

NIAS CONDENSING



GB

Line
tech



INSTALLATION USE AND MAINTENANCE



Dear Customer,

Thank you for choosing and buying one of our boilers. Please read these instructions carefully in order to install, operate and service the boiler properly.

General information for fitters, maintenance technicians and users

This INSTRUCTION MANUAL, which is an integral and indispensable part of the product, must be handed over to the user by the fitter and must be kept in a safe place for future reference. The manual must accompany the boiler should it be sold or its possession transferred.



This boiler is designed for connection to a central heating system and to a hot domestic water system. Any other use is considered incorrect and therefore dangerous.

The boiler must be installed in compliance with the applicable laws and standards and according to the manufacturer's instructions given in this manual. Incorrect installation may cause injury to people or animals and damage to property. The manufacturer shall not be held liable for any such injury or damage.

Damage or injury caused by incorrect installation or use, or by failure to follow the manufacturer's instructions will relieve manufacturer of any and all contractual and extra-contractual liability.

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 has not been damaged during transport and handling. Do not install equipment which is damaged or faulty.

Do not obstruct the air intake or heat dissipation openings.

Only Manufacturer-approved accessories with optional electric or other kits must be installed.

All the packaging materials can be recycled and must be disposed of correctly. They must be sent to a specific waste management site.

Keep the packaging out of the reach of children as it may represent a hazard.

In the event of failure or faulty operation, switch off the boiler. Do not attempt to make any repairs and contact a qualified technician. Manufacturer-approved parts must be used for all repairs to the boiler.

Failure to comply with the above requirements may affect the safety of the boiler and endanger people, animals and property.



Routine boiler maintenance should be performed according to the schedule in the relevant section of this manual. Appropriate boiler maintenance ensures efficient operation, preservation of the environment, and safety for people, animals and property. Incorrect and irregular maintenance can be a source of danger for people, animals and property.

The Manufacturer recommends that Customers contact a Service Centre or a qualified fitter for maintenance and repairs.

If the boiler is to remain inactive for a long time, disconnect it from the power mains and close the gas tap.

Warning! If the boiler is disconnected from the mains, the electronic anti-freeze function will not operate.

Should there be a risk of freezing, add anti-freeze to the heating system. It is not advisable to empty the system as this may result in damage. Use specific anti-freeze products suitable for multi-metal heating systems.



If you smell gas:

- do not touch any electrical switches and do not turn on electrical appliances;
 - do not ignite flames and extinguish any cigarettes;
 - close the main gas tap;
 - open doors and windows;
 - contact a Service Centre, a qualified fitter or the gas supply company.
- Never use a flame to detect a gas leak.**



This boiler has been built for installation in the country indicated on packaging /rating plates. Installation in a country other than the specified one may be a source of danger for people, animals and property.

The Manufacturer cannot be held contractually or extra-contractually liable in the event of failure to comply with the above.

Rapid operating instructions

The following instructions will help you to switch the boiler on quickly and regulate it for immediate use.



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



If any accessories have been fitted on the boiler, these instructions will not cover them. You will therefore have to refer to the full boiler instructions as well as to the specific instructions for the accessories.

This manual contains full details of how the boiler works, and full operating and safety instructions.

1. Open the gas cock upstream the boiler.
2. Turn the master switch to **ON**: the display comes on and shows the function set via the boiler selector (**2** in fig. 1).
3. If you **do not wish** to activate the heating function, turn the boiler selector (**2**, fig. 1) to SUMMER. This will activate domestic hot water (DHW) only, and the display will show the flow water temperature.



Boiler selector on SUMMER

4. If you **wish** to activate the heating function, turn the boiler selector (**2**, fig. 1) to WINTER. This will activate both DHW and heating, and the display will show the flow water temperature.



Boiler selector on WINTER

5. Decide whether you wish to activate the Aqua Premium system and proceed as follows to regulate the hot water temperature. Turn regulator (**3**, fig. 1) anticlockwise as far as it will go. The water storage symbol  is displayed, showing that the Aqua Premium system is active (if it was already active, this operation deactivates it). Then turn the selector (**3**) until the desired hot water temperature value is displayed (at least 40°C). While the DHW temperature is being regulated, the display shows the temperature setting and the DHW symbol flashes.



DHW temperature regulator



Liquid crystal display LCD

6. To regulate the CH water temperature, first set the regulator (**4**, fig. 1) to 3 o'clock (about 70°C), then regulate it as required. While the DHW temperature is being regulated, the LCD displays the temperature setting and the CH symbol flashes.



CH water temperature regulator



Liquid crystal display LCD

7. Set the desired temperature on the (optional) room thermostat in the building.

The boiler is now ready to operate.

If the boiler shuts down, turn the boiler selector (**2** in fig. 1) to reset for a few seconds, then back to the desired position. If the boiler does not restart, contact a Service Centre.



Boiler selector on RESET

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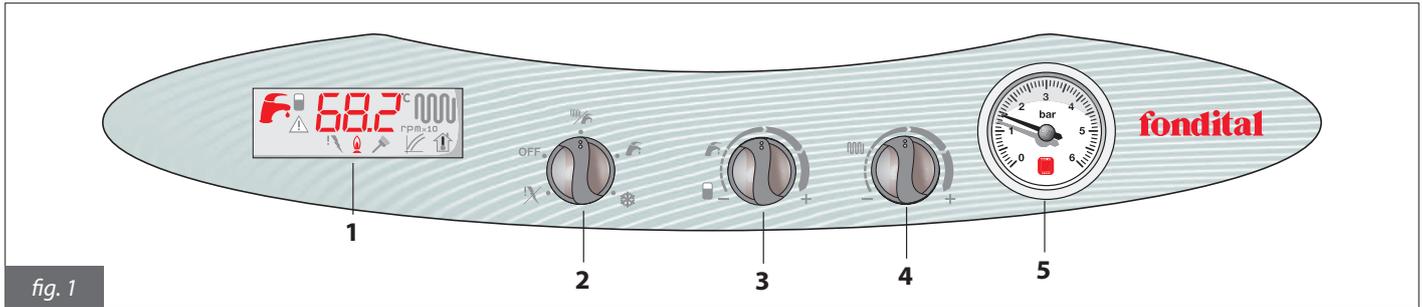
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1. User instructions

1.1. Control panel



1. Liquid crystal display (LCD)

The LCD displays the boiler status and operating data (see fig. 2).

2. Boiler mode selector

With the selector on RESET  the boiler restarts after activation of the burner shutdown device.

With the selector on OFF, the boiler is in stand-by mode, with the heating and hot water functions disabled.

With the selector on SUMMER  the boiler is ready to produce domestic hot water only.

With the selector on WINTER  the boiler is ready to heat and produce hot water.

With the selector on ANTI-FREEZE  only the anti-freeze function is enabled.

3. DHW temperature regulator

This is used to enable/disable water storage tank and to set the DHW temperature in the range 35-57°C.

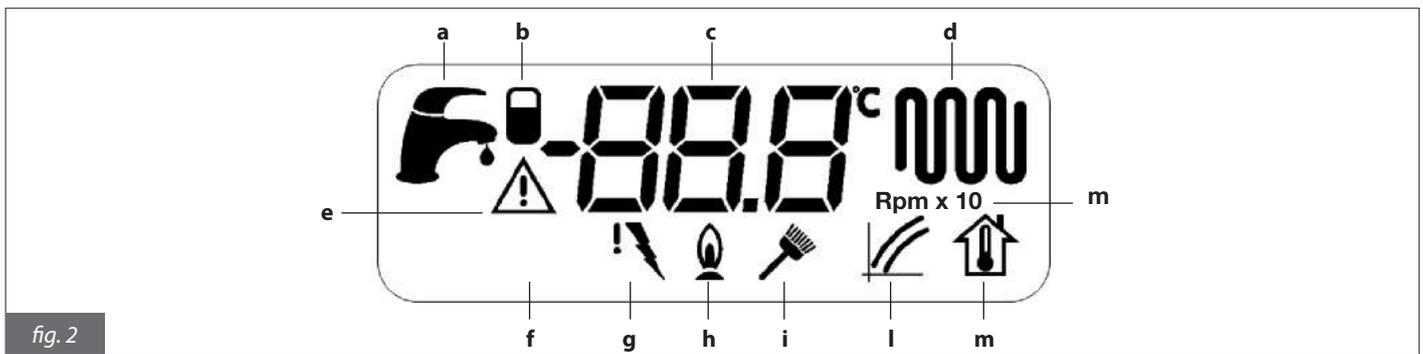
4. CH water temperature regulator

This is used to select the temperature of the water in the heating system in the range 20-78°C (when standard temperature range is selected) or 20-45°C (when reduced temperature range is selected).

5. Water pressure gauge

This shows the pressure of the water in the heating system.

1.2. LCD



a. DHW indicator

This comes on when the boiler is in DHW mode.

It flashes when the DHW temperature is being regulated via regulator **3** (fig. 1).

b. Water heater on indicator

This indicator comes on when the water heater is activated via regulator **3** (fig. 1).

c. Alphanumeric indicator

This shows the following:

- CH flow temperature
- CH temperature setting
- DHW temperature setting
- boiler status
- boiler diagnostics

d. Central heating indicator

This comes on when the boiler is in CH mode.

It flashes when the CH temperature is being regulated via regulator **4** (fig. 1).

e. Boiler shutdown indicator

This comes on when there is a malfunction that cannot be reset via the boiler function selector **2** (fig. 1).

The problem must be solved before the boiler can be restarted.

f. Burner shutdown indicator

This comes on when the burner shutdown device activates due to a malfunction.

To restart the boiler, turn the boiler selector **2** (fig. 1) to the RESET  position for a few seconds and then back to the desired position.

g. Flame indicator

This comes on when the burner flame is present.

h. Chimney-sweep function indicator (for fitter only)

This flashes when the chimney-sweep function is activated.

The flow water temperature and the number of fan rounds are shown alternatively (in this case, symbol **m** is also shown)

i. Thermoregulation indicator (for fitter only)

This comes on when the thermoregulation curve is being set.

l. Calculated ambient temperature indicator

When an external probe is installed, this indicator flashes when the calculated ambient temperature is set via regulator **4**.

m. Number of fan rounds (for fitter only)

When the chimney sweep function is activated, symbol **h** flashes and flow water temperature and number of fan rounds are shown alternatively (in this case, the correspondent symbol is also shown).

1.3. BOILER STATUS – LCD ACTIVATION Correspondence

Normal operation

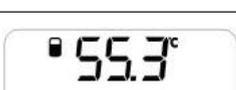
Boiler selector on OFF	
Boiler selector on ANTI-FREEZE	
Boiler selector on SUMMER or WINTER No function active The water flow temperature is displayed	
Boiler selector on SUMMER or WINTER Aqua Premium system enabled, no function active The water flow temperature is displayed	
Boiler selector on WINTER CH function active (Aqua Premium system disabled) The water flow temperature is displayed	
Boiler selector on SUMMER or WINTER CH function active The water flow temperature is displayed	

Table 1 - BOILER STATUS - LCD visualisation correspondence (normal operation)

Malfunction

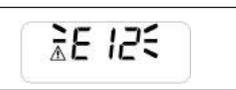
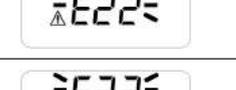
Boiler not powered on	
Boiler shutdown due to flame absence	
Boiler shutdown due to safety thermostat activation	
Boiler shutdown due to flue gas thermostat activation	
CH probe failure	
DHW probe failure	
Storage probe fault	
Low primary fluid level alarm or minimum pressure switch activation (pump ON – flow switch OPEN)	
Low primary fluid level alarm (pump OFF – flow switch CLOSE)	
Fan failure	
Remote control connection failure	
External probe failure	

Table 2 - BOILER STATUS - LCD visualisation correspondence in case of malfunctions

1.4. Operating the boiler

1.4.1. Switching on



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

- Open the gas cock;
- Turn the master switch to ON – the LCD light up and shows the active function (see table 1);
- Choose the boiler mode via selector **2** (fig. 1): OFF/SUMMER/WINTER/ANTI-FREEZE;
- Set the temperature for the heating system on regulator **4** (fig. 1);
- Set the DHW temperature on regulator **3** (fig. 1);
- Set the ambient temperature on the (optional) thermostat

IMPORTANT

If the boiler is not used for a long time, particularly when it runs on propane gas, ignition may be difficult. So, before starting the boiler, switch on a different gas-fired device (e.g. a cooking ring).

Note that the boiler may still shut down a couple of times. If this happens, turn selector **2 (fig. 1) to the RESET!X position for a few seconds, then back to the desired position.**

1.4.2. CH function

Set desired CH water temperature via no. **4** knob (fig. 1);

CH water temperature adjusting range depends on selected operation range:

- **standard range:** from 20°C to 78°C (from full counter-clockwise position to full clockwise position);
- **reduced range:** from 20°C to 45°C (from full counter-clockwise position to full clockwise position).

Operation range choice is to be selected by the fitter or a qualified Service Centre.

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



When the CH system requests heat, the LCD shows the (fixed) CH symbol and the temperature of the CH water. The burner symbol  only shows while the burner is operating.



To prevent frequent ignition and switching off in central heating mode, boiler is programmed to have a waiting time between subsequent ignitions which depends on the selected operating range.

- **standard range:** 4 minutes;
- **reduced range:** 2 minutes.

Should water temperature in the system fall below the default value, waiting time procedure is aborted and boiler re-ignited (see par. 3.2.1.1).

1.4.3. DHW function

The boiler always gives priority to DHW demand over the CH function.

The boiler is equipped with the AQUA PREMIUM system, which combines the instantaneous production of domestic hot water with a storage function.

1.4.3.1. AQUA PREMIUM system

The boiler comes with a 25-litre stratification storage tank and a secondary plate heat exchanger.

The boiler can either function as a standard instantaneous boiler, when the storage tank is deactivated, or with the innovative Aqua Premium system, when the storage tank is switched on.

The storage tank function is controlled via regulator **3** (fig. 1).

When regulator **3** is turned fully anticlockwise, the storage tank symbol is displayed. Then turn regulator **3** clockwise until a setting of at least 40°C is reached.

To deactivate the water storage tank function, turn regulator **3** fully anticlockwise until the symbol disappears, then back to a setting of at least 40°C.



The temperature range is 35-57°C (from the fully anticlockwise to the fully clockwise position of regulator **3**). During temperature setting, the DHW symbol on the LCD flashes and the water temperature is displayed.



In Aqua Premium mode, when a hot water tap is turned on, the flow switch cuts off the supply of water. The boiler switches on, the cutoff valve opens and the DHW pump activates (the pump flow rate is fixed).

When DHW demand is less than the pump's flow rate, water to the tap is only supplied by the secondary plate heat exchanger and excess DHW is deviated to the storage tank.

When the DHW demand exceeds the flow rate, water produced by the secondary heat exchanger is added to that from the storage tank. This gives a higher hot water flow than the one produced by instantaneous boilers with an identical thermal output and traditional ones with a storage tank of the same capacity.

When there is a demand for domestic hot water, the tap symbol (fixed) and the instantaneous water temperature are displayed.

The burner symbol  shows while the burner is in operation.



The boiler can also operate as a standard instantaneous boiler, when the storage tank disabled.

1.4.3.2. Instantaneous production of DHW

When the storage tank is disabled, the boiler operates as a standard instantaneous boiler: the cutoff valve is closed and the DHW pump is off. In this case, DHW demand is met by the secondary heat exchanger only and the maximum quantity of hot water supplied depends on the boiler thermal output.

The temperature can be selected on regulator **3** in the range 35-57°C (from the fully anticlockwise to the fully clockwise position).

During temperature setting, the DHW symbol on the LCD flashes and the DHW temperature is displayed.



The DHW flow rate in litres per minute at the set temperature depends on the boiler's thermal output and the water supply temperature. It can be calculated from the following formula:

$$l = \text{litres of hot water per minute} = \frac{K}{\Delta T}$$

where K is

- 401 for model KB 24
- 444 for model KB 28

and ΔT = DHW temperature – cold water supply temperature

For instance, with model KB 24, if the water supplied is 8°C and you want shower water at 38°C, the value of ΔT is:

$$\Delta t = 38^\circ\text{C} - 8^\circ\text{C} = 30^\circ\text{C}$$

and the number of DHW litres per minute available at 38°C is:

$$l = \frac{401}{30} = 13.4 \text{ litres per minute}$$



When there is a demand for hot water, the tap symbol (fixed) and the instantaneous flow water temperature are displayed.

The burner symbol  shows while the burner is in operation.

1.4.4. Anti-freeze function

The boiler comes with an anti-freeze function which is active in SUMMER, WINTER and ANTI-FREEZE modes.



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

The heating system must be protected by a room thermostat, which is disabled when selector 2 is on ANTI-FREEZE or OFF. So, if you wish to protect the heating system as well, turn selector 2 to WINTER .

The heating system can also be protected effectively from frost by using specific anti-freeze products suitable for multi-metal systems.

Do not use vehicle anti-freeze products. Periodically check the effectiveness of the additive.

When the heating water temperature sensor reads a temperature of 5°C, the boiler switches on at minimum thermal output until the temperature rises to 30°C or 15 minutes have elapsed.

If the boiler shuts down, the pump continues to operate.

When the DHW temperature sensor reads a temperature of 5°C, the boiler switches on at minimum thermal output until the temperature rises to 10°C or 15 minutes have elapsed (the switching valve switches to the DHW position).

If the boiler shuts down, the pump continues to operate.

When the storage tank temperature sensor reads a temperature of 5°C, the boiler switches on at minimum thermal output until the temperature rises to 10°C or 15 minutes have elapsed.

If the boiler shuts down, the pump continues to operate.

1.4.5. Pump and valve anti-shutdown function

If the boiler remains inactive and selector **2** is not in the OFF position, and the boiler is still connected to the mains supply, the pump, the switching valve and the two-way valve activate briefly every 24 hours to keep them efficient.

1.4.6. Operation with (optional) remote control

The boiler can be linked to an (optional, can be supplied by the Producer) remote control, which can be used for setting numerous parameters, including:

- boiler status;
 - ambient temperature;
 - CH system water temperature;
 - DHW system water temperature;
 - CH system activation times and storage activation times;
 - boiler diagnostics display;
 - boiler reset,
- and other parameters

For instructions on how to connect the remote control, refer to subsection 3.2.13.



Only original remote controls supplied by the manufacturer must be used. If non-original remote controls are used, correct operation of the boiler, or of the remote control, cannot be guaranteed.

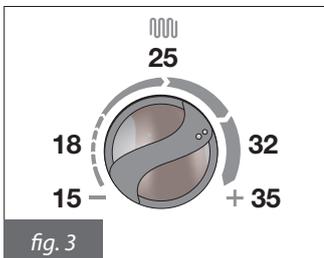
1.4.7. Operation with an (optional) external probe

The boiler can be connected to an (optional) external temperature probe.

When the external temperature has been measured, the boiler automatically regulates the heating water temperature, increasing it when the outside temperature drops and decreasing it when it rises, which improves comfort and saves fuel (this is referred to as sliding temperature operation).

The heating water temperature varies according to a program in the boiler's microprocessor.

When an external probe is installed, the DHW temperature 4 loses its heating water temperature function and becomes a calculated ambient temperature regulator (fig. 3) for the temperature desired in the areas to be heated.



During temperature setting, the calculated ambient temperature symbol  flashes and the temperature setting is displayed.

Regulator **4** in the fully anticlockwise position corresponds to a calculated ambient temperature of 15°C, 9 o'clock corresponds to 18°C, 12 o'clock to 25°C, 3 o'clock to 32°C and the fully clockwise position to 35°C.

To get an optimal curve, a setting of approximately 20°C is recommended

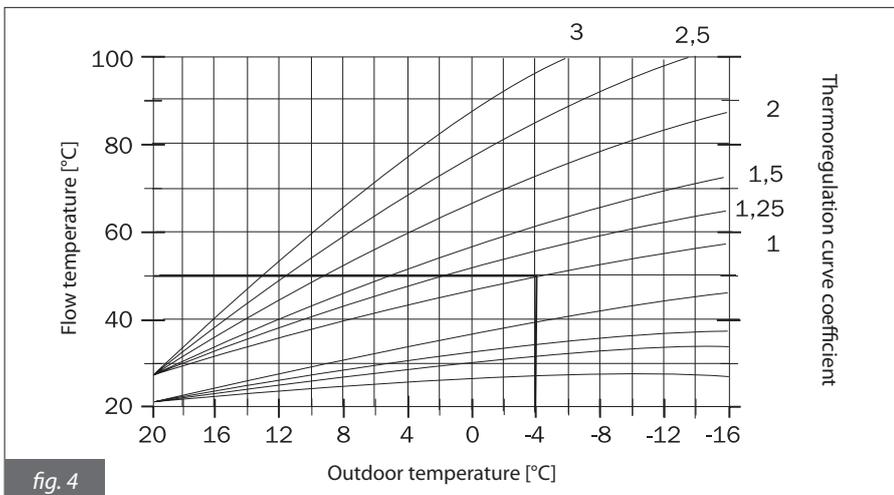


Fig. 4 shows the curves for a calculated temperature of 20°C. When this value is increased or decreased via regulator 4, the curves move up or down, respectively.

With this setting, for instance, if you select the curve corresponding to parameter 1 and the outdoor temperature is -4°C, the CH flow temperature will be 50°C.



Only original external probes supplied by the manufacturer must be used. If non-original external probes are used, correct operation of the boiler, or of the probe, cannot be guaranteed.

1.5. Boiler shutdown

The boiler shuts down automatically if a malfunction occurs.

Refer to Tables 1 and 2 to identify the boiler operating mode.

Refer to Table 2 and section 6 to identify possible causes of the shutdown. The troubleshooting section is at the end of this manual. Below is a list of kinds of shutdown and the procedure to follow in each.

1.5.1. Burner shutdown

If the burner shuts down as there is no flame, the burner shutdown symbol  is displayed and code E01 flashes.

If this happens, proceed as follows:

- check that the gas cock is open and light a gas ring for example to check the gas supply;
- if the gas supply is normal, turn selector **2** to the reset position  for 2 seconds, then back to the desired position. If after three attempts the burner still fails to ignite, contact a qualified Service Centre or service engineer.

If the burner shuts down frequently, there is a recurring malfunction, so contact an Authorised Service Centre or a qualified service engineer.

1.5.2. Shutdown due to overheating

If the water temperature is too high, the boiler will shut down. The burner shutdown symbol  is displayed and code E02 flashes. Contact a qualified Service Centre or service engineer.

1.5.3. Shutdown due to air/flue gas system malfunction

If the air/flue gas system malfunctions, the boiler shuts down. The burner shutdown symbol  symbol is displayed and code E20 (differential pressure switch cut-in) flashes.

Contact a qualified Service Centre or service engineer.

1.5.4. Shutdown due to low fluid level

If water circulation in the DHW circuit is incorrect, the boiler shuts down.

The LCD displays the boiler shutdown  symbol and the E10 or E26 codes flashing, depending on the type of malfunction.

In the former case (code E10 flashing), there may be 2 possible reasons:

a) The pressure gauge (5 in fig. 1) shows a pressure value below 1 bar

Fill the system with water as detailed below:

- Turn the filling tap (fig. 5) anticlockwise to allow water to enter the boiler;
- Keep the tap open until the pressure gauge shows a value of 1±1.3 bar;
- Turn the tap fully clockwise to close it;
- Turn selector **2** to the RESET position  for a few seconds, then back to the desired position.

If the boiler still fails to operate, contact a qualified Service Centre or service engineer.



Make sure you close the tap carefully after filling.

If you do not, when the pressure increases, the safety valve may activate and discharge water.

b) The pressure gauge (5 in fig. 1) shows a pressure value of 1±1.3 bar

Contact an Authorised Service Centre or a qualified service engineer.

In the latter case (code E26 flashing) contact a qualified Service Centre or service engineer.

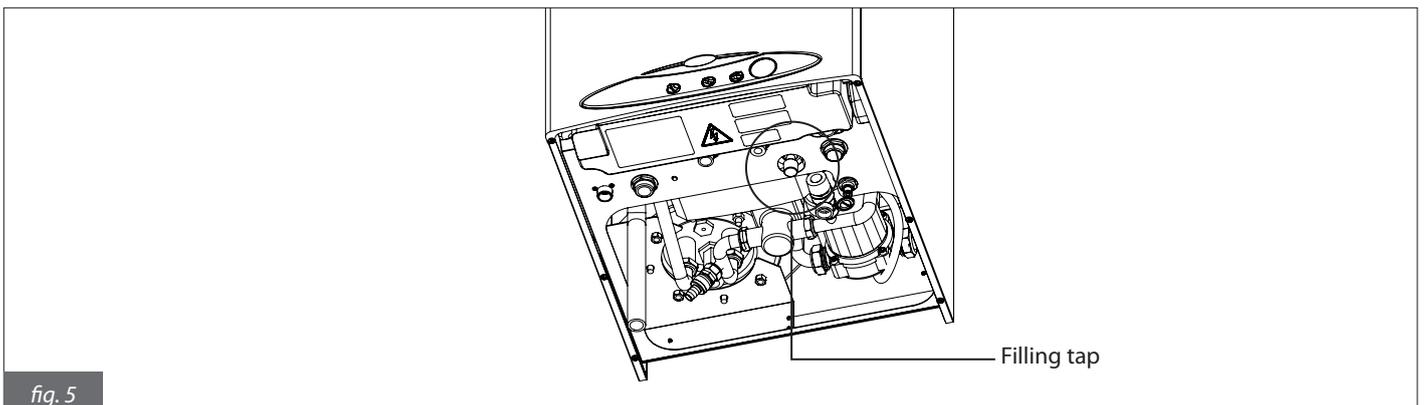


fig. 5

1.5.5. Shutdown due to fan malfunction

If the fan work is constantly monitored and in case of malfunction it goes off; the boiler shutdown symbol  is displayed and code E17 flashes.

This mode is maintained until the fan recovers normal working parameters.

If the boiler should not start and remain in this mode, contact a qualified Service Centre or service engineer.



1.5.6. Alarm due to temperature probe malfunction

If the burner shuts down due to malfunction of the temperature probes, the boiler shutdown symbol  is displayed and the following codes may flash:

- E05, CH probe:

the boiler does not work.

- E06, DHW probe:

the boiler only operates in CH mode, not DHW mode.

- E12, storage probe:

the boiler operates in CH and instantaneous DHW mode.

Contact a qualified Service Centre or service engineer.

1.5.7. Alarm due to gas valve modulator malfunction

If the gas valve modulator malfunctions, the boiler shutdown symbol  is displayed and code E16 flashes. The boiler will continue to operate, but at the minimum available output.

Contact a qualified Service Centre or service engineer.



1.5.8. Alarm due to (optional) remote control connection malfunction

The boiler recognises whether or not there is a remote control (optional). If the remote control is connected but the boiler does not receive instructions, the boiler shutdown symbol  is displayed and code E22 flashes.

The boiler will continue to operate according to the settings on the control panel (fig. 1) and ignore the remote control settings.

Contact a qualified Service Centre or service engineer.



1.5.9. Alarm due to (optional) external probe malfunction

If the (optional) external temperature probe malfunctions, the boiler shutdown symbol  is displayed and code E23 flashes.

The boiler will continue to operate, but the sliding temperature function is deactivated. The temperature of the CH water is regulated according to the position of regulator 4 (fig. 1), which in this case loses its function as a calculated room temperature regulator (see par.1.4.7.).

Contact a qualified Service Centre or service engineer.



1.6. Maintenance

The boiler must be serviced periodically as indicated in the relevant section of this manual.

Correct maintenance of the boiler will allow it to work efficiently, without harming the environment, and in complete safety.

Maintenance and repairs must be performed by qualified personnel.

The user is strongly advised to have the boiler serviced and repaired by one a fully qualified Service Centres.

Refer to Section 5 – Maintenance for detailed instructions.

The user may only clean the external casing of the boiler, using ordinary furniture cleaning products.

Do not use water.

1.7. Notes for the user

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 cannot be held liable for damage or injury due to tampering of the boiler or improper intervention.

If the boiler remains inactive and the power supply is switched off for a long time, it may be necessary to reset the pump.

This involves removing the casing and accessing internal parts, so it must only be done by suitably qualified personnel.

Pump failure can be avoided by adding to the water filming additives suitable for multi-metal systems.

2. Technical features and dimensions

2.1. Technical features

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

- KB 24** condensing boiler with sealed chamber and forced draught, supplying CH water and instant DHW with Aqua Premium system, heat output 23.7 kW
- KB 28** condensing boiler with sealed chamber and forced draught, supplying CH water and instant DHW with Aqua Premium system, heat output 26.2 kW

These boilers meet all the requirements in the country of destination indicated on the rating plate. Installation in a different country may cause a hazard for people, animals and property.

The main technical features of the boiler are given below.

Construction characteristics

- IPX4D electrically protected control panel
- Electronic safety board and integrated modulation
- Electronic ignition with separate igniter and ionization flame detector
- Stainless steel, fully pre-mixed burner
- Mono-thermal, high efficiency, composite and stainless steel heat exchanger with air purging device
- DHW stainless steel plate heat exchanger
- Twin shutter, modulating gas valve with constant air/gas ratio
- Modulating, electronically managed flue gas discharge fan
- 3-speed CH pump with built-in deaerator
- DHW pump
- Safety flow-switch, preventing operation with water circulation malfunction in the CH system
- DHW, CH and storage tank temperature probes
- Safety limit thermostat
- Flue gas thermostat
- Integrated, automatic by-pass
- 10 liter expansion vessel
- System loading and draining taps
- Motorized switching valve
- DHW priority flow switch

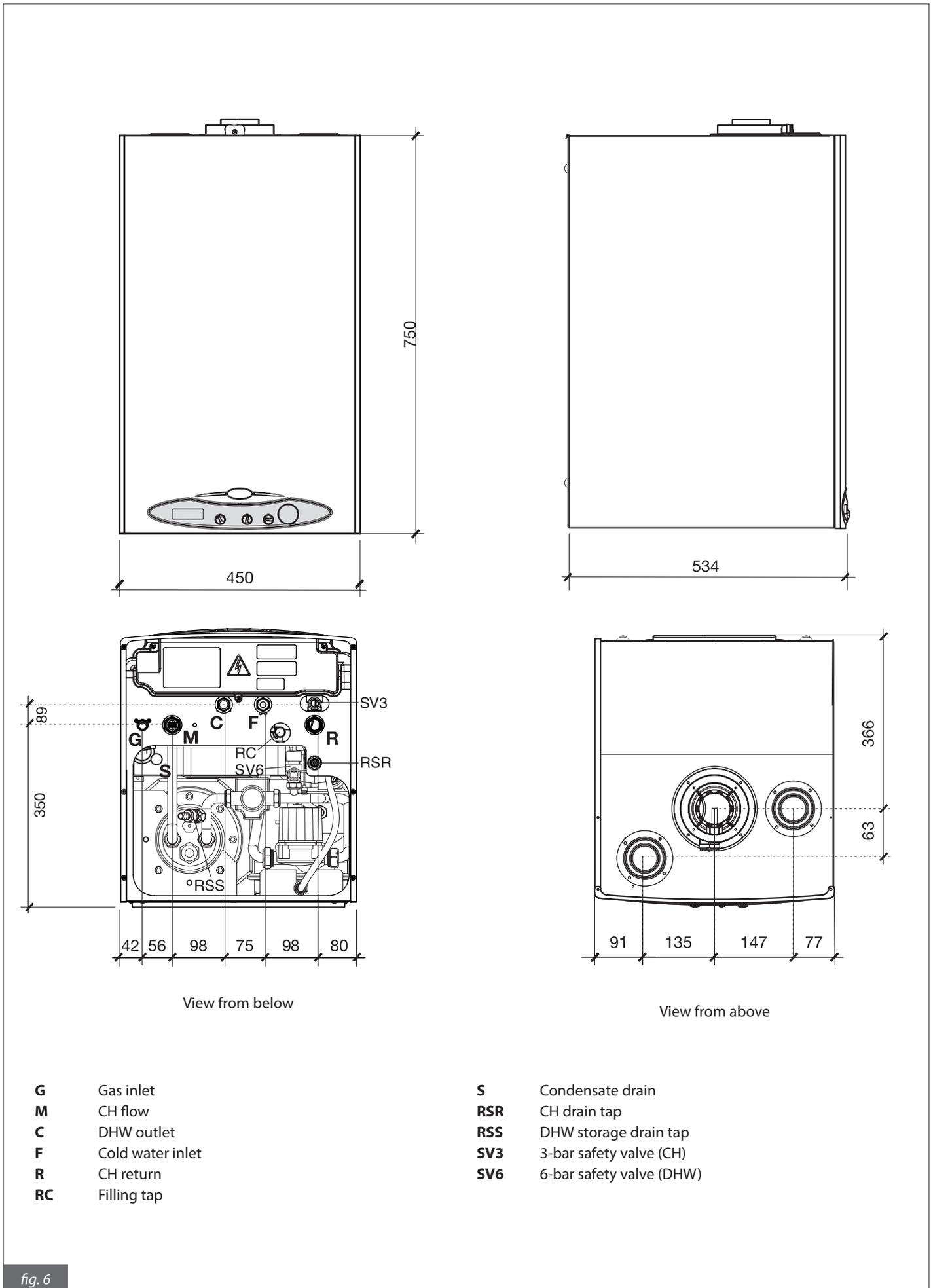
User interface

- Liquid crystal display showing the boiler operating status
- Mode selector: OFF, RESET, WINTER, SUMMER and ANTI-FREEZE
- CH water temperature regulator: 20-78°C (standard range) or 20-45 °C (reduced range)
- DHW water temperature regulator: 35-57°C
- Water pressure gauge

Operating features

- CH electronic flame modulation with timer-controlled rising ramp (50 seconds)
- DHW electronic flame modulation
- DHW priority function
- CH flow anti-freeze function (ON 5°C; OFF 30°C or after 15 minutes of operation)
- DHW anti-freeze function (ON 5°C; OFF 10°C or after 15 minutes of operation)
- Storage tank anti-freeze function (ON 5°C; OFF 10°C or after 15 minutes of operation)
- Anti-legionella function
- Timer-controlled chimney-sweep function (15 minutes)
- Ignition flame propagation function
- CH maximum heat input adjusting trimmer
- Ignition heat input adjusting trimmer
- Timer-controlled room thermostat (240 seconds with CH flow temperature >40°C)
- Heating pump post-circulation function in CH, ANTI-FREEZE and CHIMNEY-SWEEP mode (180 seconds)
- Pump post-circulation function in DHW mode (30 s)
- Post-circulation function for CH temperature >85°C (30 seconds).
- Post-ventilation safety function (ON 95°C; OFF 90°C).
- Pump and switching valve anti-blocking function (180-seconds' operation after 24-hours' of non operation).
- Ready for connection to a room thermostat (optional)
- Ready for operation with an external probe (optional, supplied by the manufacturer)
- Ready for operation with an OpenTherm remote control (optional, supplied by the manufacturer)

2.2. Dimensions

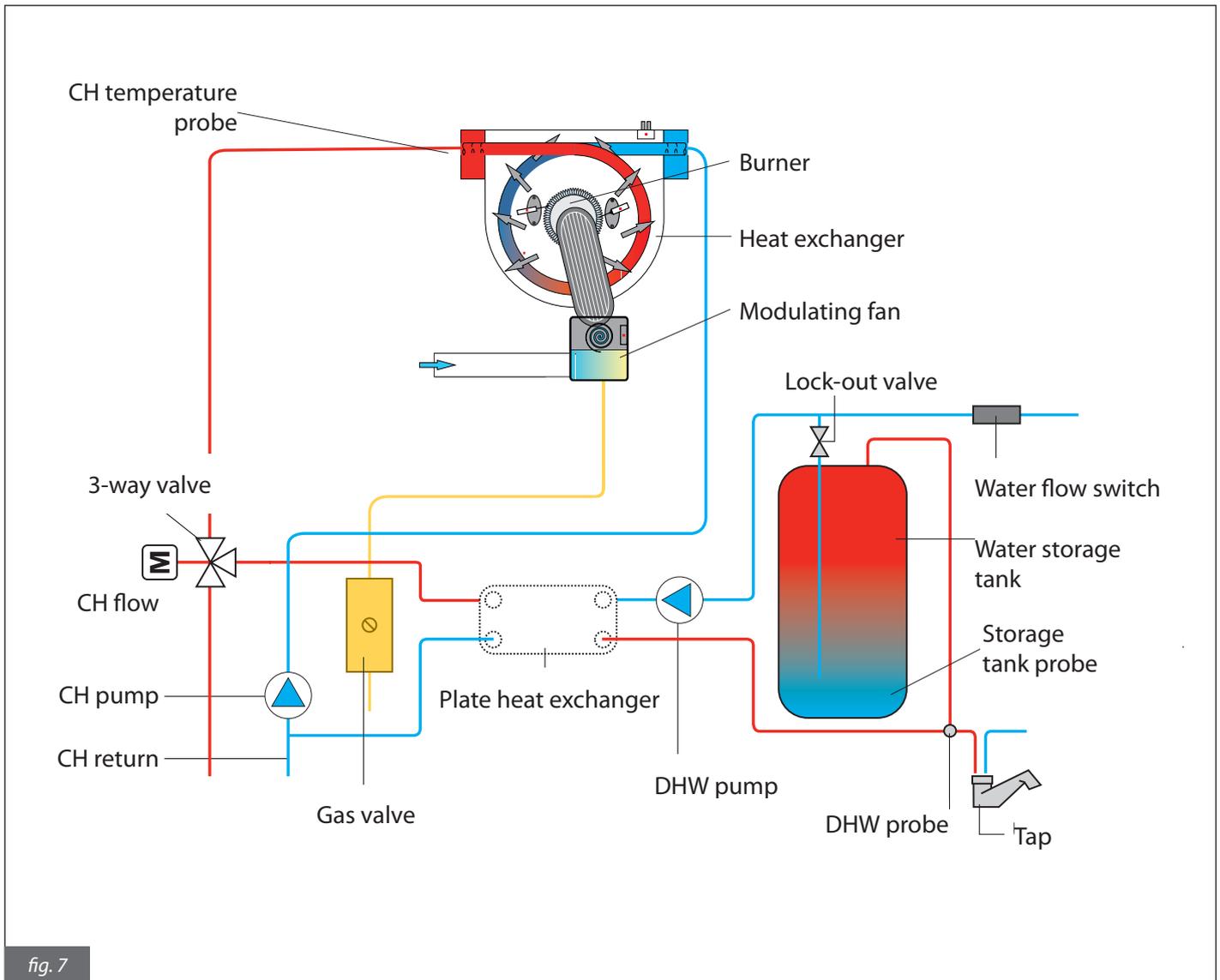


- G** Gas inlet
- M** CH flow
- C** DHW outlet
- F** Cold water inlet
- R** CH return
- RC** Filling tap

- S** Condensate drain
- RSR** CH drain tap
- RSS** DHW storage drain tap
- SV3** 3-bar safety valve (CH)
- SV6** 6-bar safety valve (DHW)

fig. 6

2.3. Plumbing system



2.4. Operating data

Burner pressures must be verified after a three minute boiler operation time.

KB 24										
Fuel type	Max. CH Input [kW]	CH output (80-60°C) [kW]		CH output (50-30°C) [kW]		DHW output [kW]		Gas mains pressure [mbar]	Diaphragm diameter [mm]	Flue gas CO ₂ [%]
		min	max	min	max	min	max			
	Kw							mbar	mm	%
Methane Gas G20	23.7	6.5	23.1	7.3	24.8	7.3	28.0	20	7.2	8.8 ÷ 9.1
Propane Gas G31	23.7	6.5	23.1	7.3	24.8	7.3	28.0	37	5.3	9.1 ÷ 10.1

Table 3

Instantaneous DHW supply ΔT 45 K = 8.9 l/min
 Instantaneous DHW supply ΔT 40 K = 10.0 l/min
 Instantaneous DHW supply ΔT 35 K = 11.5 l/min

Instantaneous DHW supply ΔT 30 K = 13.4 l/min
 Instantaneous DHW supply ΔT 25 K = 16.1 l/min

KB 28										
Fuel type	Max. CH Input [kW]	CH output (80-60°C) [kW]		CH output (50-30°C) [kW]		DHW output [kW]		Gas mains pressure [mbar]	Diaphragm diameter [mm]	Flue gas CO ₂ [%]
		min	max	min	max	min	max			
	Kw							mbar	mm	%
Methane Gas G20	26.2	5.4	25.55	6.1	27.4	6.1	31.0	20	7.2	8.8 ÷ 9.1
Propane Gas G31	26.2	5.4	25.55	6.1	2.74	6.1	31.0	37	5.3	9.8 ÷ 10.1

Table 4

Instantaneous DHW supply ΔT 45 K = 9.9 l/min
 Instantaneous DHW supply ΔT 40 K = 11.1 l/min
 Instantaneous DHW supply ΔT 35 K = 12.7 l/min

Instantaneous DHW supply ΔT 30 K = 14.8 l/min
 Instantaneous DHW supply ΔT 25 K = 17.8 l/min

Note: DHW supply refers to instantaneous production (Aqua Premium system disabled).

2.5. General characteristics

		KB 24	KB 28
Equipment category	-	II2H3P	II2H3P
Minimum CH system pressure	bar	0.5	0.5
Maximum CH system pressure	bar	3	3
Minimum DHW system pressure	bar	0.5	0.5
Maximum DHW system pressure	bar	8	8
DHW specific flow rate (Δt 30 °C)	l/10'	163	183
Electric power supply – voltage / frequency	V ~ Hz	230 ~ 50	230 ~ 50
Power mains supply fuse	A	2	2
Maximum power consumption	W	145	145
Electric protection rating	IP	X4D	X4D
Methane gas consumption at maximum CH input (*)	m ³ /h	2.51	2.77
Propane gas consumption at maximum CH input	kg/h	1.84	2.03
Maximum CH working temperature	°C	83	83
Maximum DHW working temperature	°C	62	62
Total capacity of expansion vessel	l	10	10
Maximum recommended CH system capacity (**)	l	200	200

Table 5

(*) Value refers to 15°C - 1013 mbar.

(**) Maximum water temperature = 83°C. Expansion vessel pressure pre-charge = 1 bar

KB 24

		Pmax	Pmin	Reduced load (30%)
Casing heat loss with burner on	%	1.4	2.1	-
Casing heat loss with burner off	%		0.2	
Chimney heat loss with burner on	%	2.6	2.2	-
Flue gas system mass flow rate	g/s	12.4	3.1	-
Flue gas temp. – air temp	°C	67	49	-
Maximum heat output efficiency rating (60/80°C)	%	97.5	-	-
Maximum heat output efficiency rating (30/50°C)	%	104.8	-	-
Minimum heat output efficiency rating (60/80°C)	%	-	95.7	-
Minimum heat output efficiency rating (30/50°C)	%	-	106.9	-
30% heat output efficiency rating	%	-	-	109.1
Efficiency rating (according to 92/42/CEE)	-	★★★★		
NOx emission class	-	5		

Table 6

KB 28

		Pmax	Pmin	Reduced load (30%)
Casing heat loss with burner on	%	0.9	2.3	-
Casing heat loss with burner off	%		0.3	
Chimney heat loss with burner on	%	2.5	2.2	-
Flue gas system mass flow rate	g/s	13.9	3.1	-
Flue gas temp. – air temp	°C	51.2	45	-
Maximum heat output efficiency rating (60/80°C)	%	97.53	-	-
Maximum heat output efficiency rating (30/50°C)	%	105.4	-	-
Minimum heat output efficiency rating (60/80°C)	%	-	95.5	-
Minimum heat output efficiency rating (30/50°C)	%	-	106.7	-
30% heat output efficiency rating	%	-	-	108.9
Efficiency rating (according to 92/42/CEE)	-	★★★★		
NOx emission class	-	5		

Table 7

2.6. Available head

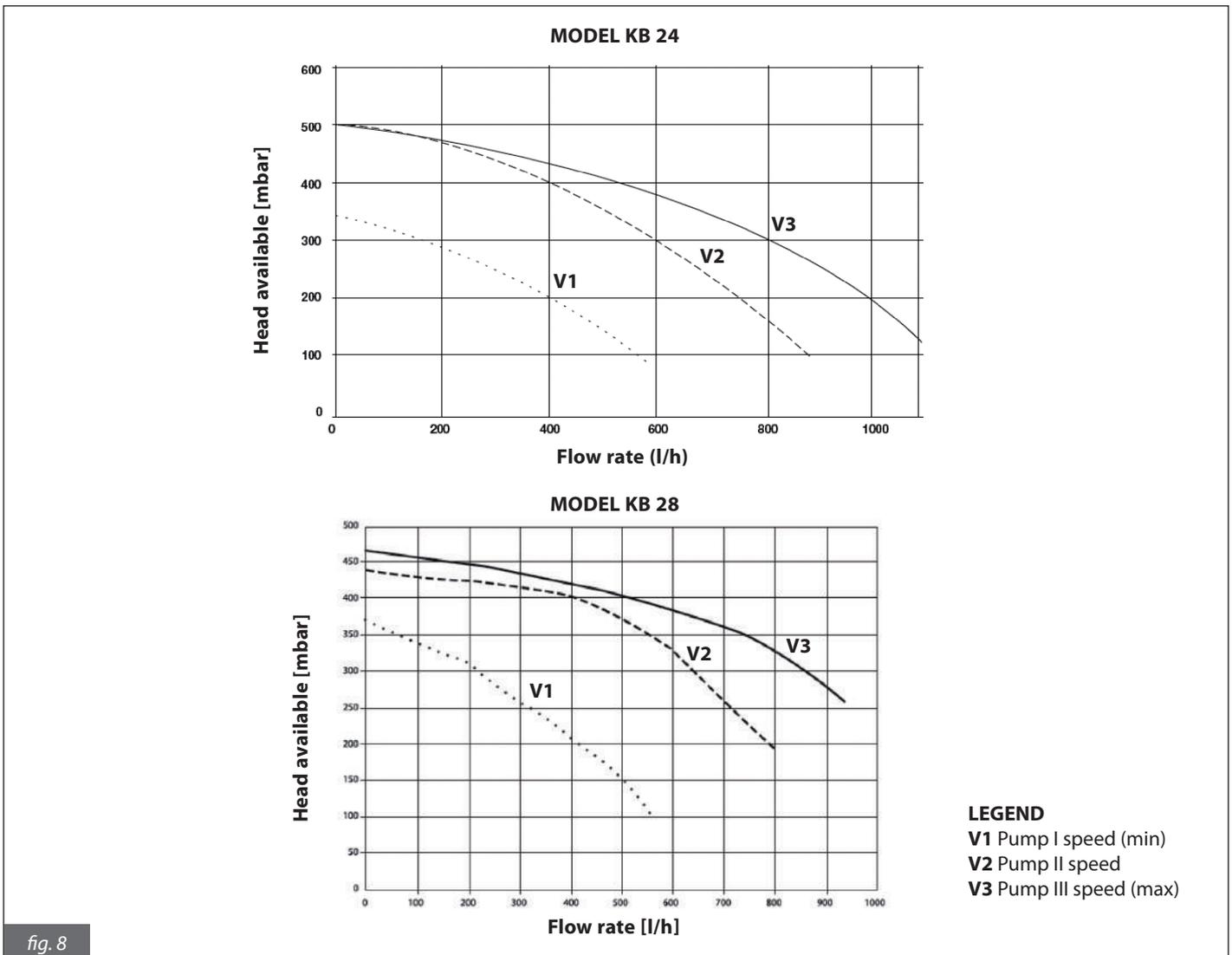


fig. 8

3. Instructions for the fitter

3.1. Installation standards

This is a II2H3P boiler which must be installed in compliance with the applicable laws and standards in the country of installation.

3.2. Installation



**Only original accessories and spare parts supplied by the manufacturer must be used for installation and maintenance.
If non-original accessories and spare parts are used, correct operation of the boiler cannot be guaranteed.**

3.2.1. Packaging

The boiler is supplied in a sturdy cardboard box. Unwrap the boiler, then check that everything is complete and nothing is damaged. All the packaging materials can be recycled and should be disposed of in appropriate waste collection bins. Keep the packaging out of the reach of children as it may be a source of danger.

The manufacturer cannot be held liable for damage or injury due to non-observance of the above rules.

Contents of the box:

- kit of copper pipes for connecting the boiler to the CH and DHW system and the gas mains;
- 2 shut-off cocks: one for gas and one for cold water;
- wall hanging bracket;
- a bag containing:
 - a) boiler installation, use and maintenance manual
 - b) a wall-mounting template (fig. 9)
 - c) 4 screws and wall plugs for fixing the boiler to the wall.

3.2.2. Choosing where to install the boiler

There are several points to take into account when deciding where to install the boiler.

- Refer to the instructions in subsection 3.2.6. Air intake/flue gas discharge system;
- Make sure the wall is strong enough to support the boiler – avoid lightweight partition walls.
- Do not install the boiler above any equipment that may affect operation (e.g. cookers generating greasy vapour or washing machines).

3.2.3. Positioning the boiler

Each boiler is provided with a paper template (fig. 9) that can be used when designing the plumbing system and prior to installation of the boiler to position the connections to the CH system, the DHW system, the gas mains and the air intake /flue gas discharge system.

The template is made of heavy-duty paper. Fix it in position on the wall, using a spirit level. It provides all the indications required to drill the holes for fixing the boiler to the wall, which is done using two screws and wall plugs.

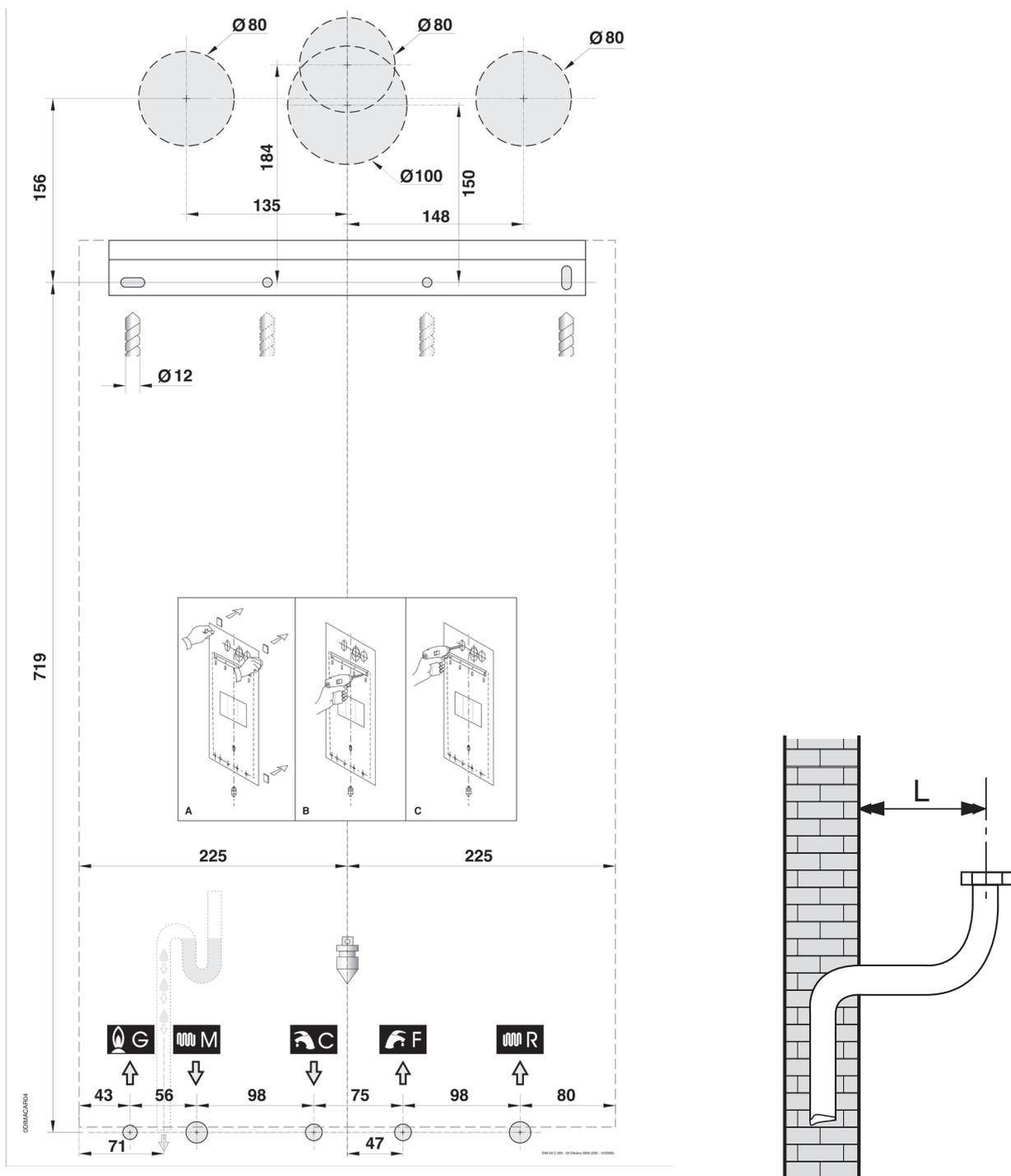
The lower section of the template shows where to mark the exact spots where the fittings are to be positioned for connecting the boiler to the gas, cold water, DHW flow, CH flow and return pipes.

The upper section shows where to mark the exact spots for positioning the air/flue gas pipes.



**Since the temperature of the wall on which the boiler is fitted and the outside temperature of the coaxial air intake and flue gas outlet pipes are less than 60°C, a minimum distance between flammable walls is not required.
For boilers with split air and flue gas pipes that run along or through flammable walls, insulation must be laid between the wall and the flue gas outlet pipe.**

Wall-mounting template



	Fitting Ø	Copper pipe Ø	L
M = CH flow	3/4"	18 mm	349 mm
C = DHW	1/2"	14 mm	389 mm
G = Gas	1/2"	18 mm	349 mm
F = Cold water	1/2"	14 mm	389 mm
R = CH return	3/4"	18 mm	349 mm

fig. 9

3.2.4. Installing the boiler

Before connecting the boiler to the CH and DHW system, it needs to be cleaned thoroughly.

Before putting a NEW system into service, clean thoroughly to remove any metal residue left over from manufacturing and welding processes, and any oil and grease deposits. This is because if they got into the boiler they would damage it or interfere with operation.



Before putting a RENOVATED system into service (addition of radiators, replacement of the boilers, etc.), clean thoroughly to remove any sludge and foreign bodies.

This can be done using suitable non-acidic products available from the market.

Do not use solvents as they could damage the components.

In any heating system (new or renovated), add to the water (in a suitable concentration) specific corrosion inhibitors for multi-metal systems, which form a protective film on the internal surfaces.

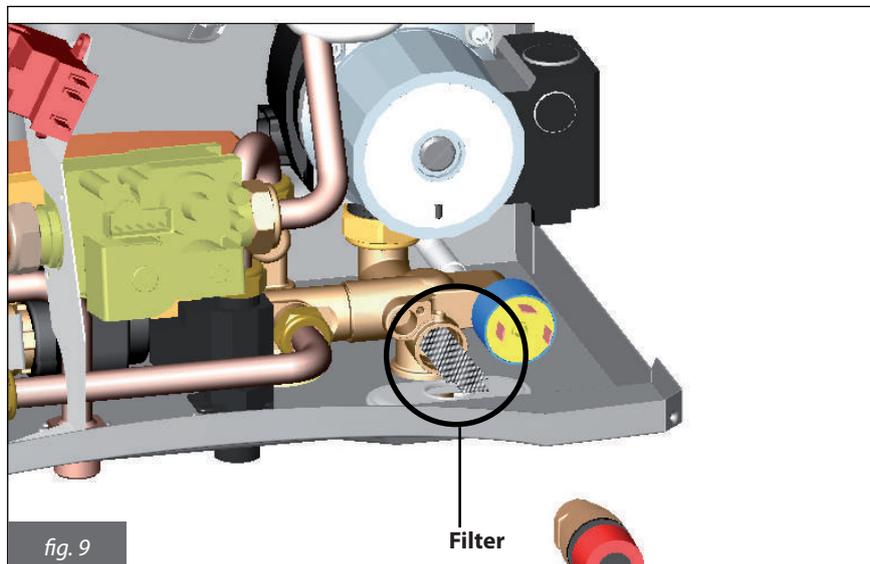
The manufacturer declines all liability for damage or injury caused by failure to comply with these instructions.

The boiler is fitted with a filter (fig. 10) whose function is to prevent the main heat exchanger pipes from obstructing, due to deposits that may form in the heating system.

Such filter is not sufficient to prevent deposits of such materials to form inside the boiler. To this purpose, please note that:



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



In order to install the boiler proceed as follows:

- affix the template (fig. 9) to the wall;
- drill two 12 mm \varnothing holes in the wall to accommodate the boiler support bracket wall plugs;
- arrange air intake/flue gas system path in the wall as needed;
- secure boiler support bracket to the wall by means of the wall plugs supplied with the boiler;
- position gas supply network coupling (G), water mains supply coupling (F), DHW coupling (C), CH coupling (M), and CH return coupling (R), as shown on the template (refer to its lower area);
- provide a system for relieving condensates (S in fig. 6), an outlet for the 3-bar safety valve (SV3) and one for the 6-bar safety valve (SV6);
- secure the boiler to the supporting bracket on the wall;
- connect the boiler to network pipes by means of the coupling kit supplied with the boiler (refer to subsections 3.2.8. and 3.2.9.);
- connect the boiler to pipe for condensate discharge (refer to subsection 3.2.9.);
- connect the boiler to the system for relieving the 3-bar safety valve and the 6-bar safety valve;
- connect the boiler to the air intake and flue gas discharge system (refer to 3.2.6. subsection);
- connect electric power supply, room thermostat (when available) and other available accessories (refer to the following subsections).

3.2.5. Boiler room ventilation



It is mandatory to install the boiler in a suitable room in accordance with the applicable laws and standards in the country of installation, which are considered as fully transcribed in this manual.

The boiler has sealed combustion chamber. Combustion air is not drawn from boiler room, therefore specific recommendations need not to be applied concerning the boiler room or openings and ventilation provided to the boiler room.

3.2.6. Air intake / flue gas discharge system

Flue gas discharge into the atmosphere must comply with applicable laws and standards in the country of installation.



The boiler is equipped with safety devices checking correct flue gas discharge. Should an air/flue gas system malfunction occur, the safety devices shut down the boiler and the LCD will display the burner shutdown symbol  and flashing E03 code. It is strictly forbidden to tamper with and/or prevent operation of such safety devices. Should the boiler repeatedly shut down, it is necessary to have air/flue gas system ducts inspected, as they might be obstructed or inadequate to flue gas discharge into the atmosphere.



In air intake/flue gas discharge systems, specific, manufacturer approved, condensate acid-resistant systems for condensing boiler are to be used.



Flue gas discharge pipes are to be installed tilted toward the boiler so that condensate runs in the direction of 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. It is necessary to avoid formation of condensate stagnation areas in the flue gas discharge system, with the exception of the condensate drain siphon eventually connected to the discharge system itself.

The manufacture shall not be held liable for damage resulting in incorrect installation, use, modification of the equipment or non-observance of instructions provided by the manufacturer or applicable installation standards involving the product.

Installation examples

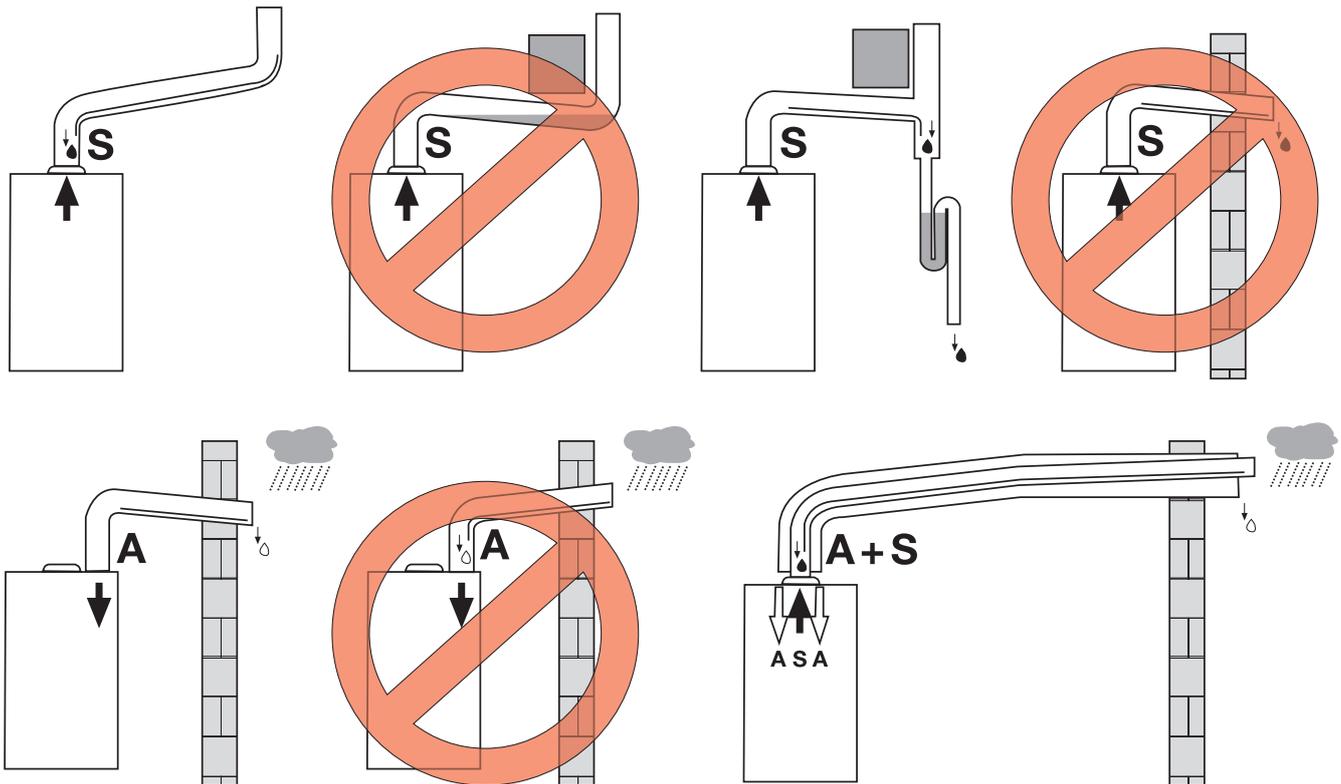


Chart to acronyms

fig. 11

A Air intake - S Flue gas discharge -  Condensate -  Rain

3.2.6.1. Air intake/flue gas discharge system duct configuration: B23, B53, C13, C33, C43, C53, C83

Type B23

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 by anti-wind gust device; it has to be equipped by a fan mounted before the combustion chamber/heat exchanger.

Type B53

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

Air intake 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 by anti-wind gust device; it has to be equipped by a fan mounted before the combustion chamber/heat exchanger.

Type C13

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

The distance between the air intake duct and the flue gas duct is to be a minimum of 250 mm, and both terminals are to be positioned within a squared area having 500 mm sides.

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

Type C33

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

The distance between air intake duct and flue gas duct is to be a minimum of 250 mm, and both ends are to be positioned within a squared area having 500 mm sides.

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

Type C43

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

The flue gas chimney system must comply with current standards.

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

Type C53

Boiler with split pipes for air intake and flue gas discharge.

Air and flue gas may have different exhaust pressure. Air and flue gas terminals may not face each other from opposite walls.

The boiler is to be equipped by 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.

Flue gas chimney must comply with current standards.

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

3.2.6.2. Ø 100/60 mm and Ø 125/80 mm air intake/flue gas coaxial duct system



The above data are referred to air intake/flue gas discharge systems which are implemented by means of smooth, rigid manufacturer approved and supplied pipes.

Type C13

KB 24

Minimum permissible length of horizontal coaxial pipes is 1 meter, without accounting for the first elbow connected to the boiler.
Maximum permissible length of Ø 100/60 mm horizontal coaxial pipes is 9.5 meter not including the first elbow connected to the boiler.
Maximum permissible length of Ø 125/80 mm horizontal coaxial pipes is 14.5 meter not including the first elbow connected to the boiler.
For each additional 1 meter 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 1.5 meters.
The air intake duct is to be tilted by 1% toward its exit, in order to avoid rain water to enter it.

KB 28

Minimum permissible length of horizontal coaxial pipes is 1 meter, without accounting for the first elbow connected to the boiler.
Maximum permissible length of Ø 100/60 mm horizontal coaxial pipes is 6.5 meter not including the first elbow connected to the boiler.
Maximum permissible length of Ø 125/80 mm horizontal coaxial pipes is 11.5 meter not including the first elbow connected to the boiler.
For each additional 1 meter 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 1.5 meters.
The air intake duct is to be tilted by 1% toward its exit, in order to avoid rain water to enter it.

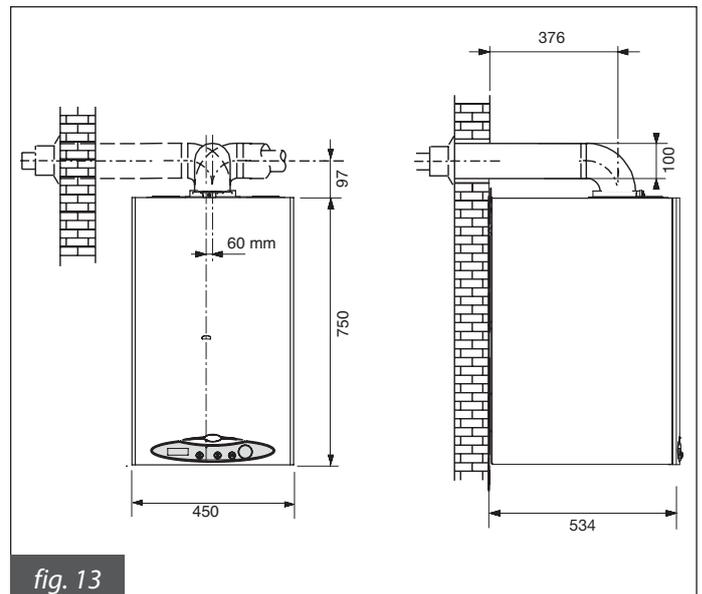
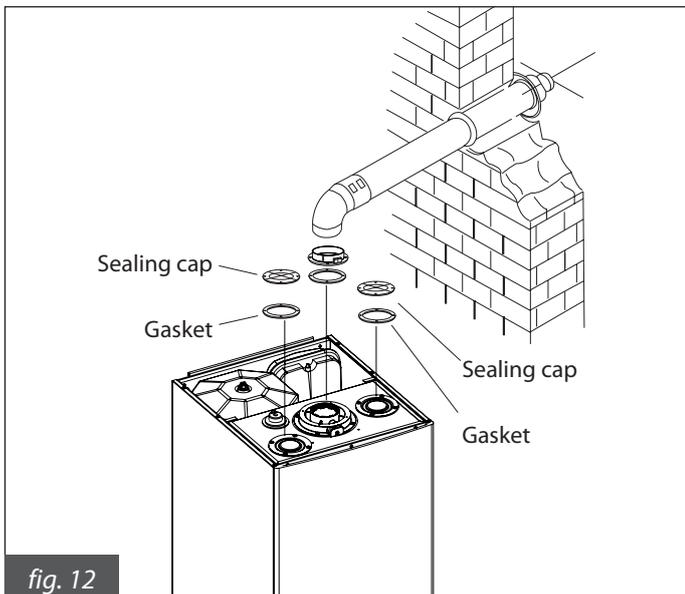
Type C33

KB 24

Minimum permissible length of vertical coaxial pipes is 1 meter.
Maximum permissible length of Ø 100/60 mm vertical coaxial pipes is 9.5 meters.
Maximum permissible length of Ø 125/80 mm vertical coaxial pipes is 14.5 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° elbow, maximum permissible length is to be reduced by 0.5 meter.
The roof terminal reduces maximum permissible length by 1.5 meters.

KB 28

Minimum permissible length of vertical coaxial pipes is 1 meter.
Maximum permissible length of Ø 100/60 mm vertical coaxial pipes is 6.5 meters.
Maximum permissible length of Ø 125/80 mm vertical coaxial pipes is 11.5 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° elbow, maximum permissible length is to be reduced by 0.5 meter.
The roof terminal reduces maximum permissible length by 1.5 meters.



These pictures are merely an indication. For installation of optional fittings please refer to the instruction enclosed to the same fittings.

3.2.6.3. Ø 80 mm air intake /flue gas discharge split duct system



The above data are referred to air intake/flue gas discharge systems which are implemented by means of smooth, rigid manufacturer approved and supplied pipes.

Installation types C43 - C53 - C83

Minimum permissible length of air intake pipe is 1 meter.

Minimum permissible length of flue gas discharge pipe is 1 meter.

Maximum permissible length of air intake/flue gas discharge pipes is 120 meters (combined length of air intake and flue gas discharge pipe length).

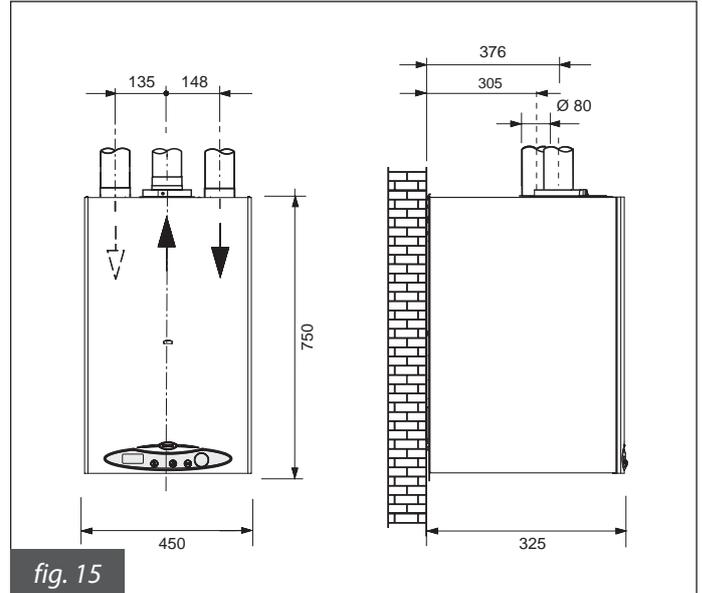
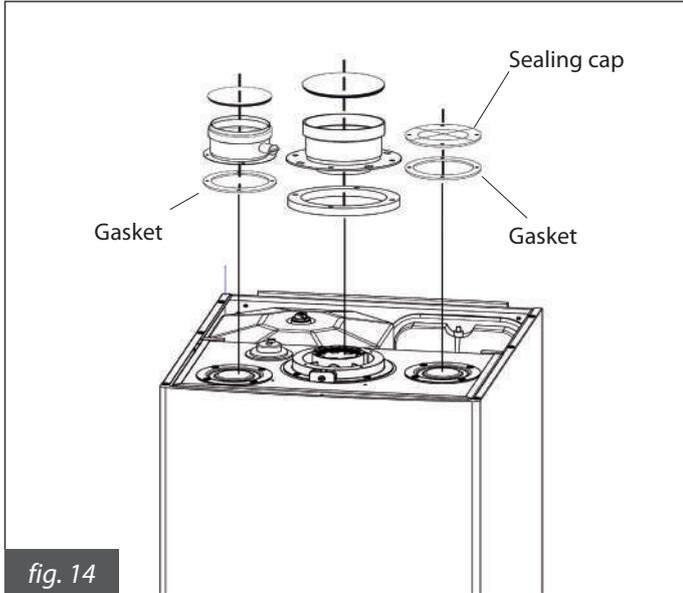
For each additional 1 meter of straight pipe maximum permissible length is to be reduced by 1 meter.

For each additional 90° elbow, maximum permissible length is to be reduced by 1.5 meter.

For each additional 45° elbow, maximum permissible length is to be reduced by 1 meter.

The roof terminal reduces maximum permissible length by 1.5 meters.

The wall terminal reduces maximum permissible length by 1 meter.



3.2.7. Testing combustion efficiency

3.2.7.1. "Chimney sweep" function

The boiler is equipped with "chimney sweep" function, to be used when testing combustion efficiency, and in order to adjust the burner.

To activate this function, it is necessary to open the front section of the casing for access to the controls. Proceed as follows:

- Unscrew two of the four screws securing the casing – either those on the left or those on the right.
- Open the casing.
- Remove the control panel mask by pulling the hooks on either side outwards and pulling the mask towards you (fig. 16).

The control panel is represented in fig. 17.

When no. 2 selector (fig. 1) is positioned to WINTER, and room thermostat (if available) to ON, while the boiler is operating, press "chimney sweep" button (fig. 17) for some seconds; the boiler turns off and resumes the ignition sequence again to the fixed heat output corresponding to setting of max heating output adjuster max (fig. 17), which allows for adjustment of maximum CH output. "Chimney sweep" function operates for 15 minutes.

In order to exit the "chimney sweep" function, set no. 2 selector to any position other than WINTER.

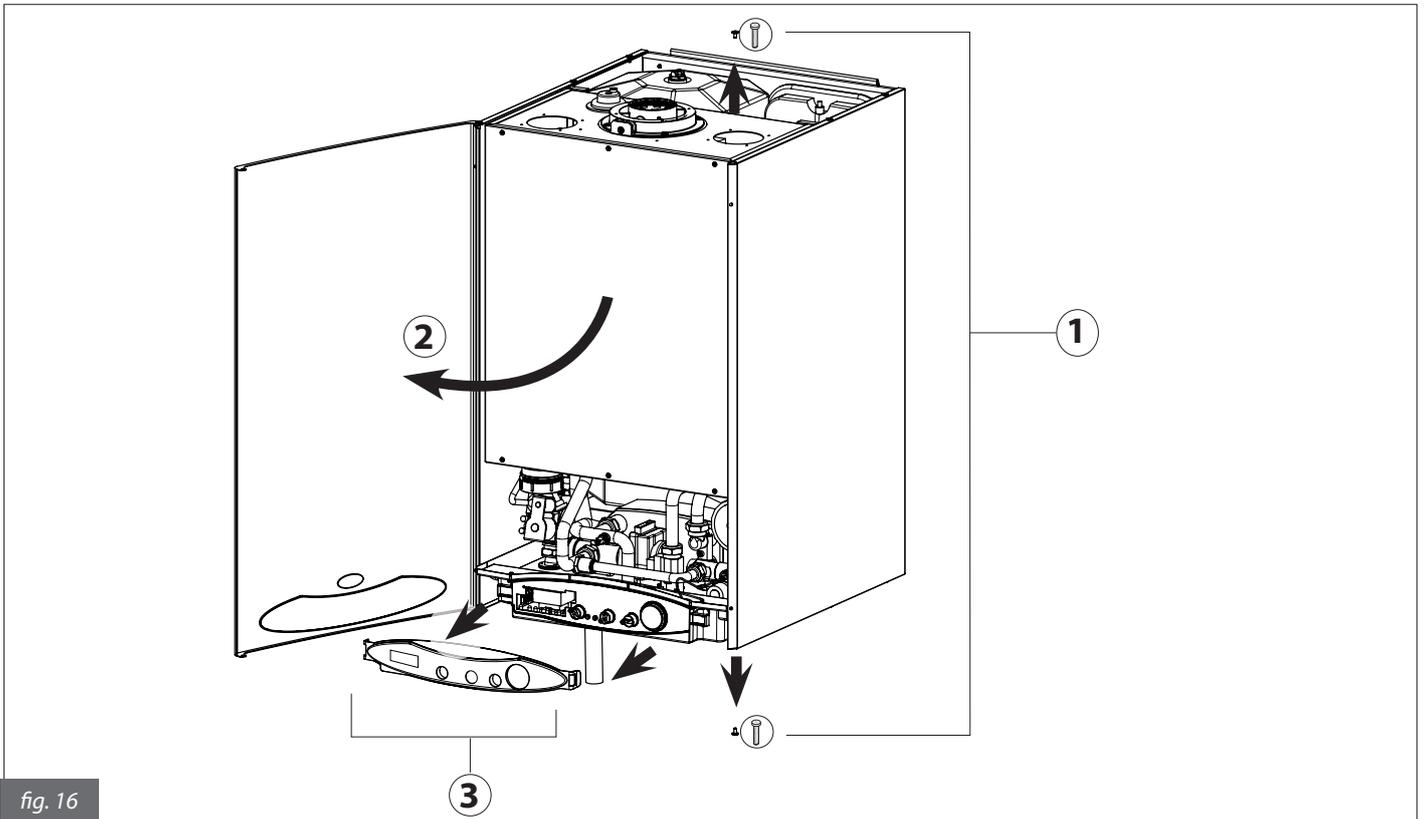


fig. 16

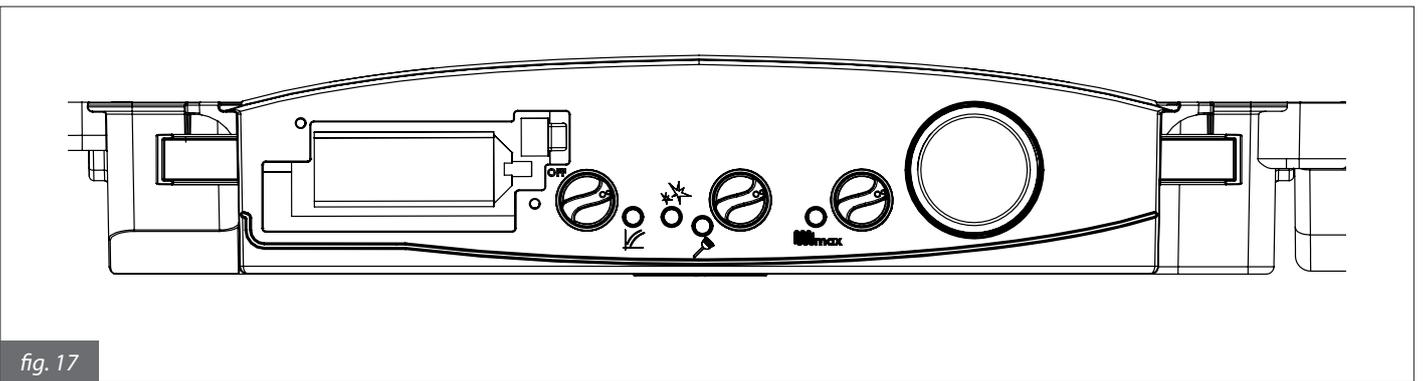


fig. 17

3.2.7.2. Measurement procedure

The boiler is equipped with a tower allowing for air intake/flue gas discharge duct connection (fig. 18 and 19). The tower is designed with two pre-arranged openings directly accessing combustion air and flue gas ducts (fig. 19).

Remove cap **A** from the pre-arranged openings on the tower, before starting combustion checking procedure (fig. 18).

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

- assess combustion air from no. 1 opening (fig. 19).
- assess flue gas temperature and CO₂ from no. 2 opening (fig. 19).

Allow the boiler to reach working temperature before performing any measurement.

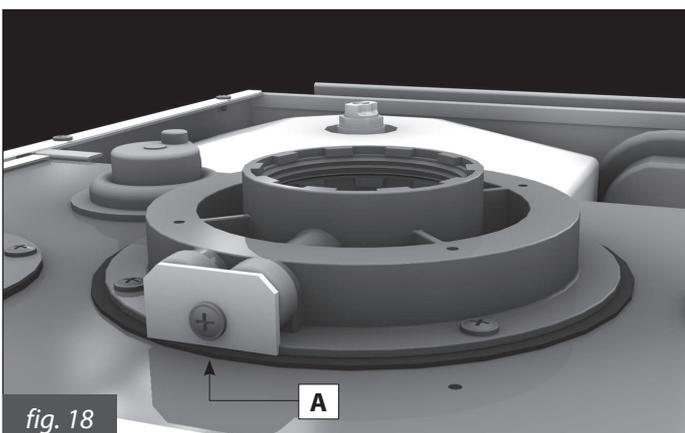


fig. 18

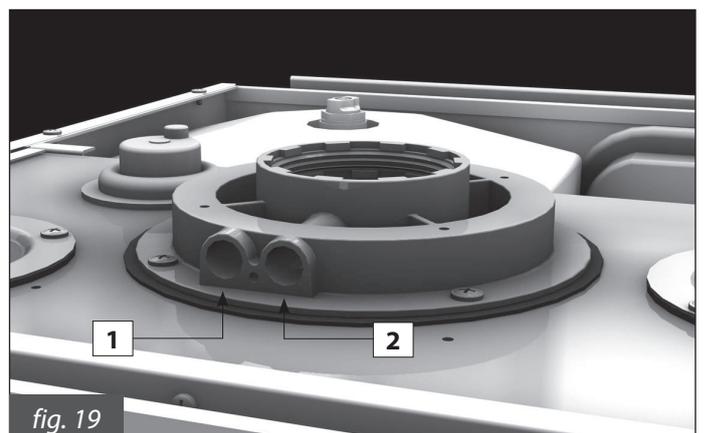


fig. 19

3.2.8. Gas mains connection

The cross-section of the gas supply pipe must be equal to or greater than that of the boiler gas inlet pipe. The cross-section of the pipe depends on its length and route and the gas flow rate. The gas pipe must be dimensioned accordingly.

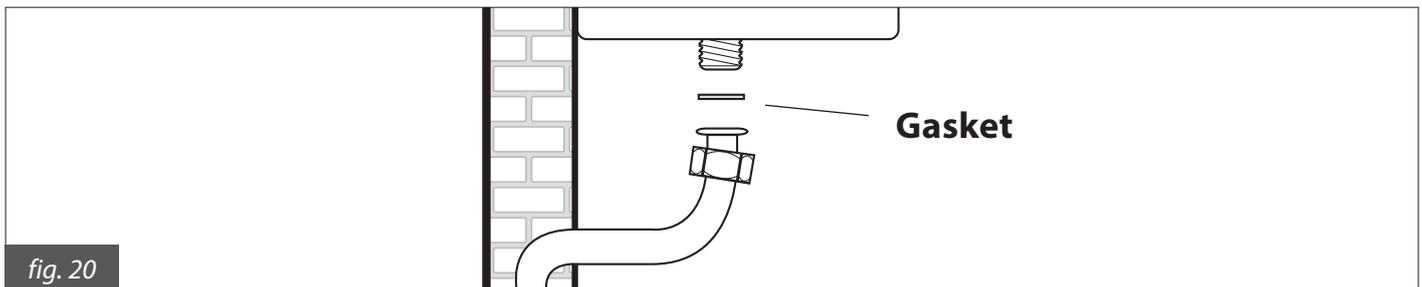
Comply with the installation standards in force in the country of use, which are considered an integral part of this manual.



Before operating an internal gas distribution system and connecting it to the meter, it must be checked for leaks. If any part of the system is going to be inaccessible, the leak test must be carried out before the pipes are covered. The leak test must NOT be carried out using flammable gas: use air or nitrogen for this purpose. If the pipes are already filled with gas, leak testing using a naked flame is forbidden. Use one of the specific products available on the market.



It is MANDATORY when connecting the boiler to the gas supply network to use a gasket of a suitable size and material (fig. 20). Hemp, Teflon tape or the like must NOT be used with this type of fitting.



3.2.9. Plumbing connection

Before installing the boiler, it is advisable to clean the system to remove any impurities present in the components, which would damage the pump and the heat exchanger (see 3.2.4.).

CENTRAL HEATING SYSTEM

The CH flow and return pipes must be connected to the corresponding 3/4" M and R fittings on the boiler (fig. 6). When calculating the size of the CH pipes, bear in mind load losses caused by radiators, thermostatic valves, radiator gate valves and the overall configuration of the system.



It is advisable to convey the flow from the boiler safety valve to a sewer system. If this precaution is not taken, the boiler room may flood if the safety valve activates. The manufacturer declines all liability for damage resulting from failure to comply with this technical precaution.

DOMESTIC HOT WATER SYSTEM

The water mains inlet pipe and the DHW flow pipe must be connected to the corresponding 1/2" F and C fittings on the boiler (fig. 6). The frequency at which the secondary plate heat exchanger needs to be cleaned depends on the hardness of the mains water.



If the water is very hard, it may be necessary to install a drinking water treatment device for domestic use in compliance with the applicable laws and standards in the country of use. Water treatment is always advisable when the water hardness exceeds 20°F. Due to the pH level, water treated using standard softeners may not be compatible with some of the components in the system.

CONDENSATE DRAIN

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

When the law is not stating differently, the condensate produced by combustion is to be routed (via the condensate drain S in fig. 6) 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 odor 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. Manufacturer shall not be held responsible for any damage to people, animals or objects, resulting as failure in observing the above mentioned technical precaution.

3.2.10. Power mains connection

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

The boiler must be connected to a 230 V ~ 50 Hz mains supply.

When connecting the boiler to the power mains, keep to the phase/neutral system.

Installation must be carried out in compliance with the applicable standards, which are considered an integral part of this manual.

An easily accessible two-pole switch must be installed outside the boiler. The minimum distance between contacts must be 3 mm. The switch must allow the power supply to be switched off, so that maintenance and servicing can be performed in complete safety.

The power supply to the boiler must be fitted with a differential magnetothermal switch with an appropriate shutdown capacity.

The power supply must be adequately earthed.

This fundamental safety measure must be verified. If in doubt, ask a qualified electrician to check the system thoroughly.



**The manufacturer declines all liability for damage resulting from failure to earth the system properly.
Gas, water and CH pipes are NOT suitable for earthing a power network.**

3.2.11. Selecting central heating output range

CH water temperature adjusting choice depends on selected operation range:

- standard range: from 20°C to 78°C (from full counter-clockwise position to full clockwise position);
- reduced range: from 20°C to 45°C (from full counter-clockwise position to full clockwise position).

Act on thermoregulation trimmer ( in fig. 21) in order to choose the operation range, as per the following instruction:

- standard range: turn trimmer  fully clockwise;
- reduced range: turn trimmer  fully counter-clockwise.

When the external probe is installed, trimmer  function varies (see subsection 3.2.14.).

Central heating output range selection also alters the waiting time between ignition sequences (thus preventing frequent ignition and switching off of the boiler), when in CH mode.

- standard range: 4 minutes;
- reduced range: 2 minutes.

Should water temperature in the system fall below a determined value (table 8), waiting time procedure is aborted and the boiler re-ignited.

Selected range	Re-ignition temperature
Standard range Set-point > 55 °C Set-point ≤ 55 °C	< 40 °C Tset-point - Tflow > 15 °C
Reduced range Regardless of set-point	< 20 °C

Table 8

Operation range selection is to be implemented by a fitter or an authorized Service Centre.

3.2.12. Connection to the room thermostat (optional)

The boiler can be connected to a room thermostat (not supplied with the boiler).

The contacts must be properly sized in relation to a 5 mA 24 VDC load.

The wires must be connected to terminal M9 on the circuit board (fig. 23), after removing the jumper supplied standard with the boiler.

Room thermostat wires must NOT be grouped together with the power supply cables.

3.2.13. Connection to an OpenTherm remote control (optional)

The boiler can be connected to an OpenTherm remote control (optional).

The remote control must be installed by a suitably qualified person.



**Only original remote controls supplied by the manufacturer must be used.
If non-original remote controls are used, correct operation of the boiler cannot be guaranteed.**

For installation instructions, refer to the booklet accompanying the remote control.

Precautions to take when installing the remote control:

- The remote control cables must NOT be routed together with power cables: otherwise the disturbance would cause the remote control to malfunction.
- Position the remote control on a wall inside the building, about 1.5 metres from the floor, in a suitable position for measuring the environmental temperature. Do not install in alcoves, behind doors or curtains, near sources of heat, or exposed to sunlight, draughts or spray.

The remote control connection is protected against false polarity, which means the connections can be switched.



The remote control must not be connected to a 230 V ~ 50 Hz mains supply.

Refer to the manual included in the remote control Open Therm kit, in order to program it.

A series of parameters, called TSP, reserved to qualified personnel (tables 9 and 10), can be read and set through the remote control. TSP0 parameter sets default data table and restores all original values, cancelling all preceding modifications on single parameters.

When the value of a single parameter is detected to be wrong, its value is restored from the default data table.

When a parameter is tried to be set to a value out of the allowed range, the new value is rejected and the existing one is kept.

Parameter	Range of values	Default values by TSP0 = 1 KB 24	Default values by TSP0 = 2 KB 28
TSP0 Equipment type and default data chart	1-2	1	2
TSP1 Fan speed at burner max. output (DHW)	120 ÷ 250 Hz (3600 ÷ 7500 rpm)	181 Hz (5430 rpm)	193 Hz (5790 rpm)
TSP2 Fan speed at burner min. output (DHW and CH)	30 ÷ 120 Hz (900 ÷ 3600 rpm)	53 Hz (1590 rpm)	56 Hz (1680 rpm)
TSP3 Fan speed at burner ignition and spread	30 ÷ 160 Hz (900 ÷ 4800 rpm)	67 Hz (2010 rpm)	67 Hz (2010 rpm)
TSP4 CH max. output upper limit, adjustable via P4 trimmer	10 ÷ 100%	84%	90%

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

Parameter	Minimum limit	Maximum limit
TSP5 P6 trimmer position	0 (thermoregulation curve = 0,0)	255 (thermoregulation curve = 3,0)
TSP6 Fictitious temperature set via adjuster 4 (only when external probe is installed)	15°C	35°C

Table 10 - TSP chart of parameters which can be displayed (these parameters cannot be adjusted via remote control)

3.2.14. Connection to an (optional) external probe and "sliding temperature" operation

The boiler can be connected to an (optional) external temperature probe for sliding temperature operation.



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 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 probe must be connected to terminal M8 on the boiler's printed circuit board. The temperature probe cables must NOT be routed together with power cables.

The temperature probe must be installed on an outside wall facing north or north-east, in a position protected from atmospheric agents. 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:

- the outdoor temperature measured
- the thermoregulation curve selected
- the calculated room temperature selected.

The thermoregulation curve is selected via trimmer ( fig. 21).

During regulation, the LCD displays the thermoregulation symbol  and the set temperature is shown. Such value can also be read as parameter TSP5 on the Remote Control (when installed).

Relation between TSP5 value and thermoregulation curves coefficients:

Relation between TSP5 value and thermoregulation curve coefficients: coefficient = read value/84.67

In addition, trimmer position () selects CH operation temperature range in relation to the following values:

TSP5 parameter values which select the reduced range Coefficients corresponding to thermoregulation curves	0 ÷ 75 0.0 ÷ 0.8
TSP5 parameter values which select the standard range Coefficients corresponding to thermoregulation curves	76 ÷ 255 1.0 ÷ 3.0

The calculated room temperature is set via regulator **4** (fig. 1), which loses its CH temperature control function (see subsection 1.4.7.) when the probe is installed and which value can be read as TSP6 parameter on the remote control (when such is installed).

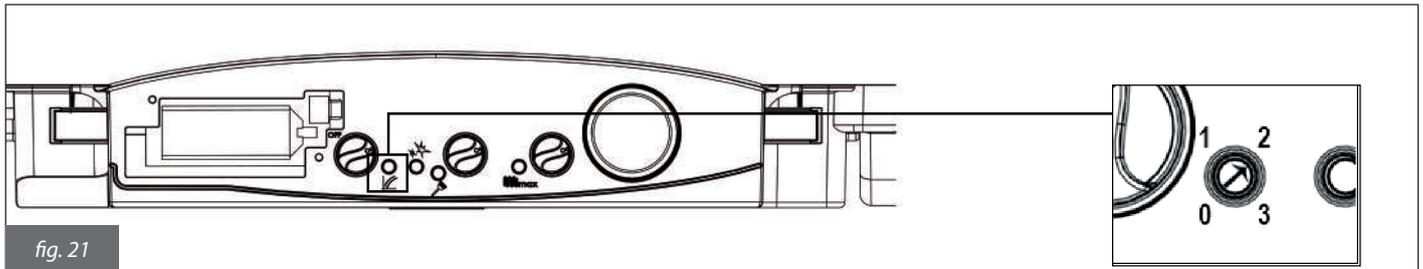


fig. 21

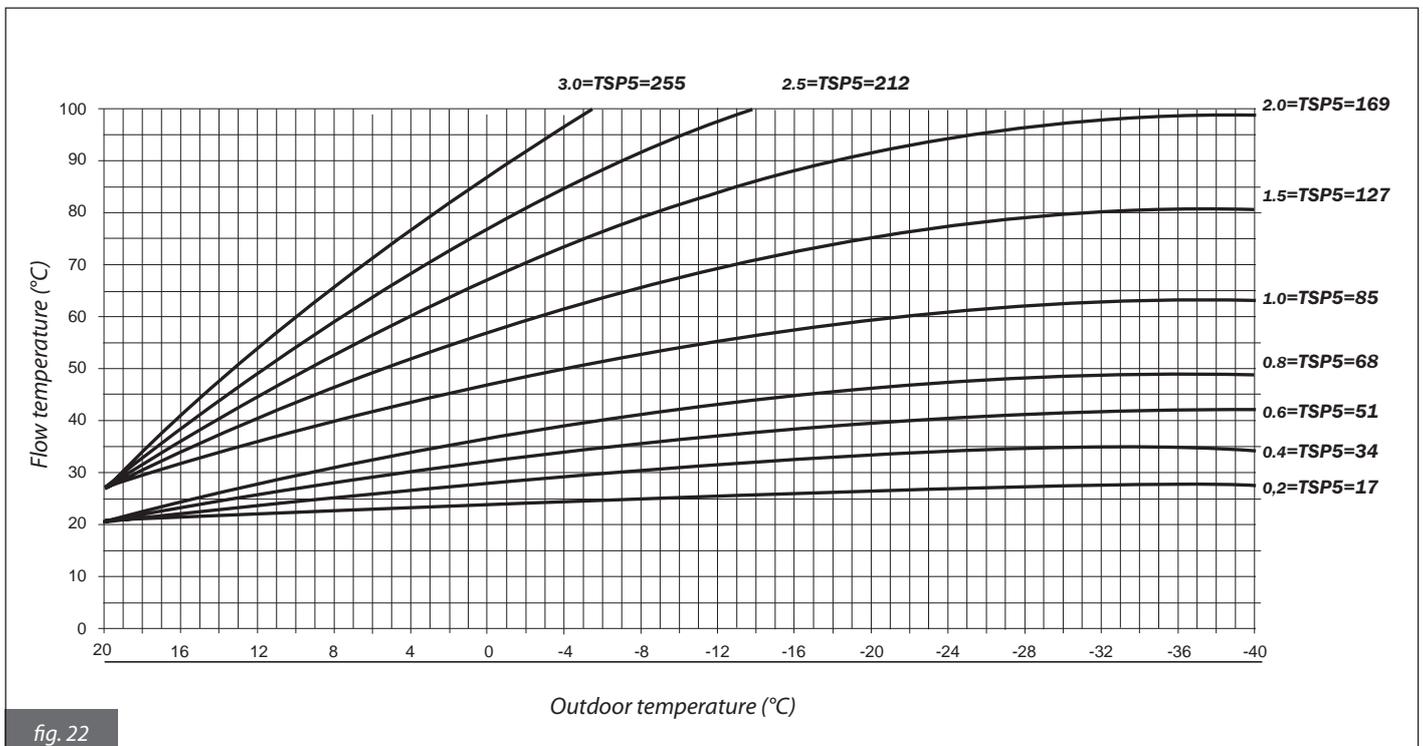


fig. 22

The above curves, which refer to an ambient temperature request of 20°C, always fall within the minimum and maximum values of the CH temperature range. In the event of a calculated ambient temperature (via regulator **3**) other than 20°C, the position all the curves changes accordingly.

3.3. Filling the system

When all the boiler connections have been completed, the CH system can be filled with water.

This must be done with caution, following these steps in sequence.

- Open the air purging valve on all the radiators and check the efficiency of the automatic boiler valve.
- Gradually open the boiler filling tap and check that all the automatic air valves work efficiently.
- Close all the radiator valves as soon as water starts to come out.
- Check on the water pressure gauge that the reading is 1÷1.3 bar.
- Close the filling tap and open all the valves on the radiators to remove any residual air.
- Start the boiler and as soon as the system reaches the working temperature, stop the pump and repeat the air bleeding procedure.
- Allow the system to cool down and the water pressure to return to 1÷1.3 bar.

WARNING

As regards treating water in domestic heating systems, it is advisable to use specific products that are suitable for multi-metal plants, in order to optimize performance and safety, preserve these conditions over time, ensure regular operation of auxiliary equipment as well, and minimize energy consumption, in compliance with the applicable laws and standards.

WARNING

The safety flow switch, in the absence of water circulation in the heating system, does not permit electric supply to start off the burner, when the water flow is too low.

The safety pressure switch, in the absence of water, does not permit electric supply to start off the burner, when the pressure level is lower than 0.4/0.6 bar.

The manufacturer advises to maintain the water pressure of the heating system equal to 1÷1.3 bar, in lack of which, act upon the inlet valve with which the boiler is equipped. The operation must be performed when the system is cold. The manometer inside the control panel enables the reading of the pressure in the circuit.

The low water pressure safety switch will prevent the burner from being started when the water pressure is below 0.4÷0.6 bar.

The water pressure in the CH system must not be below 1÷1.3 bar. Restore the correct value as needed and while the water in the system is cold.

The boiler pressure gauge shows the water pressure in the system.

WARNING

If the boiler is not used for a long time, the pump may not work.

BEFORE STARTING UP THE BOILER, PERFORM THE FOLLOWING PROCEDURE TO MAKE SURE THAT THE PUMP WORKS.

- Unscrew the protection bolt in the centre front section of the pump motor.
- Insert the tip of a screwdriver in the hole and rotate the circulation unit shaft clockwise.
- Once the unblocking operation has been completed, screw the protection bolt back on and check for water leaks.

When the protection bolt is removed, some water may flow out. Before re-installing the external housing of the boiler, check that all internal surfaces are dry.

3.4. Starting the boiler

3.4.1. Preliminary checks

Before starting the boiler, perform the following checks:

- The flue gas discharge pipe and terminal must be installed as instructed. When the boiler is running, no combustion products must leak from any of the gaskets.
- Supply power to the boiler must be 230 V – 50 Hz.
- The system must be filled with water (pressure reading on water gauge 1÷1.3 bar).
- All the stopcocks on the pipes must be open.
- The gas supplied to the boiler must be of the type for which the boiler is designed. If necessary, convert the boiler following the instructions in subsection 3.6 - ADAPTATION TO OTHER GASES AND BURNER ADJUSTMENT. This operation must be carried out by a qualified service engineer.
- The gas supply stopcock must be open.
- There must be no gas leaks.
- The main power switch must be on.
- The boiler safety valve must not be blocked.
- There must be no water leaks.
- The pump must not be blocked.
- The condensate trap installed on the boiler is discharging condensate correctly and is not stuck.



The boiler is equipped with a three-speed circulation pump corresponding to three different residual heads.

It is delivered with the circulation pump on the third speed setting.

If you wish to set a different speed, taking account of the water circulation requirements in the boiler (assured by the water pressure switch) and the resistance properties of the system, check operation of the boiler in all the conditions dictated by the features of the system (e.g. closure of one or more heating zones or of thermostat-controlled valves).

3.4.2. Switching on and off

To switch the boiler on and off, refer to the Instructions for the User, in section 1.

3.5. Wiring diagram

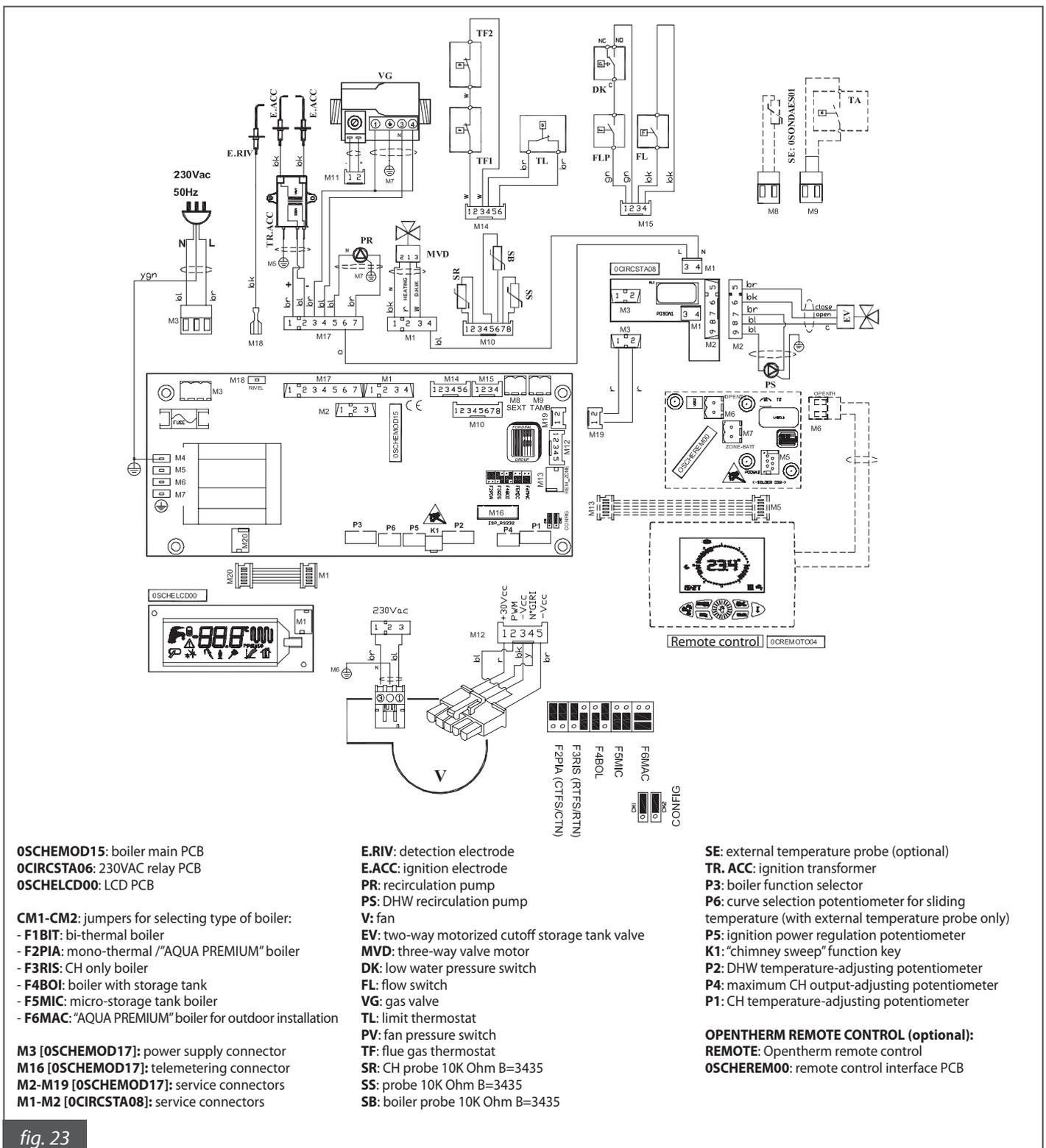


fig. 23

Relation between temperature (°C) and nominal resistance (Ohm) of SR heating and SS hot water probes

T (°C)	0	2	4	6	8
0	27203	24979	22959	21122	19451
10	17928	16539	15271	14113	13054
20	12084	11196	10382	9634	8948
30	8317	7736	7202	6709	6254
40	5835	5448	5090	4758	4452
50	4168	3904	3660	3433	3222
60	3026	2844	2674	2516	2369
70	2232	2104	1984	1872	1767
80	1670	1578	1492	1412	1336
90	1266	1199	1137	1079	1023

Table 12

3.6. Adapting to other gases and regulating the burner

This boiler is built to run on the type of gas specified on the order, which is shown on the packaging and on the boiler rating plate. If you wish to switch to another type of gas, this must be done by a qualified technician using the accessories supplied by the manufacturer. He will make the necessary modifications and adjustments to ensure efficient operation of the boiler.

3.6.1. Switching from METHANE to PROPANE

- Open the boiler front panel, as described in par. 3.2.7.1.
- unscrew the outlet connection to the gas valve (**A** in fig. 24);
- replace the diaphragm in the relevant seating, with the one for PROPANE (see tables 3 and 4).
- re-connect the outlet connection to the gas valve (**A** in fig. 24);
- see par. 3.6.3.

3.6.2. Switching from PROPANE to METHANE

- Open the boiler front panel, as described in par. 3.2.7.1.
- unscrew the outlet connection to the gas valve (**A** in fig. 24);
- replace the diaphragm in the relevant seating, with the one for METHANE (see tables 3 and 4).
- re-connect the outlet connection to the gas valve (**A** in fig. 24);
- see par. 3.6.3.

3.6.3. Burner adjustment

Maximum heat output adjustment

- set max heat output adjuster  max (fig. 17) to maximum (turn it fully clockwise); the LCD will display the desired maximum heat output, in percentage with respect to the boiler available max heat output.
- position selector 2 (fig. 1) to WINTER;
- verify the optional room thermostat (when available) to be set to ON;
- start "chimney sweep" boiler mode (see subsection 3.2.7.1);
- adjust flue gas CO₂ by turning ratio adjuster **B** (fig. 25) and verify CO₂ value to be within the range stated in table 12;
- allow boiler to keep operating in chimney sweep mode and go to the following point;

Minimum heat output adjustment

- set max heat output adjuster  max (fig. 17) to MINIMUM (turn it fully counter-clockwise); the LCD will display the desired maximum heat output, in percentage with respect to the boiler available max heat output.
- adjust flue gas CO₂ by turning offset adjuster **C** (fig. 25) and verify CO₂ value to be within the range stated in table 12;
- to end the chimney-sweep function, set selector **2** (fig. 1) on a position other than WINTER and then to the desired position.

CO₂ content

Fuel	CO ₂
Methane	8.8 ÷ 9.1
Propane	9.8 ÷ 10.1

Table 12

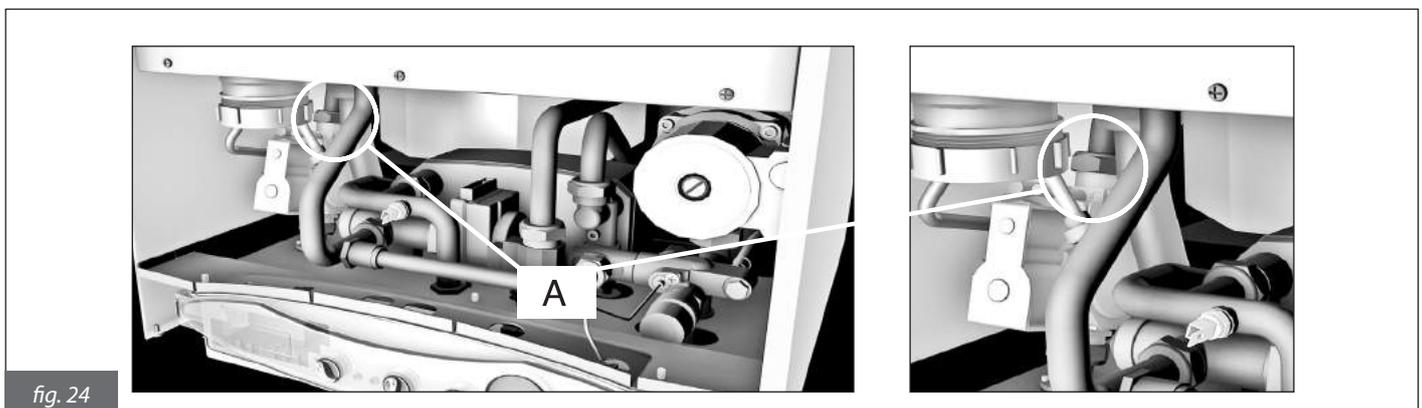


fig. 24

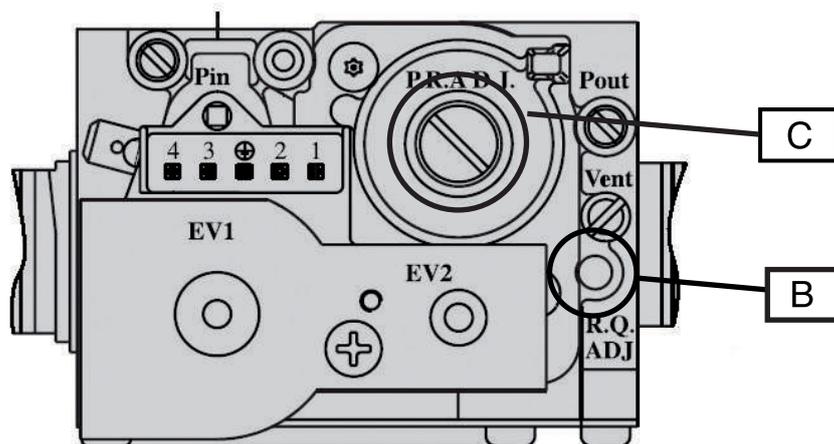


fig. 25

4. Testing the boiler

4.1. Preliminary checks

Before testing the boiler, it is advisable to check that:

- the installation complies with the current regulations;
- the flue gas discharge pipe and terminal are installed as instructed: when the boiler is running, no combustion gas must leak from any of the gaskets;
- the power supply to the boiler is 230 V ~ 50 Hz;
- the system is full of water and the pressure reading is 1÷1.3 bar;
- any system pipe stopcocks are open;
- the gas supplied to the boiler corresponds to the setting; if necessary, the boiler must be converted to the gas available (see section 3.6: Adapting to other gases);
- the gas cock is open;
- there are no gas leaks;
- the master switch is on;
- the boiler 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.



If the boiler is not installed in accordance with the applicable laws and regulations, inform the system supervisor and do not test the boiler.

4.2. Switching on and off

Refer to the User Instructions for details of how to switch the boiler on and off.

5. Maintenance

Maintenance and repairs must be carried out by a fully qualified technician.

The user is strongly advised to have the boiler serviced and repaired by one of the Manufacturer's fully qualified and authorised Service Centres

Correct maintenance of the boiler will allow it to work efficiently, without harming the environment, and in complete safety.

5.1. Maintenance schedule

Routine maintenance must be performed once a year.



Before carrying out any maintenance work involving the replacement of components or internal cleaning of the boiler, disconnect the boiler from the mains.

Routine maintenance must include a series of checks and cleaning operations.

Checks:

- General integrity of the boiler
- Boiler and gas supply leaks
- Boiler gas supply pressure
- Minimum and maximum gas pressure at the boiler nozzle
- Boiler ignition
- Flue system integrity, good state of preservation, and leak test
- Integrity of the safety thermostat on the flue gas hood
- Operation of the hall sensor
- General integrity of the boiler safety devices;
- Integrity, state of preservation and seal of the flue gas discharge pipes
- Water leaks and oxidation of the boiler fittings
- Boiler safety valve efficiency
- Expansion vessel pressure
- Water pressure switch efficiency
- Correct discharge of condensate from the drain siphon installed in the boiler.

Cleaning operations:

- Inside of the boiler
- Gas nozzles
- Air intake and flue gas discharge circuit
- Heat exchanger flue gas side
- Drainage of the condensate installed in the boiler

Checks to perform when using the boiler for the first time:

- User manual
- Suitability of the boiler room
- Flue gas discharge pipes – diameters and lengths
- Boiler installation in accordance with the instructions in this manual

If the boiler does not work properly or if it poses a danger to people, animals or property, inform the system supervisor and compile a report.

5.2. Combustion analysis

The boiler combustion parameter check to assess efficiency and polluting emissions must be performed in accordance with the applicable laws and regulations.

6. Troubleshooting

BOILER STATUS	PROBLEM	POSSIBLE CAUSE	SOLUTION
<p>The boiler has shut down. The symbol  is displayed and code E01 flashes. Turn selector 2 to RESET to resume boiler operation.</p>	Burner does not ignite	Gas supply failure	Check gas pressure. Check that the gas valve opens or whether any system safety valves have cut in.
		Gas valve disconnected	Reconnect it
		Gas valve faulty	Replace it
		PCB faulty	Replace it
	Burner does not ignite: spark not generated	Spark electrode faulty	Replace the spark electrode
		Ignition transformer faulty	Replace the ignition transformer
		PCB faulty	Replace PCB
	Burner ignites for a few seconds and then goes off	PCB does not detect flame: phase and neutral connections are inverted	Verify correct neutral and phase connections to the power mains
		Flame detection electrode wire faulty	Reconnect or replace wire
		Flame detection electrode faulty	Replace electrode
		PCB board does not detect flame	Replace PCB.
		Ignition value setpoint too low	Increase value setpoint
		Min. heat input not set correctly	Check burner setting
		Difficult draught at chimney	Check the chimney and ambient air suction grilles
		Flue gas thermostat faulty	Replace it
<p>The boiler has shut down. The symbol  is displayed and code E02 flashes. Turn selector 2 to RESET to resume boiler operation</p>	Boiler safety thermostat has cut in	CH water does not flow: pipes might be clogged, thermostatic valves might be shut, system stopcocks might be closed	Check CH system
		Pump blocked or faulty	Check the pump
<p>The boiler has shut down. The symbol  is displayed and code E10 flashes. Operation can be resumed by resetting the pressure in the system..</p>	Insufficient water circulation in the system	Possible water leaks	Check system for leaks
		Main water pressure switch disconnected	Reconnect it
		Main water pressure switch faulty	Replace it
		The minimum pressure gauge is disconnected.	Reconnect it
		The minimum pressure gauge does not intervene.	Replace it
<p>The boiler does not work in DHW mode. The symbol  is displayed and code E05 flashes. Operation is resumed automatically when the cause of shutdown has been removed.</p>	CH probe not working	CH probe disconnected	Reconnect it
		CH probe faulty	Replace it
<p>The boiler does not work in DHW mode. The symbol  is displayed and code E06 flashes. Operation is resumed automatically when the cause of shutdown has been removed.</p>	DHW probe not working	DHW probe disconnected	Reconnect it
		DHW probe faulty	Replace it

BOILER STATUS	PROBLEM	POSSIBLE CAUSE	SOLUTION
The boiler does not work in DHW mode. The symbol  is displayed and code E12 flashes. Operation is resumed automatically when the cause of shutdown has been removed.	Storage tank probe not working	Storage tank probe disconnected	Reconnect it
		Storage tank probe faulty	Replace it
The boiler does not work in DHW mode.	DHW flow switch does not cut in	System pressure or flow rate too low	Check DHW system
			Check flow meter filter
		Flow meter sensors disconnected or faulty	Replace or reconnect it
		Flow meter stuck	Replace it
The boiler does not work properly. The symbol  is displayed and code E17 flashes. Operation is resumed automatically when the cause of shutdown has been removed.	Combustion fan not working	Fan disconnected.	Reconnect it
		Fan faulty.	Replace it
The (optional) remote control is switched off. The symbol  is displayed and code E22 flashes. Operation is resumed automatically when the cause of shutdown has been removed.	No communication with remote control	Cable between boiler and remote control disconnected	Reconnect it
		Remote control faulty	Replace it
The symbol  is displayed and code E23 flashes. Operation is resumed automatically when the cause of shutdown has been removed.	External probe not working	External probe disconnected	Reconnect it
		External probe faulty	Replace it



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