic control board

It is mandatory to set up the electronic board according to the boiler model, based on the instructions supplied together with the valve. In case of loss or doubts, contact the boiler manufacturer.

It is mandatory to set up the spare electronic board based on the gas type for which boiler is preset and its power.

For configuration, carefully follow the procedures in paragraph *TSP parameters* on page 43, to set parameter P0.

Make sure that all wirings have been correctly connected according to the wiring diagrams in paragraph *Wiring diagram* on page 49.

Air pressure switch

The code and the calibration values of the spare part must comply with the product model on which it has to be installed, according to technical specifications table.

After replacement, both silicone pipes sealing and connection must be checked.

Safety thermostats and temperature probes

Spare part must be perfectly fastened and adhere to the element whose temperature must be measured.

Combustion fan

It is mandatory to properly position the seals in their seats and change any old ones with the new ones supplied together with the spare part.

Fasten the fan plate using all screws and check sealing.

Heat exchanger

In case of operations involving opening the heat exchanger, for instance in order to reach the burner, all affected seals must be changed and sealing checked and ensured.

Ignition electrode and flame detection, inspection glass

In case of operations involving removing and/or changing the ignition electrodes and/or inspection glass, all affected seals must be changed and sealing checked and ensured.

Hydraulic components

In case of operations involving removing and/or changing any hydraulic components, all affected seals must be changed and sealing checked and ensured to avoid water leakage.

6. Decommissioning, disassembly and disposal



WARNING

Gas boilers are electrical and electronic equipment (EEE) and when decommissioned they become waste electrical and electronic equipment (WEEE), therefore, they must be disposed of in compliance with the legislation in force in the country of installation.

Gas boilers are classified as domestic appliances and must be disposed of in the same way as washing machines, dish washers and tumble dryers (R4 WEEE waste).

The disassembly of gas boilers and their disposal is therefore forbidden through channels not specifically provided for by law.

Decommissioning, disassembly and disposal operations must be performed with boiler cold and disconnected from gas and power mains.



WARNING

The user is not authorised to carry out such operations.

7. Malfunctions, possible causes and solutions

7.1 Troubleshooting

| BOILER STATUS | MALFUNCTION | PROBABLE CAUSE | User's tasks | Qualified personnel's tasks | |
|---------------|---|---|--|---|--|
| E01* | Burner does not ignite | Gas supply failure. | Check gas supply. Check gas supply cock opening or gas network safety valve intervention. | | |
| | | Gas valve is disconnected. | Contact qualified personnel | Reconnect it. | |
| | | Gas valve is faulty. | Contact qualified personnel | Replace it. | |
| | | The electronic board is faulty. | Contact qualified personnel | Replace it. | |
| | Burner does not ignite: no spark | Ignition electrode is faulty. | Contact qualified personnel | Replace the electrode. | |
| | | Ignition transformer is faulty | Contact qualified personnel | Replace the ignition transformer. | |
| | | Electronic board does not ignite. It is faulty. | Contact qualified personnel | Replace electronic board. | |
| | Burner ignites for a few seconds and goes off. | Electronic board does not detect flame: inverted phase and neutral. | Contact qualified personnel | Verify correct neutral and phase connection. | |
| | | Detection electrode cable is interrupted. | Contact qualified personnel | Reconnect or replace cable. | |
| | | Detection electrode is faulty. | Contact qualified personnel | Replace the electrode. | |
| | | Electronic board does not detect flame: it is faulty. | Contact qualified personnel | Replace electronic board. | |
| | | Ignition heat input setting is too low. | Contact qualified personnel | Increase it | |
| | | Minimum heat input is not set correctly. | Contact qualified personnel | Check burner setting. | |
| E02* | Flow temperature exceeded the max. allowed value. | Circulation pump is faulty. | Contact qualified personnel | Replace it. | |
| | | Circulation pump is seized. | Contact qualified personnel | Check pump electrical connection. | |
| E03* | Flue thermostat triggering. | Poor flue draught. | Contact qualified personnel | Check the chimney and ambient air-intake grilles. | |
| | | Flue vent/air intake duct is obstructed. | Contact qualified personnel | Check for any duct obstruction, and eliminate it. | |
| | | Flue gas thermostat is faulty. | Contact qualified personnel | Replace it. | |
| E04** | CH system water pressure is low. | The system has been recently bled. | Fill the system (see section Boiler shut-down). If the error occurs again several times, contact a qualified Service Centre or qualified personnel. | | |
| | | The system is leaking. | Check system. | | |
| | | Pressure transducer is disconnected. | Contact qualified personnel | Reconnect it. | |
| | | Pressure transducer is faulty. | Contact qualified personnel | Replace it. | |

| BOILER STATUS | MALFUNCTION | PROBABLE CAUSE | User's tasks | Qualified personnel's tasks |
|----------------------|---|--|-----------------------------|---|
| E05** | CH probe failure | Flow probe is electrically disconnected. | Contact qualified personnel | Reconnect it. |
| | | Flow probe faulty. | Contact qualified personnel | Replace it. |
| E06** | DHW probe failure. | DHW probe is electrically disconnected. | Contact qualified personnel | Replace it. |
| | | DHW probe faulty. | Contact qualified personnel | Replace it. |
| E15** | Return probe failure. | Probe is disconnected. | Contact qualified personnel | Reconnect it. |
| | | Probe is faulty. | Contact qualified personnel | Replace it. |
| E23** | External probe fault (only with connected external probe). | Probe is disconnected. | Contact qualified personnel | Reconnect it. |
| | | Probe is faulty. | Contact qualified personnel | Replace it. |
| E31** | Remote Control connection failure (only shown on Remote Control display). | The Remote Control is not connected to boiler board. | Contact qualified personnel | Reconnect it. |
| | | Remote control faulty. | Contact qualified personnel | Replace it. |
| | | Boiler board is faulty. | Contact qualified personnel | Replace it. |
| E40* | Fan failure. | Fan disconnected. | Contact qualified personnel | Reconnect it. |
| | | Fan faulty. | Contact qualified personnel | Replace it. |
| E44** | Ambient probe fault (only with connected ambient probe). | Probe is disconnected. | Contact qualified personnel | Reconnect it. |
| | | Probe is faulty. | Contact qualified personnel | Replace it. |
| E70* | Problems with air flow rate. Possible obstruction of heat exchanger on flue gas side. | Heat exchanger is clogged on flue gas side. | Contact qualified personnel | Check the heat exchanger. |
| E77 | Electrical power supply problems on the electronic board. | The electrical power mains are not stable. | Contact qualified personnel | Check the electrical power mains. |
| E78* | Flow temperature increases too quickly. | Pump is seized. | Contact qualified personnel | Unseize the pump. |
| | | Pump is faulty. | Contact qualified personnel | Replace it. |
| | | Air present inside heating system. | Contact qualified personnel | Bleed the air from the boiler by opening the jollies on the exchanger and pump. |

| BOILER STATUS | MALFUNCTION | PROBABLE CAUSE | User's tasks | Qualified personnel's tasks |
|---------------|--|---|-----------------------------|---|
| E80* | The ΔT between flow and return is not within the limits. | Flow and/or return probes are faulty. | Contact qualified personnel | Replace them. |
| | | Obstructed bypass pipe | Contact qualified personnel | Remove any obstructions, or replace the pipe. |
| | | The bypass valve is not assembled or wrongly assembled. | Contact qualified personnel | Restore bypass valve correct assembling. |
| | | Heat exchanger primary circuit is obstructed. | Contact qualified personnel | Clean or replace the exchanger. |
| E81* | Water circulation malfunction in boiler. | There is not enough pressure in the system. | Contact qualified personnel | Check system. |
| | | Water does not circulate correctly in the system. | Contact qualified personnel | Check system. |

* errors that can be reset by the user by keeping the **RESET** button pressed

** self-resettable errors, they automatically reset as soon as the failure is fixed



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Uff. Pubblicità Fondital IST 03 C 1408 - 01 | Agosto 2020 (08/2020)