

OPERA



EN

INSTRUCTIONS FOR USE, INSTALLATION AND MAINTENANCE



- Read the warnings in this instruction booklet carefully since they provide important information on safe installation, use and maintenance.
- This instruction booklet is an integral and essential part of the product and must be kept with care by the user for future reference.
- If the unit is sold or transferred to another owner or if it is to be moved, always make sure the booklet stays with the boiler so that it can be consulted by the new owner and/or installer.
- Installation and maintenance must be carried out by professionally qualified personnel, according to current regulations and the manufacturer's instructions.
- Incorrect installation or inadequate maintenance can result in damage or injury. The manufacturer declines any liability for damage caused by errors in installation and use or by failure to follow the instructions provided.
- Before carrying out any cleaning or maintenance operation, disconnect the unit from the power supply using the system switch and/or the special cut-off devices.
- In case of a fault and/or poor operation, deactivate the unit and do not try to repair it or directly intervene. Contact professionally qualified personnel. Any repair/replacement of the products must only be carried out by qualified personnel using genuine parts. Failure to comply with the above can compromise the safety of the unit.
- Periodic maintenance performed by qualified personnel is essential in order to ensure proper operation of the unit.
- This unit must only be used for its intended purpose. Any other use is deemed improper and therefore hazardous.
- After unpacking, check the good condition of the contents. The packing materials are potentially hazardous and must not be left within the reach of children.
- The unit can be used by children aged at least 8 years and by persons with reduced physical, sensory or mental capabilities, or lacking experience or the necessary knowledge, only if under supervision or they have received instructions on its safe use and the related risks. Children must not play with the unit. Cleaning and maintenance intended to be done by the user can be carried out by children aged at least 8 years only if under supervision.
- In case of doubt, do not use the unit. Contact the supplier.
- The unit and its accessories must be appropriately disposed of in compliance with current regulations.
- The images given in this manual are a simplified representation of the product. In this representation there may be slight and insignificant differences with respect to the product supplied.

	This symbol indicates "CAUTION" and is placed next to all safety warnings. Strictly follow these instructions in order to avoid danger and damage to persons, animals and things
	This symbol calls attention to a note or important notice.
	This symbol, which is used on the product, packaging or documents, means that at the end of its useful life, this product must not be collected, recycled or disposed of together with domestic waste. Improper management of electric or electronic waste can lead to the leakage of hazardous substances contained in the product. For the purpose of preventing damage to health or the environment, users are kindly asked to separate this equipment from other types of waste and to ask for it to be dealt with by the municipal waste service or dealer under the conditions and according to the methods set down in national and international laws transposing the Directive 2012/19/EU. Separate waste collection and recycling of unused equipment helps to save natural resources and to guarantee that this waste is processed in a manner that is safe for health and the environment. For more information about how to collect electric and electronic equipment and appliances, please contact your local Council or Public Authority competent to issue the relevant permits.



The CE marking certifies that the products meet the essential requirements of the relevant directives in force.
The declaration of conformity may be requested from the manufacturer.

COUNTRIES OF DESTINATION: IT - ES - RU

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1. Operating instructions

1.1 Introduction

Dear Customer,

Thank you for choosing **OPERA**, a floor-standing boiler **FERROLI** featuring advanced design, cutting-edge technology, high reliability and quality construction. Please read this manual carefully, as it provides important information on safe installation, use and maintenance.

OPERA is a high efficiency, low emissions **premix condensing** heat generator for heating, running on natural gas or LPG and equipped with a microprocessor control system.

The **boiler body** consists of a patented helical tube stainless-steel exchanger and a steel **premix burner**, equipped with electronic ignition with ionization flame control, modulating speed fan and modulating gas valve. **OPERA** is a heat generator arranged to operate alone or in cascade

FERROLI supplies on request all the hydraulic accessories and smoke manifolds for the connection of 2 or 3 units in cascade in configurations of **70 + 70 kW** to **450 + 450 + 450 kW**.

1.2 Control panel

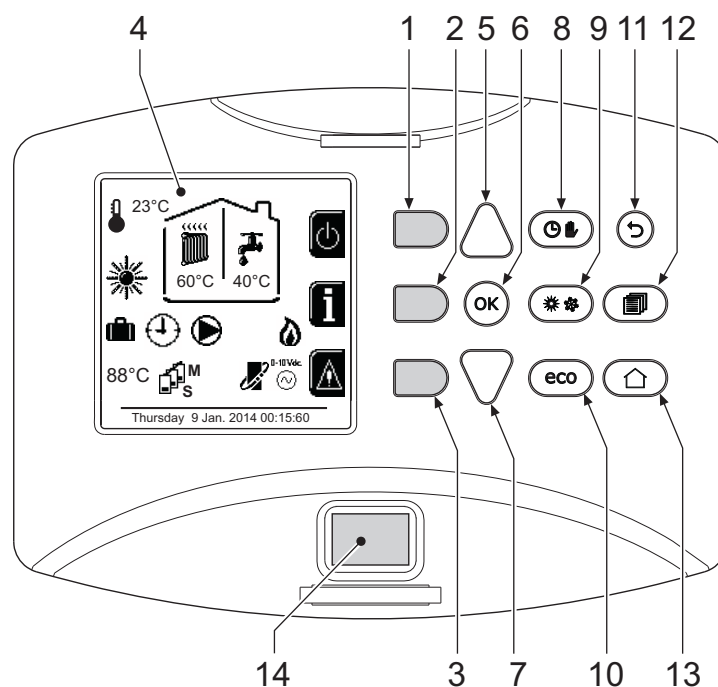


fig. 1 - Control panel

Legend

- 1 = Contextual button 1
- 2 = Contextual button 2
- 3 = Contextual button 3
- 4 = Dot matrix display (example main screen)
- 5 = Menu navigation button
- 6 = Confirm/menu access button
- 7 = Menu navigation button
- 8 = Automatic/Manual Heating/DHW button
- 9 = Summer/Winter mode selection button
- 10 = Economy/Comfort mode selection button
- 11 = Menu exit button
- 12 = Main menu button
- 13 = Home button (back to main screen)

14 = Main switch

Contextual button

The contextual buttons (details 1, 2, 3 - fig. 1) are grey, with no screen print, and take on a different meaning depending on the menu selected. It is essential to observe the indication provided by the display (icons and text). In fig. 1 for example, using the contextual button 2 (detail 2 - fig. 1) it is possible access unit information such as: temperature of sensors, work power, etc.

Direct buttons

The direct buttons (details 8, 9, 10 - fig. 1) always have the same function.

Menu/navigation buttons

The menu/navigation buttons (details 5, 6, 7, 11, 12, 13 - fig. 1) are used to navigate among the various menus implemented in the control panel.

Menu structure

From the Home page, press the main Menu button (detail 12 - fig. 1).

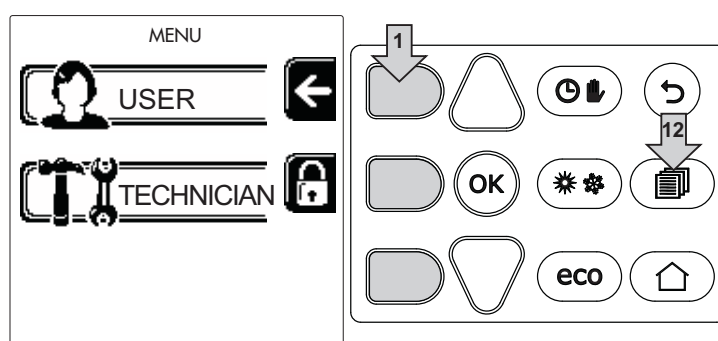


fig. 2

Access the "User" menu by pressing contextual button 1 (detail 1 - fig. 2). Then use the "menu navigation" buttons to access the different levels described in the following table.

USER MENU			
HEATING			
		Adjustment Temp	See fig. 13
		Reduction Adjustment Temp	See fig. 14
			See fig. 28
			See fig. 29
			See page 152
			/
			/
		Time Program menu	See "Time programming" on page 147
DOMESTIC HOT WATER			
		Adjustment Temp	See fig. 15
		Reduction Adjustment Temp	See fig. 16
		Legionella	See "Legionella programming (with optional hot water tank installed)" on page 150
		Time Program	See "Time programming" on page 147
VACATION FUNCTION			
			See "Holiday Function" on page 151

MAINTENANCE			
		Test Mode	See fig. 64
		Gas Type Selection	See fig. 63
		Cascade Test Mode	See "CASCADE TEST mode activation" on page 179
		Service Information	See "Service Information" on page 151
		Service Intervention Date	See "Service Intervention Date" on page 151
SETTINGS			
		Language	See fig. 8
		Unit of measure	/
		Date setting	See fig. 9
		Time setting	See fig. 10

Indication during operation

Heating

A heating request (generated by Room Thermostat or Remote Timer Control or 0-10 Vdc signal) is indicated by activation of the circulating pump and by the hot air above the radiator (fig. 3).

"Heating only/Double circulating pump" configuration

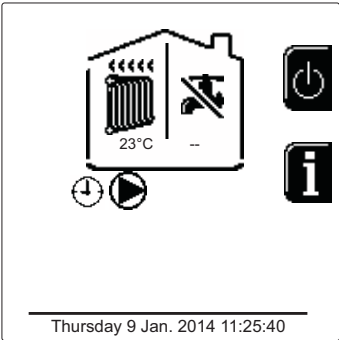


fig. 3

"Circulating pump and 3-way valve" configuration

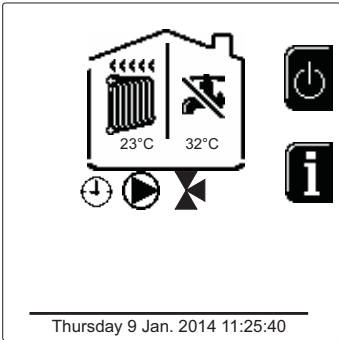


fig. 4

DHW circuit (with optional hot water tank installed)

A hot water tank heating request is indicated by activation of the droplet under the faucet (fig. 5 and fig. 6).

"Double circulating pump" configuration

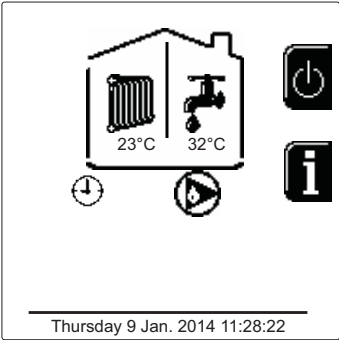


fig. 5

"Circulating pump and 3-way valve" configuration

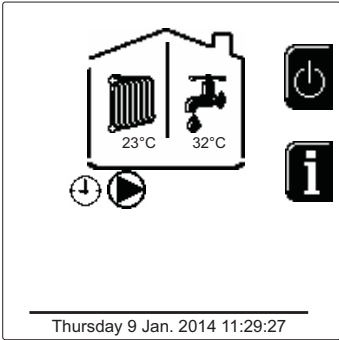


fig. 6

Exclude hot water tank (economy)

Hot water tank temperature maintaining/heating can be excluded by the user. If excluded, domestic hot water will not be delivered. The hot water tank can be deactivated by the user (ECO mode) by pressing the **eco/comfort** button (detail 10 - fig. 1). In ECO mode the display activates the symbol ☹️. To activate COMFORT mode, press the **eco/comfort** button (detail 10 - fig. 1) again.

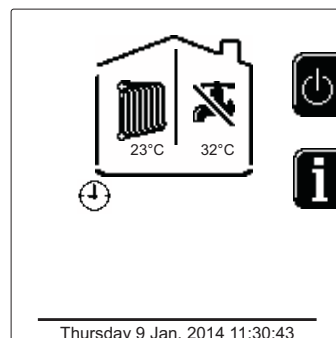


fig. 7- Economy

Information

From the main screen (Home), press the contextual button 2 (detail 2 - fig. 1). Then use the "Menu Navigation" buttons to display the following values:

Heating demand	OT means OpenTherm control demand
	TA means room thermostat demand
	0-10Vdc means 0-10Vdc signal demand
	TA2 means second room thermostat demand
Heating circulating pump	ON/OFF
Heating 3-way valve	ON/OFF
DHW 3-way valve	ON/OFF
Standby time	ON/OFF
T Delta protection	ON/OFF
Flame Supervisor	ON/OFF
Heating sensor1	°C
Heating sensor2	°C
Return sensor	°C
DHW sensor	°C
External probe	°C
Fume sensor	°C
Cascade heating sensor	°C
Fan frequency	Hz
Burner load	%
System water pressure	1.4bar = ON, 0.0 bar = OFF
Modulating circulating pump	%
Cascade modulating circulating pump	%
Ionisation current	uA
Input 0-10Vdc	Vdc
Heating adjustment temperature	Setpoint (°C)
Power level adjustment 0-10Vdc	Setpoint (%)

1.3 Lighting and shutdown

Boiler lighting

Press the On/Off button (detail 14 - fig. 1).

By pressing contextual button 1 it is possible to choose the desired language and confirm it with the "OK" button.

By pressing contextual button 3 it is possible to interrupt the FH mode.

If neither of the two choices described above is made, continue as follows.

- For the following 300 seconds the display will show FH which identifies the heating system air venting cycle.
- The display also shows the firmware version of the cards.
- Open the gas cock ahead of the boiler.
- When the message FH disappears, the boiler is ready to operate automatically in case of a room thermostat request.

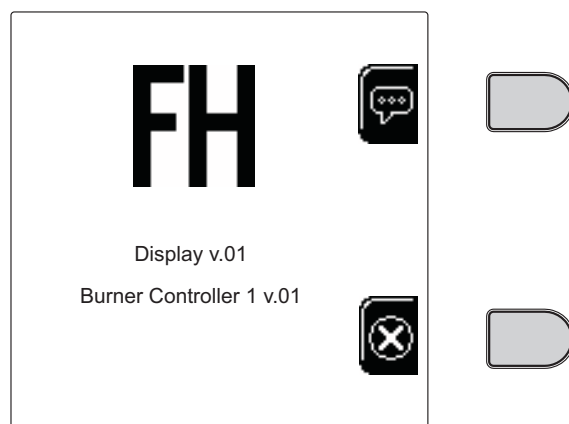


fig. 8- Boiler lighting

Settings

Contrast adjustment

To adjust the display contrast, press the **contextual button 2** and the **OK button together**. Then press the button ref. 5 of fig. 1 to increase the contrast or the button ref. 7 of fig. 1 to decrease it.

Date and Time Adjustment

Reach the screen shown in fig. 9, navigating in the menu and following the path "USER MENU ➡ "Settings" ➡ "Date Setting". Press navigation buttons 5 and 7 to select the value and modify it with contextual buttons 1 and 2. Confirm with the OK button.

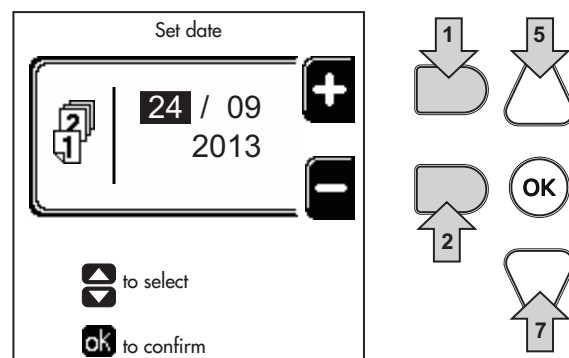


fig. 9- Date Adjustment

Reach the screen shown in fig. 10, navigating in the menu and following the path "USER MENU ➡ "Settings" ➡ "Time Setting". Press navigation buttons 5 and 7 to select the value and modify it with contextual buttons 1 and 2. Confirm with the OK button.

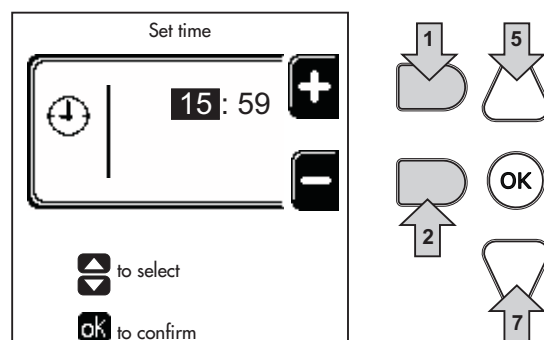


fig. 10- Time Adjustment

Boiler shutdown

From the main screen/Home, press the contextual button  and confirm with the button .

When the boiler is turned off, the PCB is still powered.

Domestic hot water (with optional hot water tank installed) and heating operation are disabled. The frost protection system remains on.

To relight the boiler, press the contextual button again .

The boiler will be immediately ready to operate whenever domestic hot water is drawn (with optional hot water tank installed) or in case of a room thermostat request.

To completely disconnect the unit from the power supply, press the button detail 14 fig. 1.

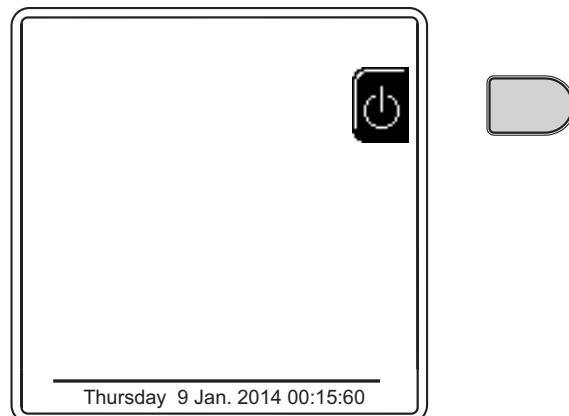


fig. 11- Turning the boiler off



The frost protection system does not work when the power and/or gas to the unit are turned off. To avoid damage caused by freezing during long shutdowns in winter, it is advisable to drain all water from the boiler, the DHW circuit and the heating system water; or drain just the DHW circuit and add a suitable antifreeze to the heating system, as prescribed in sec. 2.3.

1.4 Adjustments

Summer/Winter Switchover

Press the button  (detail 9 - fig. 1) for 1 second.

The display activates the **Summer** symbol. The heating function is deactivated while possible DHW production remains active (with optional external hot water tank). The frost protection system remains on.

To deactivate Summer mode, press the button  (detail 9 - fig. 1) again for 1 second.

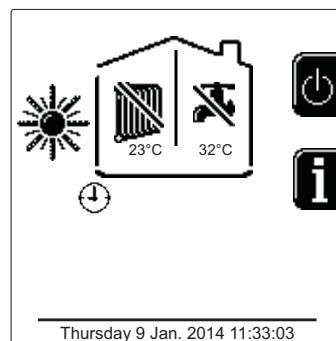


fig. 12- Summer

Heating temperature adjustment

Access the “**Adjustment Temp**” menu to vary the temperature from a minimum of **Tmin** to a maximum of **TMax**. Confirm with the OK button.



The boiler comes with the time program not activated. Therefore, if requested, this is the setpoint value.

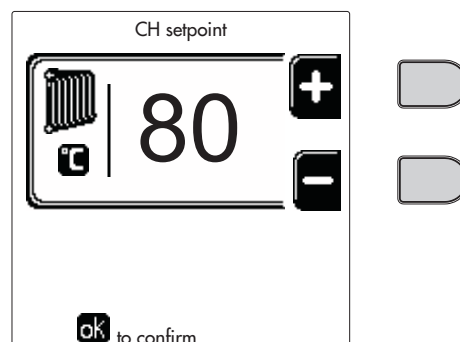


fig. 13

Heating temperature reduction

Access the “**Reduction Adjustment Temp**” menu to vary the temperature from a minimum of 0°C to a maximum of 50°. Confirm with the OK button.

This parameter is used only if time programming is activated. See *** 'Time programming' on page 147 ***

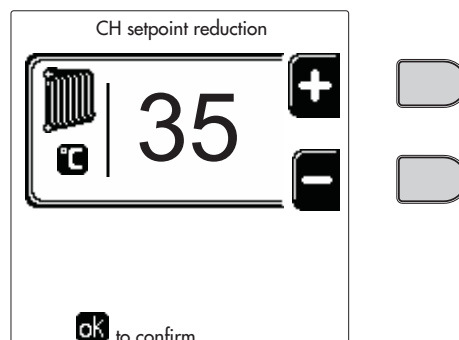


fig. 14

DHW temperature adjustment (with optional hot water tank installed)

Access the “**Adjustment Temp**” menu to vary the temperature from a minimum of 10°C to a maximum of 65°C. Confirm with the OK button.

The boiler comes with the time program not activated. Therefore, if requested, this is the setpoint value.

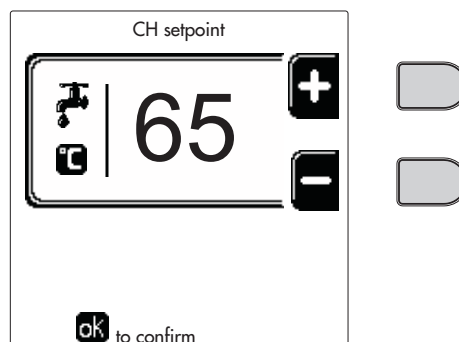


fig. 15

DHW temperature reduction (with optional hot water tank installed)

Access the “**Reduction Adjustment Temp**” menu to vary the temperature from a minimum of 0°C to a maximum of 50°C. Confirm with the OK button.

This parameter is used only if time programming is activated. See *** 'Time programming' on page 147 ***

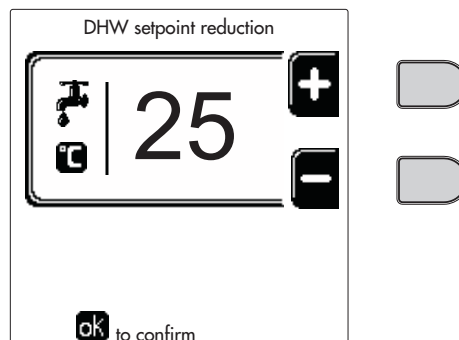


fig. 16

Time programming

Time programming is done in the same way both for heating and for DHW; the two programs are independent.

To program **Heating**, access the “Time Program” menu by following the path “USER MENU ➡ “HEATING” ➡ “Time Program”.

To program **DHW**, access the “Time Program” menu by following the path “USER MENU ➡ “DOMESTIC HOT WATER” ➡ “Time Program”.

Choose the type of programming to carry out and follow that described below. Select the day (fig. 17) or the interval of days to program (fig. 18) and confirm with the **OK** button.

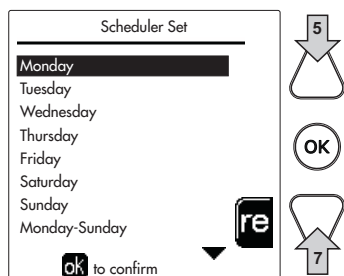


fig. 17

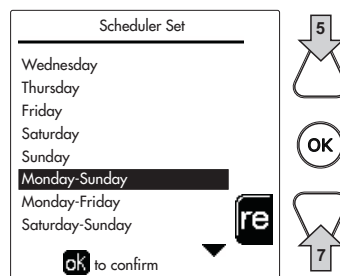


fig. 18

The program is weekly: this means that 6 independent time bands can be set for each day of the week (fig. 19); 4 options can be chosen for each time band:

- **ON**. In case of a Heating/DHW request, the boiler works at the set Heating/DHW Adjustment Temperature (fig. 13/ fig. 15).
- **re**. In case of a Heating/DHW request, the boiler works at the Reduced Adjustment Temperature. The Reduced temperature is obtained by subtracting the Reduction Adjustment Temperature (fig. 14/fig. 16) value from the set Heating/DHW Adjustment Temperature (fig. 13/fig. 15).
- **OFF**. In case of a heating/DHW request, the boiler will not activate the Heating/DHW mode.
- **-- : -- OFF**. Time band disabled.

 The boiler comes with the time program not activated. In fact, every day will be programmed from 00:00 to 24:00h in ON mode (fig. 19).

First, set the start time of the first time band (fig. 19) using contextual buttons 1 and 2.

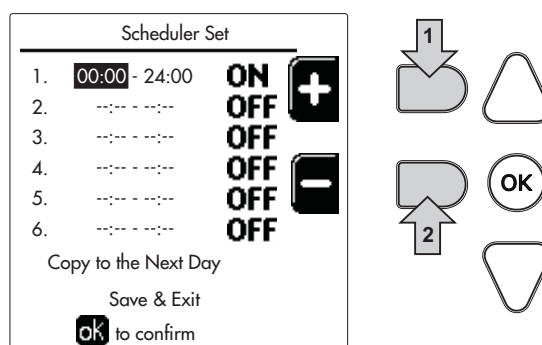


fig. 19

Press navigation button 7 to go to the end time of the first time band (fig. 20) and set it to the desired value using contextual buttons 1 and 2.

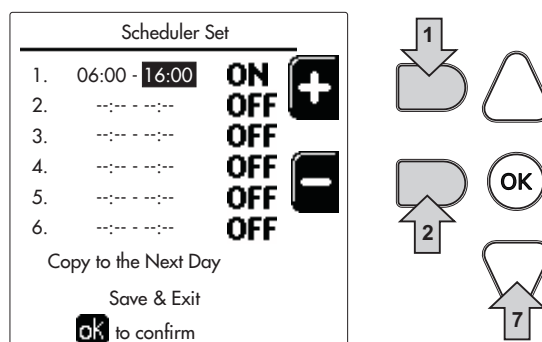


fig. 20

Press navigation button 7 and use contextual buttons 1 and 2 to set the work mode during the first time band (fig. 21)

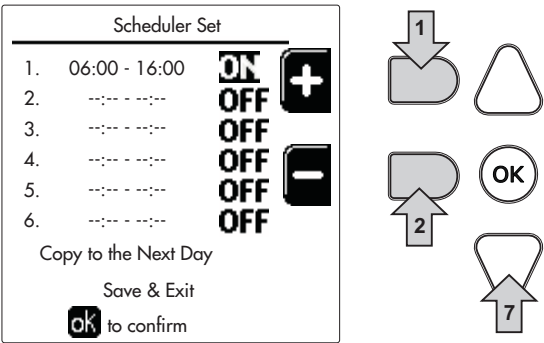


fig. 21

Then, press navigation button 7 to set (if necessary) the subsequent time bands (fig. 22, fig. 23 and fig. 24).

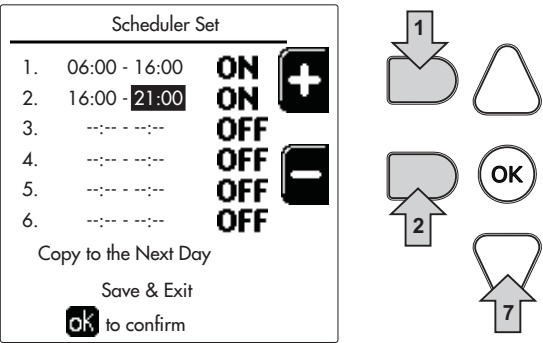


fig. 22

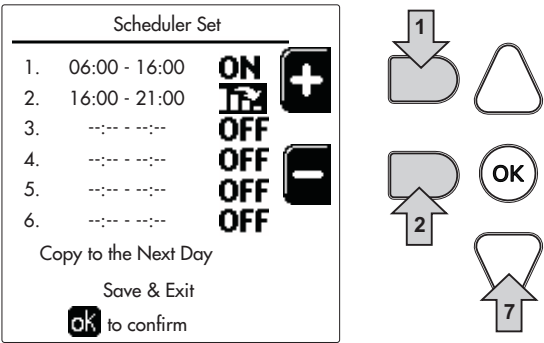


fig. 23

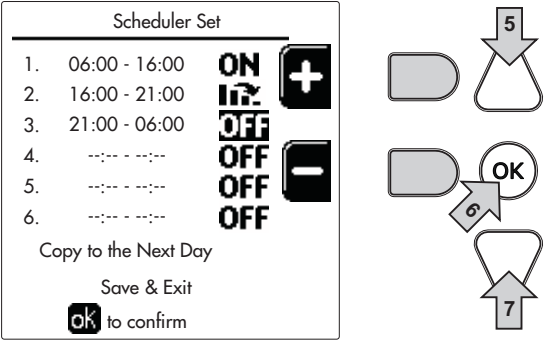


fig. 24

When the day has been programmed, press the OK button; the item "Save & Exit" will automatically be selected (fig. 25). Use navigation buttons 5 and 7 to modify the previous settings or press OK to confirm: in this case the display will return to showing the day (fig. 17) or the interval of days to be programmed (fig. 18). The same procedure can then be followed to complete the desired weekly program.

To program the following day in the same way, select "Copy to next day" and press OK to confirm (fig. 25).

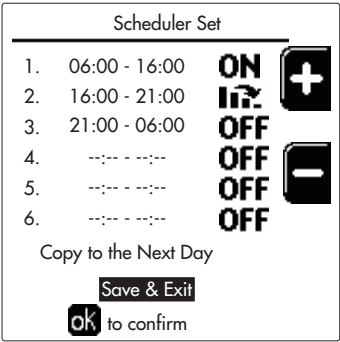


fig. 25



To restore the time program to the factory values, press **contextual button 3** in the **Time Program** menu (fig. 26) and confirm with **OK**.

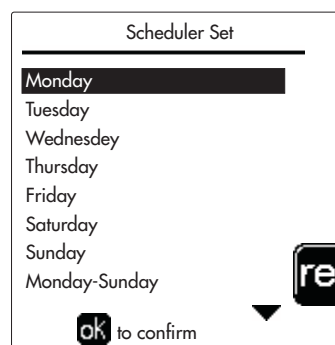


fig. 26



The two Heating and DHW hourly programs are independent even in case of Reset to factory value.

Legionella programming (with optional hot water tank installed)

To enable the **Anti-Legionella Function** it is necessary to set parameter **P23**, within the "TECHNICAL MENU", to **ON**.

To program the function it is necessary to access the "**Legionella**" menu via the path "**USER MENU**" ➡ "**DOMESTIC HOT WATER**" ➡ "**Legionella**".

In this menu it is possible to set the following options:

- **Anti-Legionella day**. Defines the day of the week during which the function will be activated. The function can only be activated once a week.
- **Anti-Legionella time of day**. Defines the start time of the function.
- **Anti-Legionella duration**. Defines the duration (in minutes) of the function.
- **Anti-Legionella Adjustment Temp.** Defines the DHW Adjustment temperature during the function.



ATTENTION

- In **ECO** mode the function **is not active**.
- The **Anti-Legionella Function** will only be active if the boiler is set to "**Automatic**" mode (🔌) and only in the time bands set to **ON** or to "**Reduced temperature**" (📉).

Otherwise, in the time bands set to **OFF**, the function will not be activated, even if set.

- In **vacation mode** (☂️) the **Anti-Legionella Function** is active.
- If the **Anti-Legionella Function** is not carried out correctly, the message shown in fig. 27 is displayed. Even in the presence of this message, the boiler will continue to operate correctly.



fig. 27- Message Anti-legionella function not completed



The temperature set via the "**Anti-Legionella Adjustment Temp.**" menu must NOT be higher than the maximum DHW adjustment temperature set via parameter **P19** within the TECHNICAL MENU.



If a circulating pump is installed in the system, for water circulation during the **Anti-Legionella Function**, parameter **b08** must be set to **1**. In this way the contact between terminals **9-10** (ref. **300** - fig. 95, fig. 96 and fig. 97) closes when the function is activated.

Holiday Function

Access the "HOLIDAY FUNCTION" menu through the path "USER MENU ➡ "HOLIDAY FUNCTION" to set:

- Holiday start date.
- Holiday end date.

The display can activate two types of icons:

- - The Holiday function is programmed but not yet active.
- - The Holiday function is in progress. The boiler will behave as if Summer mode and Economy mode were active (with optional hot water tank installed).
The frost protection and Legionella functions will remain active (if activated).

Service Intervention Date

This informs when the alert of programmed maintenance by the technician will be activated. It does not represent an alarm or a fault but just a notice. After that date, whenever the Main menu is accessed, the boiler will activate a screen indicating that programmed maintenance is due.

Service Information

This information shows the telephone number to contact in case of assistance (if programmed by the technician).

Room temperature adjustment (with optional room thermostat)

Using the room thermostat, set the temperature required in the rooms.

Room temperature adjustment (with optional remote timer control)

Using the remote timer control, set the temperature desired in the rooms. The boiler unit will set the system water according to the required room temperature. For information on the remote timer control, please refer to its user's manual.

Sliding Temperature

When the external probe (optional) is installed, the relevant external temperature symbol is activated on the control panel display. The boiler control system works with "Sliding Temperature". In this mode, the heating system temperature is regulated according to weather conditions, to ensure high comfort and energy efficiency throughout the year. In particular, as the outside temperature increases the system flow temperature decreases according to a specific "compensation curve".

With Sliding Temperature adjustment, the "Heating adjustment" temperature becomes the maximum system flow temperature. It is advisable to set a maximum value to allow system adjustment throughout its useful operating range.

The boiler must be adjusted at the time of installation by qualified personnel. The user can still make further adjustments for better comfort.

Compensation curve and curve offset

Access the Sliding Temperature menu. Adjust the desired curve from 1 to 10 according to the characteristic (fig. 30) via the parameter "Curve1" and confirm with the OK button.

By setting the curve to 0, the sliding temperature adjustment is disabled.

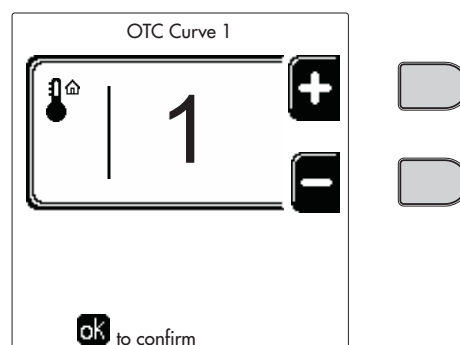


fig. 28- Compensation curve

Adjust the parallel offset of the curves from 20 to 60 °C (fig. 31), via the parameter “Offset1” and confirm with the OK button.

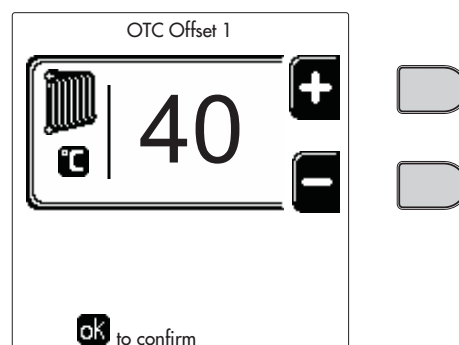


fig. 29- Parallel curve offset

If the room temperature is lower than the desired value, it is advisable to set a higher order curve and vice versa. Proceed by increasing or decreasing in steps of one and check the result in the room.

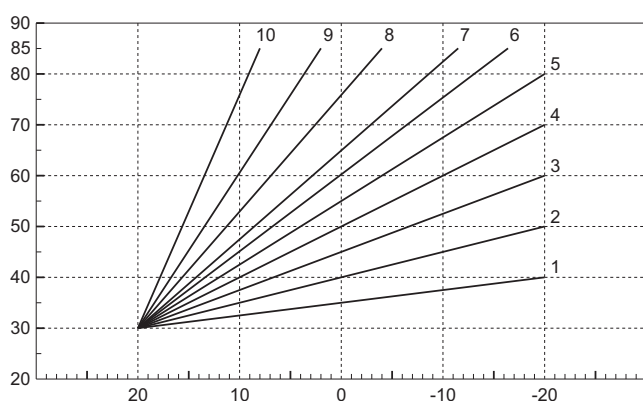


fig. 30- Compensation curves

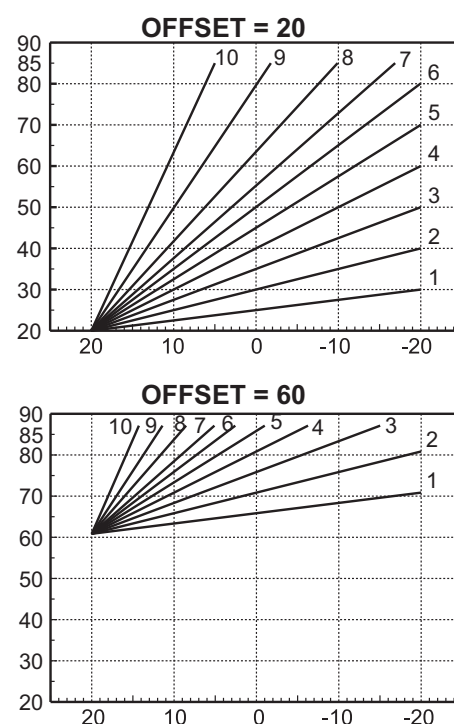


fig. 31- Example of compensation parallel curve offset

 This parameter is used only if the time programming has been activated. See *** 'Time programming' on page 147 ***

Outside Temperature Heating OFF

Access the “Out Temp Heat Off” to activate the function: between 7°C and 30°C.

If activated, this function will deactivate the heating demand whenever the temperature measured by the external probe is higher than the programmed value.

The heating demand will be reactivated as soon as the temperature measured by the external probe is lower than the programmed value.

Adjustments from remote timer control



If the boiler is connected to the Remote Timer Control (optional), the previously described adjustments are managed as described in table 1.

Table 1

Heating temperature adjustment	Adjustment can be made from the Remote Timer Control menu and the boiler control panel.
DHW temperature adjustment (with optional hot water tank installed)	Adjustment can be made from the Remote Timer Control menu and the boiler control panel.
Summer/Winter Switchover	Summer mode has priority over a possible Remote Timer Control heating request.
Eco/Comfort selection (with optional hot water tank installed)	On disabling DHW from the Remote Timer Control menu, the boiler selects Economy mode. In this condition, the button detail 10 - fig. 1 on the boiler panel, is disabled.
	By enabling DHW from the Remote Timer Control menu, the boiler selects Comfort mode. In this condition, use the button detail 10 - fig. 1 on the boiler panel to select one of the two modes.
Sliding Temperature	Both the Remote Timer Control and the boiler card manage the Sliding Temperature adjustment: between the two, the Sliding Temperature of the boiler card has priority.

System water pressure adjustment

The filling pressure with the system cold must be approx. 1.0 bar. If the system pressure falls to values below minimum, the boiler card will activate **fault 37** and the number of the module (fig. 32).



Once the system pressure is restored, the boiler will activate the 300-second air venting cycle indicated on the display by FH.

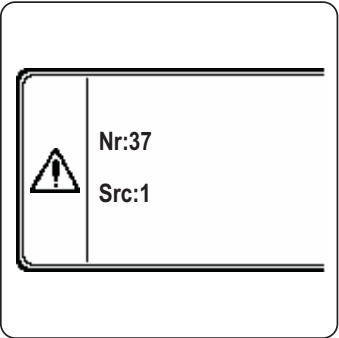


fig. 32- Module 1 insufficient system pressure fault



2. Installation

2.1 General Instructions

THE BOILER MUST ONLY BE INSTALLED BY QUALIFIED PERSONNEL, IN COMPLIANCE WITH ALL THE INSTRUCTIONS GIVEN IN THIS TECHNICAL MANUAL, THE CURRENT PROVISIONS OF LAW, THE NATIONAL AND LOCAL REGULATIONS, AND THE RULES OF PROPER WORKMANSHIP.

For Switzerland, the following installation regulations and directives must be applied:

- **SVGW** - gas principles G1: installation Gas
- **EKAS** - Form. 1942: liquid gas directive, part 2
- Cantonal laws and regulations (e.g. fire safety regulations)

OPERA is a heat generator arranged to operate alone or in cascade (bank).

FERROLI supplies on request all the hydraulic accessories and smoke manifolds for the connection of 2 or 3 units in cascade in configurations of **70 + 70 kW** to **450 + 450 + 450 kW**.

When OPERA generators are installed in cascade with the accessories foreseen by FERROLI, all the requirements of current laws and regulations applicable to such "equivalent" generator of total thermal capacity must be met. In particular the place of installation, safety devices and fume exhaust system must be adequate for the total heating capacity of the bank of units. The instructions given in this manual concern both the single unit and the connection in cascade. For further information regarding installation of the generators in cascade, refer to the specific manual supplied with the cascade connection kits.



The boiler electronics are equipped with management functions for a cascade of up to 6 units. To create cascade systems with more than three units without using the accessories foreseen by FERROLI, suitably sized hydraulic/gas manifolds must be arranged, complete with all the safety devices required by current regulations, as well as individual fume exhausts or fume manifolds appropriately sized by a qualified technician.

2.2 Place of installation

The generator must be installed in a suitable room with ventilation openings towards the outside in conformity with current regulations. If there are several burners or exhausters that can work together in the same room, the ventilation openings must be sized for simultaneous operation of all the units. The place of installation must be free of flammable materials or objects, corrosive gases, powders or volatile substances. The room must be dry and not exposed to rain, snow or frost. For positioning, leave sufficient room around the unit for normal maintenance operations. In particular, check that the burner door can open freely.

2.3 Plumbing connections

The heating capacity of the unit must be previously established by calculating the building's heat requirement according to current regulations. The system must be provided with all the components for correct and regular operation. In particular, provide for all the protection and safety devices required by current regulations for the complete modular generator. They must be installed on the hot water circuit flow piping, immediately after the last module, within a distance of not more than 0.5 m. and with no shutoff devices in between. **The unit is not supplied with an expansion tank or safety valve; their connection must therefore be carried out by the Installer.**

This unit can operate correctly also with a minimum flow rate of 0 l/h and does not require post-circulation to eliminate the thermal inertia. With reference to par. "3.3. R3F file R edition 2009" the post-circulation time prescribed by the manufacturer is therefore equal to 0 seconds.



The safety valve outlet must be connected to a funnel or collection pipe to prevent water spurting onto the floor in case of overpressure in the heating circuit. Otherwise, if the discharge valve cuts in and floods the room, the boiler manufacturer cannot be held liable.

Do not use the water system pipes to ground electrical appliances.



Before installation, flush all the pipes of the system thoroughly to remove any residuals or impurities that could affect proper operation of the unit. Use chemical conditioners suitable for the purpose; i.e. able to remove from the walls and bottom of the pipes and the various components of the system, sludge, metal

oxides and, in low temperature systems, also biomass, with just the circulation of the water, with system hot and/or cold. The products used must not be corrosive and/or aggressive for metals and plastics and must not significantly alter the natural pH of the water.



Also, a filter must be installed on the system return piping to prevent impurities or sludge from the system clogging and damaging the heat generators.

The filter must be installed when replacing generators in existing systems. The manufacturer declines any liability for damage caused to the generator by failure to install or inadequate installation of this filter.

Carry out the relevant connections according to the diagram in sec. 4.1 and the symbols on the unit.

Table 2- SIZE OF CONNECTIONS

MODEL	70	125	160 220	320	450
System flow	1" 1/4 threaded	1" 1/4 threaded	2" threaded	DN65 flanged	DN65 flanged
Main system return / LOW TEMPERATURE	1" 1/4 threaded	1" 1/4 threaded	2" threaded	DN65 flanged	DN65 flanged
Gas inlet	3/4" threaded	1" threaded	1" threaded	1" 1/4 threaded	1" 1/2 threaded

In case of installation in bank, the water circuit of each boiler must be fitted with a motor-operated shutoff valve (controlled by the unit, see wiring diagram fig. 95) that prevents reverse circulation with the boiler not working.

A single safety valve must also be provided for each boiler in accordance with the requirements of "file R".

The following optional kits are available for this purpose:

052000X0 - MOTOR-OPERATED BUTTERFLY VALVE **DN50**

052001X0 - MOTOR-OPERATED BUTTERFLY VALVE **DN65**

If the distribution system adjustment is independent of the electronics of the generators, the creation of a bypass between the flow manifold and that of the system return is advisable in order to protect the circulating pumps.

System water characteristics

Before installing the OPERA generator, the new or existing system must be properly cleaned in order to eliminate installation residues, solvents, sludge and contaminants in general that may compromise the effectiveness of the protective conditioning treatments. Use neutral cleaning products that do not attack metals, rubber and plastic parts of the generator/system. Empty, wash and recharge the system in compliance with the following instructions. A dirty system will not guarantee the life of the generator over time, even with the use of protective conditioners.



OPERA boilers are suitable for installation in heating systems with non-significant entry of oxygen (ref. systems "**case I**" EN14868). A physical separator (e.g. plate heat exchanger) must be provided in systems with continuous entry of oxygen (e.g. underfloor systems without anti-diffusion pipes or open vessel), or frequent (frequent water replenishment).

The water in a heating system must be treated in compliance with the laws and regulations in force, have the characteristics required by UNI 8065, and comply with the provisions of EN14868 (protection of metallic materials against corrosion).

The filling water (first filling and subsequent replenishments) must be potable, clear, with hardness under the values indicated in the table below and treated and conditioned with chemical conditioners declared suitable by the maker (see following list), in order to prevent encrustations, corrosive or aggressive phenomena on the metals and plastics of the generator and system, the formation of gas, and the proliferation of bacterial or microbial masses in low temperature systems.



The water contained in the system, as well as the replenishment water, must be checked periodically (at every start-up of the system, after any non-scheduled intervention such as, for example, replacement of the generator or other system components, as well as at least once a year during mandatory routine maintenance operations as required by UNI 8065). The water must have a clear appearance and respect the limits given in the following table.

	EXISTING SYSTEM	NEW SYSTEM
WATER PARAMETER		
Total filling water hardness (°f)	<10	<10
Total system water hardness (°f)	<15	<10
PH	7 < Ph < 8.5	
Copper Cu (mg/l)	Cu < 0.5 mg/l	
Iron Fe (mg/l)	Fe < 0.5 mg/l	
Chlorides (mg/l)	Cl < 50 mg/l	
Conductivity (µS/cm)	< 600 µS/cm*	
Sulfates	< 100 mg/l	
Nitrates	< 100 mg/l	

* In the presence of conditioners, the limit increases to **1200 µS/cm**.

In case of differing values or difficult verification of values with conventional analysis/testing procedures, contact the company for additional evaluations. The conditions of the feed water to be treated can vary even significantly depending on the geographical areas where the systems are located.

Chemical conditioners deoxygenating, anti-scaling, corrosion inhibiting, anti-bacterial, anti-algae, frost protection, PH correction products, etc., must also be suitable for the materials of the generator and system. They must be put in the system respecting the quantity indicated by the supplier of the chemical product and verified in their concentration.



A chemical conditioner in insufficient concentration will not be able to ensure the required protection.

Always check the product concentration each time it is added and cyclically, at least once a year, using qualified technical personnel such as our authorized technical assistance network.

Table 3- Chemical conditioners declared suitable and available at our network of Authorized Technical Assistance Centers

	Description	Sentinel type alternative products
 LIFE PLUS/B - MOLY - MOLY K	Molybdenum-based corrosion inhibitor	X100
LIFE DUE	Noise reduction/anti-scaling maintenance	X200
BIO KILL	Biocidal anti-algae	X700
PROGLI	Propylene frost protection	X500
Products with equivalent characteristics may be used		

The unit is equipped with a frost protection system that activates the boiler in heating mode when the system delivery water temperature falls below 6°C. The device is not active if the power and/or gas supply to the unit is turned off. If necessary, for system protection use a suitable anti-freeze liquid that meets the same requirements as set out above and provided for by UNI 8065.

In the presence of adequate chemical/physical system and feed water treatments and related high cyclicity controls able to ensure the required parameters, for industrial process applications the product can be installed in open-vessel systems with vessel hydrostatic height able to ensure compliance with the minimum operating pressure indicated in the product technical specifications.

To ensure the reliability and correct operation of the boilers, always install a mechanical filter in the loading circuit and, in the system, a dirt separator (possibly magnetic) and a deaerator as required by the UNI 8065 as well as a volumetric meter on the system replenishment line.



Failure to comply with the provisions of this paragraph, "System water features", will involve non-recognition of the warranty and damage due to such shortcomings.

Combustion chamber maintenance

To ensure the efficiency and reliability of the generator over time, it is very important to contact our authorized technical assistance service, at least once a year, for routine maintenance operations and also for checking the combustion chamber and, if necessary, its cleaning. In this regard we recommend the use of the following products, checked and tested on our exchangers and available at our Authorized Technical Assistance Centers.

Table 4- Products declared suitable and available at our network of Authorized Technical Assistance Centers

	Description
BIO INF	Liquid product for cleaning steel combustion chambers
Products with equivalent characteristics may be used	

Given the aggressiveness of the chemical products for combustion chambers, always rely only and exclusively on qualified personnel and make safe the sensitive elements, such as the electrodes, insulating materials, etc., that could become damaged by direct contact with the product. Rinse well after each heat exchanger cleaning process (product application time 15-20 minutes) and repeat the operation as required.



Irrespective of the chemical products used, always make use of qualified technical personnel such as our authorized technical assistance network and manage the technological fluids according to the applicable local laws, rules and regulations.



Hydraulic circuit examples

In the examples described below, the checking/change of some parameters may be required.

To do this it is necessary to access the Technical menu.

From the Home page, press the main Menu button (detail 12 - fig. 1).

Access the "Technical" menu by pressing contextual button 2 (detail 2 - fig. 1).

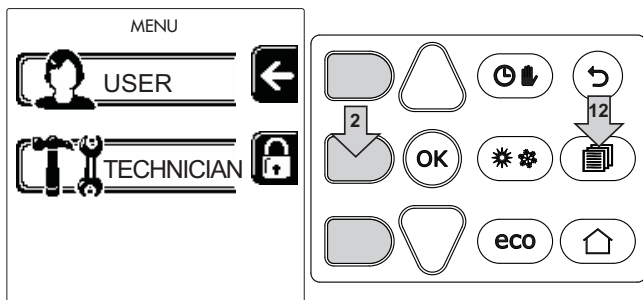


fig. 33

Enter the code "4 1 8" with contextual buttons 1 and 2. Confirm each number with the OK button.

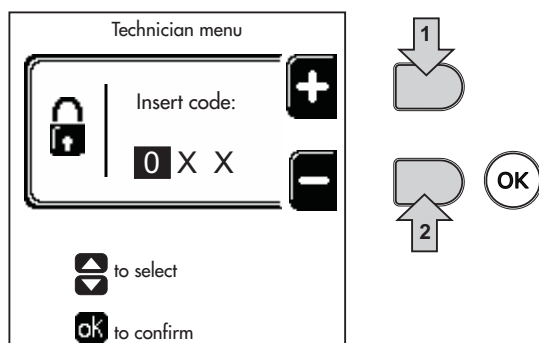


fig. 34

Access the Parameters menu by pressing the OK button.

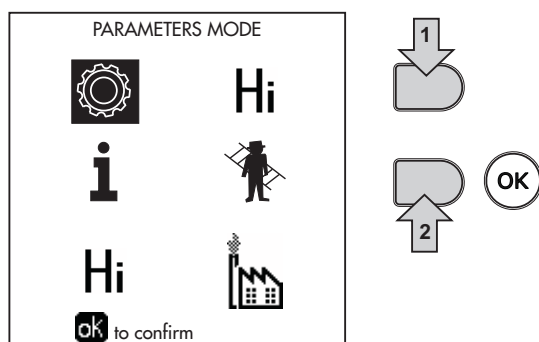


fig. 35

Access the "Configuration Menu" or "System Type Menu" according to the parameter to be modified as given in each hydraulic circuit example.

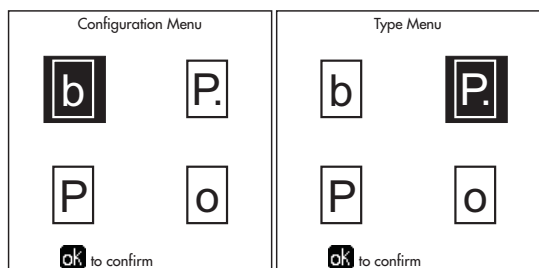


fig. 36

Two direct heating circuits - Schematic diagram

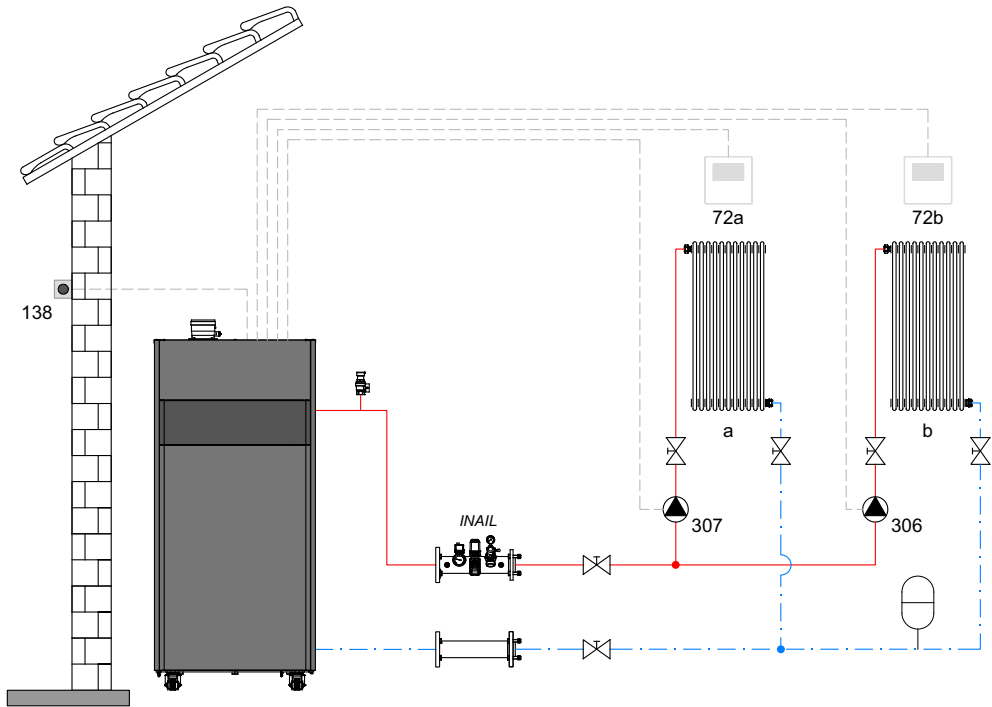


fig. 37

- Electrical connections

After installation, carry out the necessary electrical connections as shown in the wiring diagram.

Then configure the controller as described in the specific section.

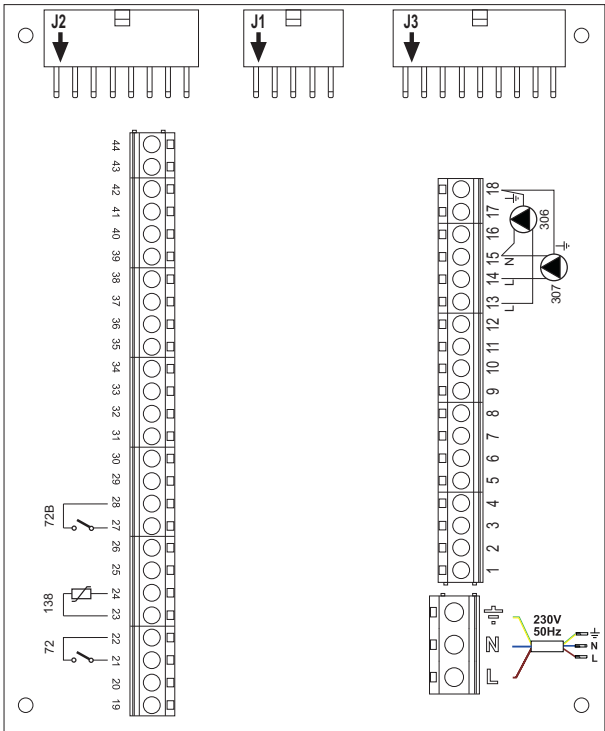


fig. 38

Legend (fig. 37 and fig. 38)

- 72** 1st zone (direct) room thermostat
- 72b** 2nd zone (direct) room thermostat
- 138** External probe
- 307** 1st zone (direct) circulating pump
- 306** 2nd zone (direct) circulating pump
- a** 1st zone (direct)
- b** 2nd zone (direct)
- M** Flow
- R** Return
- I*** ISPESL safety devices (when required - not supplied)

To manage the sliding temperature it is necessary to purchase the external probe accessory code 013018X0

- Parameters

Each system requires a different parameterisation. Follow the access procedure given below.

“System Type Menu”

Change parameter **P.01** of the “System Type Menu” to **4**.

Change parameter **P.09** of the “System Type Menu” to **1**.

- Optional features

In addition to the electrical connections of the previous figure (necessary for this system configuration) there are options that do not require settings.

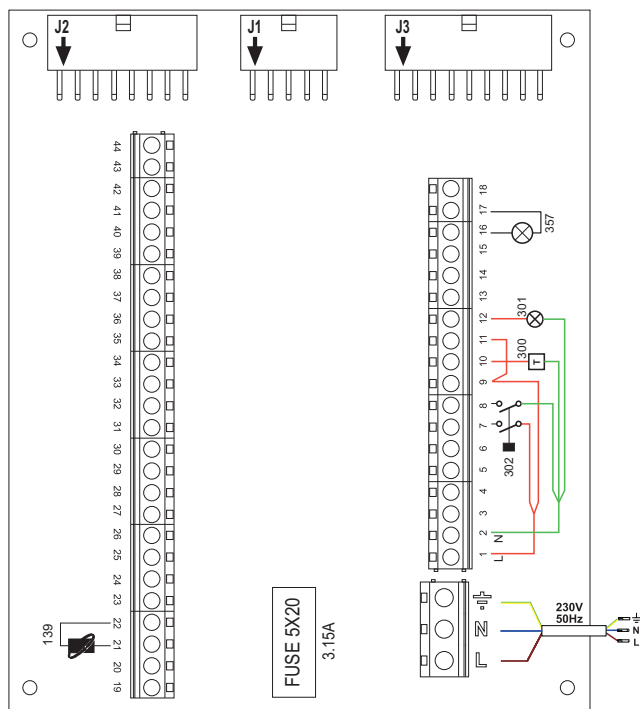


fig. 39

Legend (fig. 39)

- 139** Remote control: it can be installed instead of 72 to manage the request of the 1st zone (direct)
- 300** Burner on indication (voltage-free contact output): the example shows the connection of a 230 Vac hour meter
- 301** Fault indication (voltage-free contact output): the example shows the connection of a 230Vac lamp
- 302** Remote reset input (230Vac): the example shows the connection of a double-pole switch at 230Vac, allowing the resetting of a block type fault
- 357** Fault indication (230Vac): the example shows the connection of a 230Vac lamp

One direct heating circuit and one DHW circuit with circulating pump

- Schematic diagram

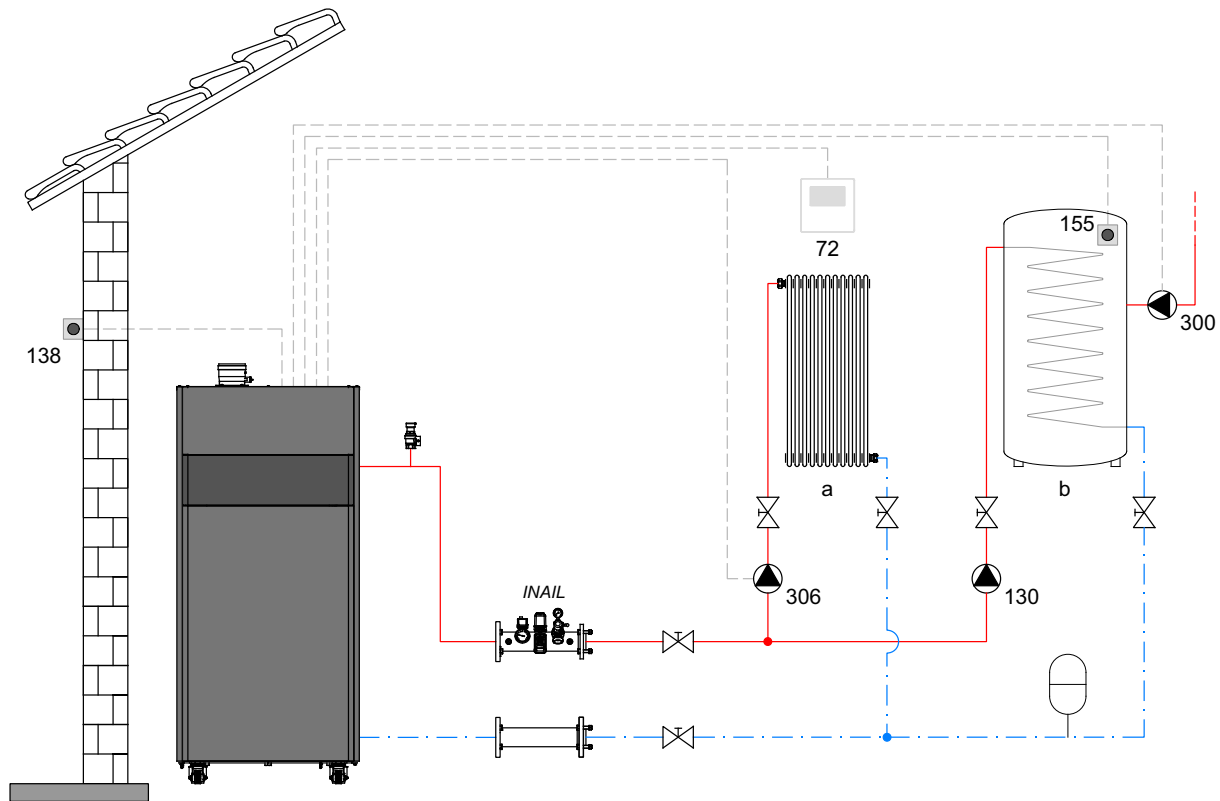


fig. 40

- Electrical connections

After installation, carry out the necessary electrical connections as shown in the wiring diagram.

Then configure the controller as described in the specific section.

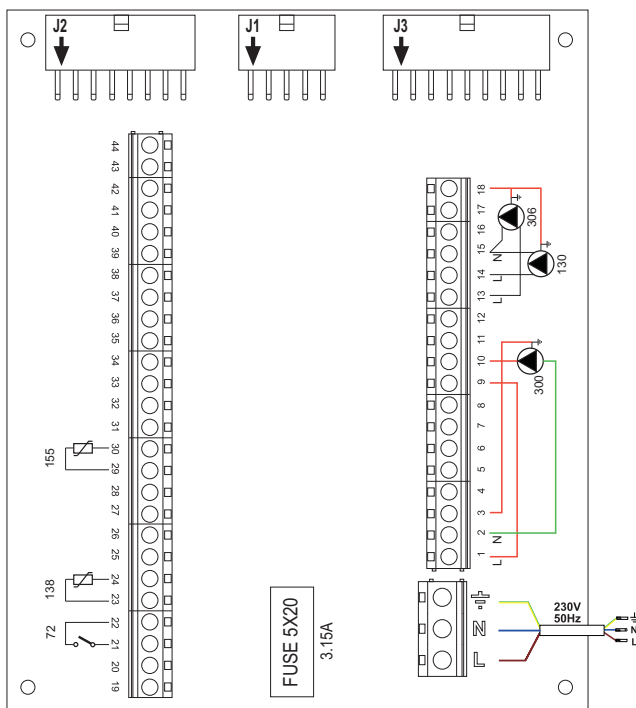


fig. 41

Legend (fig. 40 and fig. 41)

- 72 1st zone (direct) room thermostat
- 130 Hot water tank circulating pump
- 138 External probe
- 155 Hot water tank probe
- 300 Anti-Legionella circulating pump
- 306 1st zone (direct) circulating pump
- a 1st zone (direct)
- b Hot water tank circuit
- M Flow
- R Return
- I* ISPEL safety devices (when required - not supplied)

To manage the sliding temperature it is necessary to purchase the external probe accessory code 013018X0

If a hot water tank probe (not supplied) is used, it is necessary to purchase the NTC probe accessory code 1KWMA11W (2 mt.) or code 043005X0 (5 mt.)

If a hot water tank thermostat (not supplied) is used, it is necessary to purchase the accessory kit code 013017X0 (to be connected in place of the Hot Water Tank Probe)

- Parameters

Each system requires a different parameterisation. Follow the access procedure given below.

“Service Menu”

Check/change parameter **b02** of the “Transparent Parameters Menu” to **8** (for models 70, 125 and 320) and to **5** (for model 220)

Check/change parameter **b08** of the “Transparent Parameters Menu” to **1**

“System Type Menu”

Change parameter **P.09** of the “System Type Menu” to **1**.

- Optional features

In addition to the electrical connections of the previous figure (necessary for this system configuration) there are options that do not require settings.

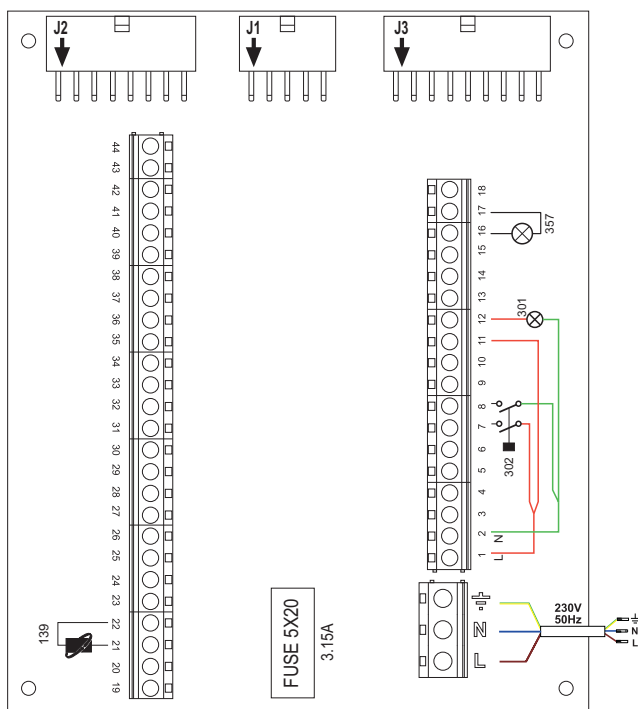


fig. 42

Legend (fig. 42)

- 139** Remote control: it can be installed instead of 72 to manage the request of the 1st zone (direct)
- 301** Fault indication (voltage-free contact output): the example shows the connection of a 230Vac lamp
- 302** Remote reset input (230Vac): the example shows the connection of a double-pole switch at 230Vac, allowing the resetting of a block type fault
- 357** Fault indication (230Vac): the example shows the connection of a 230Vac lamp

A direct heating circuit and a DHW circuit with diverter valve (3-wire)

- Schematic diagram

Use diverter valves with 3 wires: OPENING PHASE 230V - CLOSING PHASE 230V - NEUTRAL with switching times (from fully closed to fully open) not exceeding 90 seconds

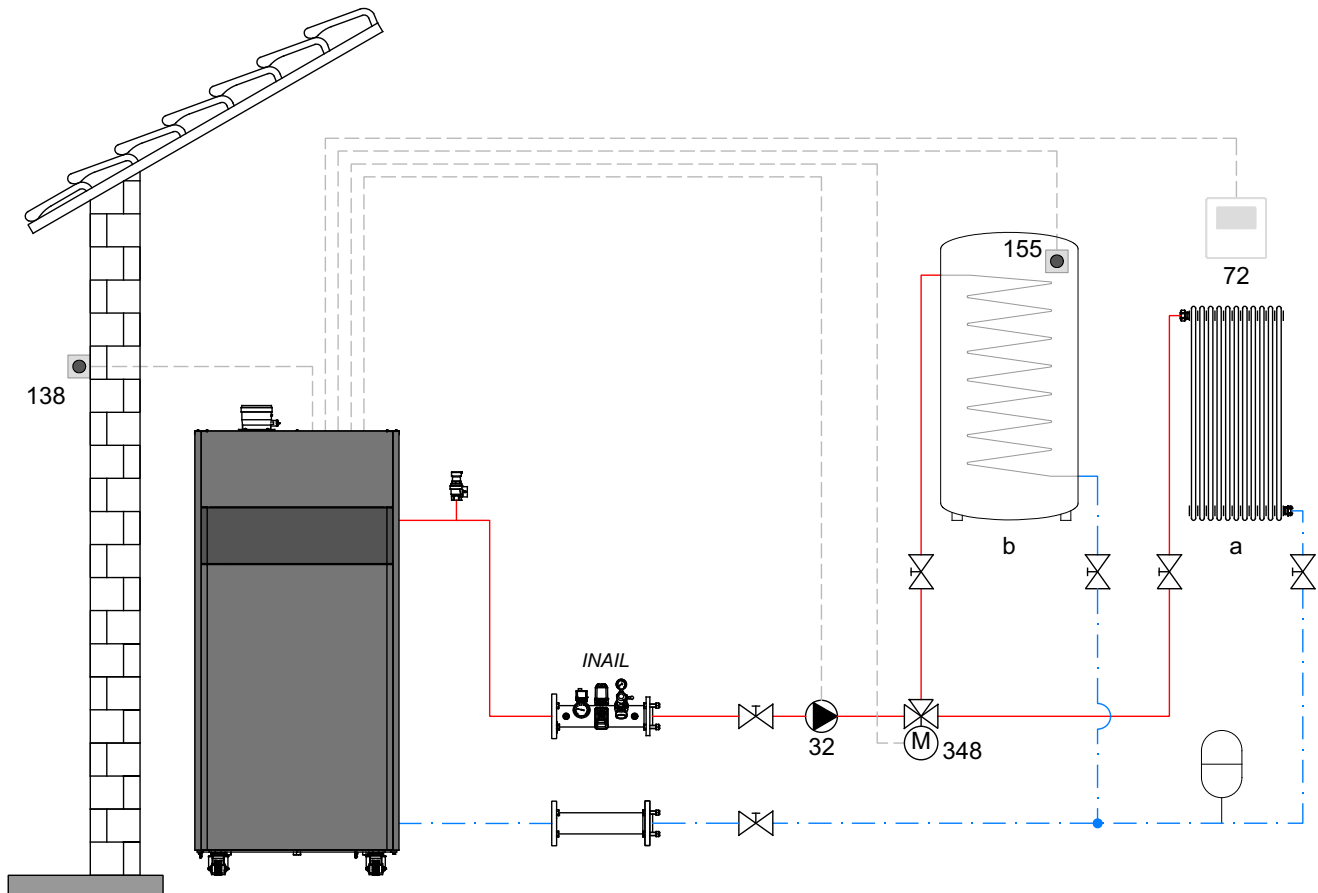


fig. 43

Legend (fig. 43 and fig. 44)

- 32** Heating circulating pump
- 72** 1st zone (direct) room thermostat
- 138** External probe
- 155** Hot water tank probe
- 348** 3-way valve (3-wire)
 - A** = OPENING PHASE
 - B** = NEUTRAL
 - C** = CLOSING PHASE
- a** 1st zone (direct)
- b** Hot water tank circuit
- M** Flow
- R** Return
- I*** ISPEL safety devices (When required - Not supplied)



- Electrical connections

After installation, carry out the necessary electrical connections as shown in the wiring diagram.

Then configure the controller as described in the specific section.



To avoid damaging the board, it is advisable to use external relays to control the 3-way valve, as indicated in fig. 44.

To manage the sliding temperature it is necessary to purchase the external probe accessory code 013018X0

If a hot water tank probe (not supplied) is used, it is necessary to purchase the NTC probe accessory code 1KWMA11W (2 mt.) or code 043005X0 (5 mt.)

If a hot water tank thermostat (not supplied) is used, it is necessary to purchase the accessory kit code 013017X0 (to be connected in place of the Hot Water Tank Probe)

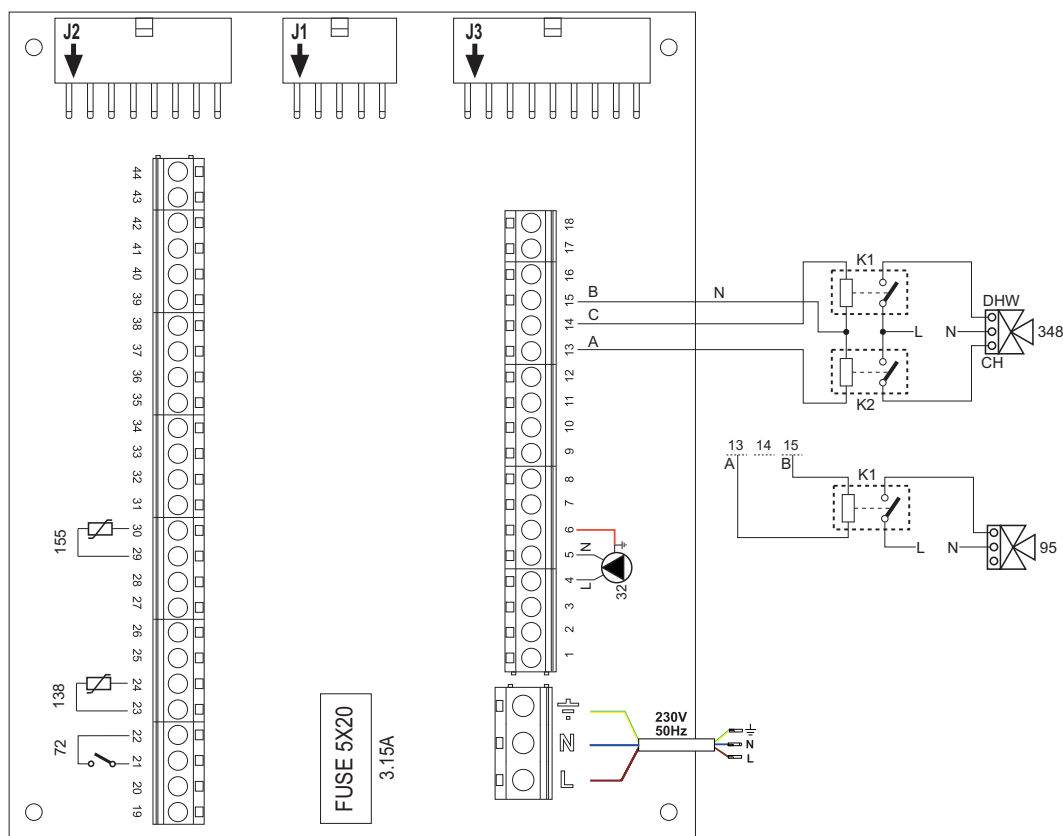


fig. 44

- Parameters

Each system requires a different parameterisation. Follow the access procedure given below.

“Service Menu”

Check/change parameter **b02** of the “Transparent Parameters Menu” to **9** (for models 70, 125 and 320) and to **6** (for model 220).

- Optional features

In addition to the electrical connections of the previous figure (necessary for this system configuration) there are options that do not require settings.

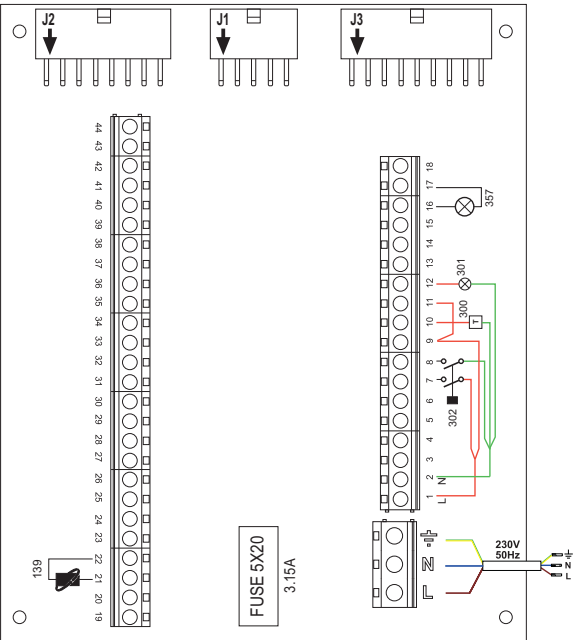


fig. 45

Legend (fig. 45)

- 139** Remote control: it can be installed instead of 72 to manage the request of the 1st zone (direct)
- 300** Burner on indication (voltage-free contact output): the example shows the connection of a 230Vac hour meter
- 301** Fault indication (voltage-free contact output): the example shows the connection of a 230Vac lamp
- 302** Remote reset input (230Vac): the example shows the connection of a double-pole switch at 230Vac, allowing the resetting of a block type fault
- 357** Fault indication (230Vac): the example shows the connection of a 230Vac lamp



Two mixed heating circuits, one direct heating circuit and one DHW circuit with circulating pump
- Schematic diagram

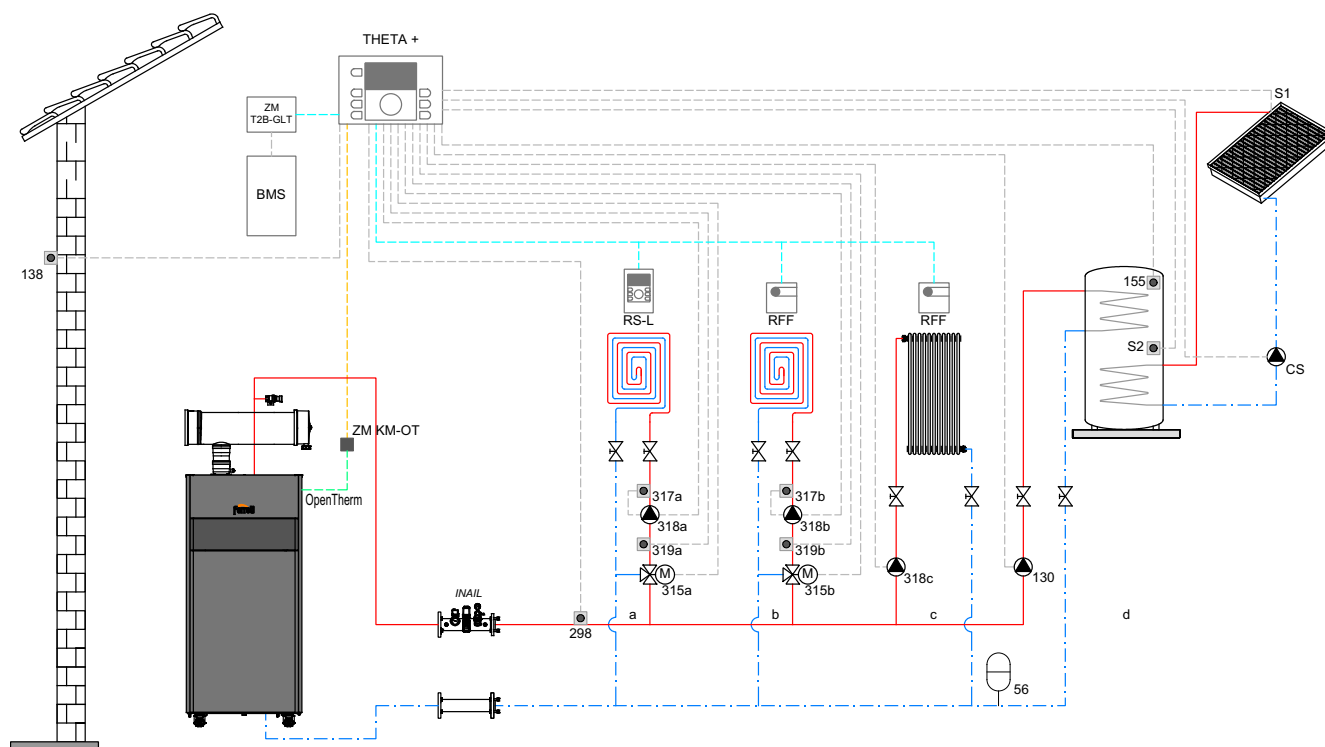


fig. 46

Legend (fig. 46 and fig. 47)

- THETA+** Central temperature control unit and cascade manager
- ZM KM-OT** Module for cascade management and communication between the generator and the THETA+ unit via OpenTherm
- RS-L** Room unit
- RFF** Room probe
- ZM T2B-GLT** Interface with BMS systems
- BMS** Building Management System
- a** Low temperature mixed zone
- b** Low temperature mixed zone
- c** High temperature direct zone
- d** DHW production with double coil storage
- CS** Solar circulating pump
- S1** Solar field flow sensor (PT 1000)
- S2** Storage tank temperature probe (supplied as standard with THETA+)
- INAIL** INAIL safety devices branch.
- 56** Expansion vessel
- 130** DHW storage tank filling pump
- 138** 138 External probe (supplied as standard with THETA+)
- 155** Storage tank probe (supplied as standard with THETA+)
- 298** System flow manifold probe (supplied as standard with THETA+)
- 315 a/b** Motorized mixer valve
- 317 a/b** Safety thermostat
- 318 a/b/c** Heating system circulating pump
- 319 a/b** Mixed zone flow probe (supplied as standard with THETA+)

- Electrical connections

After installation, carry out the necessary electrical connections as shown in the wiring diagram.

Then configure the controller as described in the specific section.

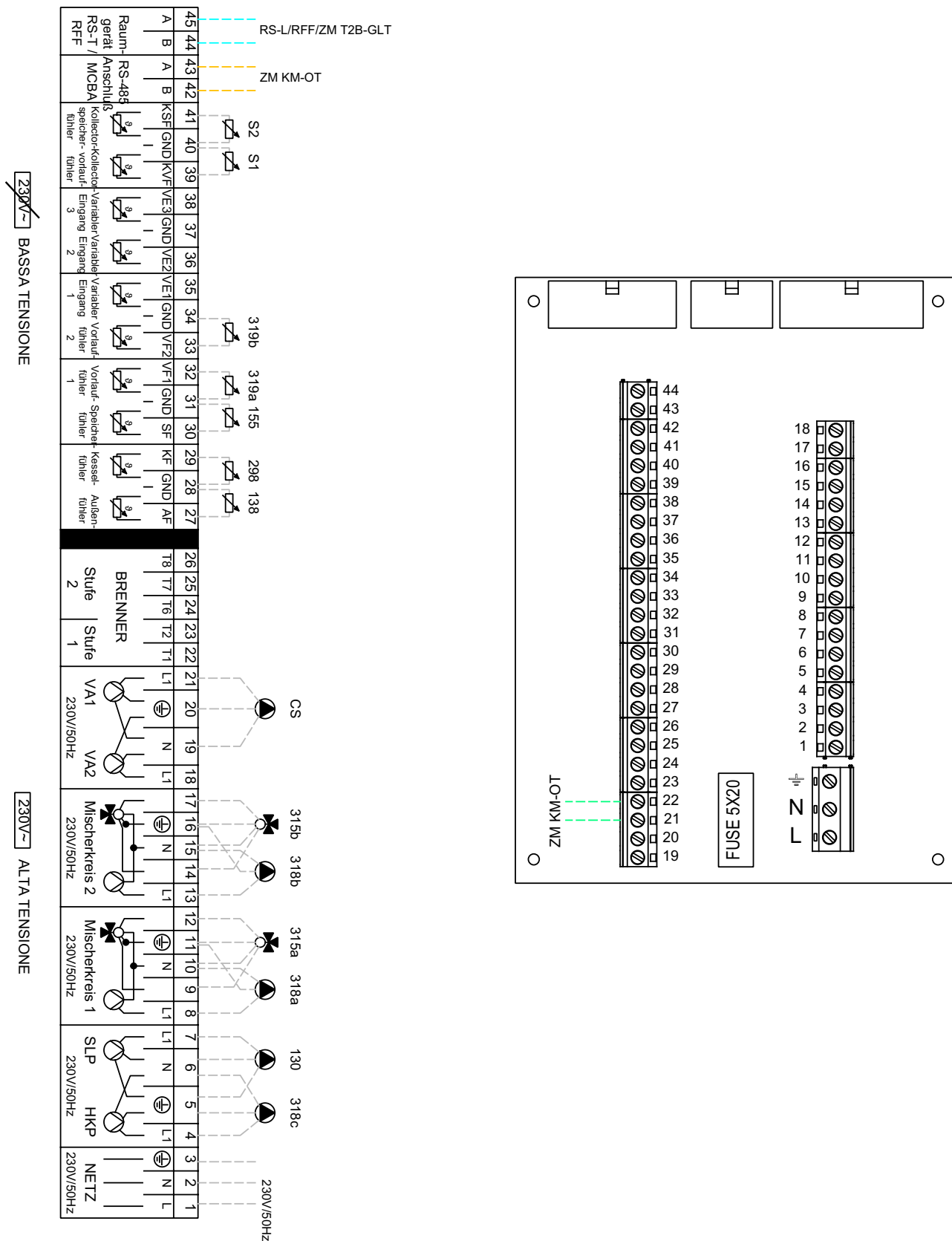


fig. 47

- Parameters

To parameterize the "THETA+" thermoregulation, consult the manual supplied with the kit.

- Optional features

In addition to the electrical connections of the previous figure (necessary for this system configuration) there are options that do not require settings.

Legend (fig. 48)

- 301** Fault indication (voltage-free contact output): the example shows the connection of a 230Vac lamp
- 302** Remote reset input (230Vac): the example shows the connection of a double-pole switch at 230Vac, allowing the resetting of a block type fault
- 357** Fault indication (230Vac): the example shows the connection of a 230Vac lamp

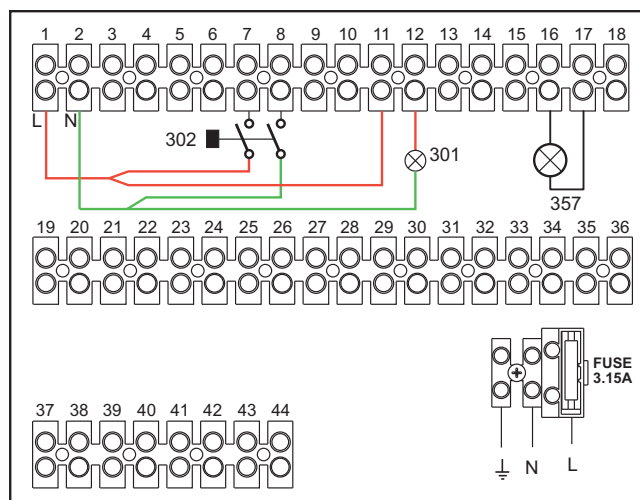
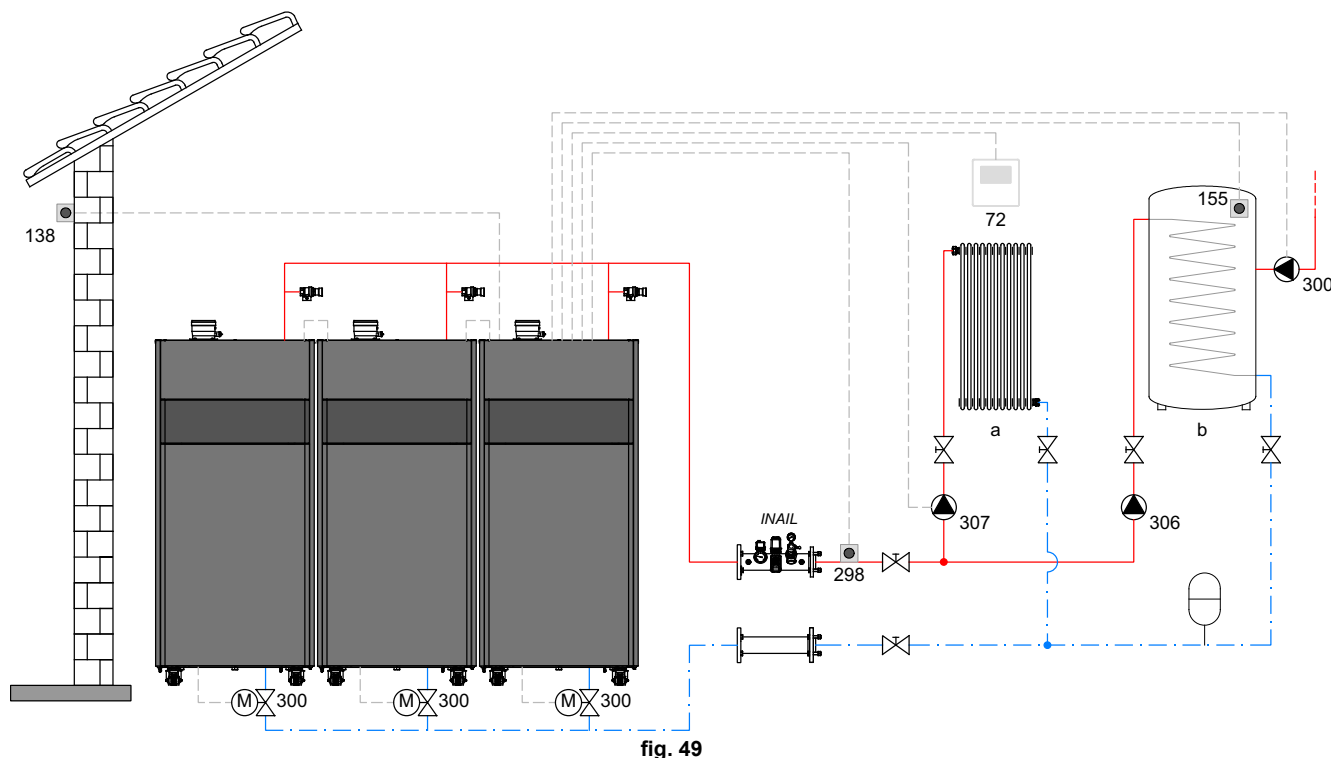


fig. 48

Generators in cascade: a direct heating circuit and a DHW circuit with circulating pump

Schematic diagram

The boiler electronics can manage up to a maximum of **6 modules**. 3 are given in the example.



Legend (fig. 49 and fig. 50)

- 72** 1st zone (direct) room thermostat
- 130** Hot water tank circulating pump
- 138** External probe
- 155** Hot water tank probe
- 298** Cascade temperature sensor
- 300M** MASTER boiler motorized butterfly valve
 - A** = OPENING PHASE
 - B** = NEUTRAL
 - C** = CLOSING PHASE
- 300S** SLAVE boiler motorized butterfly valve

- A** = OPENING PHASE
- B** = NEUTRAL
- C** = CLOSING PHASE
- 306** 1st zone (direct) circulating pump
- a** 1st zone (direct)
- b** Hot water tank circuit
- M** Flow
- R** Return
- I*** ISPEL safety devices (when required - not supplied)

- To manage the sliding temperature it is necessary to purchase the external probe accessory code 013018X0
- If a hot water tank probe (not supplied) is used, it is necessary to purchase the NTC probe accessory code 1KWMA11W (2 mt.) or code 043005X0 (5 mt.)
- If a hot water tank thermostat (not supplied) is used, it is necessary to purchase the accessory kit code 013017X0 (to be connected in place of the Hot Water Tank Probe)
- If a cascade probe (not supplied) is used, it is necessary to purchase the accessory NTC probe code 1KWMA11W (2 mt.) or code 043005X0 (5 mt.)

- Electrical connections

After installation, carry out the necessary electrical connections as shown in the wiring diagram.

Then configure the controller as described in the specific section.

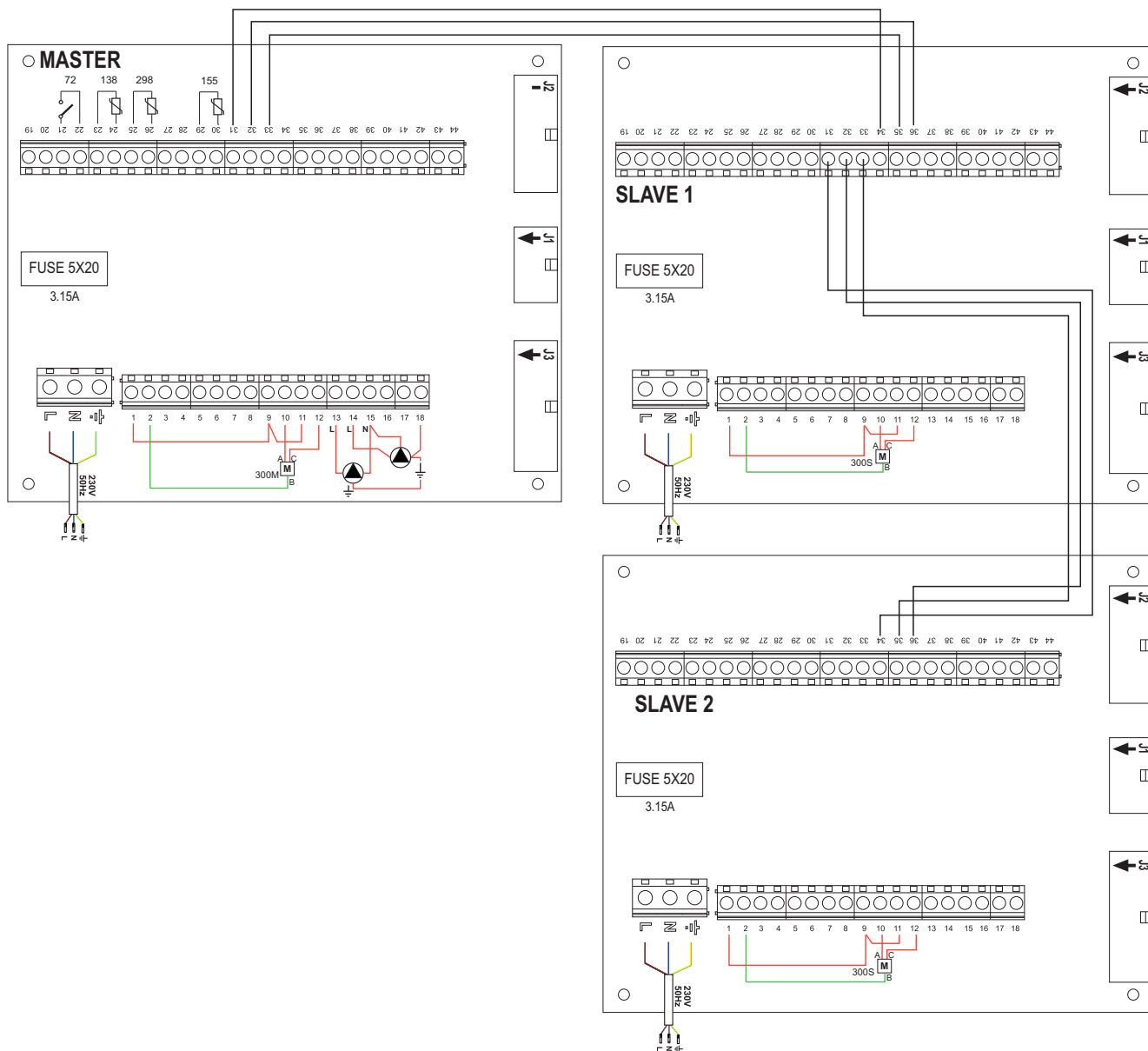


fig. 50

Parameters

Each system requires a different parameterisation. Follow the access procedure given below, for the **MASTER** as well as **SLAVE** boilers.

“Service Menu”

Check/Change parameter **P02** of the “Transparent Parameters Menu” to **8**. (for models 70, 125 and 320) and to **5** (for model 220)

Check/Change parameter **b08** of the “Transparent Parameters Menu” to **3**.

“System Type Menu”

Change parameter **P.02** of the “System Type Menu” to **1**.

Change parameter **P.09** of the “System Type Menu” to **1**.

- Optional features

In addition to the electrical connections of the previous figure (necessary for this system configuration) there are options that do not require settings.

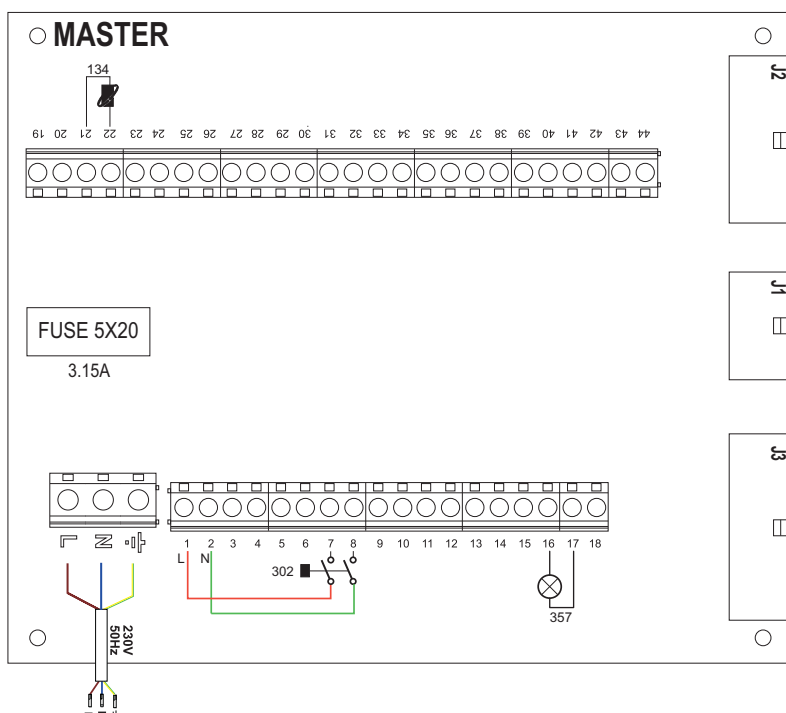


fig. 51- MASTER

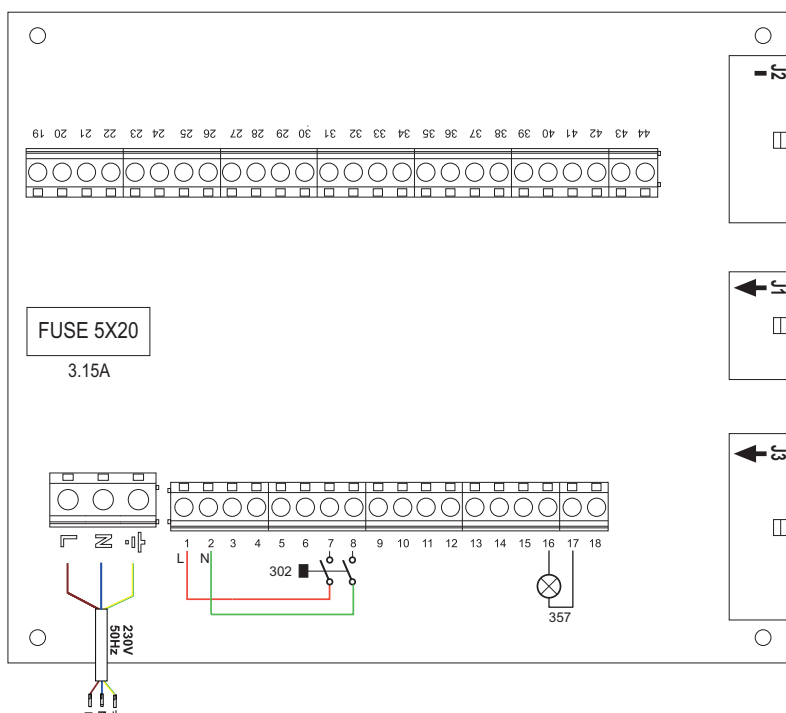


fig. 52- SLAVE

Legend (fig. 51 and fig. 52)

- 139** Remote control: it can be installed instead of 72 to manage the request of the 1st zone (direct)
- 302** Remote reset input (230Vac): the example shows the connection of a double-pole switch at 230Vac, allowing the resetting of a block type fault
- 357** Fault indication (230Vac): the example shows the connection of a 230Vac lamp

2.4 Gas connection



Before making the connection, make sure the unit is arranged for operation with the type of fuel available and carefully clean all the pipes of the gas system to remove any residues that could affect proper functioning of the boiler.

The gas must be connected to the relevant connection (see fig. 74, fig. 77, fig. 80, fig. 81 and fig. 84) in conformity with the current regulations, using a continuous-surface stainless steel hose, placing a gas cock between the system and the boiler.



To allow easy opening of the burner door during periodic maintenance, the last section of the connection between the system and the unit must have a continuous-surface stainless steel hose.

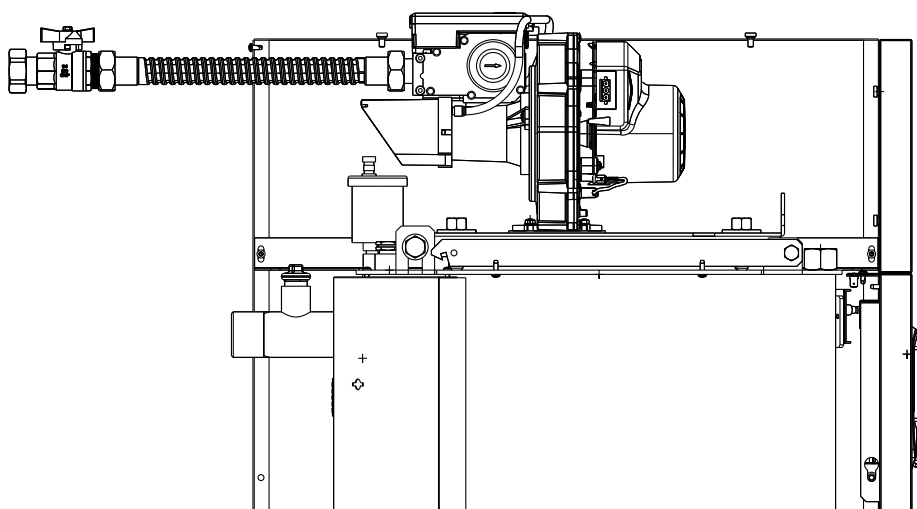


fig. 53

Make sure that all gas connections are tight. The capacity of the gas meter must be sufficient for the simultaneous use of all units connected to it. The diameter of the gas pipe leaving the boiler is not decisive for choosing the diameter of the pipe between the unit and the meter; it must be chosen according to its length and pressure losses, in conformity with the current regulations.



Do not use the gas pipes to earth electrical appliances.

In case of connection in cascade, make sure to install a fuel shutoff valve externally with respect to the modules.

2.5 Electrical connections

Connection to the electrical grid



The unit's electrical safety is only guaranteed when correctly connected to an efficient earthing system executed according to current safety standards. Have the efficiency and suitability of the earthing system checked by professionally qualified personnel. The manufacturer is not responsible for any damage caused by failure to earth the system. Also make sure that the electrical system is adequate for the maximum power absorbed by the unit, as specified on the boiler dataplate.

The boiler is prewired and provided with a Y-cable and plug for connection to the electricity line. The connections to the grid must be made with a permanent connection and equipped with a bipolar switch whose contacts have a minimum opening of at least 3 mm, interposing fuses of max. 3A between the boiler and the line. It is important to respect the polarities (LINE: brown wire / NEUTRAL: blue wire / EARTH: yellow-green wire) in making connections to the electrical line. During installation or when changing the power cable, the earth wire must be left 2 cm longer than the others.



The user must never change the unit's power cable. If the cable gets damaged, switch off the unit and have it changed solely by professionally qualified personnel.

If changing the electric power cable, use solely “**HAR H05 VV-F**” 3x0.75 mm² cable with a maximum outside diameter of 8 mm.

Room thermostat (optional)



CAUTION: The room thermostat must have clean contacts. **CONNECTING 230 V. TO THE TERMINALS OF THE ROOM THERMOSTAT WILL IRREPARABLY DAMAGE THE ELECTRONIC CARD.**

When connecting a remote timer control or a timer switch, do not take the power supply for these devices from their cut-out contacts. Their power supply must be taken with a direct connection from the mains or with batteries, depending on the kind of device.

External probe (optional)

Connect the probe to its respective terminals. The maximum permissible length of the boiler – external probe connection electric cable is 50 m. A common 2-core cable can be used. The external probe should preferably be installed on the North, North-West wall or on the wall with most of the main living room. The probe must never be exposed to the sun in the early morning, and in general, as far as possible, it must not receive direct solar radiation; if necessary, it must be protected. In any case, the probe must never be mounted near windows, doors, ventilation openings, flues or heat sources that could affect the reading.

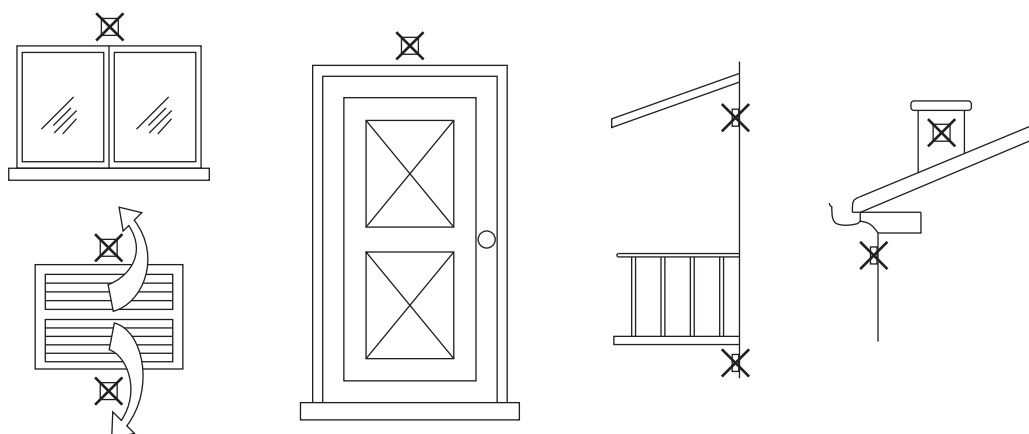


fig. 54- Positioning of external probe not recommended

Accessing the electrical terminal block

The electrical terminal block is located in the back of the boiler. Make the electrical connections as shown in the wiring diagram on fig. 95 and run the cables through the special cable glands.

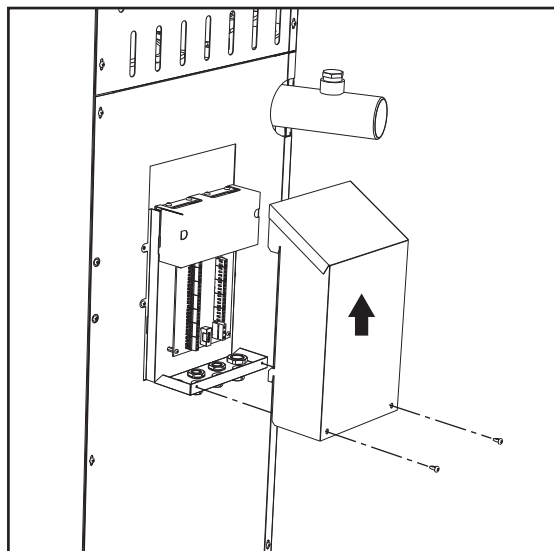


fig. 55- Electrical terminal block



Maximum applicable loads:

- Heating circulating pump: **230Vac 0.8A max, $\cos\phi = 0.6$**
- 3-way valve: **230 Vac, 0.8 A max, $\cos\phi = 0.6$ for max 1 minute, 0.4 A continuous**
- Alarm: **230 Vac, 0.8 A max, $\cos\phi = 0.6$**

For connection in cascade

NOTE: The boiler electronics can manage up to a **maximum of 6 modules**.

1. Connect the modules as shown in fig. 56 (**example with 3 modules**)

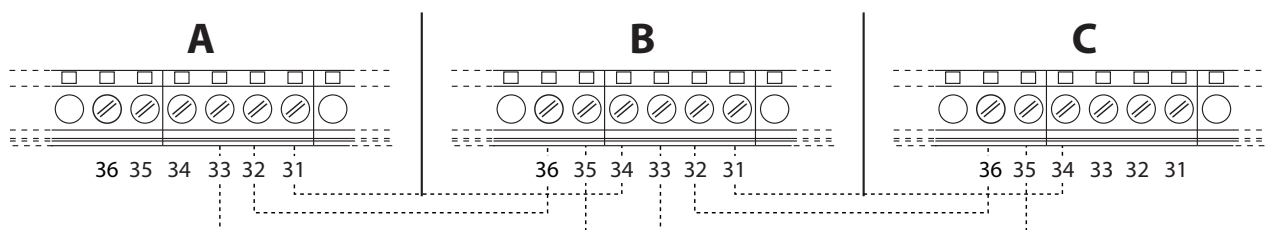


fig. 56- Cascade connection

A 1st Module

B 2nd Module

C 3rd Module

2. Carry out all the electrical connections (terminals 1 to 30) on module no.1
3. On the remaining modules, connect only the power supply and, if necessary, the contacts relevant to: burner on (300), fault contact (301) and remote reset input (302).
Remove the jumper relevant to: Room Thermostat (72)/Remote Timer Control (139).
4. Switch on the power to the entire cascade
5. After the "FH" procedure, check correct operation of the cascade:
 - Module 1: MASTER icon
 - Module 2: SLAVE icon
 - Module 3: SLAVE icon

If this does not occur, disconnect the power and check the wiring in fig. 56. .

Settings

All adjustments must be made on all the modules, whereas Time Programming must be set only on Module 1.

Possible faults

If the electrical connection of a module is disconnected for any reason, module 1 will activate fault **F70**.

If the electrical connection of a module is disconnected for any reason, the next module will activate fault **F71**.

2.6 Flue connection

Important

The unit is a B23-type with combustion air drawn from the place of installation, and fume exhaust by means of a fan (operation with flue pressurised), and must be connected to one of the discharge systems indicated below. Before proceeding with installation, check and carefully comply with the local regulations and provisions. Also, comply with the provisions on the positioning of wall and/or roof terminals and the minimum distances from windows, walls, ventilation openings, etc.

Manifold, ducts and flue must be suitably sized, designed and made in compliance with the current regulations. They must be made of suitable materials, i.e. resistant to heat and corrosion, smooth on the inside and tight. In particular, joints must be condensate proof. Also, provide for adequate condensate drainage points, connected to a trap to prevent the condensate formed in the flues from running into the generators.

Connection

To calculate the maximum length of the fume ducts, refer to the maximum available head indicated in table 5.



Before making the flue connection fill the condensate trap with approx. 0.5 liters of water through the flue connections.

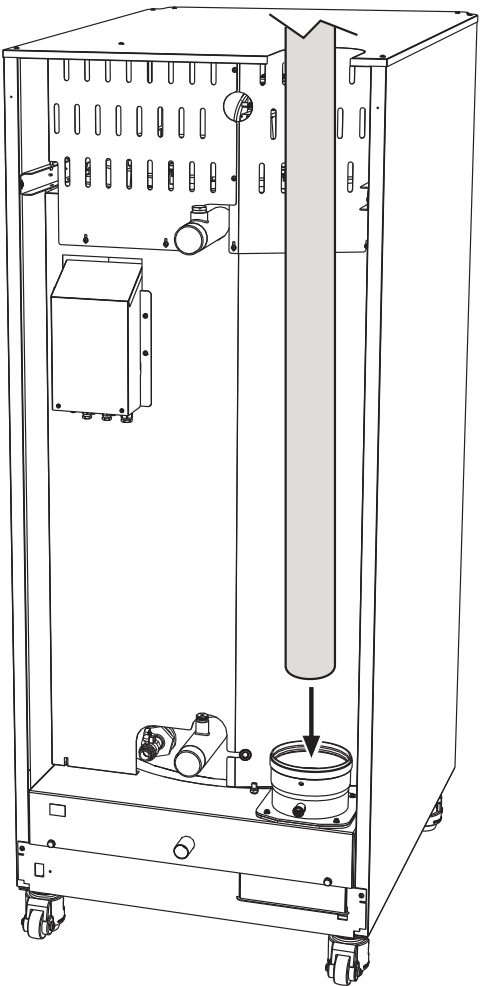


fig. 57- Fume outlet

Table 5- Maximum flue pipe length

	Model "70" Ø 80	Model "125" Ø 100	Models "160" "220" Ø 160	Models "320" "450" Ø 200
Maximum flue head	200 Pa	200 Pa	200 Pa	200 Pa

2.7 Condensate drain connection

The boiler has a trap to drain condensate. Proceed as follows for assembly.



ATTENTION: The unit must never be operated with the trap empty!

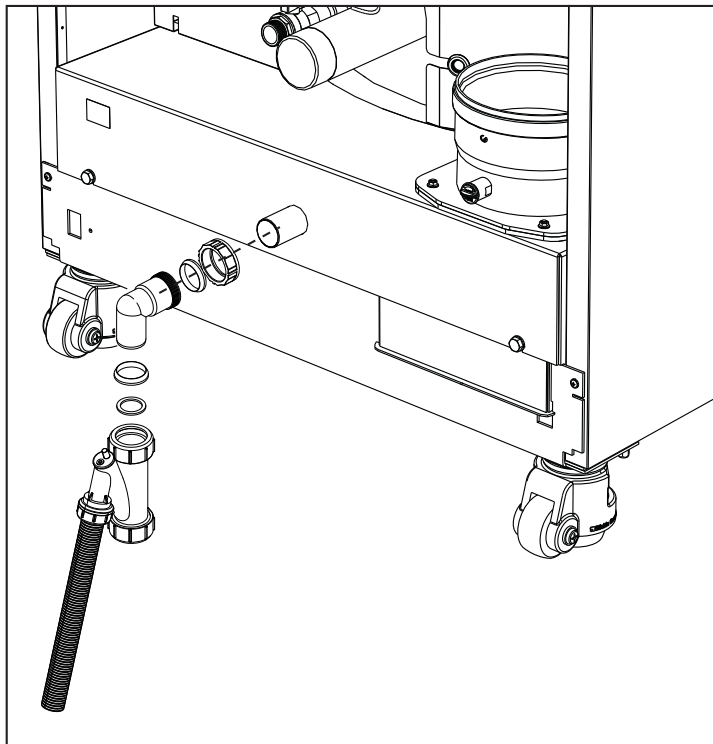


fig. 58- Condensate drain connection

Neutralizer kit

The following condensate neutralizer kits are available on request:

- code 051000X0** up to 320 kW
- code 051001X0** up to 320 kW (con pompa di rilancio)
- code 051002X0** up to 1500 kW
- code 051003X0** up to 1500 kW (con pompa di rilancio)

Connect these neutralizers directly to the boiler outlet without putting the trap in between. The trap function is carried out by the neutralizer.

3. Service and maintenance

All adjustment, conversion, commissioning and maintenance operations described below must only be carried out by Qualified Personnel (meeting the professional technical requirements of current regulations) such as the personnel of the Local After-Sales Technical Service.

FERROLI declines any liability for damage and/or injury caused by unqualified and unauthorized persons tampering with the unit.

3.1 Adjustments

Gas conversion

The unit can run on natural gas or LPG and is factory-set for use with one of these two gases, as clearly shown on the packing and on the data plate. Whenever a different gas to that for which the unit is set has to be used, the special conversion kit will be required, proceeding as follows:

1. Disconnect the power supply to the boiler.
2. Remove the panels.
3. Detach the electrical connections from the gas valve controller.
4. Undo the fastening screws "E" and remove the gas valve.
5. Replace the gas nozzle "F", positioning it inside the gasket "G". with that contained in the conversion kit. Refit the parts and check tightness.

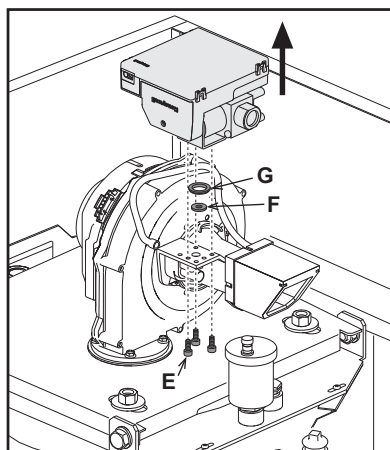


fig. 59- Model OPERA 70

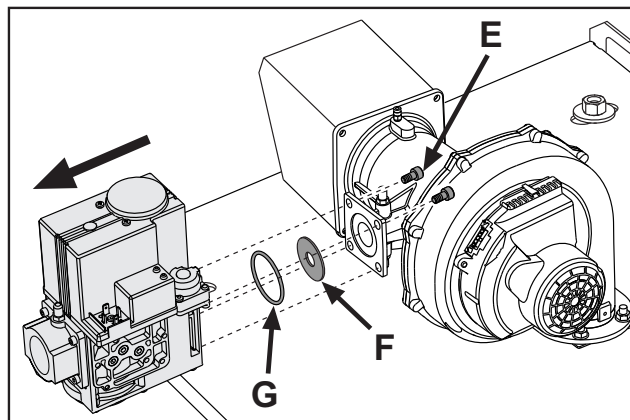


fig. 61- Model OPERA 220

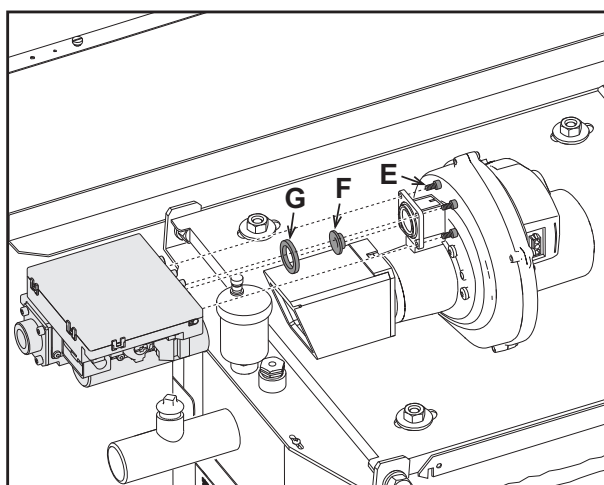


fig. 60- Model OPERA 125 and OPERA 160

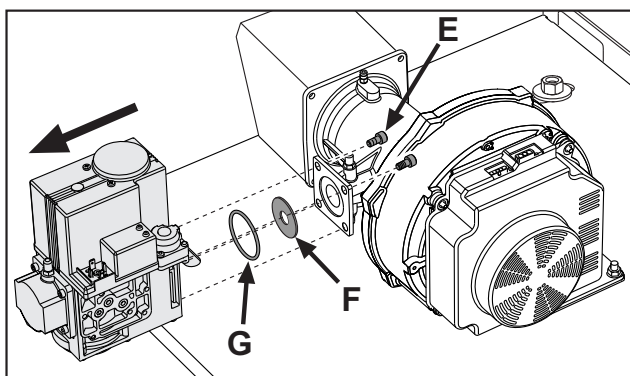


fig. 62- Model OPERA 320 and OPERA 450

6. Modify the parameter for the type of gas as described below.
Reach the screen shown in fig. 63, navigating in the menu and following the path "USER MENU ➡ Maintenance ➡ Test Mode ➡ Gas Type Selection". Press the contextual buttons 1 and 2 to select the type of gas. Confirm with the OK button.

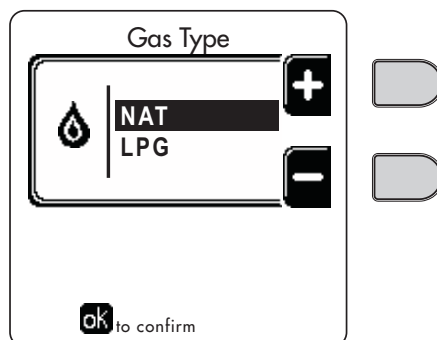


fig. 63 - Gas type selection

7. Apply the label, contained in the conversion kit, near the data plate.
8. Using a combustion analyzer connected to the boiler fume outlet, make sure the CO₂ content in the fumes, with the boiler operating at max. and min. output, complies with that given in the technical data table for the corresponding type of gas.

TEST mode activation

Reach the screen shown in fig. 64, navigating the following menu path: "USER MENU ➡ Maintenance ➡ Test Mode ➡ Test mode".

The boiler will light, gradually reaching the maximum heating power (Range Rated) set as described in the next section. The display will show the actual heating power and that set.

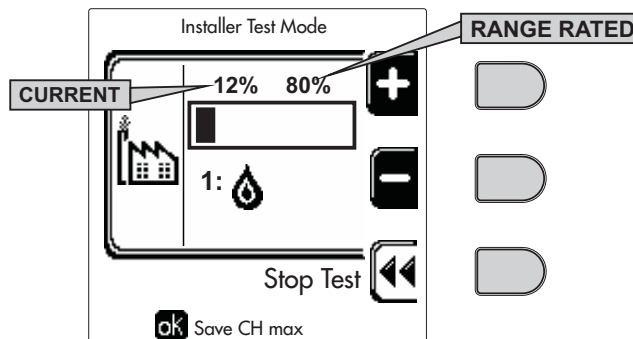


fig. 64 - Test mode (example heating power = 80%)

Press the contextual buttons 1 and 2 to increase the maximum power.

To deactivate the TEST mode, press the contextual button 3.

The TEST mode is automatically disabled in any case after 15 minutes.

 After activating test mode, to exit the TEST make sure to deactivate the function, only by pressing the contextual button "Stop Test".

DO NOT TURN OFF THE BOILER ELECTRICALLY DURING THE TEST.

If that happens, when the power is switched on again the system does not recognise deactivation of the TEST, and starts working as though still in TEST mode and not as in a normal heating demand.

Heating Capacity Adjustment (RANGE RATED)



This is a “**RANGE RATED**” boiler (according to EN 483) and can be adjusted to the system's thermal requirement by setting the maximum heating capacity for operation in heating mode, as follows:

- Put the boiler in TEST mode (see sec. 3.1).
- Press the **contextual buttons 1 and 2** to increase or decrease the heating capacity (minimum = 00 - maximum = 100). See the diagram “Heating Capacity Adjustment” (fig. 65).
- By pressing the **OK button** (detail 6 - fig. 1) the maximum heating capacity will remain that just set. Exit TEST mode (see sec. 3.1).

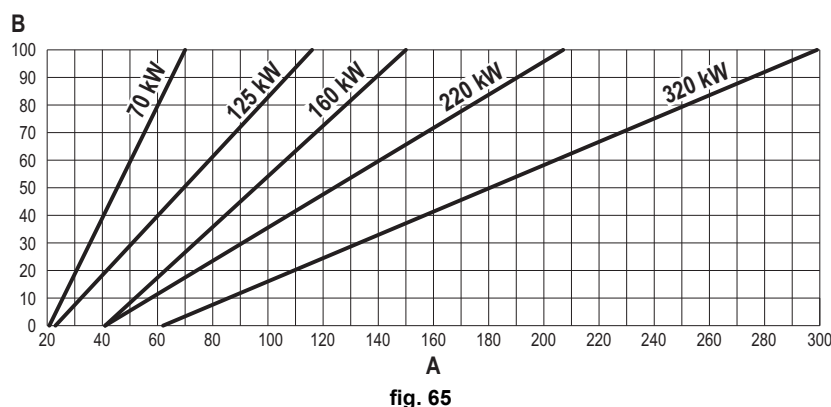
After setting the desired heating capacity, write the value on the sticker provided and place it on the boiler under the data plate. For subsequent checks and adjustments, refer to the set value.



THE HEATING CAPACITY ADJUSTMENT THUS MADE ENSURES THE EFFICIENCY VALUES DECLARED AT cap. 4.3 “Technical data table”

Heating capacity adjustment diagram

A = kW - B = Electronic Board Parameter



CASCADE TEST mode activation

This function allows all the modules connected in cascade (RANGE RATED) to be activated at the same heating power. From the Master boiler panel (identifiable by the icon ) , reach the screen shown in fig. 66, navigating the following menu path: “USER MENU ➡ Maintenance ➡ Test Mode ➡ Test mode”.

The modules will light, reaching the maximum heating power (Range Rated) gradually.

The display will show the actual heating power (fig. 66 - example with two modules).

- **5%** = Actual heating power
- **1/2** = Modules lit/Modules connected

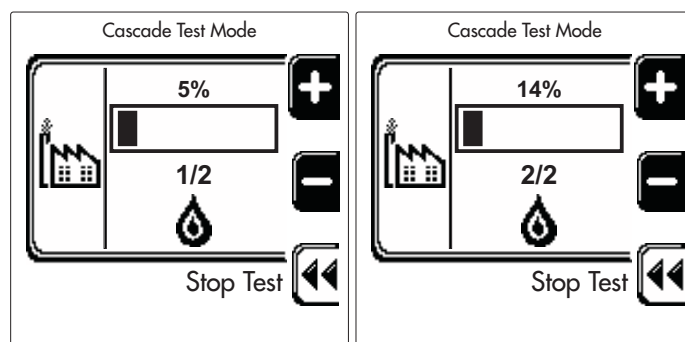


fig. 66 - Cascade TEST mode (example with two modules)

Press the contextual buttons 1 and 2 to increase the maximum power of all modules.

To deactivate the CASCADE TEST mode, press the contextual button 3.

The CASCADE TEST mode is disabled automatically in any case after 15 minutes.



After activating test mode, to exit the TEST make sure to deactivate the function, only by pressing the contextual button “Stop Test”.

DO NOT TURN OFF THE BOILER ELECTRICALLY DURING THE TEST.

If that happens, when the power is switched on again the system does not recognise deactivation of the TEST, and starts working as though still in TEST mode and not as in a normal heating demand.

TECHNICAL MENU

ONLY QUALIFIED PERSONNEL CAN ACCESS THE SERVICE MENU AND MODIFY PARAMETERS.

The Technical Menu can only be accessed after entering the code 4 1 8. It is valid for 15 minutes.

Configuration - Parameters Menu

16 parameters are available, indicated by the letter “b”, which are not modifiable from Remote Timer Control.

Table 6- Parameters - Configuration

Parameter	Description	Range	70	125	160	220	320	450
b01	Gas type selection	Natural Gas/LPG	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas	Natural gas
b02	Boiler type selection	1 ÷ 6 = Not used 7 = Heating only 8 = Combi with storage tank with double pump 9 = Combi with storage tank with diverter valve	7	7	7	7	7	7
b03	System water pressure protection selection	0 = Pressure switch 1 = Flow switch 1 sec 2 = Flow switch 3 sec 3 = Flow switch 5 sec 4 = Flow switch 10 sec 5 = Pressure transducer	0	0	0	0	0	0
b04	Fan max. frequency in DHW	0-255 Hz	210 Hz	200 Hz	230 Hz	180 Hz	190 Hz	240 Hz
b05	Fan max. frequency in heating	0-255 Hz	210 Hz	200 Hz	230 Hz	180 Hz	190 Hz	240 Hz
b06	Fan min. frequency in DHW/heating	0-255 Hz	50 Hz	50 Hz	45 Hz	45 Hz	45 Hz	60 Hz
b07	Fan min. Frequency Offset	0-255 Hz	40 Hz	40 Hz	40 Hz	40 Hz	40 Hz	60 Hz
b08	Variable output Relay operation selection	0=Burner lit 1=Legionella pump 2=Boiler room ventilation 3=Motor-operated shutoff valve	0	0	0	0	0	0
b09	Post-Ventilation	0-120 seconds	30	30	30	30	30	30
b10	Boiler room pre-ventilation	1-15 minutes	1	1	1	1	1	1
b11	Boiler room post-ventilation	1-15 minutes	1	1	1	1	1	1
b12	Fume sensor	OFF = Deactivated, ON = Enabled	ON	ON	ON	ON	ON	ON
b13	Not implemented	--	--	--	--	--	--	--
b14	Fumes Max Temperature	0-125°C	110	110	110	110	110	110
b15	Fan type selection	--	--	--	--	--	--	--
b16	Pump antiblock operation time	0-20 seconds	5	5	5	5	5	5

Notes

- Parameters with more than one description vary their function and/or range in relation to the setting of the parameter given in brackets.
- Parameters with more than one description are reset to the default value if the parameter given in brackets is modified.

Parameters Menu - Transparent Parameters

31 parameters are available, indicated by the letter “P”, which are not modifiable from Remote Timer Control.

Table 7- Parameters - Transparent

Parameter	Description	Range	70	125	160	220	320	450
P01	Ignition power	0-100%	30	30	50	45	30	40
P02	Heating ramp	1-10°C/minute	1	1	1	1	1	1
P03	Virtual setpoint min. temperature	20-80°C	20	20	20	20	20	20
P04	Heating standby time	0-10 minutes	4	4	4	4	4	4
P05	Heating Post-Circulation	0-255 minutes	3	3	3	3	3	3
P06	Pump operation	0-3 Operation strategy	0	0	0	0	0	0
P07	Modulating pump min. speed	0-100%	30	30	30	30	30	30
P08	Modulating pump start speed	0-100%	75	75	75	75	75	75
P09	Modulating pump max. speed	30-100%	100	100	100	100	100	100
P10	Pump deactivation temperature during Post-Circulation	0-100°C	35	35	35	35	35	35
P11	Pump activation hysteresis temperature during Post-Circulation	0-20°C	5	5	5	5	5	5
P12	Heating user min. setpoint	10 ÷ 80°C	20	20	20	20	20	20
P13	Heating user max. setpoint	20 ÷ 80°C	80	80	80	80	80	80
P14	Max. output in heating	0-100%	80	80	80	80	80	80
P15	DHW ramp	1-10°C/min	5	5	5	5	5	5
P16	DHW standby time	0-255 seconds	120	120	120	120	120	120
P17	DHW pump Post-Circulation	0-255 seconds	30	30	30	30	30	30
P18	With B02 = 7 - Not implemented	--	--	--	--	--	--	--
	With B02 = 8 - DHW user min. setpoint	10° ÷ 40°	10°	10°	10°	10°	10°	10°
	With B02 = 9 - DHW user min. setpoint	10° ÷ 40°	10°	10°	10°	10°	10°	10°
P19	With B02 = 7 - Not implemented	--	--	--	--	--	--	--
	With B02 = 8 - DHW user max. setpoint	40° ÷ 70°	65°	65°	65°	65°	65°	65°
	With B02 = 9 - DHW user max. setpoint	40° ÷ 70°	65°	65°	65°	65°	65°	65°
P20	Max. output in DHW	0-100%	80%	80%	80%	80%	80%	80%
P21	With B02 = 7 - Not implemented	--	--	--	--	--	--	--
	With B02 = 8 - Hot water tank hysteresis	0° ÷ 60°	2°	2°	2°	2°	2°	2°
	With B02 = 9 - Hot water tank hysteresis	0° ÷ 60°	2°	2°	2°	2°	2°	2°
P22	With B02 = 7 - Not implemented	--	--	--	--	--	--	--
	With B02 = 8 - Primary setpoint	70° ÷ 85°	80°	80°	80°	80°	80°	80°
	With B02 = 9 - Primary setpoint	70° ÷ 85°	80°	80°	80°	80°	80°	80°
P23	With B02 = 7 - Not implemented	--	--	--	--	--	--	--
	With B02 = 8 - Legionella protection	ON - OFF	OFF	OFF	OFF	OFF	OFF	OFF
	With B02 = 9 - Legionella protection	ON - OFF	OFF	OFF	OFF	OFF	OFF	OFF
P24	Fan frequency in standby mode	0-255 Hz	0	0	0	0	0	0
P25	Modulating pump adjustment temperature	0-60°C	20	20	20	20	20	20
P26	Primary exchanger protection temperature	0-80°C	35	35	35	35	35	35
P27	System min. pressure value	--	--	--	--	--	--	--
P28	System nominal pressure value	--	--	--	--	--	--	--
P29	Exchanger protection intervention	0 = No F43, 1-15 = 1-15°C/second	0	0	0	0	0	0
P30	Heating hysteresis after ignition	6-30°C	10	10	10	10	10	10
P31	Timer for heating hysteresis after ignition	0-180 seconds	60	60	60	60	60	60

Notes

- Parameters with more than one description vary their function and/or range in relation to the setting of the parameter given in brackets.
- Parameters with more than one description are reset to the default value if the parameter given in brackets is modified.
- The Maximum Heating Power parameter can also be modified in Test Mode.

System Type - Parameters Menu

23 parameters are available, indicated by the letter "P." which are not modifiable from Remote Timer Control.

Parameter	Description	Range	70	125	160	220	320	450
P.01	Heating request selection	0 = Normal heating request 1 = Request from remote control with external on-off enabling 2 = 0-10V signal request with temperature control with external on-off enabling 3 = 0-10V signal request with external on-off enabling 4 = Control of 2 climatic curves with remote control-room thermostat and second room thermostat 5 = Control of 2 climatic curves with remote control-room thermostat and second room thermostat	0	0	0	0	0	0
P.02	Cascade sensor selection	0 = Disabled 1 = CH + DHW (Heating + DHW) 2 = CH (Heating)	0	0	0	0	0	0
P.03	No function	0-1	0	0	0	0	0	0
P.04	3-way valve time	0 ÷ 255 seconds	0	0	0	0	0	0
P.05	Activation timer*	0 ÷ 255 minutes	1	1	1	1	1	1
P.06	Deactivation timer*	0 ÷ 255 minutes	5	5	5	5	5	5
P.07	Activation power*	0 ÷ 100%	70	70	70	70	70	70
P.08	Deactivation power*	0 ÷ 100%	25	25	25	25	25	25
P.09	Hydraulic separator function	OFF = Disabled, ON = Enabled	OFF	OFF	OFF	OFF	OFF	OFF
P.10	System filling function	OFF = Disabled, ON = Enabled	OFF	OFF	OFF	OFF	OFF	OFF
P.11	3-way valve selection	2/3 = 2 or 3 wires 2 = 2 wires	2/3	2/3	2/3	2/3	2/3	2/3
P.12	0-10Vdc Heating OFF voltage (Temperature Control)**	0.1-10 Vdc	2.5	2.5	2.5	2.5	2.5	2.5
P.13	0-10Vdc Heating ON voltage (Temperature Control)**	0.1-10 Vdc	3.0	3.0	3.0	3.0	3.0	3.0
P.14	0-10Vdc Max. voltage (Temperature Control)**	0.1-10 Vdc	10	10	10	10	10	10
P.15	0-10Vdc Min. temperature (Temperature Control)**	0 ÷ 100°C	20	20	20	20	20	20
P.16	0-10Vdc Max. temperature (Temperature Control)**	0 ÷ 100°C	90	90	90	90	90	90
P.17	0-10Vdc Heating OFF voltage (Power Control)**	0.1-10 Vdc	2.5	2.5	2.5	2.5	2.5	2.5
P.18	0-10Vdc Heating ON voltage (Power Control)**	0.1-10 Vdc	3.0	3.0	3.0	3.0	3.0	3.0
P.19	0-10Vdc Max. power (Power Control)**	0.1-10 Vdc	10	10	10	10	10	10
P.20	0-10Vdc Min. power (Power Control)**	0-100%	0	0	0	0	0	0
P.21	0-10Vdc Max. power (Power Control)**	0-100%	100	100	100	100	100	100
P.22	Enable DHW Slave boiler (Autocascade)	OFF = Disabled, ON = Enabled	OFF	OFF	OFF	OFF	OFF	OFF
P.23	Continuous comfort Slave boiler (AX5200SQ)	OFF = Disabled, ON = Enabled	OFF	OFF	OFF	OFF	OFF	OFF

Notes

- * These parameters are active only when several systems are connected in cascade.
- ** These parameters are active only when the system operates with input 0-10Vdc.

3.2 Commissioning



Checks to be done at first lighting, and after all maintenance operations that involved disconnection from the systems or work on safety devices or parts of the boiler:

Before lighting the boiler

- Open any on-off valves between the boiler and the systems.
- Check the tightness of the gas system, proceeding with caution and using a soap and water solution to detect any leaks in connections.
- Check correct prefilling of the expansion tank (ref. sec. 4.3).
- Fill the water system and make sure all air contained in the boiler and the system has been vented, by opening the air vent valve on the boiler and any vent valves on the system.
- Fill the condensate trap and check correct connection of the condensate elimination system.
- Make sure there are no water leaks in the system, DHW circuits, connections or boiler.
- Check correct connection of the electrical system and efficiency of the earthing system
- Make sure the gas pressure value for heating is that required.
- Make sure there are no flammable liquids or materials in the immediate vicinity of the boiler



IF THE ABOVE INSTRUCTIONS ARE NOT OBSERVED THERE MAY BE RISK OF SUFFOCATION OR POISONING DUE TO GAS OR FUMES ESCAPING; DANGER OF FIRE OR EXPLOSION. ALSO, THERE MAY BE A RISK OF ELECTRIC SHOCK OR FLOODING THE ROOM.

Checks during operation

- Turn the unit on as described in sec. 1.3.
- Make sure the fuel circuit and water systems are tight.
- Check the efficiency of the flue and air-fume ducts while the boiler is working.
- Check the correct tightness and functionality of the condensate elimination system and trap.
- Make sure the water is circulating properly between the boiler and the systems.
- Make sure the gas valve modulates correctly in the heating and domestic hot water production phases.
- Check proper boiler lighting by doing several tests, turning it on and off with the room thermostat or remote control.
- Using a combustion analyser connected to the boiler fume outlet, check that the CO₂ content in the fumes, with the boiler operating at max. and min. output, corresponds to that given in the technical data table for the corresponding type of gas.
- Make sure the fuel consumption indicated on the meter matches that given in the technical data table on sec. 4.3.
- Check the correct programming of the parameters and carry out any necessary customization (compensation curve, power, temperatures, etc.).



3.3 Maintenance

Periodical inspection

To ensure proper operation of the unit, it is necessary to have an annual inspection carried out by qualified personnel, providing for the following:

- heat exchanger check and cleaning with suitable products if dirty or clogged
- check and possible cleaning of burner (do not use chemical products or wire brushes)



IMPORTANT: after cleaning the burner, be sure to position it by aligning the flange joint weld with the center of the peephole hole (see fig. 67).

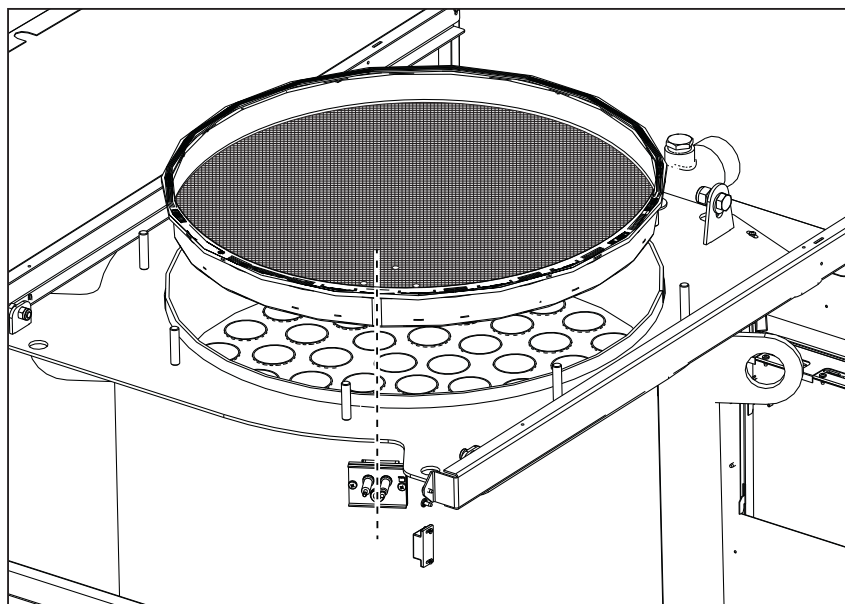


fig. 67 - Alignment of the burner

- check and cleaning of electrodes, which must be free of deposits and properly positioned
- seal and gasket check (burner, sealed chamber, etc.)
- check and cleaning of sludge remover filters and system filters
- check, cleaning and filling of condensate drain traps
- check of wiring, contacts, electrical actuators
- check and cleaning of generator air inlets and boiler room air intakes
- check and cleaning of fume evacuation duct-manifold-flue system.
- expansion tank check and prefilling
- check of correct and stable system water pressure, ensuring conformity with the required working pressure.



The use of automatic filling systems for reinstatement of operating conditions must provide for adequate treatment of the water (ref. *** 'System water characteristics' on page 155 ***)

- check of heating system water chemical and physical parameters (ref. *** 'System water characteristics' on page 155 ***)
- water and gas system tightness check
- check of correct and stable gas supply pressure to plant (20 mbar for operation with natural gas); any fluctuations or pressure drops below the declared value can create malfunctioning and stops with need for manual resetting.
- burner ignition and control and safety device check (gas valve, flowmeter, thermostats, etc.)
- circulating pump check, freeing when necessary
- fume analysis and check of combustion parameters



The casing, control panel and aesthetic parts of the boiler can be cleaned with a soft damp cloth, possibly soaked in soapy water. All abrasive detergents and solvents should be avoided.

Burner door opening

To access the burner observe the following instructions.

- Remove the cover and front panel (fig. 68).

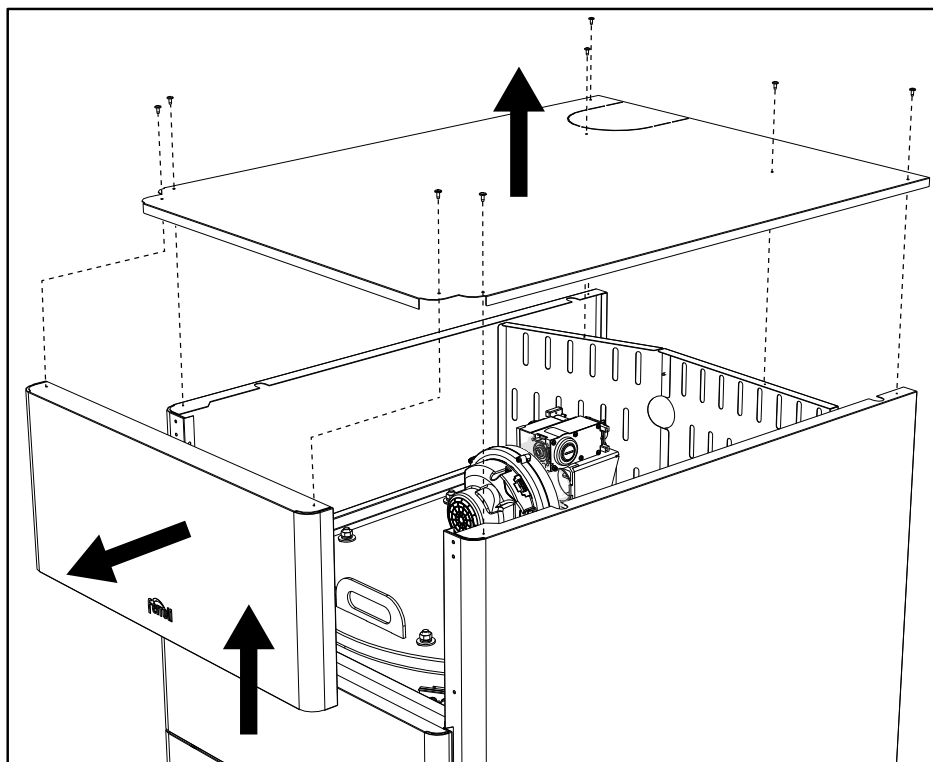


fig. 68

- Remove the rear panels (fig. 69).

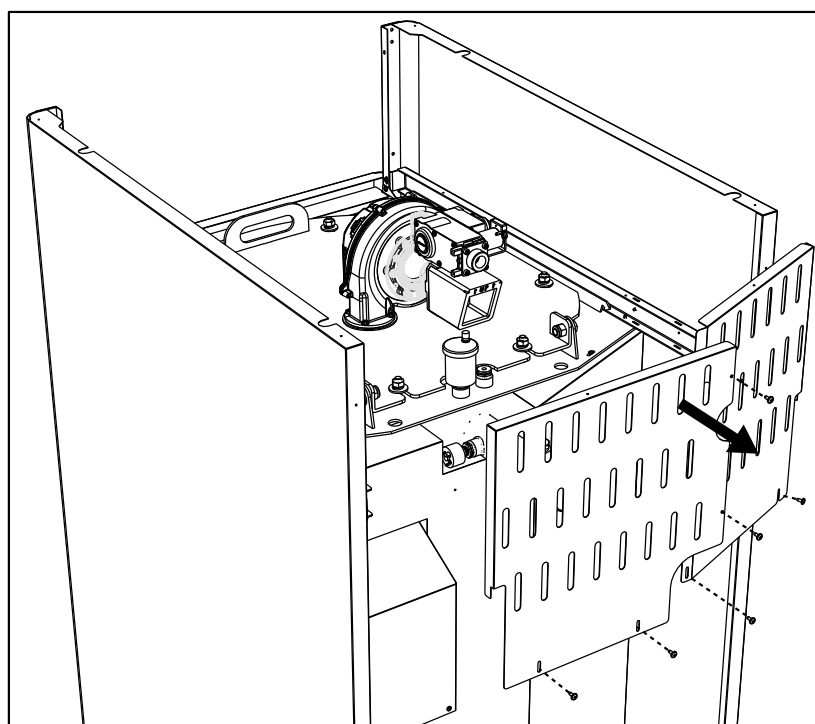


fig. 69



- Remove the nuts and washers (fig. 70).
6 for models **OPERA 70** and **125**.
8 for models **OPERA 160, 220, 320** and **450**.

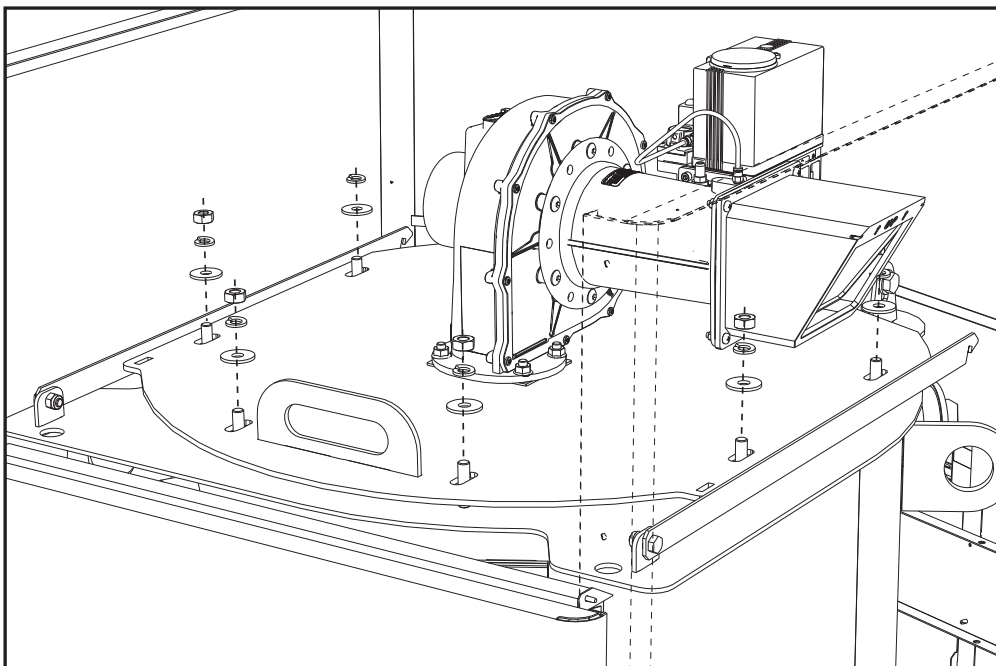


fig. 70

- Open the burner door and block it with the support brackets (fig. 71).
ONE for models **OPERA 70** and **125**.
TWO for models **OPERA 160, 220, 320** and **450**.

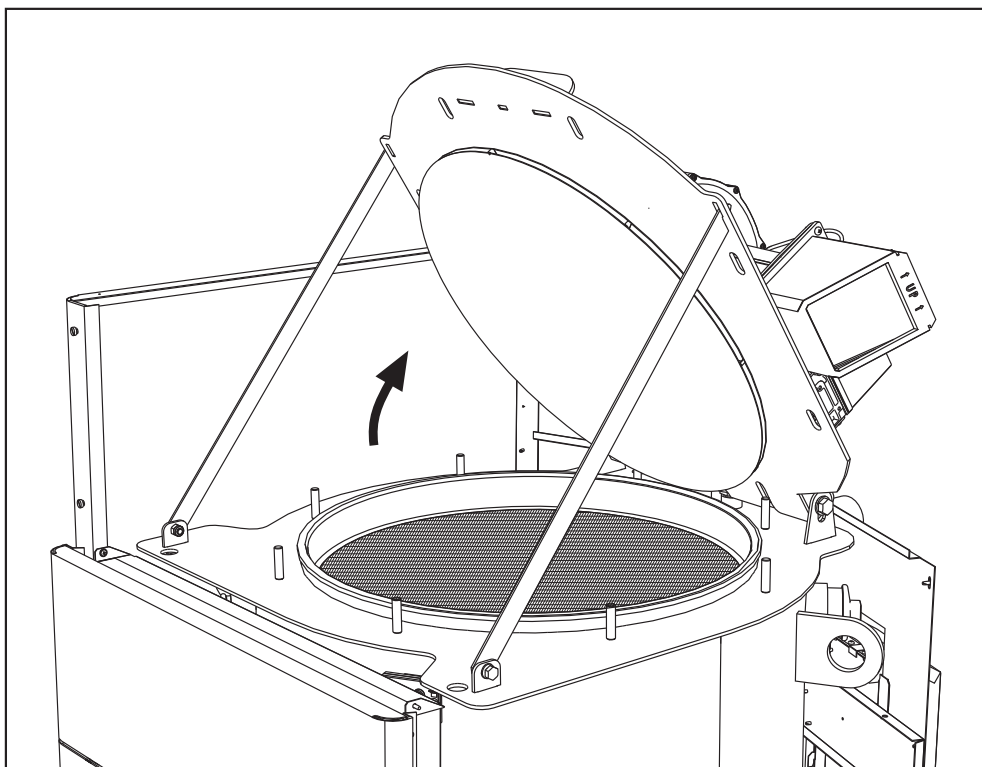


fig. 71

To close it, repeat these operations in reverse order.



Carefully tighten the nuts (fig. 72).

6 for models **OPERA 70** and **125**.

8 for models **OPERA 160, 220, 320** and **450**.

When finished check the perfect tightness of the gas circuit.

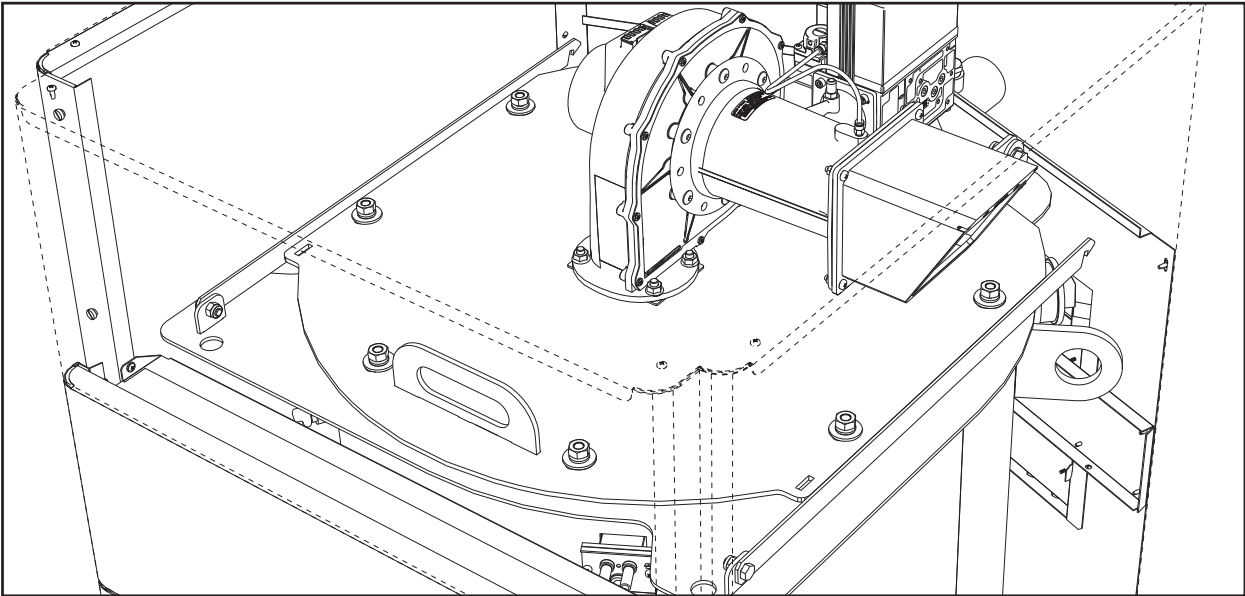


fig. 72

3.4 Troubleshooting

Diagnostics

The boiler is equipped with an advanced self-diagnosis system. In case of a boiler fault, the display lights up indicating the fault code and, in case of cascade connection, the module number.

- There are faults that cause permanent shutdowns which can be reset by pressing the **OK** button for one second or with the **RESET** button on the remote timer control (optional) if installed. If the boiler fails to restart after resetting, it is necessary to eliminate the fault first.
- Other faults cause temporary shutdowns which are automatically reset as soon as the value returns within the boiler's normal working range.

Table of faults

Table 8- List of faults

Fault code	Fault	Possible cause	Cure
01	No burner ignition	No gas	Check the regular gas flow to the boiler and that the air has been eliminated from the pipes
		Ignition/detection electrode fault	Check the wiring of the electrode and that it is correctly positioned and free of any deposits
		Faulty gas valve	Check the gas valve and replace it if necessary
		Insufficient gas supply pressure	Check the gas supply pressure
		Trap blocked	Check the trap and clean it if necessary
02	Flame present signal with burner off	Electrode fault	Check the ionization electrode wiring
		Card fault	Check the card



Fault code	Fault	Possible cause	Cure
03	Overtemperature protection intervention	No water circulation in the system	Check the circulating pump
		Air in the system	Vent the system
04	Fume extraction duct safety device intervention	Fault 07 generated 3 times in the last 24 hours	See fault 07
05	Fan protection intervention	Fault 15 generated for 1 hour consecutive	See fault 15
06	No flame after ignition phase (6 times in 4 minutes)	Ionization electrode fault	Check the position of the ionization electrode and replace it if necessary
		Flame unstable	Check the burner
		Gas valve Offset fault	Check the Offset adjustment at minimum power
		air/fume ducts obstructed	Remove the obstruction from the flue, fume extraction ducts, air inlet and terminals
		Trap blocked	Check the trap and clean it if necessary
07	High fume temperature	Exchanger dirty	Clean the exchanger
		Exchanger deteriorated	Check the integrity of exchanger
		Sensor does not indicate the correct temperature	Check the fume sensor or replace it
08	Heating sensor 1 (flow) overtemperature indication (Viewable only in History Menu)	insufficient system water circulation	check water circulation
09	Return sensor overtemperature indication (Viewable only in History Menu)	insufficient system water circulation	check water circulation
10	Heating sensor 1 (flow) fault	Sensor damaged	Check the wiring or replace the sensor
		Wiring shorted	
		Wiring disconnected	
11	Return sensor fault	Sensor damaged	Check the wiring or replace the sensor
		Wiring shorted	
		Wiring disconnected	
12	DHW sensor fault	Sensor damaged	Check the wiring or replace the sensor
		Wiring shorted	
		Wiring disconnected	
13	Fume sensor fault	Sensor damaged	Check the wiring or replace the sensor
		Wiring shorted	
		Wiring disconnected	
14	Heating sensor 2 (Safety) fault	Sensor damaged	Check the wiring or replace the sensor
		Wiring shorted	
		Wiring disconnected	
15	Fan fault	No 230V power supply	Check the 3-pin connector wiring
		Tachometric signal interrupted	Check the 5-pin connector wiring
		Fan damaged	Check the fan
26	RESET button on controller on gas valve, fault.	RESET button on controller fitted on gas valve blocked or faulty.	Check the RESET button and replace the controller on the gas valve if necessary.
34	Supply voltage under 170V	Electric mains trouble	Check the electrical system

Fault code	Fault	Possible cause	Cure
35	Faulty mains frequency	Electric mains trouble	Check the electrical system
37	Pressure switch contact open	Low system pressure	Check the system water pressure
39	External probe fault	Probe damaged or wiring shorted	Check the wiring or replace the sensor
		Probe disconnected after activating the sliding temperature	Reconnect the external probe or disable the sliding temperature
41	No +/-1°C variation of flow sensor	Flow sensor disconnected from pipe	Check the correct positioning and operation of flow sensor
42	Protection for temperature difference > 21° between flow sensor and safety sensor	Insufficient circulation in boiler	Check boiler/system water circulation
		Incorrect flow sensor position	Check the integrity of sensor
50	Cascade temperature sensor fault	Sensor damaged	Check the wiring or replace the sensor
		Wiring shorted	
		Wiring disconnected	
52	Protection for temperature difference > 18° between flow sensor and safety sensor	Insufficient circulation in boiler	Check boiler/system water circulation
			Check the integrity of flow and safety sensor
61	Controller fault	Controller internal error	Check the ground connection and replace the controller if necessary.
62	No communication between controller and gas valve	Controller not connected	Connect the controller to the gas valve
		Valve damaged	Replace the valve
63 64 65 66	Controller fault	Controller internal error	Check the ground connection and replace the controller if necessary
99	No communication between controller and display	Wiring disconnected	Check the wiring of the 6 wires between controller and display



4. Technical data and characteristics

Legend of figures cap. 4 "Technical data and characteristics"

7	Gas inlet
10	System flow
16	Fan
32	Heating circulating pump (not supplied)
36	Automatic air vent
44	Gas valve
72	Room thermostat (not supplied)
72b	Second room thermostat (not supplied)
81	Ignition electrode
82	Detection electrode
95	3-way valve - 2 wires (not supplied)
	A = Heating phase
	B = Neutral
98	Switch
114	Water pressure switch
130	DHW circulating pump (not supplied)
138	External probe (not supplied)
139	Remote timer control (not supplied)
154	Condensate drain pipe
155	Hot water tank temperature probe (not supplied)
186	Return sensor
188	Ignition/Ionization electrode
191	Fume temperature sensor
220	Ignition card
256	Modulating heating circulating pump signal
275	Heating system drain cock
278	Double sensor (Safety + Heating)
298	Cascade temperature sensor (not supplied)
299	Input 0-10 Vdc
300	Burner lit contact (voltage-free contact)
301	Fault contact (voltage-free contact)
302	Remote reset input (230 Volt)
306	Heating system circulating pump (not supplied)
307	Heating system second circulating pump (not supplied)
321	Low temperature return
346	High temperature return
348	3-way valve - 3 wires (not supplied)
	A = Heating phase
	B = Neutral
	C = DHW phase
357	Faulty contact (230 Vac)
361	Cascade connection of next module
362	Cascade connection of previous module
363	MODBUS communication

4.1 Dimensions, connections and main components

Views for the model 70

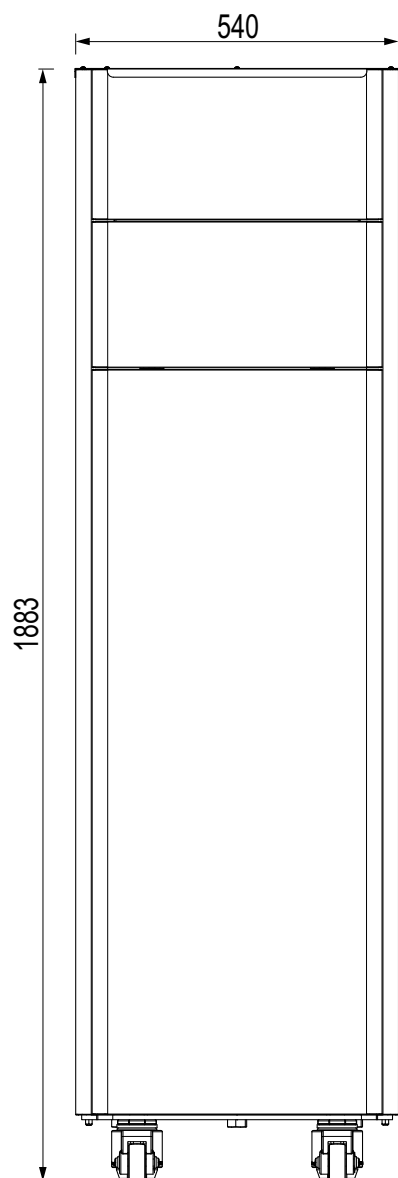


fig. 73- Front

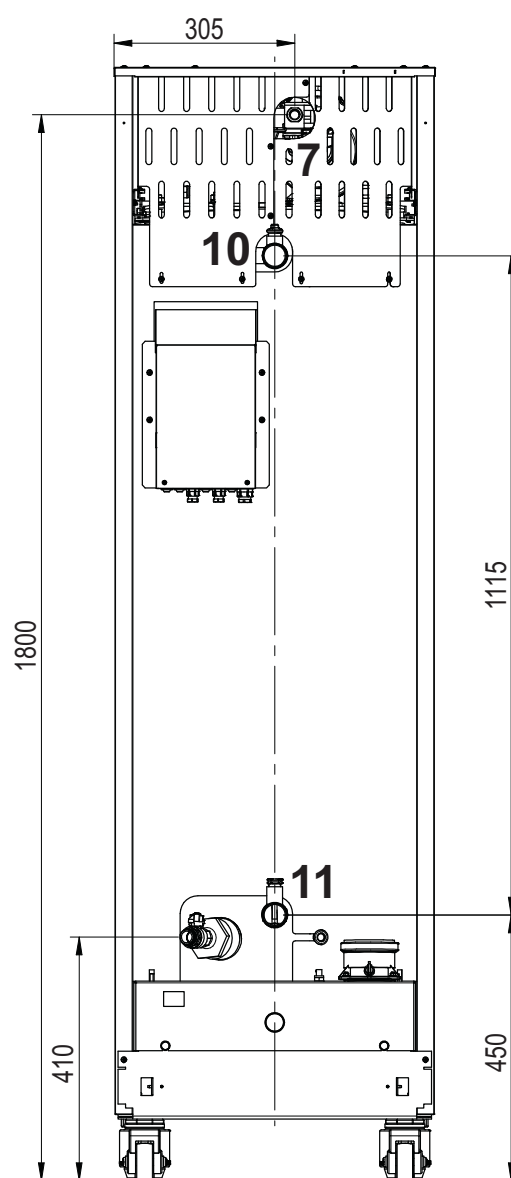


fig. 74- Rear

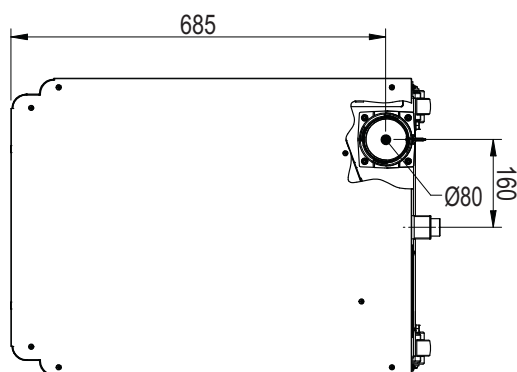


fig. 75- Top



Views for the model 125

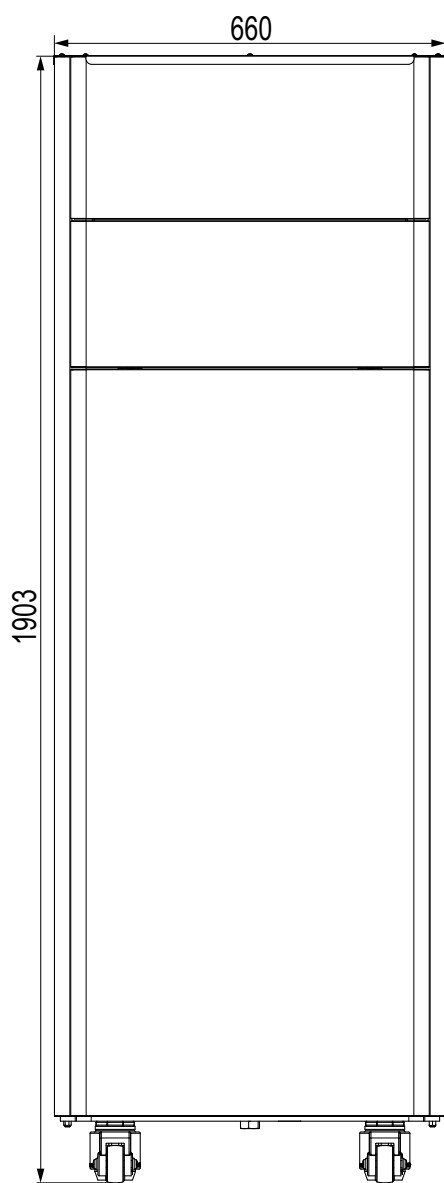


fig. 76- front

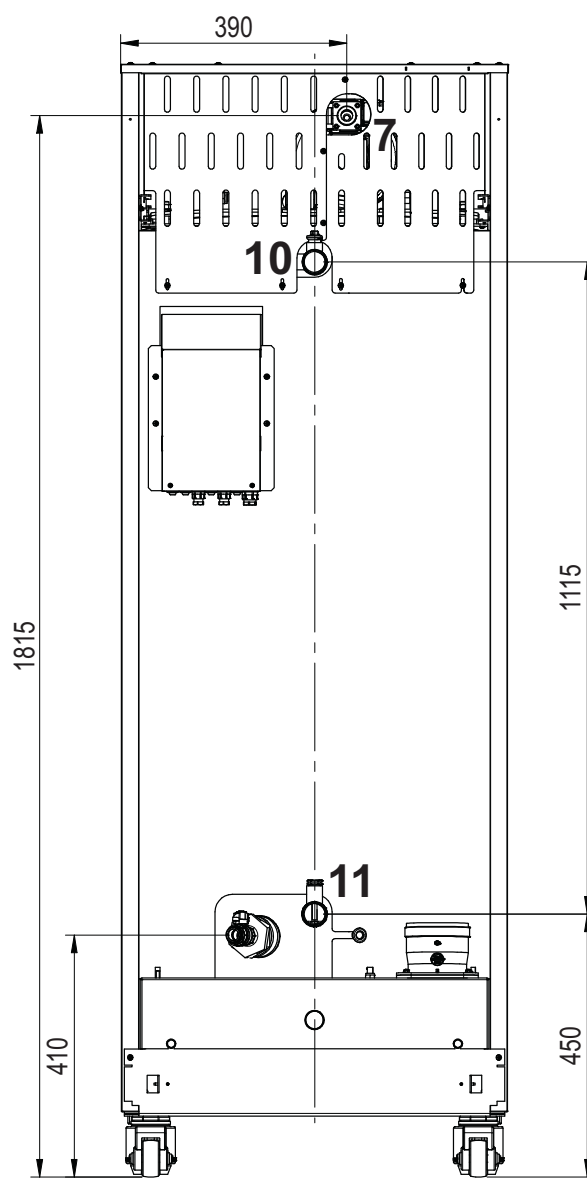


fig. 77- rear

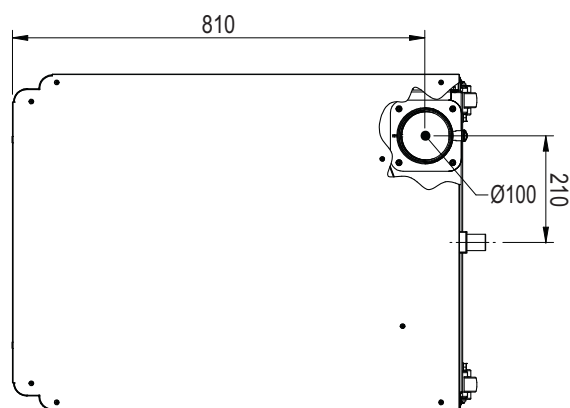


fig. 78- top

Views for the model 160 and 220

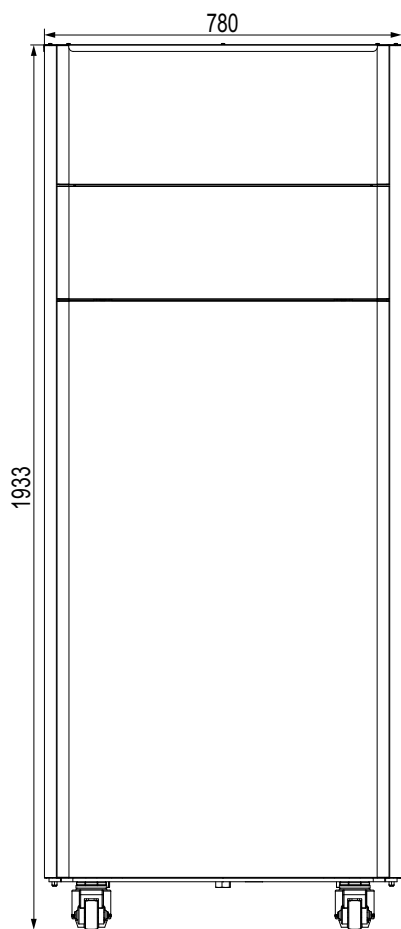


fig. 79- front

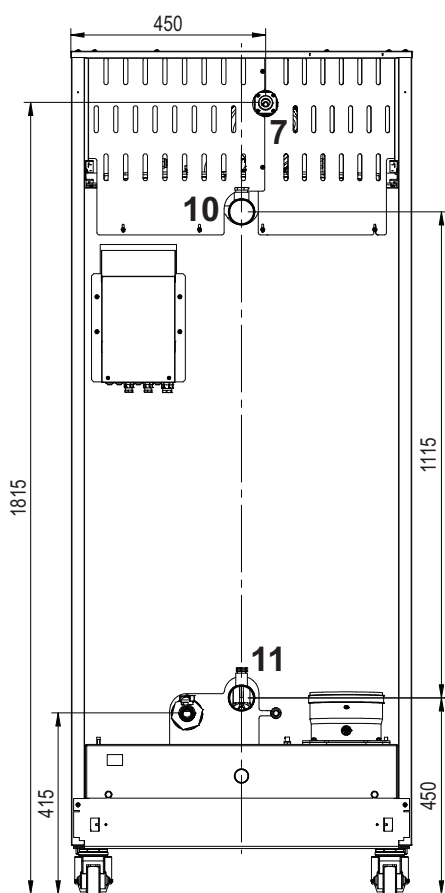


fig. 80- rear 160

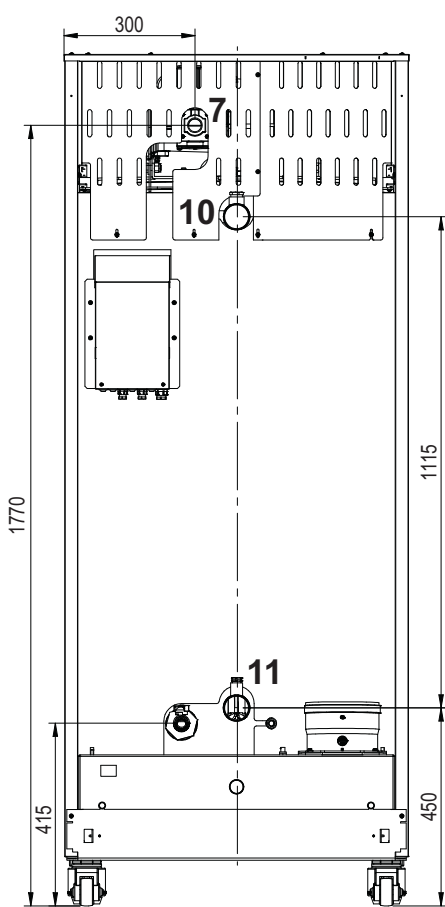


fig. 81- rear 220

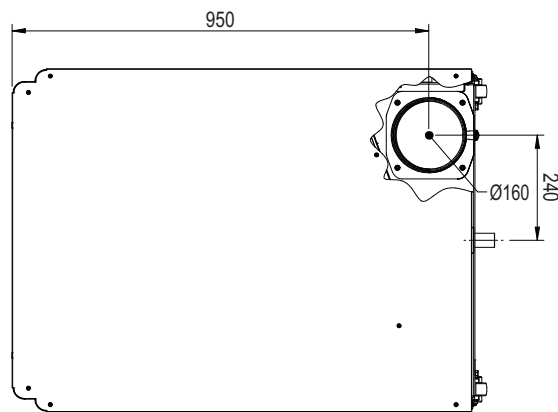


fig. 82- top

Views for the model 320

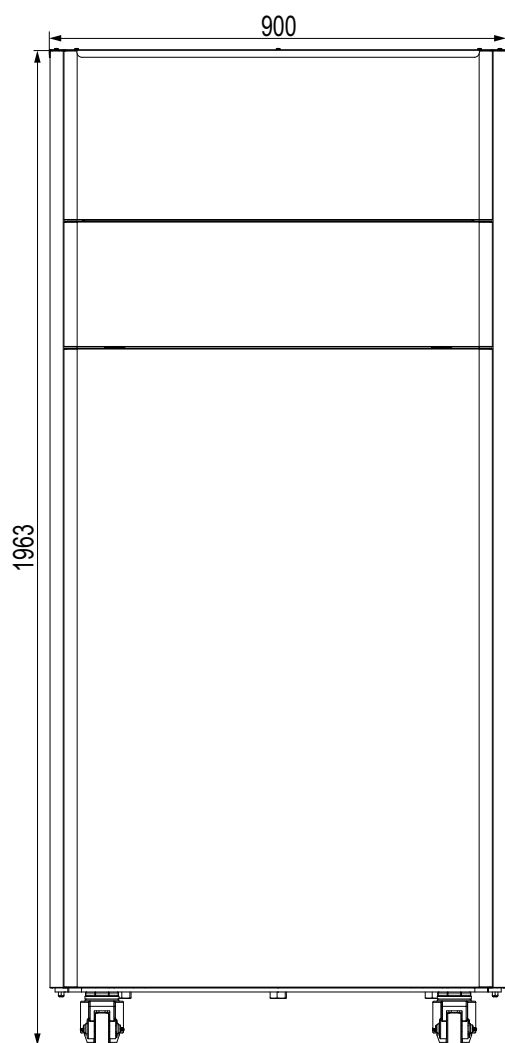


fig. 83- Front view model 320

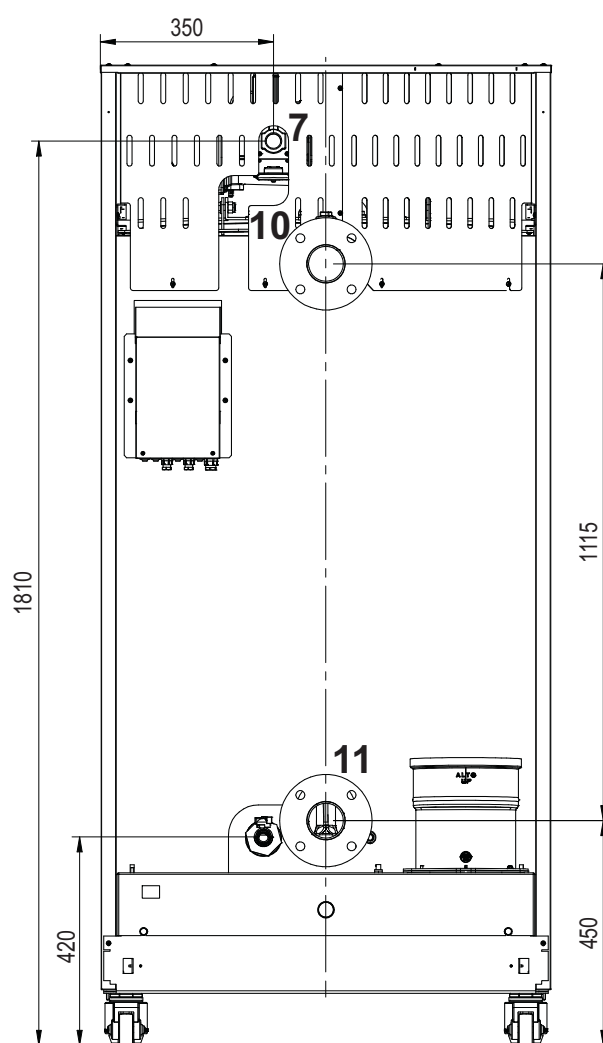


fig. 84- Rear view model 320

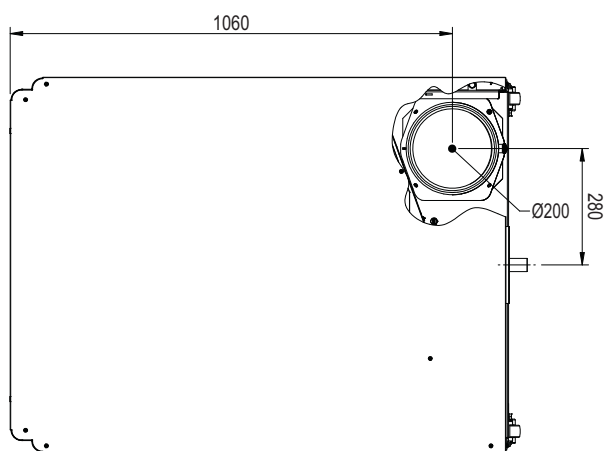


fig. 85- Top view model 320

Views for the model 450

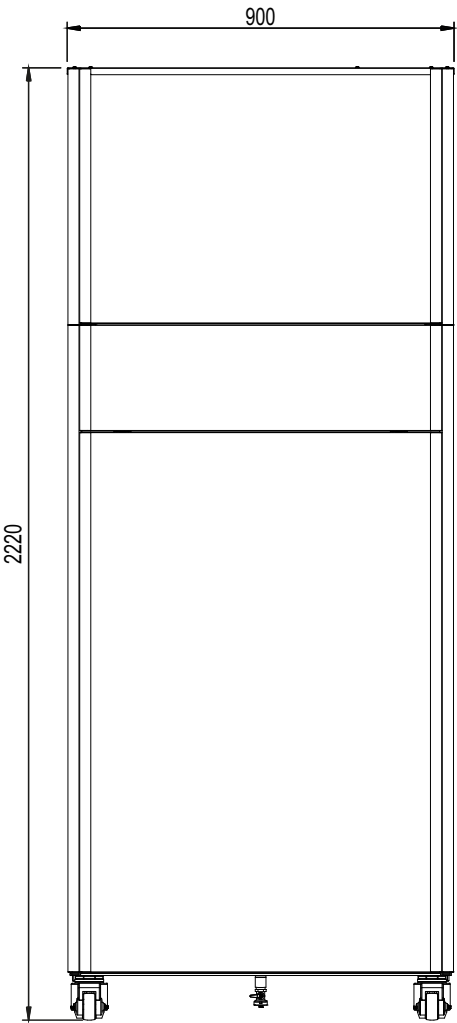


fig. 86- Front view model 450

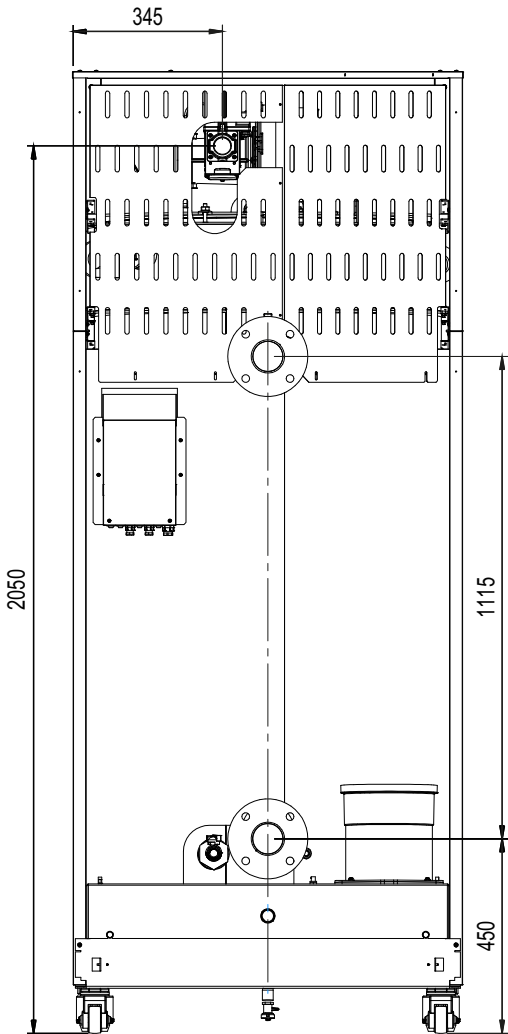


fig. 87- Rear view model 450

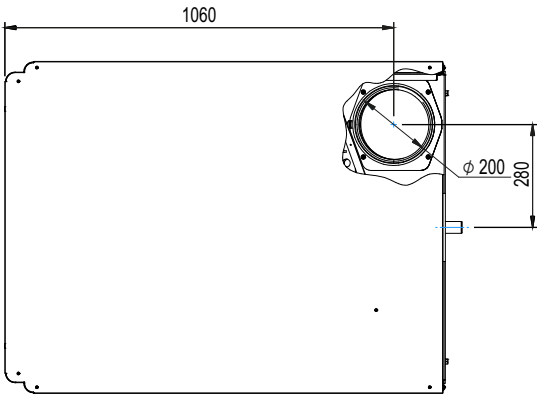


fig. 88- Top view model 450



4.2 Hydraulic circuit

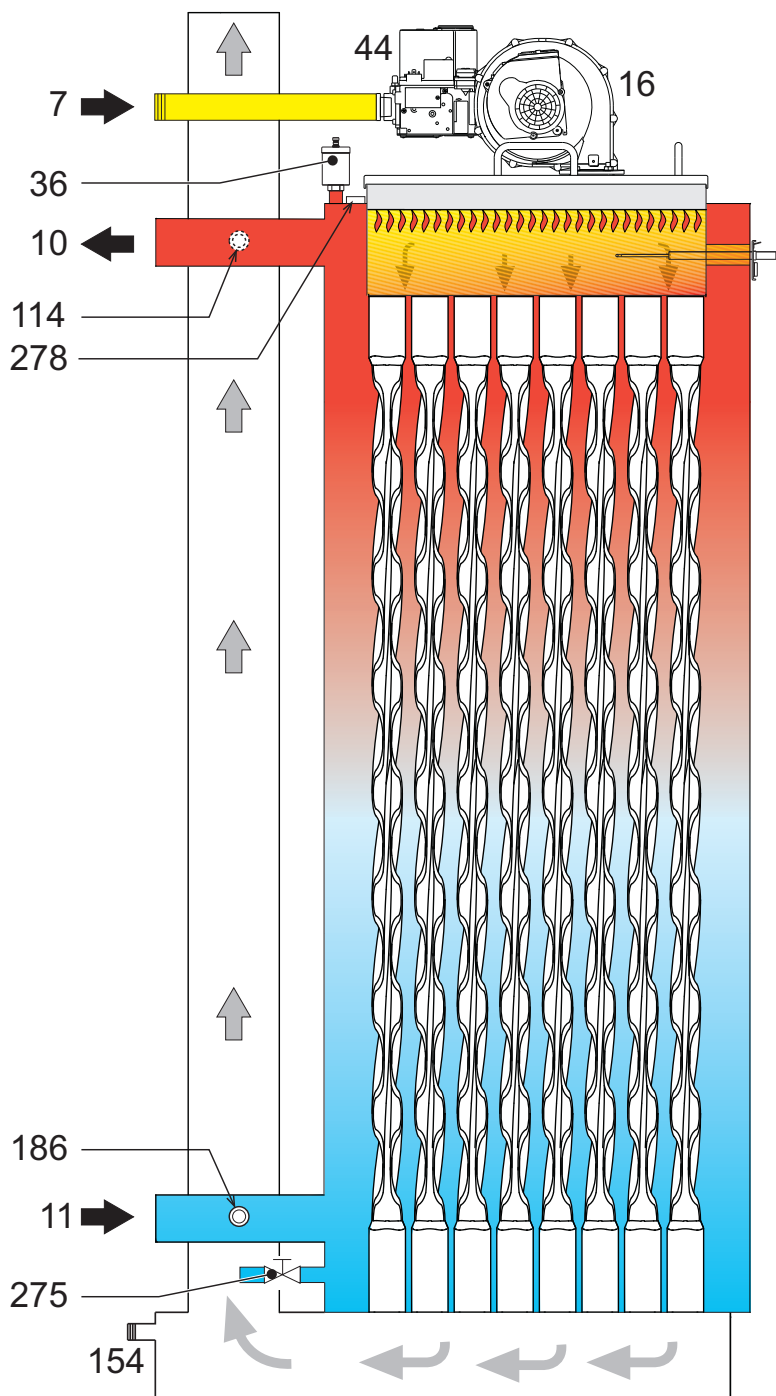


fig. 89- Hydraulic circuit

4.3 Technical data table

The column on the right gives the abbreviation used on the data plate.

0RBM4AWA	OPERA 70
0RBM7AWA	OPERA 125
0RBM8AWA	OPERA 160

COUNTRIES OF DESTINATION		IT ES RU						
GAS CATEGORY		II2H3B/P (IT) II2H3P (ES) II2H3B/P (RU)						
PRODUCT IDENTIFICATION CODES		0RBM4AWA		0RBM7AWA		0RBM8AWA		
Max. heating capacity	kW	65,5		116,0		150,0		Qn
Min. heating capacity	kW	14,0		23,0		41,0		Qn
Max. heat output in heating (80/60 °C)	kW	64,4		114,0		147,6		Pn
Min. heat output in heating (80/60 °C)	kW	13,7		22,5		40,2		Pn
Max. heat output in heating (50/30 °C)	kW	70,0		123,9		160,2		Pn
Min. heat output in heating (50/30 °C)	kW	15,1		24,8		44,2		Pn
Efficiency Pmax (80/60 °C)	%	98,3		98,3		98,4		
Efficiency Pmin (80/60 °C)	%	98,0		98,0		98,0		
Efficiency Pmax (50/30 °C)	%	106,8		106,8		106,8		
Efficiency Pmin (50/30 °C)	%	107,7		107,7		107,7		
Efficiency 30%	%	109,7		109,7		109,5		
Flue losses with burner ON (80/60 °C) - Pmax / Pmin	%	2,30	2,00	1,70	1,30	1,70	1,30	
Shell losses with burner ON (80/60 °C) - Pmax / Pmin	%	0,04	1,30	0,04	1,30	0,03	1,30	
Flue losses with burner ON (50/30 °C) - Pmax / Pmin	%	1,10	0,70	1,10	0,70	1,20	0,60	
Shell losses with burner ON (50/30 °C) - Pmax / Pmin	%	0,04	0,70	0,03	0,70	0,02	0,70	
Flue losses with burner OFF (50K / 20K)	%	0,03	0,01	0,03	0,01	0,02	0,01	
Shell losses with burner OFF (50K / 20K)	%	0,26	0,10	0,23	0,09	0,21	0,08	
Fume temperature (80/60 °C) - Pmax / Pmin	°C	68	60	66	60	67	61	
Fume temperature (50/30 °C) - Pmax / Pmin	°C	43	33	43	32	45	31	
Temperature of overheating combustion products	°C	110,0		110,0		110,0		
Fume flow rate - Pmax / Pmin	g/s	29,7	6,7	52,7	11,1	68,1	19,8	
Gas supply pressure G20	mbar	20		20		20		
Gas nozzle G20	Ø	6,7		9,4		9,4		
Gas flow rate G20 - Max / min	m3/h	6,9	1,5	12,3	2,4	15,9	4,3	
CO2 - G20	%	9,3±0,3		9,3±0,3		9,3±0,3		
CO - G20 - Max / min	mg/kWh	28	1	30	2	15	1	
Gas supply pressure G31	mbar	37		37		37		
Gas nozzle G31	Ø	5,2		7,4		7,2		
Gas flow rate G31 - Max / min	kg/h	5,1	1,1	9,1	1,8	11,7	3,2	
CO2 - G31	%	10,5±0,3		10,5±0,3		10,5±0,3		
CO - G31 - Max / min	mg/kWh	23	1	26	1	20	1	
NOx emissions class	-	6 (< 56 mg/kWh)						NOx
Max. working pressure in heating	bar	6,0		6,0		6,0		PMS
Min. working pressure in heating	bar	0,5		0,5		0,5		
Heating adjustment max. temperature	°C	95		95		95		tmax
Heating water content	liters	166,0		265,0		386,0		
Heating expansion vessel capacity	liters	/		/		/		
Heating expansion vessel precharge pressure	bar	/		/		/		
Protection rating	IP	IPX0D		IPX0D		IPX0D		
Power supply voltage	V/Hz	230V~50HZ						
Electrical power input	W	105		200		200		W
Empty weight	kg	230,0		280,0		400,0		
Type of unit								B23

These boilers can work correctly with a minimum flow rate of 0 liters/h.

The column on the right gives the abbreviation used on the data plate.

0RBMAAWA	OPERA 220
0RBMDAWA	OPERA 320
0RBMGAWA	OPERA 450

COUNTRIES OF DESTINATION		IT ES RU						
GAS CATEGORY		II2H3B/P (IT) II2H3P (ES) II2H3B/P (RU)						
PRODUCT IDENTIFICATION CODES		0RBMAAWA		0RBMDAWA		0RBMGAWA		
Max. heating capacity	kW	207,0		299,0		420,0		Qn
Min. heating capacity	kW	41,0		62,0		80,0		Qn
Max. heat output in heating (80/60 °C)	kW	203,7		294,4		412,7		Pn
Min. heat output in heating (80/60 °C)	kW	40,2		60,8		78,4		Pn
Max. heat output in heating (50/30 °C)	kW	221,1		319,3		448,6		Pn
Min. heat output in heating (50/30 °C)	kW	44,2		66,8		86,2		Pn
Efficiency Pmax (80/60 °C)	%	98,4		98,4		98,3		
Efficiency Pmin (80/60 °C)	%	98,0		98,0		98,0		
Efficiency Pmax (50/30 °C)	%	106,8		106,8		106,8		
Efficiency Pmin (50/30 °C)	%	107,7		107,7		107,7		
Efficiency 30%	%	109,5		109,7		109,3		
Flue losses with burner ON (80/60 °C) - Pmax / Pmin	%	1,70	1,30	2,30	2,10	1,70	1,30	
Shell losses with burner ON (80/60 °C) - Pmax / Pmin	%	0,02	1,30	0,01	1,30	0,01	1,30	
Flue losses with burner ON (50/30 °C) - Pmax / Pmin	%	1,20	0,60	1,20	0,60	1,20	0,60	
Shell losses with burner ON (50/30 °C) - Pmax / Pmin	%	0,01	0,70	0,01	0,70	0,01	0,70	
Flue losses with burner OFF (50K / 20K)	%	0,02	0,01	0,01	0,01	0,01	0,00	
Shell losses with burner OFF (50K / 20K)	%	0,15	0,06	0,12	0,05	0,11	0,04	
Fume temperature (80/60 °C) - Pmax / Pmin	°C	67	61	67	61	67	61	
Fume temperature (50/30 °C) - Pmax / Pmin	°C	45	31	45	31	45	31	
Temperature of overheating combustion products	°C	110,0		110,0		110,0		
Fume flow rate - Pmax / Pmin	g/s	94,0	19,8	139,8	30,5	196,3	39,3	
Gas supply pressure G20	mbar	20		20		20		
Gas nozzle G20	Ø	15,5		17		17		
Gas flow rate G20 - Max / min	m3/h	21,9	4,3	31,6	6,6	44,4	8,5	
CO2 - G20	%	9,3±0,3		9,0±0,3		9,0±0,3		
CO - G20 - Max / min	mg/kWh	40	2	35	3	13	1	
Gas supply pressure G31	mbar	37		37		37		
Gas nozzle G31	Ø	11,5		12,5				
Gas flow rate G31 - Max / min	kg/h	16,2	3,2	23,4	4,9	32,9	6,3	
CO2 - G31	%	10,5±0,3		10,5±0,3		10,5±0,3		
CO - G31 - Max / min	mg/kWh	52	2	36	3	43	2	
NOx emissions class	-	6 (< 56 mg/kWh)						NOx
Max. working pressure in heating	bar	6,0		6,0		6,0		PMS
Min. working pressure in heating	bar	0,5		0,5		0,5		
Heating adjustment max. temperature	°C	95		95		95		tmax
Heating water content	liters	386,0		530,0		561,0		
Heating expansion vessel capacity	liters	/		/		/		
Heating expansion vessel precharge pressure	bar	/		/		/		
Protection rating	IP	IPX0D		IPX0D		IPX0D		
Power supply voltage	V/Hz	230V~50HZ						
Electrical power input	W	260		330		800		W
Empty weight	kg	400,0		500,0		550,0		
Type of unit		B23						

These boilers can work correctly with a minimum flow rate of 0 liters/h.

4.4 ErP tables

ErP product fiche

MODEL: OPERA 70 (ORB4AWA)
MODEL: OPERA 125 (ORB7AWA)
MODEL: OPERA 160 (ORB8AWA)

ORB4AWA
ORB7AWA
ORB8AWA

TRADEMARK: FERROLI						
Condensing boiler				YES	YES	YES
Low-temperature boiler (**)				YES	YES	YES
B1 Boiler				NO	NO	NO
Combination heater				NO	NO	NO
Cogeneration space heater				NO	NO	NO
Item	SYMBOL	UNIT	VALUE			
Seasonal space heating energy efficiency class (from A+++ to D)			A	A	A	
Rated heat output	P _n	kW	64	114	148	
Seasonal space heating energy efficiency	η _s	%	94	94	94	
Useful heat output						
Useful heat output at rated heat output and high-temperature regime (*)	P ₄	kW	64,4	114,0	147,6	
Useful heat output at 30% of rated heat output and low-temperature regime (**)	P ₁	kW	13,1	24,2	44,5	
Useful efficiency						
Useful heat output at rated heat output and high-temperature regime (*)	η ₄	%	88,5	88,5	88,6	
Useful heat output at 30% of rated heat output and low-temperature regime (**)	η ₁	%	98,7	98,8	98,6	
Auxiliary electricity consumption						
At full load	el _{max}	kW	0,105	0,200	0,250	
At part load	el _{min}	kW	0,019	0,025	0,035	
In standby mode	PSB	kW	0,003	0,003	0,003	
Other items						
Standby heat loss	P _{stby}	kW	0,190	0,300	0,350	
Ignition burner power consumption	P _{ign}	kW	0,000	0,000	0,000	
Annual energy consumption	Q _{HE}	GJ	120	210	290	
Sound power level	L _{WA}	dB	58	62	68	
Emissions of nitrogen oxides	NO _x	mg/kWh	18	17	22	

(*) 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).

ErP product fiche

MODEL: OPERA 220 (ORBMAAWA)
MODEL: OPERA 320 (ORBMDAWA)
MODEL: OPERA 450 (ORBMGAWA)

ORBMAAWA
ORBMDAWA
ORBMGAWA

TRADEMARK: FERROLI					
Condensing boiler			YES	YES	YES
Low-temperature boiler (**)			YES	YES	YES
B1 Boiler			NO	NO	NO
Combination heater			NO	NO	NO
Cogeneration space heater			NO	NO	NO
Item	SYMBOL	UNIT	VALUE		
Rated heat output	P _n	kW	204	294	413
Seasonal space heating energy efficiency	η _s	%	94	94	93
Useful heat output					
Useful heat output at rated heat output and high-temperature regime (*)	P ₄	kW	203,7	294,4	412,7
Useful heat output at 30% of rated heat output and low-temperature regime (**)	P ₁	kW	41,6	60,6	81,6
Useful efficiency					
Useful heat output at rated heat output and high-temperature regime (*)	η ₄	%	88,6	88,7	88,5
Useful heat output at 30% of rated heat output and low-temperature regime (**)	η ₁	%	98,6	98,8	98,4
Auxiliary electricity consumption					
At full load	el _{max}	kW	0,260	0,330	0,800
At part load	el _{min}	kW	0,037	0,043	0,200
In standby mode	PSB	kW	0,003	0,003	0,003
Other items					
Standby heat loss	P _{stby}	kW	0,350	0,400	0,500
Ignition burner power consumption	P _{ign}	kW	0,000	0,000	0,000
Annual energy consumption	Q _{HE}	GJ	375	544	754
Sound power level	L _{WA}	dB	72	76	77
Emissions of nitrogen oxides	NO _x	mg/kWh	22	20	33

(*) 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).

4.5 Diagrams

Pressure loss

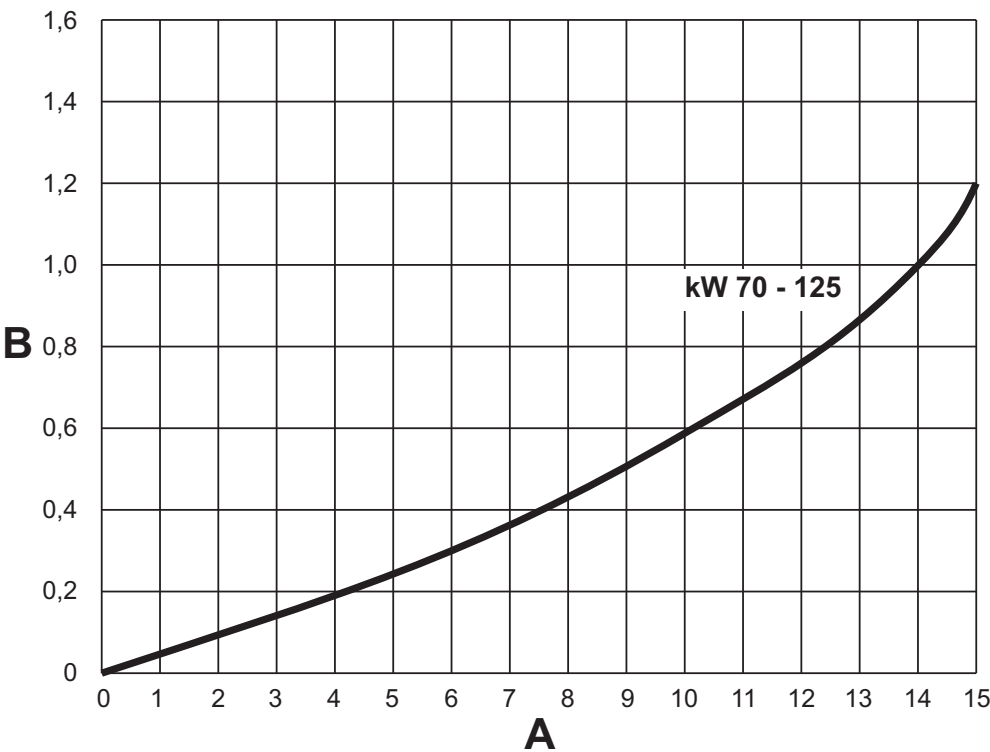


fig. 90 - Pressure loss diagram models 70 - 125

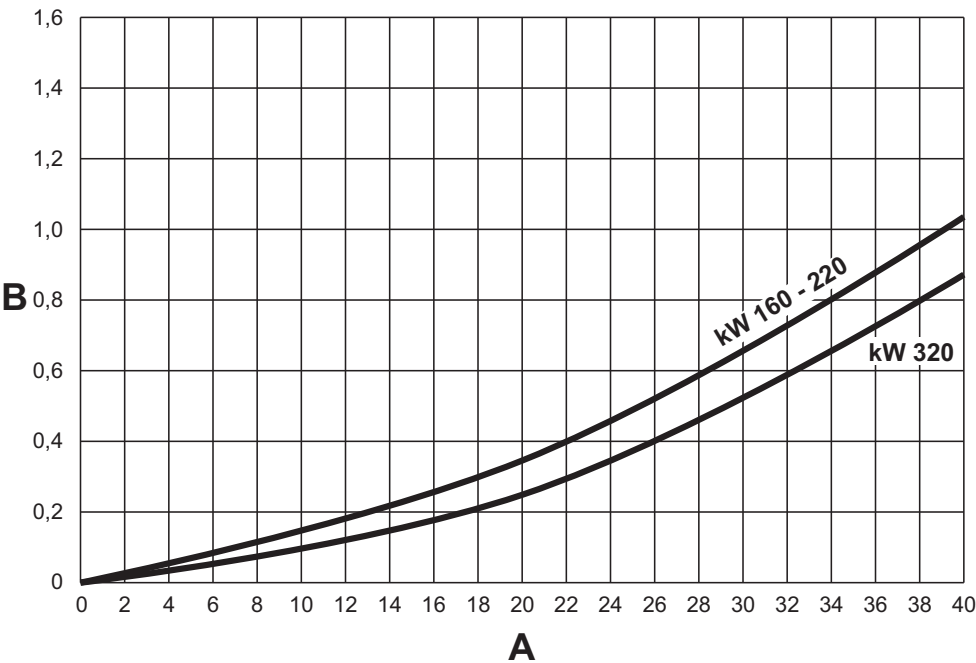


fig. 91 - Pressure loss diagram models 220, 320 and 450

A Flow rate - m³/h
B m H₂O



4.6 Wiring diagrams

ATTENTION: Remove the jumper on the terminal block before connecting the room thermostat or remote timer control.

ATTENTION: To connect the 3-way valve (terminals 13 - 14 - 15), refer to the diagrams of fig. 92 and fig. 93.

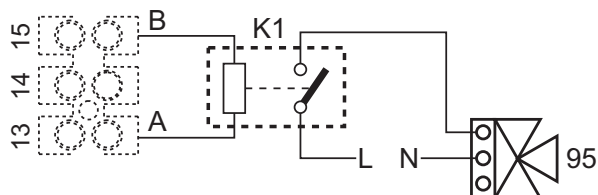


fig. 92- Connection of the 3-way valve with 2 wires

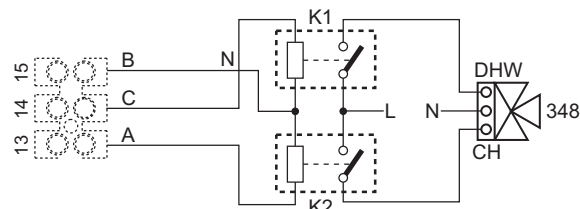


fig. 93- Connection of the 3-way valve with 3 wires

ATTENTION: In case of instability in the reading of the 0-10V signal by the electronic controller, it is advisable to connect the signal reference to ground, and insert a 10K resistor in parallel, as per fig. 94.

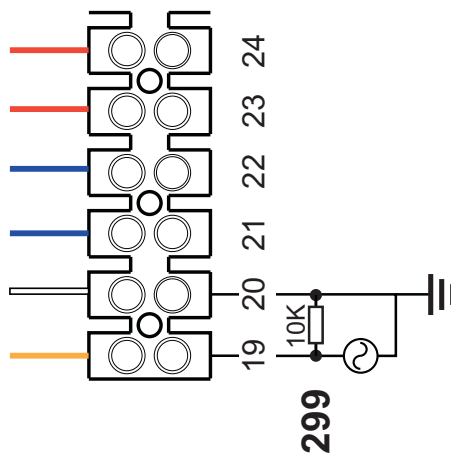


fig. 94-

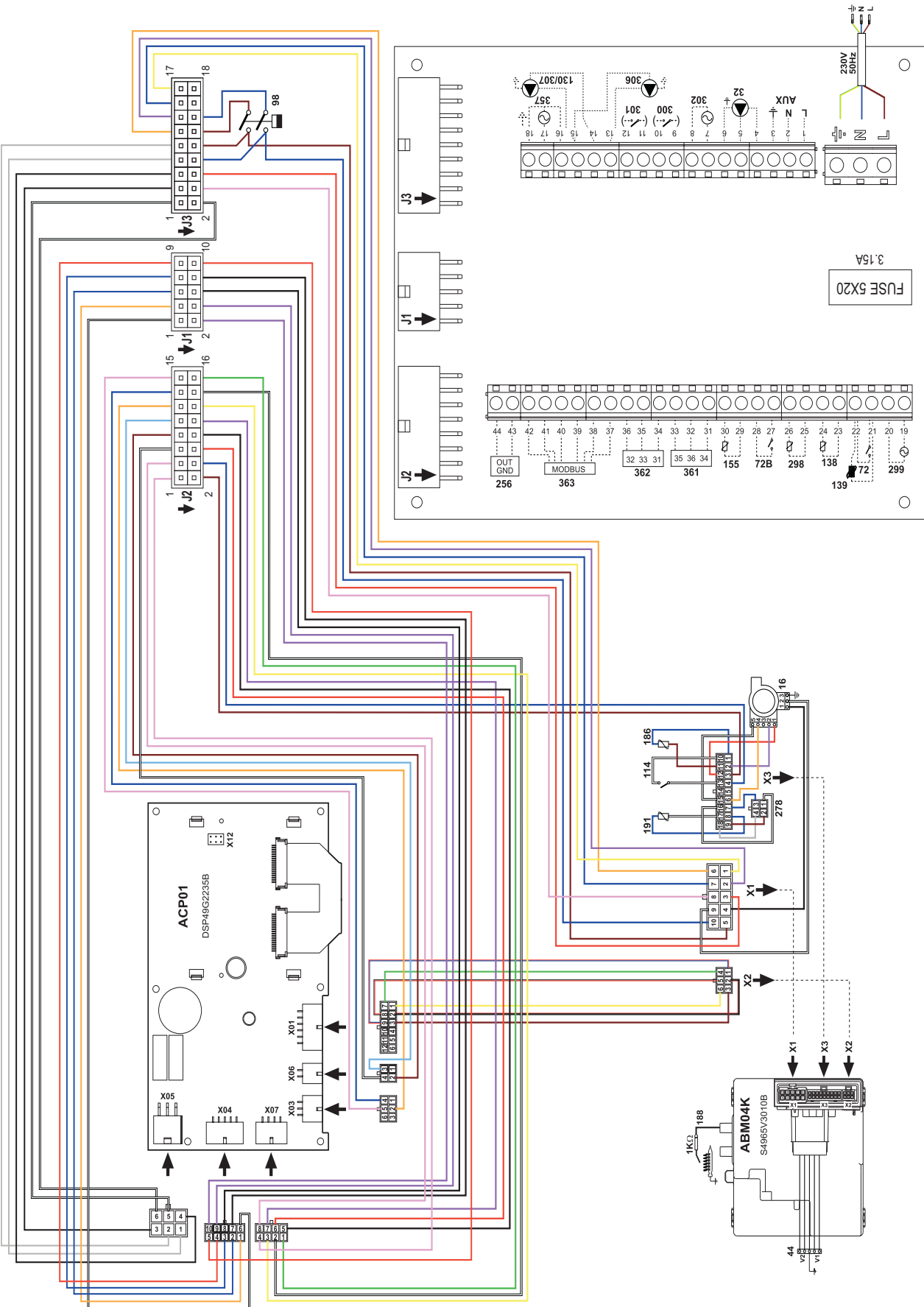


fig. 95- Wiring diagram OPERA 70

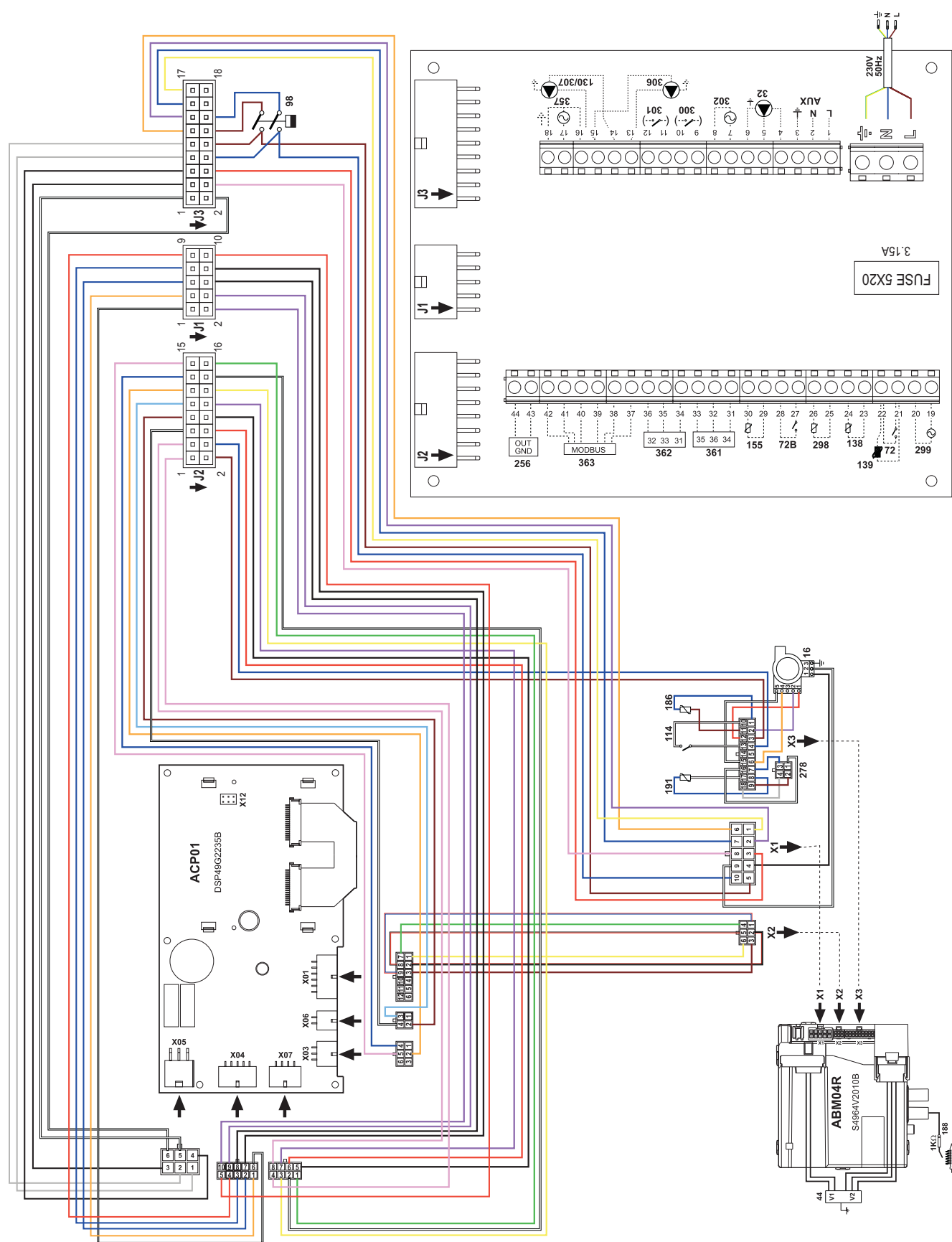


fig. 96- Wiring diagram OPERA 125 and 160

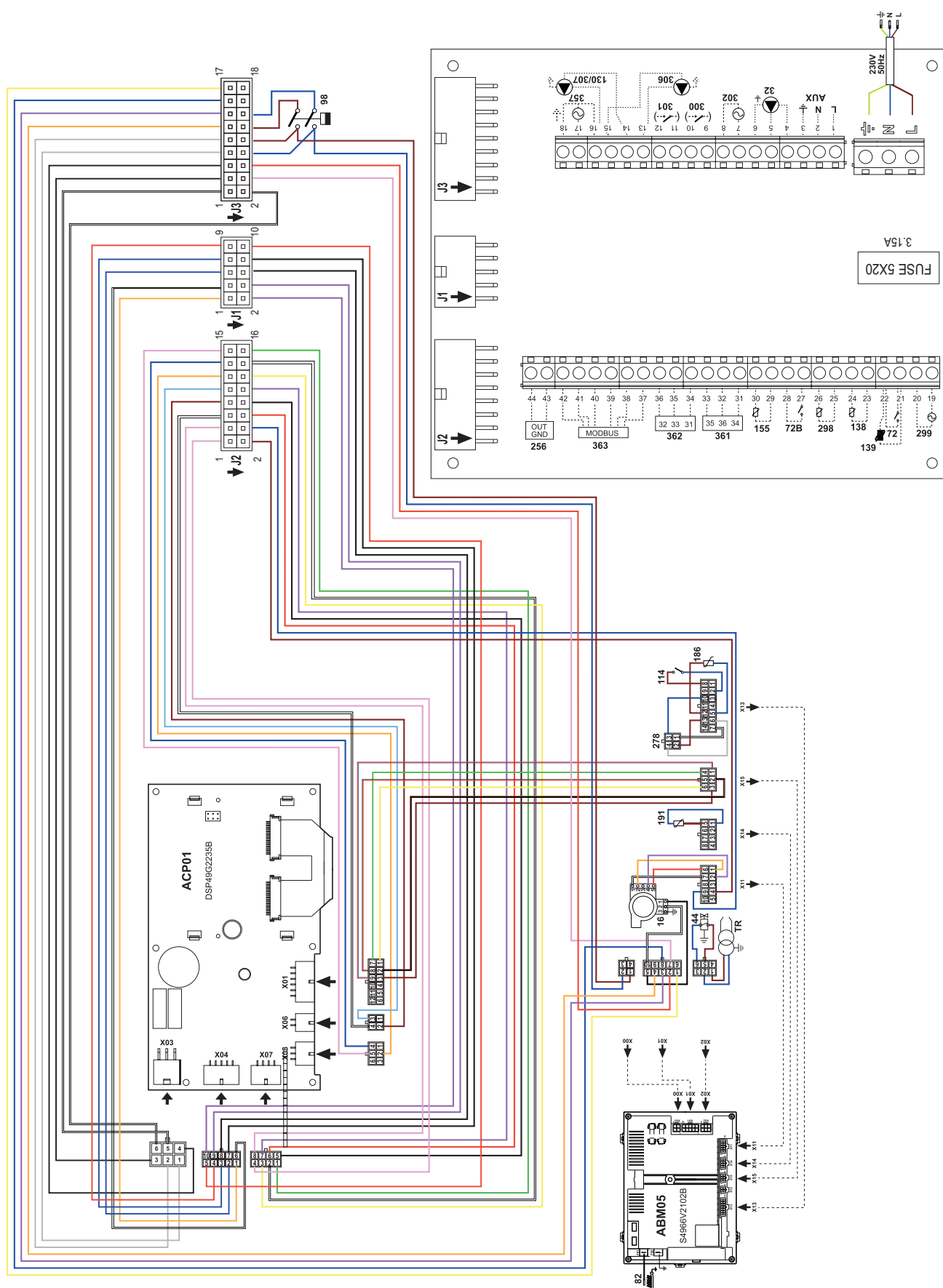


fig. 97- Wiring diagram OPERA 220/320 and OPERA 450



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