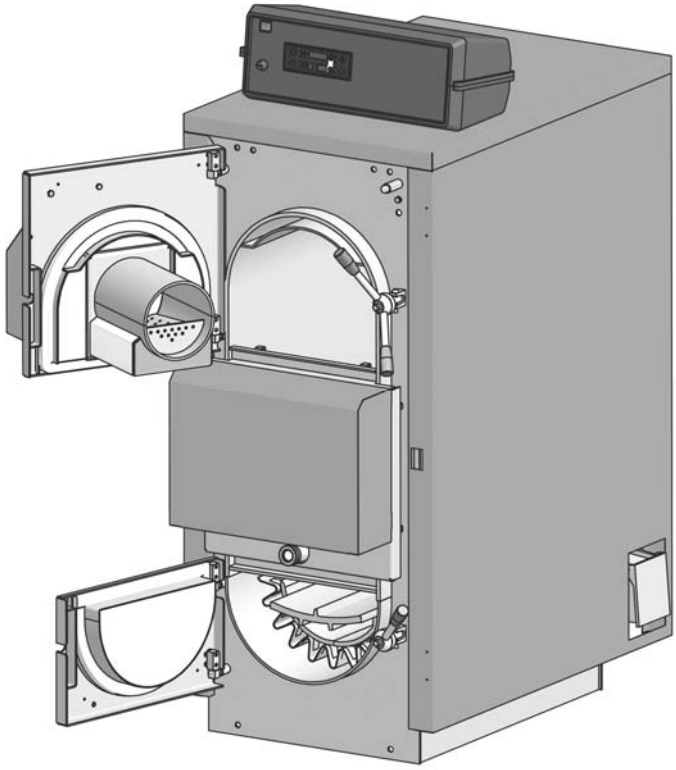
ARCA caldaie

ASPIRO

DUO TECH

Installation
Operation
Maintenance



www.arcacaldaie.com

ARCA s.r.l. will have no liability for any printing or translation mistake. The manufacturer has the right to modify its products if such modifications would be necessary or useful, without affecting the basic characteristics of the product.
The present documentation is also available in PDF format. To get it, please contact ARCA s.r.l. technical department.

code: MAN1004DUO
pages: 63
issue: 1st EDITION
revision: 2009, june

INDEX

1. GENERAL WARNINGS

The instruction and maintenance manual is an integral part of the product, and it must be the delivered to the customer along with the product. Read carefully any warning shown in the manual because they provide important guidelines and details concerning the installation, use and maintenance security. Store the manual in a safe place for further reference.

The installation must be carried out only by qualified personnel or by an authorized ARCA technical center following the manufacturer's recommendations and guidelines.

Be sure that the product comes complete and without any sign of damage. In case of doubt, don't use the product and call your local supplier. The packing components must be delivered to authorized collecting centers only and they must not be left in the reach of children.

Before performing any changing or maintenance or cleaning operation on the system, turn off the boiler using the main external switch.

If the boiler is out of order or shows strange behavior, turn it off immediately avoiding any kind of repairing or direct action. Coal qualified personnel only; any kind of repairing must be carried out by an authorized technical center only and it is mandatory the use of original spare parts only.

We take no responsibility for any damage which could result from wrong installation or use or from being not respected the instructions and recommendations given in this manual.

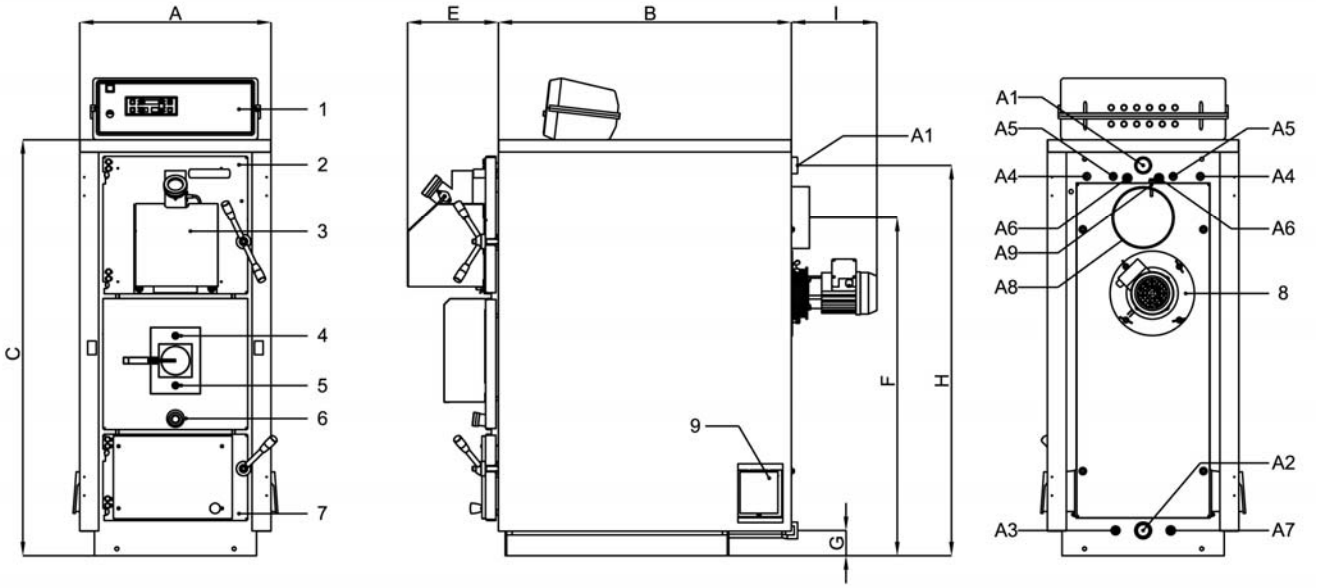
Not respecting the instructions and guidelines of this manual may compromit the security level of the whole system or of its components, causing danger for the customer, for which we don't take any responsibility.

WARNING!

The first firing and the final test of the boiler must be performed by an authorized technical center only.

2. TECHNICAL CHARACTERISTICS AND OVERALL DIMENSIONS

2.1. Boiler



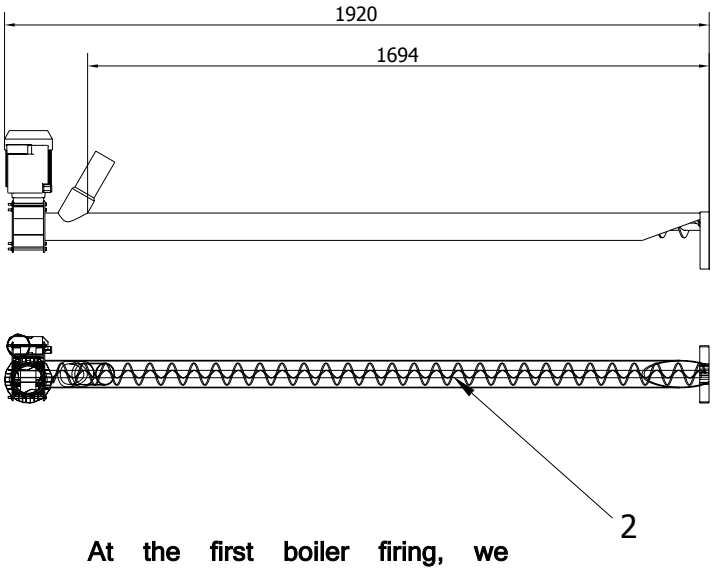
Key:

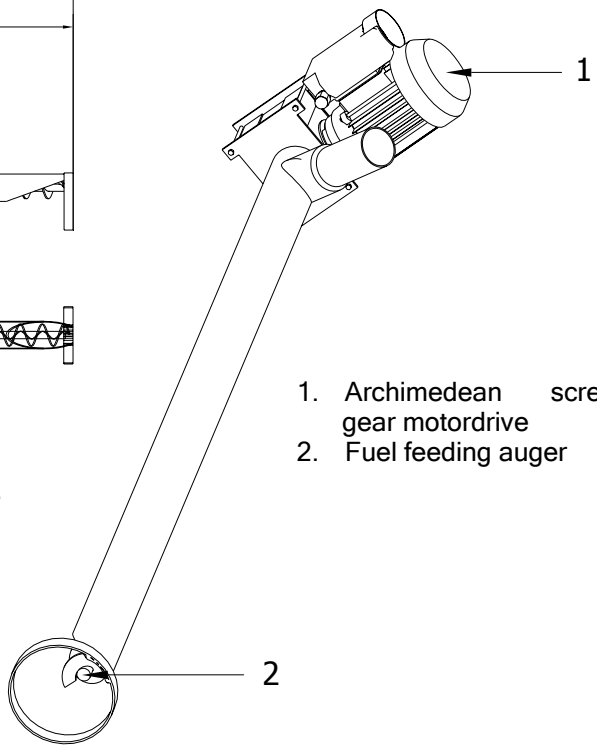
1	Electronic control board	**A1**	Heating circuit delivery
2	Top door	**A2**	Heating circuit return
3	Pellet burner	**A3**	Boiler water descharging
4	Primary air stream adjusting (wood operation)	**A4**	Sanitary hot water heat exchanger connections (only SA ver.)
5	Secondary air stream adjusting (wood operation)	**A5**	Security heat exchanger connections
6	Flame control bull's eye (wood operation)	**A6**	Temperature sensors receptacles (S4)
7	Bottom door	**A7**	Temperature sensor receptacle (S5)
8	Fan motor - two speeds	**A8**	Smoke outlet
9	Anti deflagration door	**A9**	Flue temperature sensor receptacle

Model	Power rated minimum kcal/h kW	Power rated maximum kcal/h kW	Power to the burner maximum kcal/h kW	Boiler weight kg	Boiler capacity liters	Insertion losses water side m C.A.	Insertion losses smoke side mm C.A.	Rated pressure bar	Comb. chamber volume litri	Wood box opening size mm	Max wood logs length cm
A 29 DTR/SA	14.000 16	26.000 30	29.500 34	380	95	0,10	0,3	4	95	290 × 330	53
A 34 DTR/SA	20.000 23	25.000 29	29.600 34,5	470	115	0,08	0,4	4	135	340 × 430	53
A 34 DTLA R/SA	20.000 23	25.000 29	29.600 34,5	555	135	0,10	0,6	4	185	340 × 430	68
A 43 DTR/SA	23.000 27	35.000 41	43.000 50	470	115	0,08	0,4	4	135	340 × 430	53
A 52 DTR/SA	28.000 33	42.000 49	52.000 60	555	135	0,10	0,6	4	185	340 × 430	68

Model	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm	A1 A2 ø	A3 ø	A4 ø	A5 ø	A6 A7 ø	A8 ø
A 29 DTR/SA	550	850	1.200	190	260	980	80	1130	230	1"¼	½"	½"	½"	½"	180
A 34 DTR/SA	650	850	1.300	190	260	1.080	80	1220	230	1"½	½"	½"	½"	½"	180
A 34 DTLAR/SA	650	1.030	1.300	190	260	1.080	80	1220	230	1"½	½"	½"	½"	½"	180
A 43 DTR/SA	650	850	1.300	190	260	1.080	80	1220	230	1"½	½"	½"	½"	½"	180
A 52 DTR/SA	650	1.030	1.300	190	260	1.080	80	1220	230	1"½	½"	½"	½"	½"	180

2.2. Archimedean screw (code COC0502)

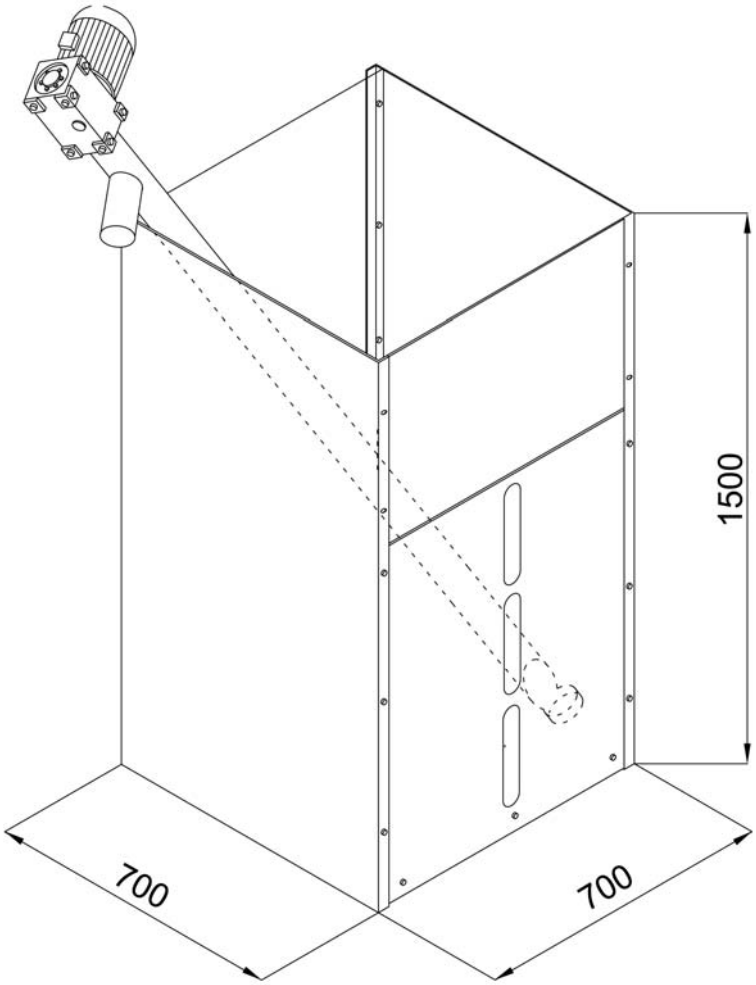




1. Archimedean screw gear motordrive
2. Fuel feeding auger

At the first boiler firing, we recommend to manually activate the archimedean screw motordrive (LOAD MENU) so to have the whole auger tube filled with fuel getting by this way a constant fuel feeding rate not to have boiler operation problems.

2.3. Fuel tank (code CON0600)



WARNING:

We recommend to insert the archimedean screw in the fuel tank inclined as much as possible.

3. MAIN BOILER COMPONENTS

3.1. Wood charging box

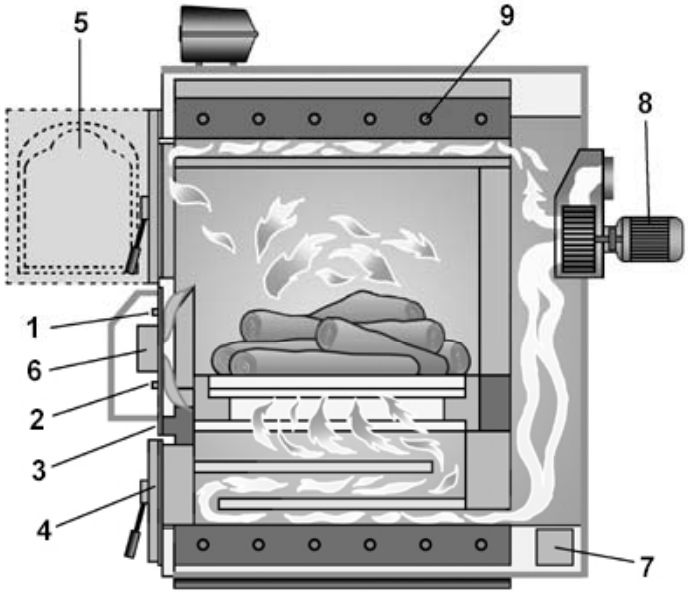
This is the boiler *fuel box*. In this box, located in the boiler upper part, the wood logs are charged after being succesfully performed the ignition procedure, getting a first layer of hot ashes.

3.2. Main burner refractory frame and cast iron bar elements

In the middle part of the boiler, between the fuel box and the bottom part where the heat exchange takes place, is located the burner, built with a special designed refractory cement frame with a slot in its central part and a grate.

3.3. Heat exchange area and catalizator

The gases released by wood, after being passed through the cast iron bars, light producing a bluish vertical reverse flame, which touches a special shaped chrome cast iron cylinder called "the catalyst".
The flame, passing through this cast iron element, which reaches a very high temperature, will have completely burnt the main part of its residual carbon particles, which couldn't be burnt before.



Key :

1. Primary air stream adjusting
2. Secondary air stream adjusting
3. Flame control bull's eye
4. Bottom door (combustion chamber)
5. Upper door (wood box)
6. Combustion air modulator
7. Anti deflagration door
8. Fan motor
9. Hot sanitary water heat exchanger (SA versions only)

3.4. Smoke drafting pass-through box and fan

The combustion products, after having gotten colder delivering a part of their heat charge to the water, are collected in the smoke pass-through drafting box in the back part of the boiler. In the smoke pass-through box is located the two speeds fan, mounted in horizontal axis configuration, which includes the electric motor and the impeller. Any maintenance operation on the fan is easy to be carried out because the fan is fixed by mean of wing nuts.

3.5. Air distribution subassembly

The immission duct has an internal gravitational closing door that closes the air passage when the drafting fan stops, and another temperature commanded external closing.
The air that enters the central section is then divided in primary air and secondary air. The primary any air stream enters the wood collecting box where, mixing with the distilled gas generates the combustible mixture that is then fired when passes through the burner grate. The secondary air stream, instead, passes through the two cavities located the in the burner main body and in the cast iron bars, providing by this way a further oxygen charge directly in the flame formation area getting a complete combustion.

3.6. Hot sanitary water heat exchanger (SA versions only)

The heat exchanger can be equipped with an internal copper pipe coil plunged in the heating circuit water gap around the boiler main body to produce hot sanitary water (SA models only), with the hidraulic connections in the rear part of the boiler.

3.7. Emergency heat exchanger

The boiler comes with an emergency heat exchanger by default for the wood-fuelled section. Its function is to let the boiler cool down in case of overheating using a thermal relief emergency valve connected to the heat exchanger inlet (see paragraph 5.5). The emergency heat exchanger is made of a steel pipe coil with the inlet and outlet connections located in the back part of the boiler (A5 connections). The thermal sensitive sensor of the thermal emergency relief valve must be positioned on theA6 connection.

3.8. Water temperature sensors mounting receptacles

In the rear part of the boiler are two threaded connections (A6), both with a ½" pipe coupling having the following function:

- to fit the copper receptacle for installing the thermostatic sensors used by the electronic control board;
- to fit another copper receptacle for other temperature sensing device (thermal emergency relief valve)

3.9. Bypass pump (anti-condensation)

With the aim to reduce the possibility of condensation products formation in the smoke passages of the wood section of the boiler, it is mandatory installing a bypass pump. The pump must be connected between the heating systems delivery connection (A1) and the return connection (A2), with flux direction toward the bottom part. A circulation pump kit may be bought from ARCA which includes the pump, the pipes and the various connections.

For the proper operation of the boiler is required the bypass pump.

THE ABSENCE OF THE BYPASS PUMP WILL VOID THE WARRANTY

3.10. Insulation

Insulation of ASPIRO boiler is obtained using a 60 mm thickness mineral fiber layer in touch with the boiler body, covered by the external boiler housing, made of sheet metal panels painted with epoxy powder paint.

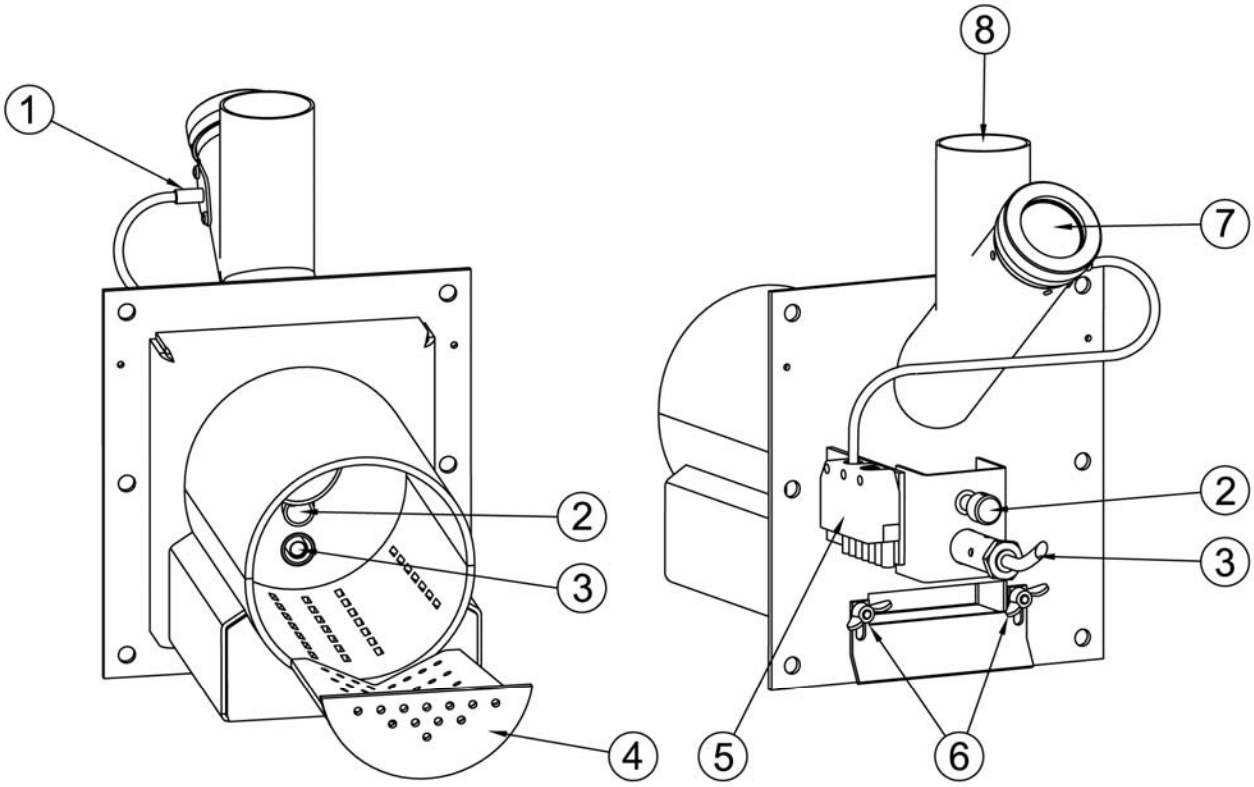
3.11. Heating system feeding water

The heating system water chemical characteristics are very important for what concerns the general operation of the heating system and its security. The main problem is water with a high hardness degree, because such water causes the heat exchanging surfaces scaling. High concentrations of calcium and magnesium carbonates (limestone), at high temperatures, precipitate and generate incrustation. The limestone, due to its low thermal conductivity, reduce the thermal exchanging degree and this causes localized overheating issues which weaken the boiler metal structures until the will break. We recommend to have your heating system supplying water chemically treated in the following cases:

- high water hardness degree (bigger than 20 French degrees)
- high water content heating systems
- frequent water delivering due to water losses
- frequent water delivering due to maintenance operations carried out on the heating system.

3.12. Pellet burner

Aspiro DUO TECH comes with a supplementary upper door where is screwed a pellet burner.
The burner operation is completely automated, and is controlled by the electronic control panel.



Key:

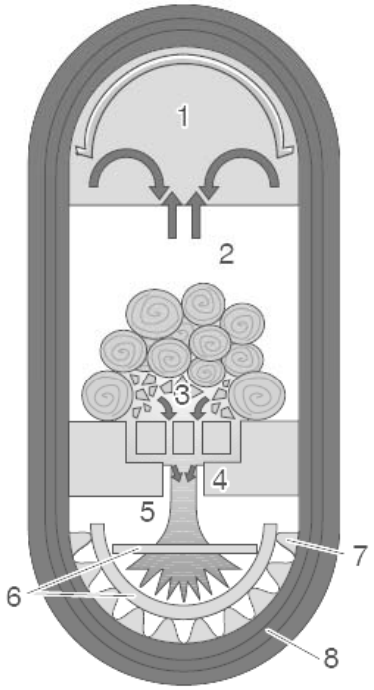
1	Photo cell	**5**	Electric sockets for connecting the boiler electronic panel
2	Secondary air stream	**6**	Primary air stream
3	Resistance	**7**	Bull's eye
4	Stainless steel grate	**8**	Pellet inlet

4. OPERATION MODES

ASPIRO DUO TECH boiler is a biomass boiler using wood as fuel, implementing the gasification technology of wood with reverse flame; the boiler can also use natural wood pellets installing a pellet burner on the front upper door with completely automated firing and cutting off operation.

4.1. Gasification technology (wood operation)

ASPIRO boiler implements the wood gasification technology. The solid fuel, charged in the upper boiler wood collecting box, when comes in touch with the hot ember layer on the burner grate, produces combustible gases which, when mixed with air (primary air stream) can be fired. The combustible mixture of wood gases and the air passes down through the burner grate toward the bottom part of the combustion chamber (heat exchanging area), where the typical *"reverse flame"* will appear.
The gasification method, not burning wood directly as in any other classic arrangement but using instead the gases released by wood under high temperature conditions, allows a complete burning of the fuel which permits to get a high thermal yield and a very low level of harmful emissions in the flue gases released outside.
ASPIRO boilers have been developed to limit to its maximum extension the damaging effects of the acid condensation products. The burner chamber has 8 mm thickness walls and no welding in its upper part; furthermore, the rear and front walls are protected by a refractory cement layer and they are not directly in touch with water (dry walls).



Key :

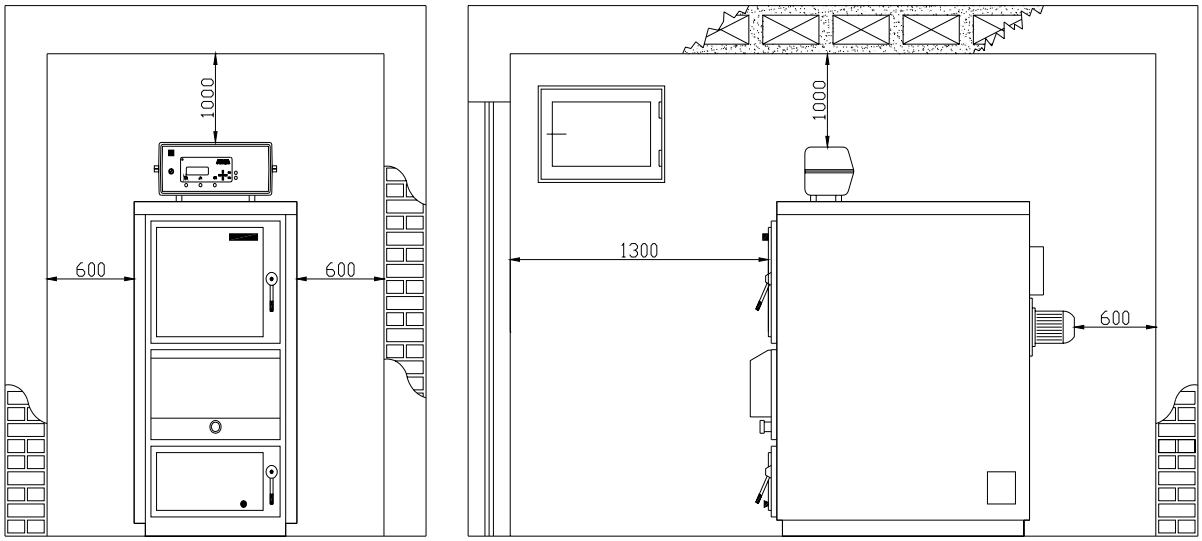
1 Wood charging box
2 Gasification area
3 Glowing coals area
4 Cast iron burner
5 Combustion chamber
6 Cast iron catalyst elements
7 Heat exchange surface
8 Coil type copper sanitary water heat exchanger.

5. INSTALLATION

ASPIRO DUO TECH boilers are not different from normal solid fuel boilers; therefore, their installation won't have to comply to special regulations different from those in force. The boiler room should be adequately vented with opening surfaces not less than 0,5 m^2. To get an easier flue duct cleaning, in front of the boiler should be a free space not less than the boiler deep, and the boiler doors must be free to open up to 90° without encountering obstacles.
The boiler can be installed directly on the floor because it is equipped with a self supporting frame. Anyway, if the boiler room is too humid, we recommend to build a concrete base. When installed, the boiler should be perfectly horizontal and stable in order to avoid vibrations and a noisy operation.

5.1. Installation in the boiler room

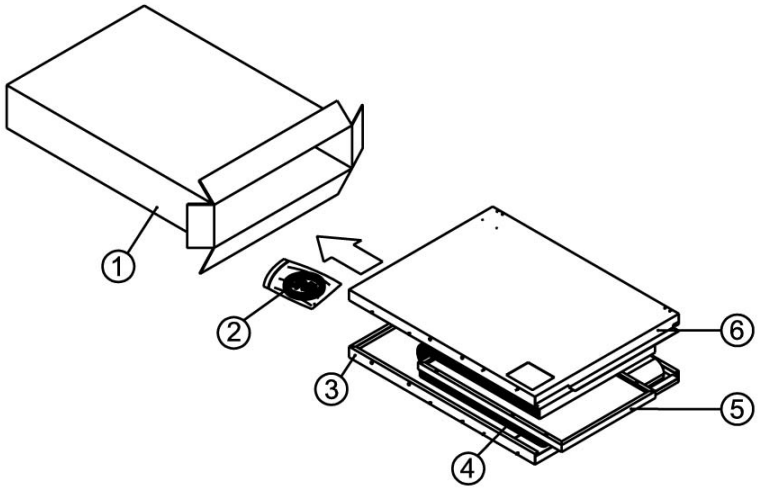
ASPIRO DUO TECH boilers must be installed only in rooms having the characteristics stated by the rules and regulations in force regarding boiler installation rooms (please contact the fire department to get more details).
The distances for the correct positioning of the boiler in the installation room are as follows:



5.2. External boiler case packing

ASPIRO DUO TECH boilers come without external case: the case and the accessory kit are delivered separately in boxes.

EXTERNAL CASE PACKING:



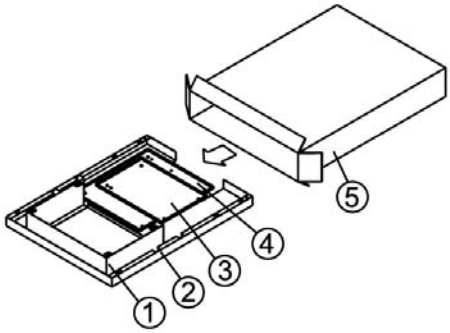
Key :

1 Packing box
2 Accessories bag
3 Right side
4 Boiler body insulation
5 Cover
6 Left side

EXTERNAL CASEPACKING

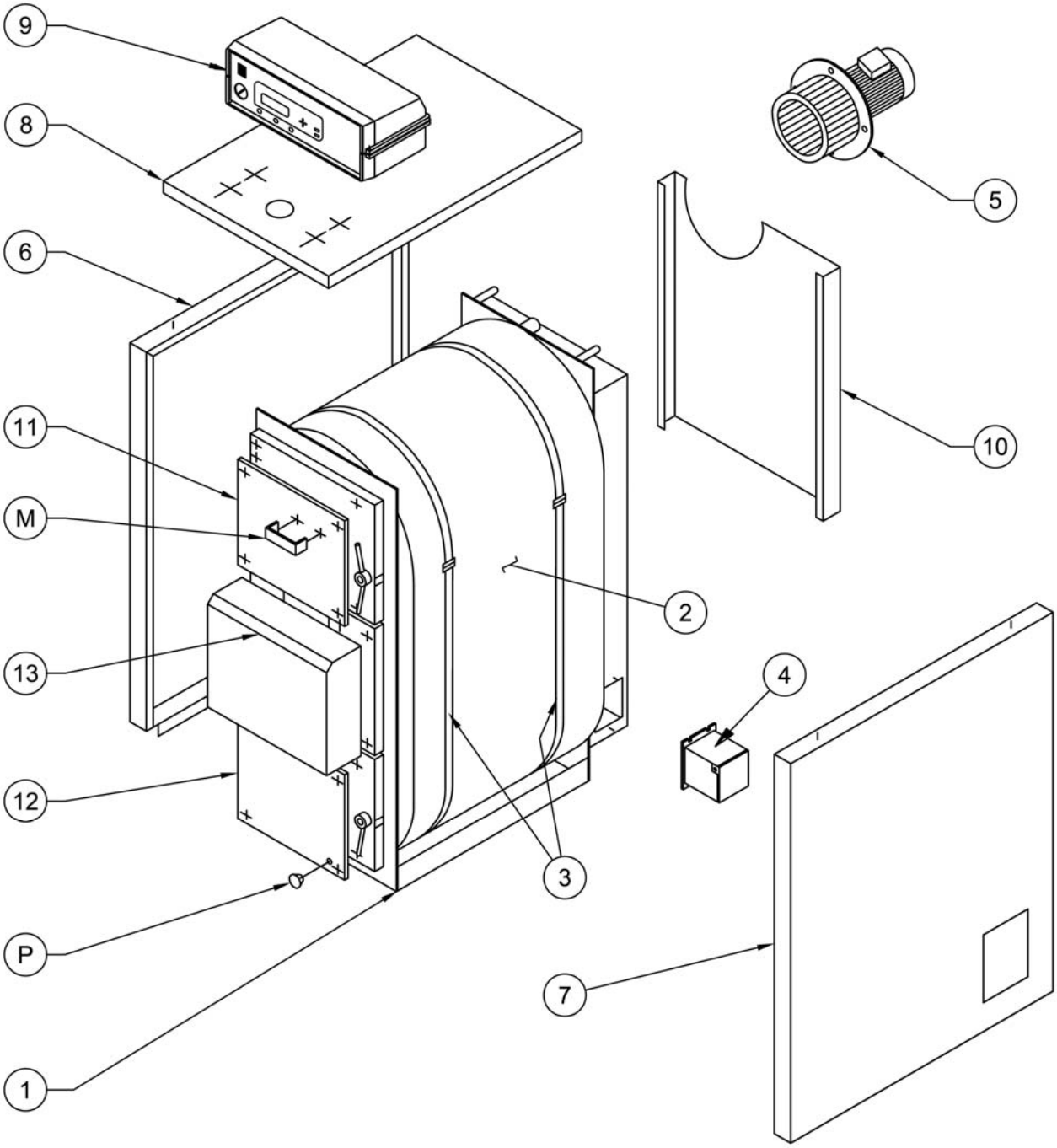
Key :

1 Central front cover
2 Back side
3 Bottom front door cover
4 Top front door cover
5 Packing box



5.3. External boiler case mounting

- Install the boiler 1 in its installation room and complete the hidraulic connections.
- Roll the boiler with the mineral fiber layer 2 fix it with the metal bands 3.
- Fix the anti-deflagration doors at the base of the smoke box tightening the screws 4.
- Install the fan 5 in place in the smoke chamber fixing it with the wing nuts.
- Position in place the side parts 6 and 7, being careful to correctly insert their upper bends in the slots on the upper part of the front and rear boiler body plates, while inserting the lower side parts bends in the internal side of the L shaped base frame.
- Put the upper part of the housing 8 over the side parts 6 and 7, carefully inserting the studs on the side parts in the holes on the cover, then gently press down to have the studs retained by the cover holes springs
- Fix the electronic control panel 9 to the cover 8 straightening the thermostat capillary tubes and letting them pass under the external housing up to the rear part of the boiler, where they will have their sensitive sections fitted in their receptacles located on the back of the boiler.
- Fit the back panel 10, fixing it to the side part studs 6 and 7 with the back panel retaining springs.
- Fit the protection panel 11 to the wood collecting box with its handle M fixed.
- Fix the hood 13 onto the middle door using the bayonet joints.
- Fix the protection panel 12 to the bottom door with its handle P mounted.



5.4. Heating system expansion tank

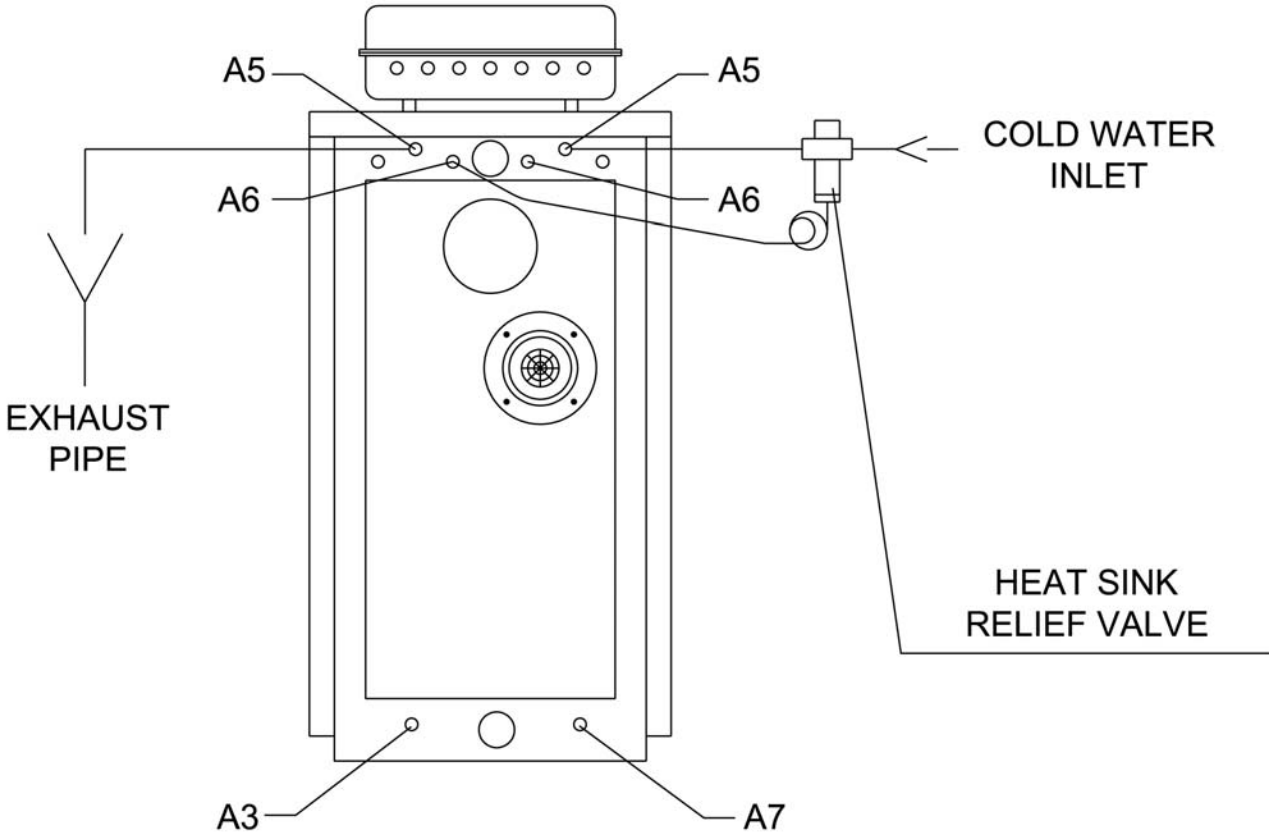
According to the regulations in force in Italy, any heating appliance with solid fuels must be equipped with open expansion tanks.

5.5. Chimney

The flue duct is very important for what concerns a proper boiler operation; it must be completely waterproof and adequately insulated. New or older fuel ducts not complying these prescriptions can be reused putting an inner stainless steel duct into the existing flue duct; the gap between the two ducts must be filled with insulating material. Flue ducts made of prefabricated concrete modules must be perfectly sealed in order to avoid that the condensation products stain the external walls.
We strongly recommend to use a flue duct complying the regulations in force, especially regarding the regulation EN 1806, which requires a resistance to a flue gases temperature of 1000°C. The customer is responsible for any damage resulting from using unsuitable flue ducts.
In any case, the flue duct must feature enough drafting action, at least 2 mm water column of depression at its base when cold. Flue ducts with not enough drafting action will make the boiler cutting off spontaneously

during its standby periods and condensation products buildups in the air inlet ducts. Inversely, a flue duct with too much drafting action will cause thermal inertia related issues and poor fuel economy.
We recommend under any circumstance to use a draft adjusting device to keep a constant depression value in the duct.

5.6. Emergency heat sink relief valve connection



Key:

A3 Boiler's water exhaust pipe

A5 Emergency heat exchanger

A6 Probes receptacles S4

A7 Probe receptacles S5

- Connect the heat sink relief valve to one of the two A5 connections.
- Connect cold water supply to the heat sink relief valve.
- Connect the free A5 fitting (waste hot water) to an exhaust duct.
- Insert the heat relief valve temperature sensing bulb in the free A6 receptacle.

Note: the heat sink relief valve could be installed even on the waste hot water outlet, but this wouldn't add anything from the point of view of the overall operation security level of the boiler, and debris in the heat exchanger could plug or stick the relief valve.

6. ELECTRONIC CONTROL SY 400 (code PEL0100DUO)

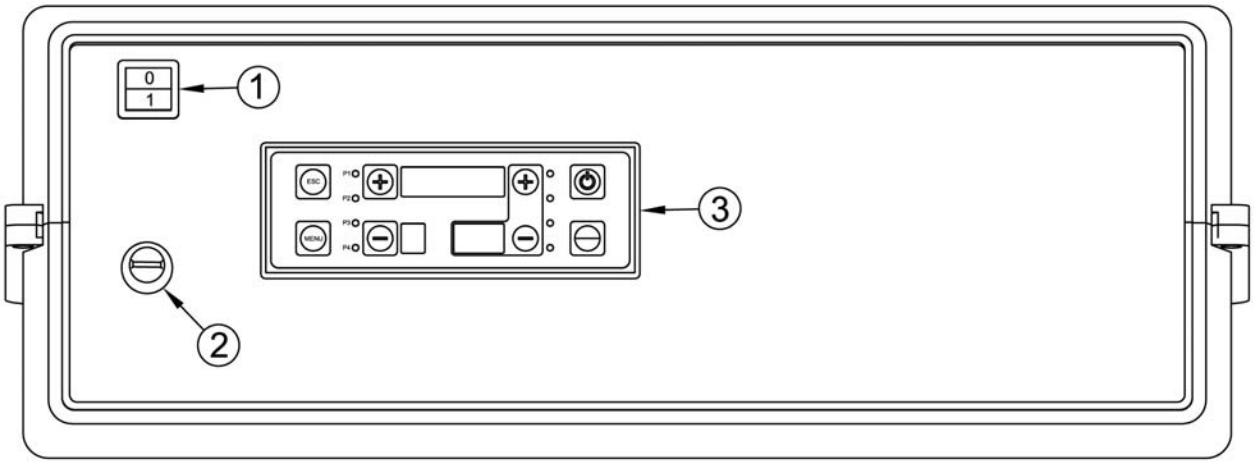


Fig.1

Key:

1 Main switch
2 Security thermostat
3 Display keyboard

6.1. The display

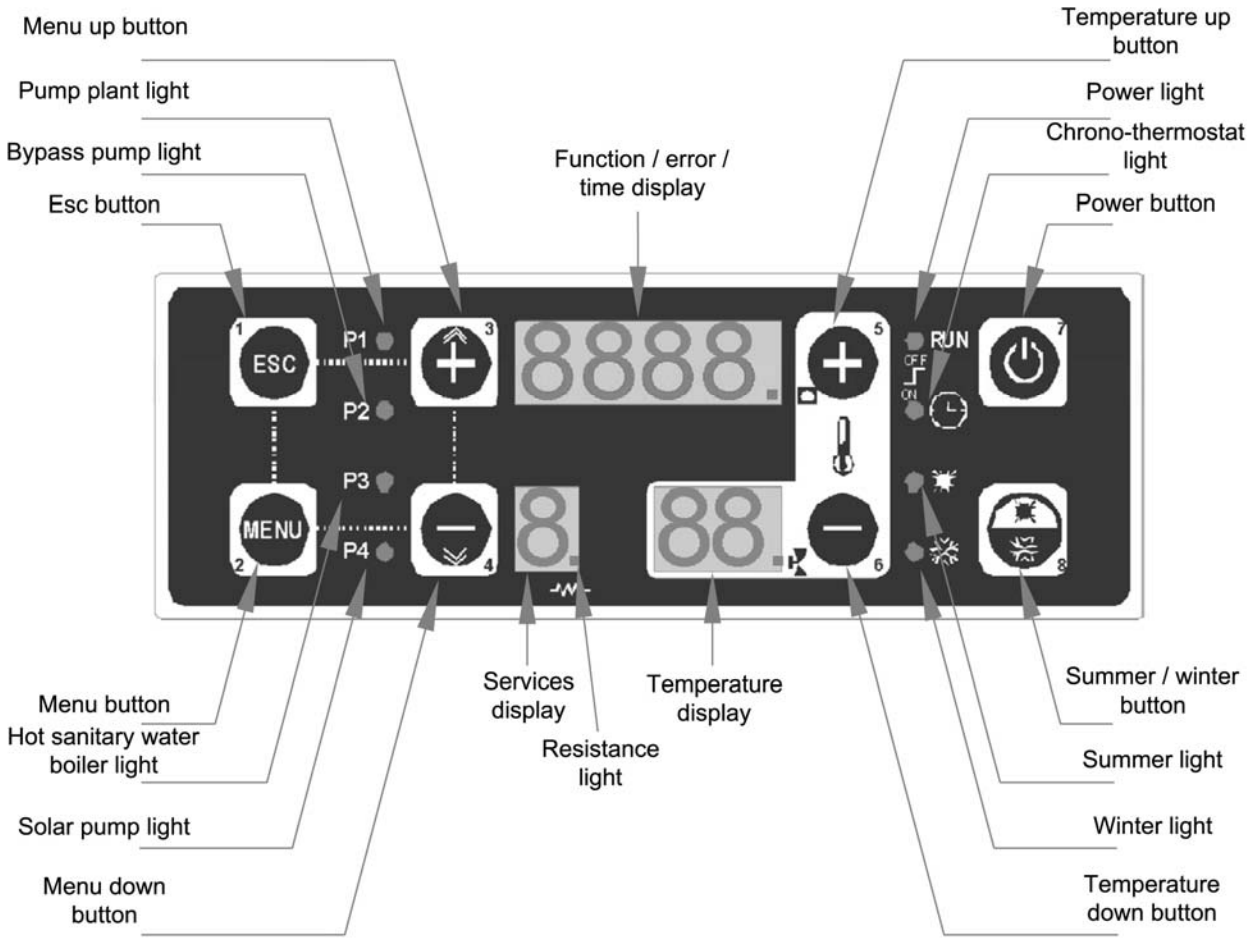
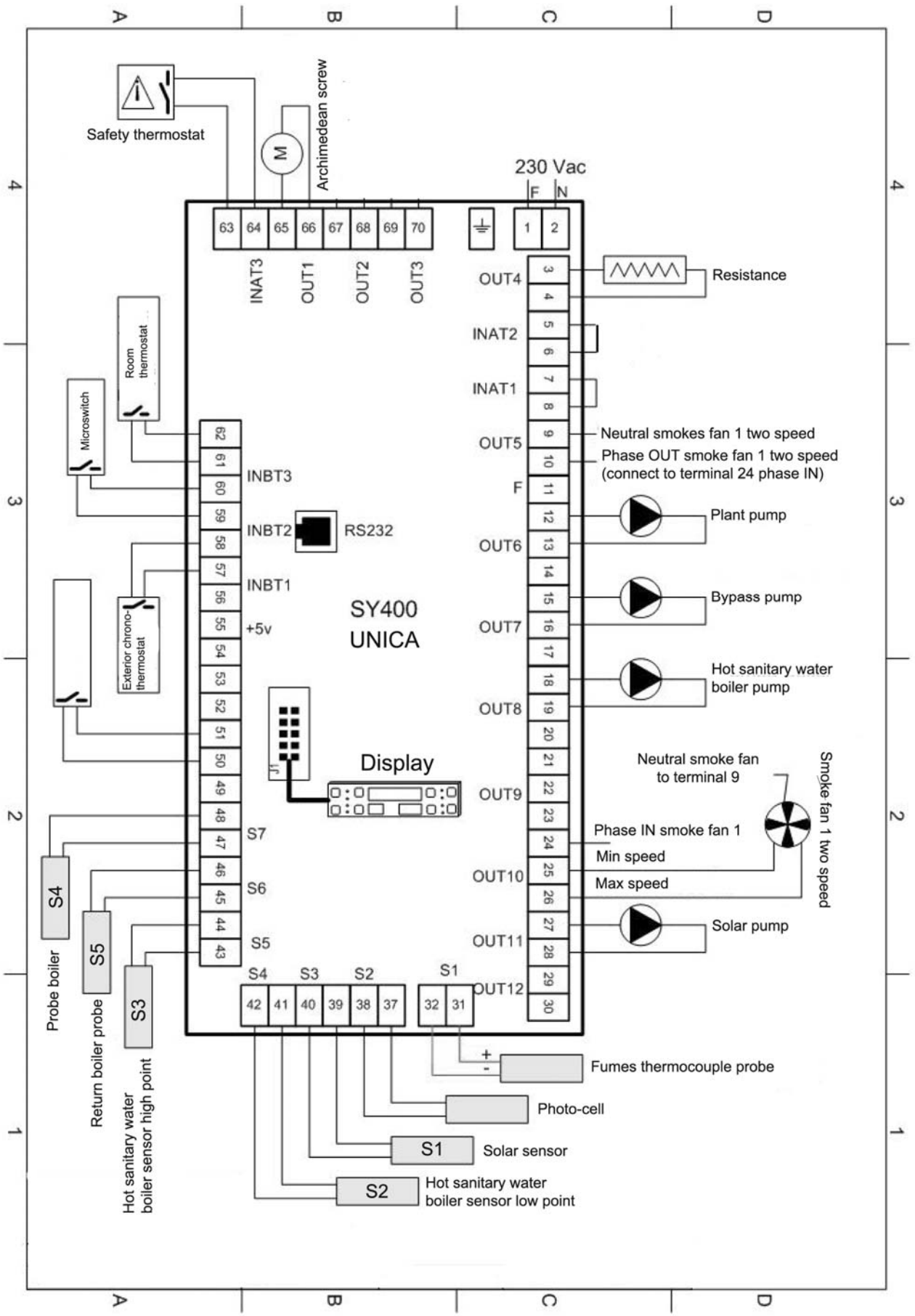


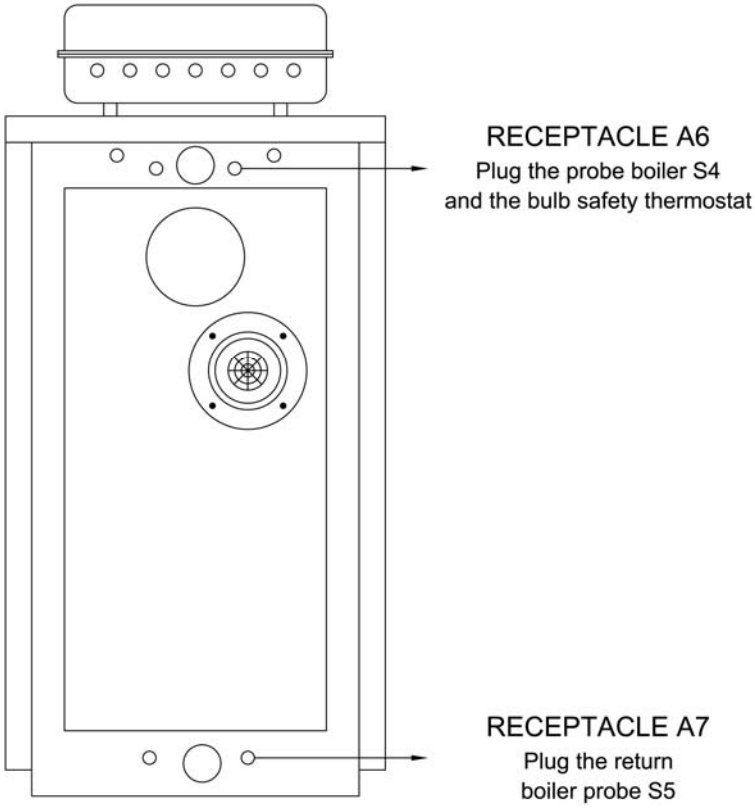
Fig.2

6.2. Electronic board (inside the electronic control panel)

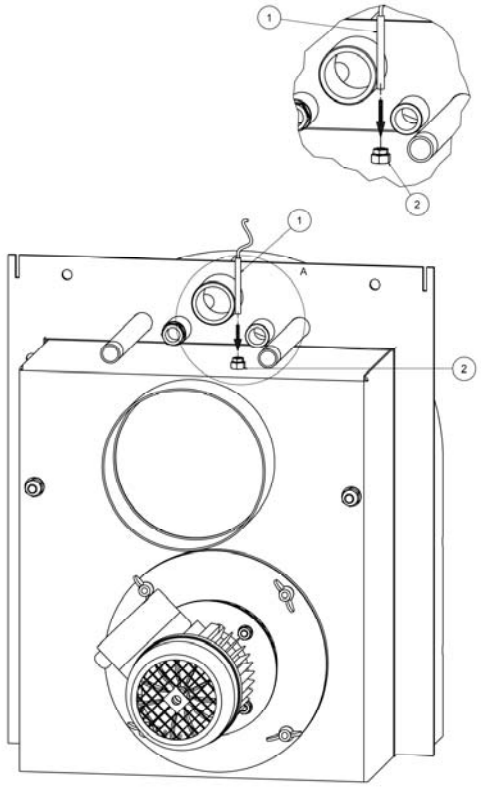


6.3. Sensors connection

For a proper boiler operation, we recommend to control the correct positioning of the temperature control sensors and the security thermostat.
The control board comes with the heating system delivery temperature sensor S4 with a 3 mt length cable (terminals 47.48 page16), the heating system return temperature sensor S5 with a 3 mt length cable (terminals 45.46 page16) and the security thermostat (terminals 63.64 page16) wired.
They must be positioned as shown in the figure below:



6.4. Smoke temperature sensor connection



Key:

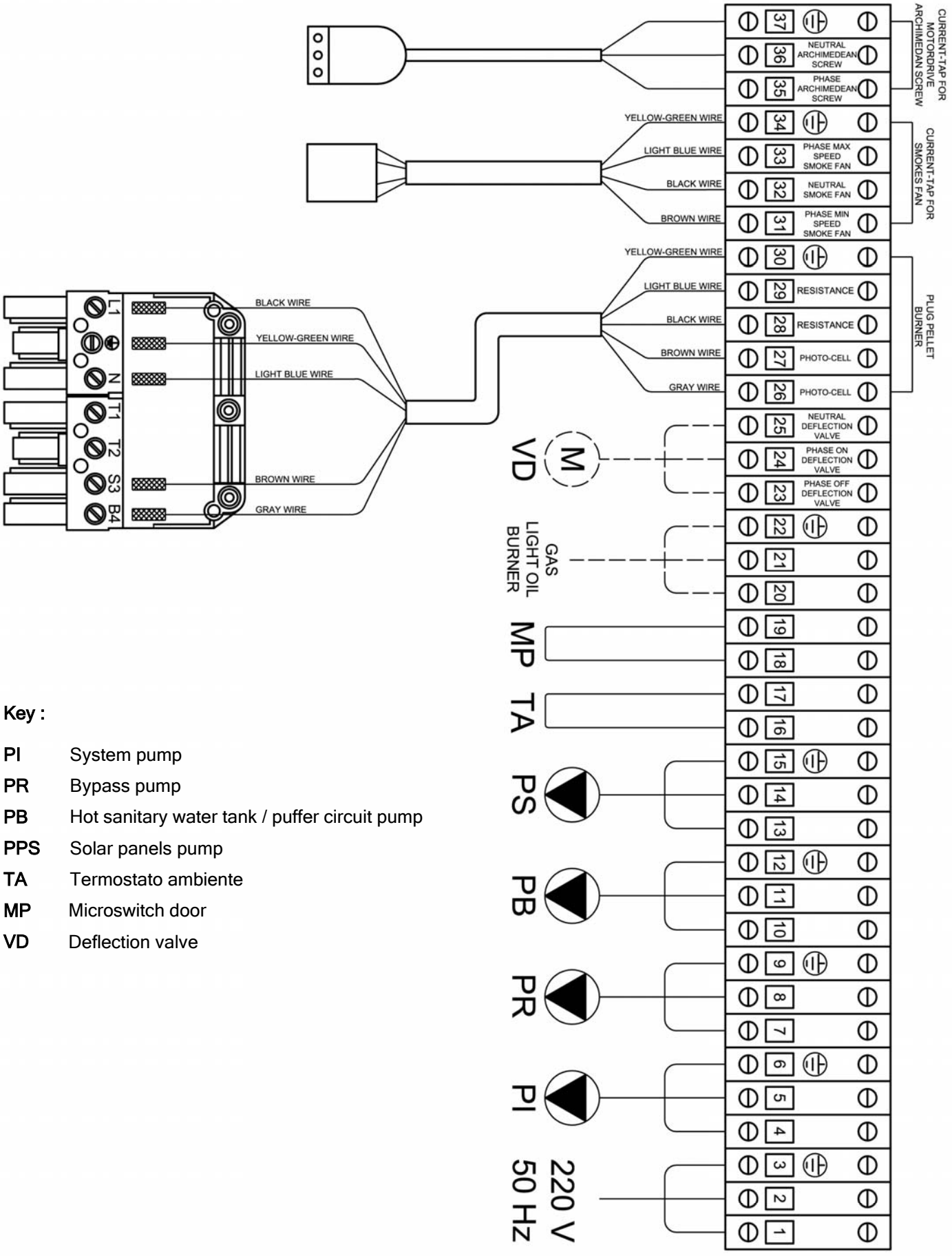
1 Smoke sensor
2 Flue gases temperature sensor receptacle

The flue gases temperature sensor is wired on the electronic board to terminals 31.32 as shown in the picture at page 16.
Must be positioned on the back of the boiler: close to the smoke outlet is located its mounting receptacle (pos.2).

WARNING!

We recommend cleaning the flue gases temperature sensor at least every two months to ensure that the correct temperature is detected.

6.5. Terminal strip electrical wiring



Key :

PI	System pump
PR	Bypass pump
PB	Hot sanitary water tank / puffer circuit pump
PPS	Solar panels pump
TA	Termostato ambiente
MP	Microswitch door
VD	Deflection valve

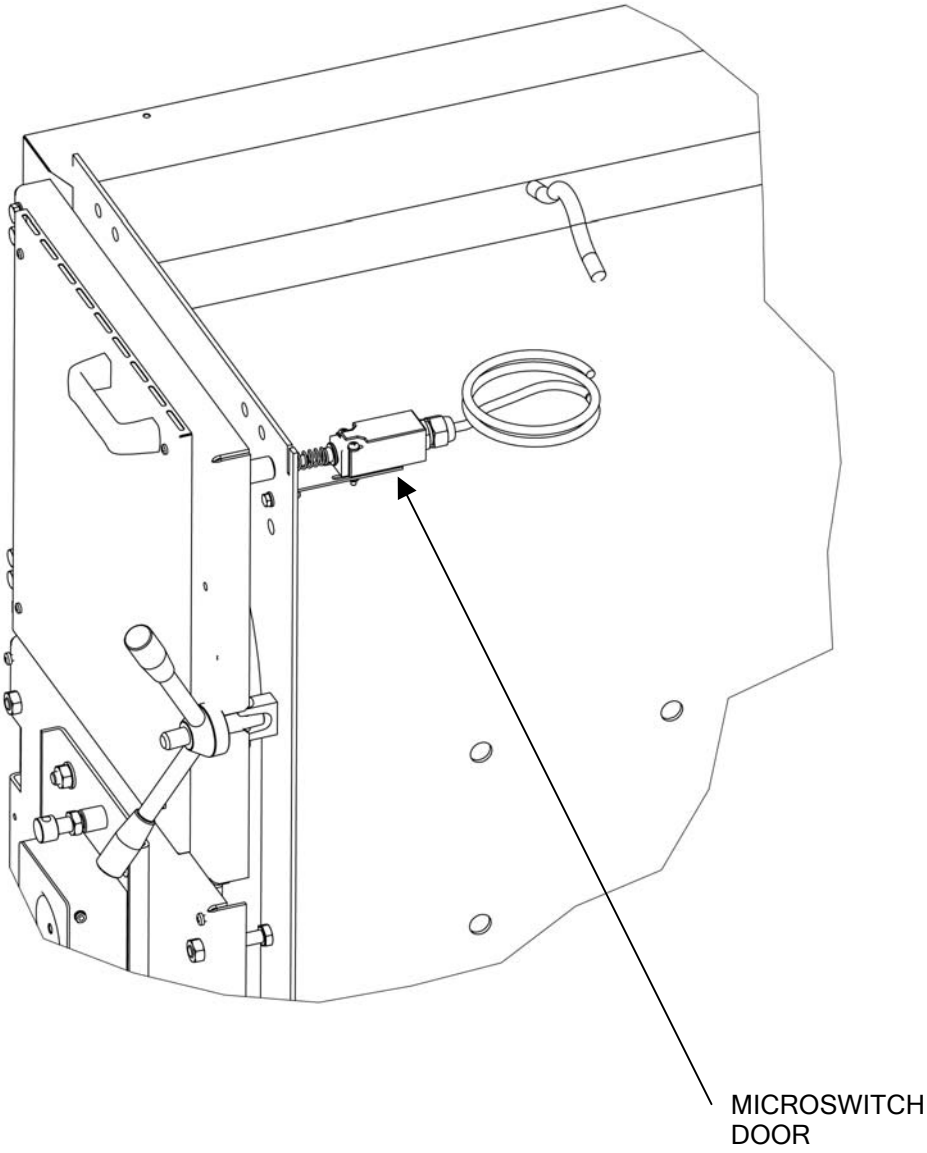
NOTE:

Terminals 16 and 17 (TA) are bridged together to allow system pump operation if a room thermostat is not employed.

WARNING:

When a room thermostat is used, remove the wire bridge and control for a correct wiring of the room thermostat. If the system pump doesn't work, control for a faulty room thermostat. Check that the room thermostat have a galvanically insulated contact from the rest of the thermostat circuitry.

The door microswitch is pre-mounted on its support; the only thing that must be done is connecting the two wires to terminals 18 and 19.

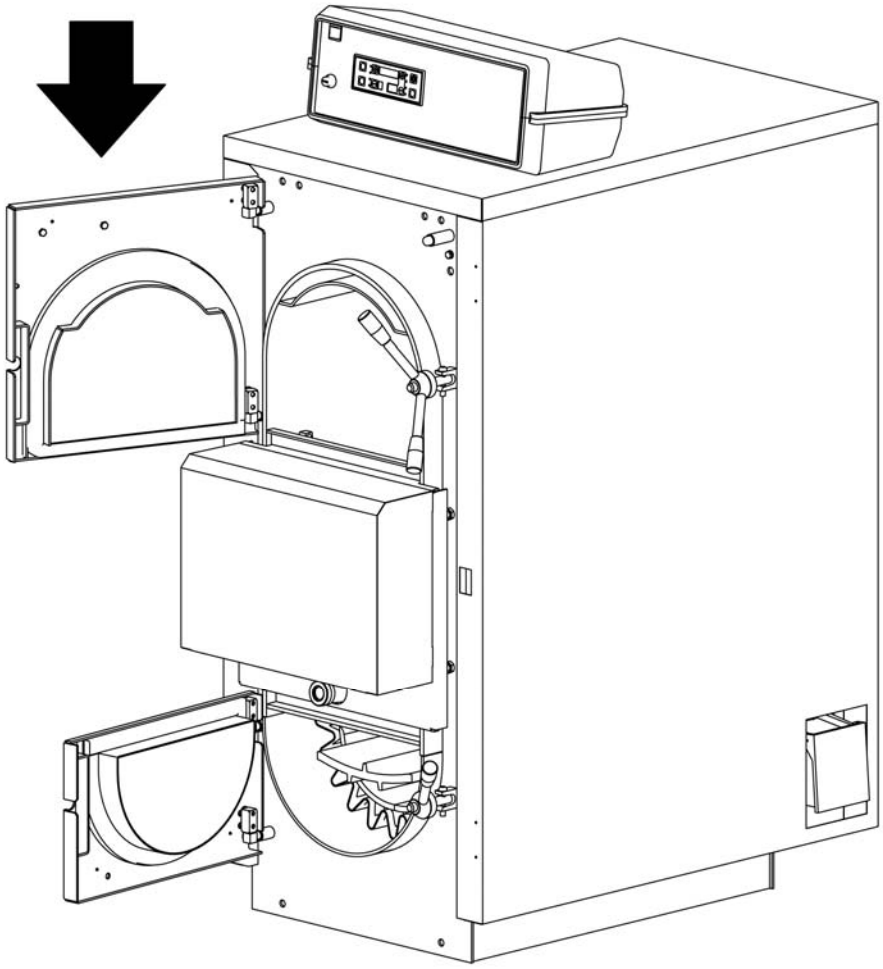


7. OPERATION MODES

7.1. Wood operation cycle

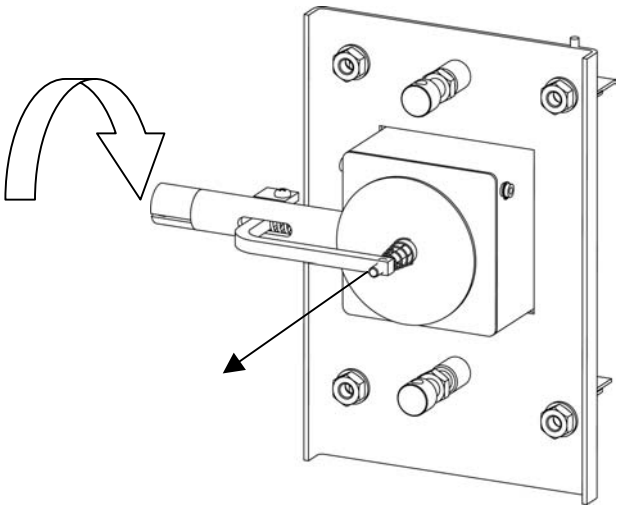
PHASE 1

Mount the upper front door.



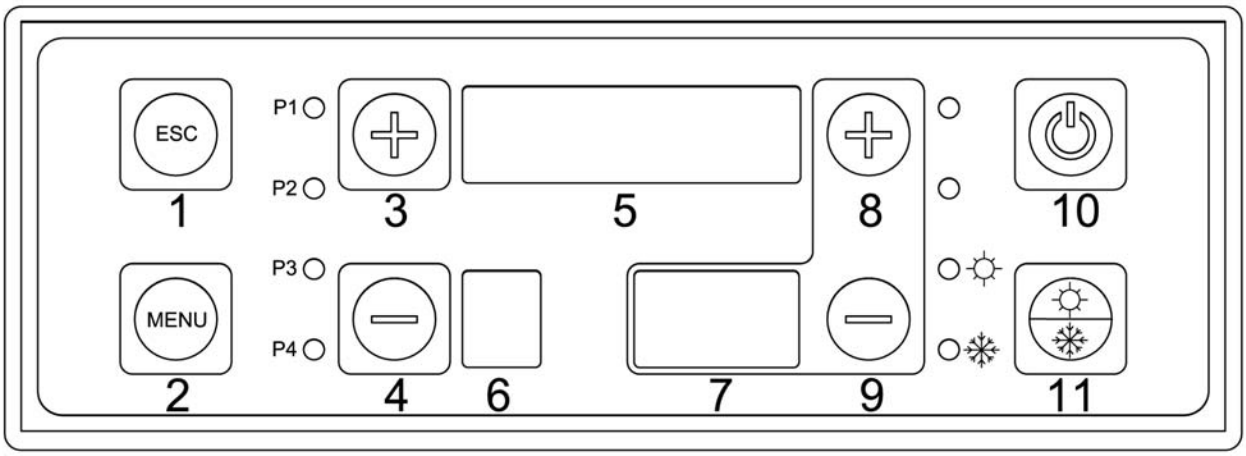
PHASE 2 - *MODULATOR ADJUSTING -*

Open the combustion air thermostatic device, rotating the ring located on the left side of the modulator device until the disc is at a distance from the hole of about 3 cm.



PHASE 3 - *OPERATION MODE SETTING -*

Before proceeding with firing, the electronic control must be set on wood operation:



- Turn on the control panel pressing the main green switch (pic.1 - pos.1 – page 16).
  The keyboard is on and the nr. 5 display will show the time, while nr. 7 display will show the boiler delivery side water temperature.

- Pressing the button nr. 2 (MENU), the customer menu opens; the customer menu has different submenus:

N° 1  Boiler operation mode menu

N° 2  Heating system configuration menu

N° 3  Temperature sensor values displaying menu

N° 4  Time setting menu

N° 5  Internal chronothermostat setting

N° 6  Manual Archimedean screw activation menu

N° 7  Outlet test menu

- Press button nr. 3 (+), then navigate until the menu "***MODE***" is reached and then press the button nr. 2 (MENU) to get in. Now, the boiler operation mode must be chosen as shown below:

Operation[P44]	Description
"LEGN"	Wood only operation
"PELL"	Pellet only operation

To change the value, press button nr. 2 (MENU), the shown value starts blinking; using button nr. 3 (+) change the value and with the button nr. 2 (MENU) confirm and store the new value.

PHASE 4 - *BOILER FIRING -*

Put at the center of the burner refractory frame, over the cast iron grate, small pieces of dry wood in a cross pattern. Over the pieces of wood put some easy flammable material; avoiding large and square shaped pieces. Using some thin paper sheets (e.g., newspapers) fire the wood. Press the nr. 10 button to start the fan and close immediately the wood collecting box door.

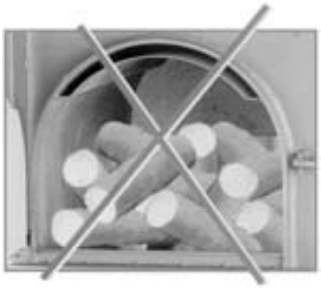
When the upper wood collecting box door is open, the display shows 

; when closing the door, make sure that this message disappears.

PHASE 5 - *CHARGING -*

When the first layer of glowing coals has appeared, the wood logs main be charged in the boiler. Slowly open the wood collecting box door, to let the drafting fan sucking the smoke in the fuel box. Using the supplied tool, slowly open the door and evenly distribute the glowing coals on the refractory cement central burner area. After that, the wood logs can be put in the fuel box; the logs should be almost of the same length as that of fuel box.

Since for getting a good combustion is necessary that the wood logs fall down smoothly and evenly in the fuel chamber, check that the wood log dimensions, their shape and the charging pattern don't create obstacles to their movements.

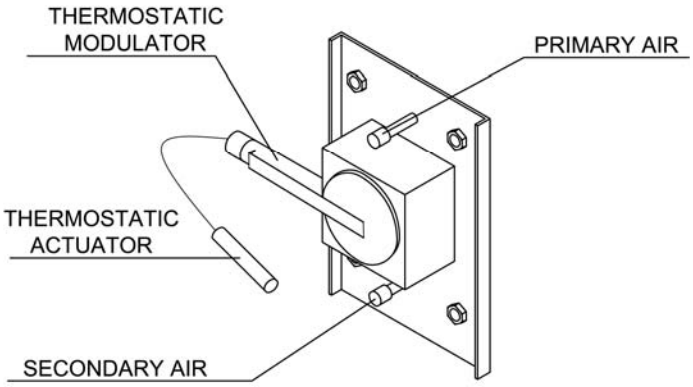


Before charging again the boiler, let the previous wood charge being burnt almost completely. A new wood charging can be performed when the glowing coals layer in the fuel box will be reduced to a thickness of about 5 cm. Put the new wood logs as shown above.

<u>Useful tips:</u>

- Too much long wood logs usually do not fall in an evenly way, they tend to block preventing other wood logs over them from falling down.
- Open slowly the wood chamber door to avoid smoke releasing outside.
- During the operation of the boiler, the lower door must remain closed under any circumstance.
- Avoid (especially in the middle seasons) to charge too much fuel in the boiler, not to have long stand-by periods with the fuel box full with wood logs. Under these conditions, the wood in the charging chamber is dryed due to the high temperature reached, but the corrosive vapours released cannot be expelled through the boiler smoke outlet, and when they come in touch with the cooler chamber metal walls they condensate taking place their corrosive action. **We do not recommend to completely fill the wood chamber** during the middle seasons (or in summertime for hot sanitary water preparation purposes), and the wood should not stay more than a day in the wood chamber without being burnt.

PHASE 6 - *COMBUSTION AIR ADJUSTING -*



The combustion air flows through the inlet duct; the flux is then divided in two separate ducts forming the "primary air stream" and the "secondary air stream".
The primary air stream amount controls the boiler operation power and the fuel consumption rate: more air, more power, more fuel consumption. The primary air stream can be easily adjusted rotating the control screw located on the air inlet duct: turning the screw lets less air will pass through, whereas rotating it counter clockwise the air amount will be higher. The correct primary air amount depends on the wood type and quality which is used: small logs of well dryed wood will require less primary air, whereas wet larger logs will need more primary air. The

secondary air stream is used to complete the oxidation process of the flame; to adjust the secondary air amount rotate the secondary air adjusting screw located under the inlet duct.
In the ashes which remain over the catalyst elements only few unburnt materials must be present. If the primary air is too much, in the ashes will be found glowing coals and small carbon pieces, the flame will be quick, too bluish and noisy; in such a case close the primary air passage. If the primary air is insufficient, the flame will be slow, small and won't get in touch with the top catalyst element; the power will decrease.
If the flame colour is dark orange, the secondary air amount is low, if it is bluish amd small the secondary air amount is too much.

INSTALLATION WITH THERMOSTATIC MODULATOR

The thermal operating power is controlled by the combustion air modulator device. This device progressively closes the combustion air passage when the boiler temperature gets higher. The modulator device is correctly adjusted when, with the boiler cold, the modulator disc is at a distance of about 2 cm from the hole (minimum) whereas, when the boiler has almost reached the thermostatic control set temperature, the distance must be about 3-4 mm (minimum). By this way the boiler operating power is controlled in function of the heat amount transferred to the heating system.

We recommend to keep the smoke outlet temperature in the range 150 -180°C finding the correct amount of primary and secondary air and property adjusting the modulator device. With lower operation temperature condensation issues in the flue duct may appear, whereas higher temperature would lower the overall thermal yield, the fan motor would get too hot while vibrations and a noisy operation would appear, causing a quick impeller bearing wear. The adjustments must be carried out by TAS (Technial Assistance Service) only.

PHASE 7 – *MAXIMUM BOILER TEMPERATURE SETTING -*

Use buttons nr. 8 and 9 to set the boiler normal operating temperature. The bottom display nr. 7 will show the set temperature.

WARNING: boiler operating temperature cannot be set to values lower than 65°C or higher than 80°C.

7.1.1. Operation cycle

The operation cycle when the boiler is fueled with wood starts when the button nr. 10 is pressed.

Operation cycle sequence:

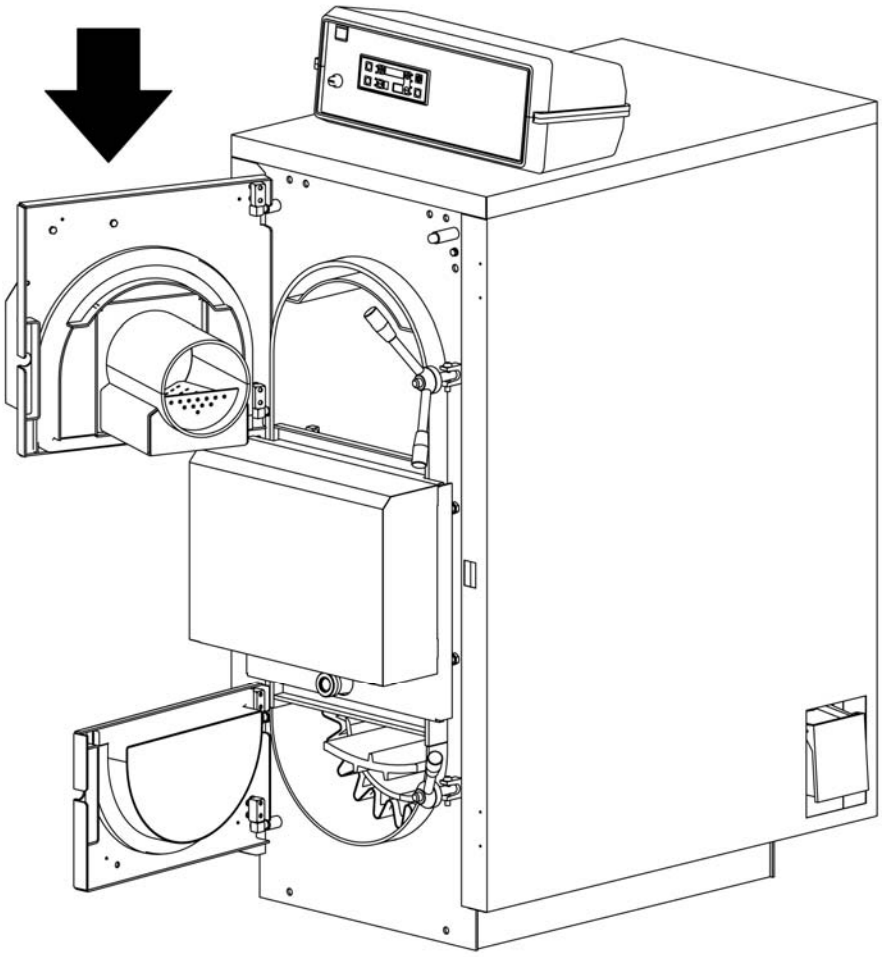
Close the bottom door and switch on the electronic control panel pressing the green main switch. Put at the center of the burner refractory frame, over the cast iron grate, small pieces of dry wood in a cross pattern. Over the pieces of wood put some easy flammable material; avoiding large and square shaped pieces. Using some thin paper sheets (e.g., newspapers), fire the wood. Press button nr. 10 to start the fan and close immediately the wood collecting box door.
Wait few minutes to let the firing charge of wood forming a layer of glowing coals, then put larger logs.

- When the operation cycle is started, the top display shows  , which means that the firing step is active. The display will show this until the outlet smoke temperature will reach the value *"minimum smoke temperature during firing"* (set to 70° C) in the maximum time set by the parameter *"firing maximum time"* (set to 10 minutes) ; during all this time the fan is driven at its maximum speed.
- When the value *"minimum smoke temperature during firing"* is reached, on the top display will appear  which means that the normal operating power has been reached; during this time the fan is driven at its maximum speed.
- When the set temperature has been reached, that is, when a value of temperature 5°C below the normal boiler operating temperature is reached, the top display will show  which means that the boiler has entered the modulation step; in this step the drafting fan is driven to its minimum speed. The display could also show this symbol when the boiler enters the modulation step because a too high smoke temperature has been reached (set to 170°C).
- When the set temperature has been reached, the top display will show  which means the temperature maintaining state of the boiler; in this state the fan is off.

7.2. Pellet operation

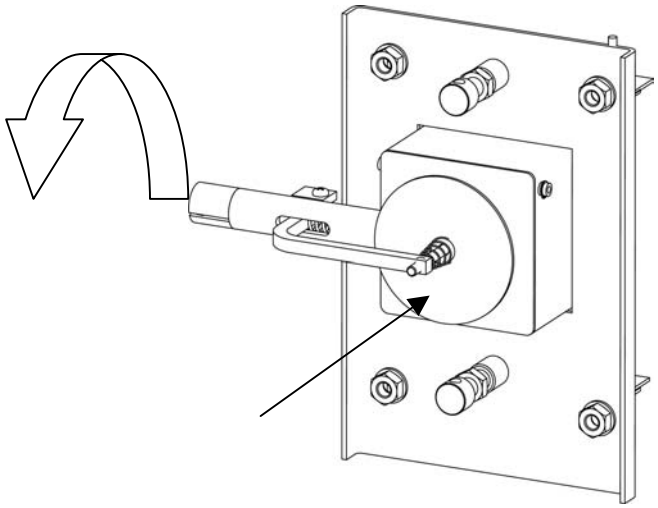
PHASE 1

- Mount the upper door with the pellet burner.
- Wire the burner cable to the electronic control panel.
- Connect the flexible auger device tube to the burner fuel inlet (be sure that the flexible tube has a proper inclination, without less inclined sections which may cause inconstant fuel feeding rate).



PHASE 2 - *MODULATOR ADJUSTING -*

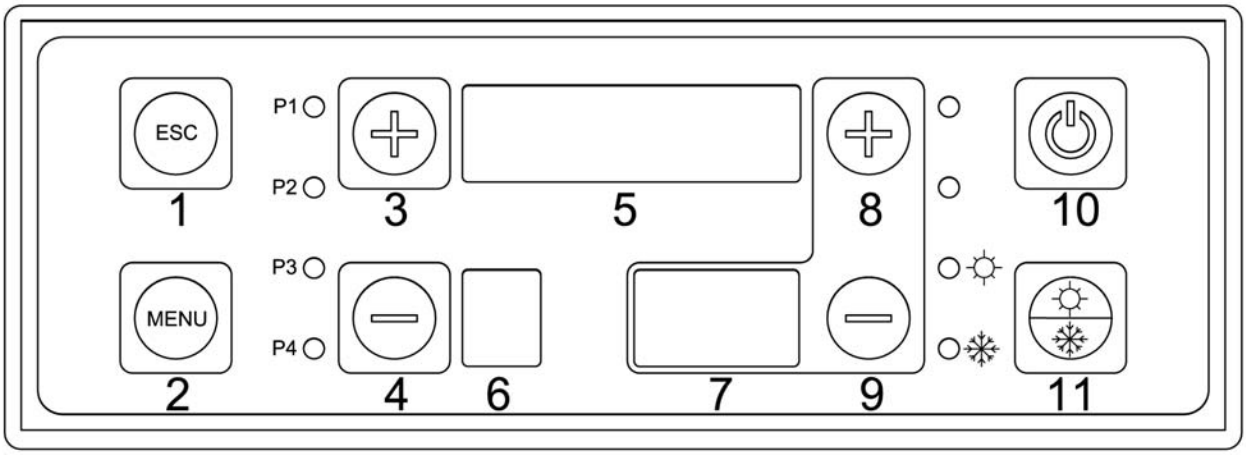
Before firing the pellet burner, be sure that the combustion air modulator device disc is completely closed. To avoid deformations of the modulator device we recommend to extract the copper sensing part to avoid boiler temperature sensing.



PHASE 3 - *OPERATION MODE SETTING* -

Before proceeding with firing, the electronic control must be set on pellet operation following the instructions shown at page 21.

PHASE 4 - *BOILER FIRING* -



To start the firing cycle, press button nr. 10 and keep it pressed for 3 seconds.

PHASE 5 – *MAXIMUM BOILER TEMPERATURE SETTING* -

Use buttons nr. 8 and 9 to set the boiler normal operating temperature. The bottom display nr. 7 will show the set temperature.

WARNING: the boiler operating temperature cannot be set to values lower than 65°C or higher than 80°C.

7.2.1. Operation cycle

The operation cycle when the boiler is fueled with pellets starts when the button nr. 10 is pressed.

Operation cycle sequence:

- When the operation cycle starts, the top display shows ChEc , which means the burner precleaning step with the fan driven at its maximum speed. This step takes 2 minutes cleaning from flying ashes the inner burner parts.
- When the precleaning step has finished, the ignition resistance preheating cycle starts. Also this procedure takes 2 minutes, with the top display showing Acc ; in this step the drafting fan is driven to its minimum speed.
- When the preheating step has finished, the electronic control board drives on the auger motordrive to bring in the burner firing area the correct amount of pellets, waiting for the flame to appear. This step takes a variable time, because the total time depends upon the quality and the type of the used fuel (anyway, the maximum time extent for firing is set to 10 minutes). If the firing fails, on the top display appears Er 12 .
- When the flame has appeared, the boiler is driven in the flame stabilization step (fixed time, 3 minutes) and on the top diaplay appears Stb ; the drafting fan is driven to its maximum speed and the auger starts taking fuel in the burner using the timings set on the control system.
- When the stabilization time has expired, the boiler enters the nominal thermal power operation. On the top display appears nor and the drafting fan is driven to its maximum speed. In this step, the auger works with the timings set on the control system.

- When the temperature value is reached 5°C less then the working temperature, on the display will appear  ; in this step the drafting fan is driven to its minimum speed. The display could also show this icon when the boiler enters the modulation step because a too high smoke temperature has been reached (set to 190°C).
- When the temperature value shown on the top display is reached, on the top display will appear  which means the temperature maintenance state; the cutting off process takes place with the drafting fan is driven to its maximum speed to have the inner parts of the burner cleaned.
- When the cutting off step has finished, the fan is driven off and the top display will continue to show  .

8. THE MENUS

The operational parameters of the thermal control unit can be set using various menus; three different menu levels exist:

- **Boiler thermostating menu**
- **Customer menu**
- **Protected menu (for authorized technical centers use only)**

8.1. Boiler thermostating menu

Can be accesed pressing the button "raise temperature" (button nr. 8) or "lower temperature" (button nr. 9) on the control panel. When the menu is open, on the bottom display the boiler maximum allowed temperature value will be shown.

To modify this value, perform the following steps:

- Press the button "raise temperature" to raise the temperature value
- Press the button "lower temperature" to lower the temperature value
- The system automatically closes the menu after 10 seconds have passed without any button being pressed, and the new value is saved.

8.2. Customer menu

Can be accessed pressing the menu button (nr. 2) on the control panel.

Entering the menu and its submenus:

- The customer menu can be accessed pressing the button menu (nr. 2)
- When the menu is open, on the top 4-digits display the names of the various available submenus will appear.
- To navigate in the submenus, press the buttons menu + (nr. 3) or menu - (nr. 4)
- To enter a submenu, press the button menu (nr. 2)
- To close a submenu and revert to the previous one, press button esc (nr. 1)
- Exiting from the main menu can be done manually, pressing the button esc (nr. 1) with the main menu shown or automatically, after 40 seconds have passed without any button being pressed.
- Below are shown all the available submenus and their options.

Menus and customer menu submenus list:

ITEM NR.	CUSTOMER MENU	SUBMENUS	DESCRIPTION
1			System operation menu
2			Heating system configuration menu
3			Temperature sensors display menu
4			Clock menu
5	 Cronothermostat menu (Visible only in pellet operation or with natural gas / oil burner)	 PROGRAM	Submenu crono; one of the setting modes below may be chosen
		 DAILY	Submenu *CRONO*, programming mode daily
		 WEEKLY	Submenu *CRONO*, programming mode weekly
		 WEEK END	Submenu *CRONO*, programming mode week end
6			Manual auger activation menu (Visible in pellet operation mode only)
7			Outlet test menu

8.3. System operation menu

Boiler operation mode selection menu.

Available operation modes list in function of system configuration:

Heating system configuration[P43] Protected menu	Operation[P44] Customer menu	Description
0 (WOOD only)	Hidden menu	Wood only operation.
1 (WOOD / PELLET)	**“LEGN”**	Wood only operation.
	“PELL”	Pellet operation only with automatic firing

PROCEDURE		
INSTRUCTIONS		**BUTTONS**
Enter the **System operation** menu following the previously shown procedure		
On the top display will appear the value corresponding to the currently type of system operation, while on the two bottom displays will be shown the parameter identification code.		
Enter the modification mode; the top display blinks		**Menu**
Select the desired operation mode		**Menu +** **Menu -**
Save the settings		**Menu**
Don't save the settings and revert back to the previous value		**Esc**
Exit from the menu **System configuration**		**Esc**

8.4. Heating system configuration menu

This menu permits the selection of the heating system type which the boiler is connected to. The various temperature sensors connected to the electronic control board can be set active or not.
Different types of heating systems which can be selected:

Heating system configuration[P37]	Description	Different types of water temperature sensors used	Different types of circulation pumps
0000	Basic heating	Heating system delivery temperature sensor Heating system return temperature sensor	Heating system circulation pump **(PI)** Bypass pump **(PR)**
0001	Heating + hot sanitary water storing tank	Heating system delivery temperature sensor Heating system return temperature sensor Hot sanitary water storing tank temperature sensor - top	Heating system circulation pump **(PI)** Bypass pump **(PR)** Hot sanitary water storing tank circulation pump **(PB)**
0002	Heating + "Puffer" tank	Heating system delivery temperature sensor Heating system return temperature sensor "Puffer" tank top side temperature sensor "Puffer" tank bottom side temperature sensor	Heating system circulation pump **(PI)** Bypass pump **(PR)** "Puffer" tank circulation pump **(PB)**
0003	Heating + hot sanitary water storing tank + solar panels	Heating system delivery temperature sensor Heating system return temperature sensor Hot sanitary water storing tank temperature sensor - top Hot sanitary water storing tank temperature sensor - bottom Solar panels temperature sensor	Heating system circulation pump **(PI)** Bypass pump **(PR)** Hot sanitary water storing tank circulation pump **(PB)** Solar panels circulation pump **(PS)**
0004	Heating + "Puffer" tank + solar panels	Heating system delivery temperature sensor Heating system return temperature sensor "Puffer" tank top side temperature sensor "Puffer" tank bottom side temperature sensor Solar panels temperature sensor	Heating system circulation pump **(PI)** Bypass pump **(PR)** "Puffer" tank circulation pump **(PB)** Solar panels circulation pump **(PS)**

PROCEDURE		
INSTRUCTIONS		BUTTONS
Enter the **Heating system operation** menu following the previously shown procedure		

On the top display will appear the value corresponding to the currently type of heating system chosen, while on the two bottom displays will be shown the parameter identification code.		
Enter the modification mode; the top display blinks		**Menu**
Select the type of heating system the boiler is connected to		**Menu +** **Menu -**
Save the settings		**Menu**
Don't save the settings and revert back to the previous value		**Esc**
Exit from the menu **Heating system configuration**		**Esc**

8.5. Temperature sensor values displaying menu

 This menu permits to show the various temperatures read by the temperature sensors.

The top display  shows the selected temperature sensor value.

The bottom displays  shows the code ‘G xx’, the temperature sensor identification code.

PROCEDURE		
INSTRUCTIONS		BUTTONS
Enter the **Temperature sensor values displaying** menu following the previously shown procedure		
Navigate through the different temperature sensors		**Menu +** **Menu -**
Exit from the menu **Temperature sensor values display menu**		**Esc**

ITEM NR.		DESCRIPTION
1		FLAME BRIGHTNESS (visible in pellet operation only)

2		SMOKE TEMPERATURE (°C)
3		BOILER DELIVERY SIDE WATER TEMPERATURE (°C)
4		BOILER RETURN SIDE WATER TEMPERATURE (°C)
5		HOT SANITARY WATER STORING TANK / PUFFER TEMPERATURE (TOP MEASURE POINT - °C)
6		HOT SANITARY WATER STORING TANK / PUFFER TEMPERATURE (BOTTOM MEASURE POINT - °C)
7		SOLAR PANELS TEMPERATURE (°C)
8		TEMPERATURE DIFFERENCE BETWEEN BOILER DELIVERY SIDE WATER AND RETURN SIDE WATER (°C)

9		TEMPERATURE DIFFERENCE BETWEEN SOLAR PANELS AND HOT SANITARY WATER TANK - BOTTOM SIDE/"PUFFER" TANK (°C)
		PROGRAM RELEASE

8.6. Clock menu

 To set the *time* and the *date*.

PROCEDURE		
INSTRUCTIONS		BUTTONS
Enter the **Clock** menu following the previously shown procedure		
Modify the selected value		**Menu +** **Menu -**
Enter the minutes setting mode, the minutes blink		**Menu**
Modify the selected value		**Menu +** **Menu -**
Enter the day setting mode, the day blinks		**Menu**
Modify the selected value		**Menu +** **Menu -**
Save the settings		**Menu**
Exit from the menu **Clock**		**Esc**

8.7. Crono menu

 Boiler *firing and cutting off* hours sucking menu. **This menu is visible only if the system is set for pellet operation.** It includes four submenus, each of them corresponding to the three different programming modes allowed:

CRONO PROGRAM

Permits the selection of the **daily**, **weekly** or **weekend** program mode which is intended to be used for the boiler automatic control, or the **manual mode**, if the crono mode is not intended to be used.

PROCEDURE		
INSTRUCTIONS		BUTTONS
Enter the **Programming** menu following the previously shown procedure		
The top display will show the current selected Crono program		
Enter the modification mode; the top display blinks		**Menu**
Select the desired **Crono setting**		**Menu +** **Menu -**
Save the settings		**Menu**
Don't save the settings and revert back to the previous value		**Esc**
Exit from the menu **Crono setting**		**Esc**

DAILY CRONO

Permits to set the boiler firing / cutting off intervals for each day of the week. For each day of the week three different time intervals are available (each of them includes the ON and the OFF hour)

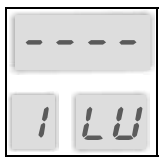
The top display shows:

⇒ *Hyphens* if no time is set

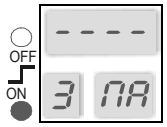
⇒ The *ON* or *OFF* hours if some of them were set

NOTE: For the Off hour the **OFF led is lit**
For the On hour the **ON led is lit**

The bottom display shows:
On the left, the set time interval (1 through 3)
On the right, the day of the week



For each time interval set, the minutes can be modified in 15 minutes steps (***e.g.:*** 08:00 PM, 08:15 PM, 08:30 PM, 08:45 PM). **Only** if 23 is entered as the hour value, the minutes can pass from 45 to 59 to get the boiler fired at midnight.

DAILY PROGRAMMING PROCEDURE			
	INSTRUCTIONS		BUTTONS
1	Enter the Daily settings menu following the previously shown procedure		
2	Navigate in the **Daily settings** submenu up to the desired day of the week (Monday through Sunday). Chosen time interval (1 through 3) ON time.		**Menu +** **Menu -**
3	Set the desired time interval. To get the hyphens canceled, keep pressed the start button nr. 7 for at least 3 seconds. **NOTE:** both the ON time and the OFF time are enabled		**FIRING** **press button nr. 7** **for 3 seconds**
4	Enter the hour setting mode, the hour blinks		**Menu**
5	Modify the selected value		**Menu +** **Menu -**
6	Enter the minutes setting mode, the minutes blink		**Menu**
7	Modify the selected value		**Menu +** **Menu -**
8	Save the settings		**Menu**
9	Select the OFF time		**Menu +** **Menu -***
10	Repeat the operations 4 through 8 for setting the *OFF time*		
11	Exit from the menu **Daily settings**		**Esc**

NOTE: TIME INTERVAL SETTING EXTENDING FROM BEFORE TO AFTER MIDNIGHT

Set the OFF time for a time interval for a day of the week at 23:59

Set the ON time for the next day of the week at 00:00

EXAMPLE:

In the example below, the boiler will remain fired continuosly from Tuesday, 09:30 PM until Wednesday, 08:30 AM.

CRONO SETTING, TUESDAY	
ON	OFF
	
CRONO SETTING, WEDNESDAY	
ON	OFF
	

WEEKLY CRONO

Permits to set the same firing/cutting off times for every day of the week, from Monday through Sunday. 3 different time intervals are available (each of them includes the *ON* and the *OFF* time).

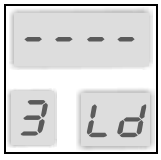
The top display shows:

⇒ *Hyphens* if no time is set

⇒ The *ON* or *OFF* hours if some of them were set

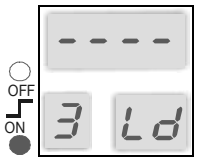
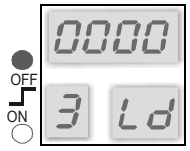
NOTE: For the Off hour the **OFF led is lit**
For the On hour the **ON led is lit**

The bottom display shows:
On the left the set time interval (1 through 3)
On the right the week day code, from Monday through Sunday

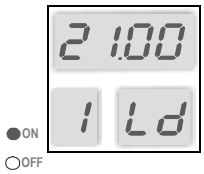
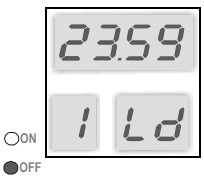



For each time interval set, the minutes can be modified in 15 minutes steps (***e.g.:*** 08:00 AM PM, 08:15 AM PM, 08:30 AM PM, 08:45 AM PM). **Only** if 23 is entered as the hour value, the minutes can pass from 45 to 59 to get the boiler fired near before midnight.

WEEKLY PROGRAMMING PROCEDURE			
	INSTRUCTIONS		BUTTONS
1	Enter the **Weekly setting** menu following the previously shown procedure		

2	Navigate in **Weekly settings** up to the desired time interval (1 through 3) ON time.		**Menu +** **Menu -**
3	Set the desired time interval. To get the hyphens canceled, keep pressed the start button nr. 7 for at least 3 seconds. **NOTE:** both the ON time and the OFF time are enabled		**FIRING** **press button nr. 7** **for 3 seconds**
4	Enter the hour setting mode, the hour blinks		**Menu**
5	Modify the selected value		**Menu +** **Menu -**
6	Enter the minutes setting mode, the minutes blink		**Menu**
7	Modify the selected value		**Menu +** **Menu -**
8	Save the settings		**Menu**
9	Select the OFF time		**Menu +** **Menu -**
10	Repeat the operations 4 through 8 for setting the *OFF time*		
11	Exit from the menu **Weekly settings**		**Esc**

NOTE:
TIME INTERVAL SETTING EXTENDING FROM BEFORE TO AFTER MIDNIGHT
For a new time interval, set the OFF time at 11:59 PM
For a new time interval, set the ON time at 12:00 AM
EXAMPLE:
In the example below, the boiler will remain continuosly fired everyday from 09:00 PM until 08:30 AM.

TIME INTERVAL 1	
ON	**OFF**
	
TIME INTERVAL 2	
ON	**OFF**
	

CRONO WEEK END

Permits to set the same boiler firing/cutting off times for every day of the week **from Monday through Friday** and the same settings for **Saturday and Sunday**. Three different time intervals are available (each of them includes an ON and an OFF time) for the days of the week from Monday through Friday and three different time intervals for Saturday and Sunday

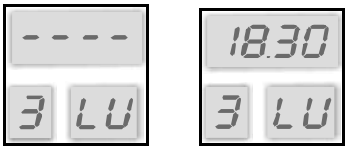
The top display shows:

⇒ *Hyphens* if no time is set

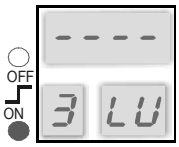
⇒ The *ON* or *OFF* hours if some of them were set

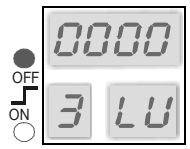
NOTE: For the Off hour the **OFF led is lit**
For the On hour the **ON led is lit**

The bottom display shows:
On the left the set time interval (1 through 3)
On the right is shown the code which represents the days of the week from Monday through Friday or Saturday-Sunday



For each time interval set, the minutes can be modified in 15 minutes steps (***e.g.:*** 08:00 AM AM PM, 08:15 AM AM PM, 08:30 AM AM PM, 08:45 AM AM PM). **Only** if 23 is entered as the hour value, the minutes can pass from 45 to 59 to get the boiler fired near before midnight.

CRONO WEEK-END SETTING PROCEDURE			
	INSTRUCTIONS		**BUTTONS**
1	Enter the **Week End** menu following the previously shown procedure		
2	Navigate in the **Week End** submenu up to the desired days interval (Monday-Friday or Saturday-Sunday) Desired programming time interval (1 through 3) ON time.		**Menu +** **Menu -**
3	Set the desired time interval. To get the hyphens canceled, keep pressed the start button nr. 7 for at least 3 seconds. **NOTE:** both the ON time and the OFF time are enabled		**FIRING** **press button nr. 7** **for 3 seconds**
4	Enter the hour setting mode, the hour blinks		**Menu**
5	Modify the selected value		**Menu +** **Menu -**
6	Enter the minutes setting mode, the minutes blink		**Menu**

7	Modify the selected value		**Menu +** **Menu -**
8	Save the settings		**Menu**
9	Select the OFF time		**Menu +** **Menu -**
10	Repeat the operations 4 through 8 for setting the ***OFF time***		
11	Exit from the **Crono Week End menu**		**Esc**

NOTE: TIME INTERVAL SETTING EXTENDING FROM BEFORE TO AFTER MIDNIGHT

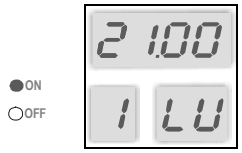
Set the OFF time for a time interval at 23:59

Set the ON time for another time interval setting at 00:00

When is required to set an on time interval beginning before and ending after midnight from Friday to Saturday, follow the same procedure as outlined for ***Crono Daily,*** taking into account for the point 1. the days from Monday through Friday and for the point 2. Saturday-Sunday.

EXAMPLE:

In the example below, the settings results is a steady on state of the boiler from Monday through Friday from 09:00 PM through 08:30 AM. On Friday night the boiler is driven off at midnight (only if another firing on interval Saturday/Sunday from 12:00 AM on is not set)

TIME INTERVAL 1 MON/FRI	
ON	**OFF**
	
TIME INTERVAL 2 **MON/FRI**	
ON	**OFF**
	

8.8. Manual auger activation menu

Permits a manual activation of the auger in the **OFF** state and in pellet operation mode to have the auger completely filled with pellets.
Only visible when in pellet operation.

PROCEDURE		
INSTRUCTIONS		BUTTONS
Be sure the boiler is **OFF**		
Enter the **LOAD** menu following the previously shown procedure		
On the top display will blink **OFF**		**Menu**
Activate the auger, on the top display will blink **ON**		**Menu +** **Menu -**
Exit from the menu **Load**		**Esc**

8.9. Test menu

This menu permits to perform the test of each electronic board outlet (along with the connected devices) with the boiler **OFF**.

PROCEDURE		
INSTRUCTIONS		BUTTONS
Be sure the boiler is **OFF**		
Enter the menu **Outlets test** following the previously shown procedure		
On the top display will appear the **SMOKE FAN 1 SUBMENU**		**Menu**

Entering the submenu on the top display, the fan speed will blink		**Menu**
Raises/lowers the fan speed The fan speed is controlled by mean of percentage points: – 0% motor off – 1% - 50% minimum speed – 51% - 99% maximum speed		**Menu +** **Menu -**
Exit from submenu		**Esc**
Pass to the next submenu **SMOKE FAN 2 SUBMENU**		**Menu +** **Menu -**
As for **SMOKE FAN 1**		
Pass to the next submenu **AUGER**		**Menu +** **Menu -**
Entering, on the top display will blink **OFF**		**Menu**
When the outlet is activated, on the display will blink **ON**		**Menu +** **Menu -**
Exit from submenu		**Esc**
Pass to the next submenu **IGNITION RESISTANCE**		**Menu +** **Menu -**
As for **AUGER**		

Pass to the next submenu **HEATING SYSTEM CIRCULATION PUMP (PI)**		**Menu +** **Menu -**
As for **AUGER**		

Pass to the next submenu **BY PASS PUMP (PR)**		**Menu +** **Menu -**
As for **AUGER**		
Pass to the next submenu **HOT SANITARY WATER STORING TANK PUMP (PB)**		**Menu +** **Menu -**
As for **AUGER**		
Pass to the next submenu **SOLAR PANELS CIRCULATION PUMP (PS)**		**Menu +** **Menu -**
As for **AUGER**		
Pass to the next submenu **DIVERTING VALVE**		**Menu +** **Menu -**
As for **AUGER**		
Pass to the next submenu **BURNER**		**Menu +** **Menu -**
As for **AUGER**		
Press **ESC** to exit from the menu **Outlets test**		

NOTE:

- When testing the **Auger,** check that the manual reset security thermostats are closed.

THE BOILER MUST BE OFF, WITHOUT ALARM CONDITIONS AND WATER TEMPERATURE BELOW THE SET NORMAL OPERATION BOILER TEMPERATURE.

8.10. Summer / winter operation

This function of the boiler thermostatic control permits two different types of control, one for the summertime and the other for wintertime. The operation mode may be set from the control panel pressing the summertime / wintertime button (nr. 11) for at least 5 seconds.

WINTERTIME OPERATION The heating system circulation pump PI is activated.

SUMMERTIME OPERATION The heating system circulation pump PI is not activated. Only the hot sanitary water storing tank/puffer combi pump will be activated if it was configured in the system.

9. HIDRAULIC SCHEMATIC DIAGRAMS

Any hydraulic schematic diagram reported in this manual must be considered to be given for reference purposes only; in the reality, the whole installation arrangement must be approved by authorized engineers. ARCA s.r.l. we take no liability for any damage caused to goods, persons or animals by wrong installation arrangements. For schematic diagrams other than those reported in the present manual, please feel free to contact the ARCA technical department. If the boiler will be connected to hydraulic systems not complying with our recommendations, or anyway not authorized, this will void the warranty.

Note:
The correct operation of the boiler requires the bypass pump to avoid harmful water temperature stratifications.

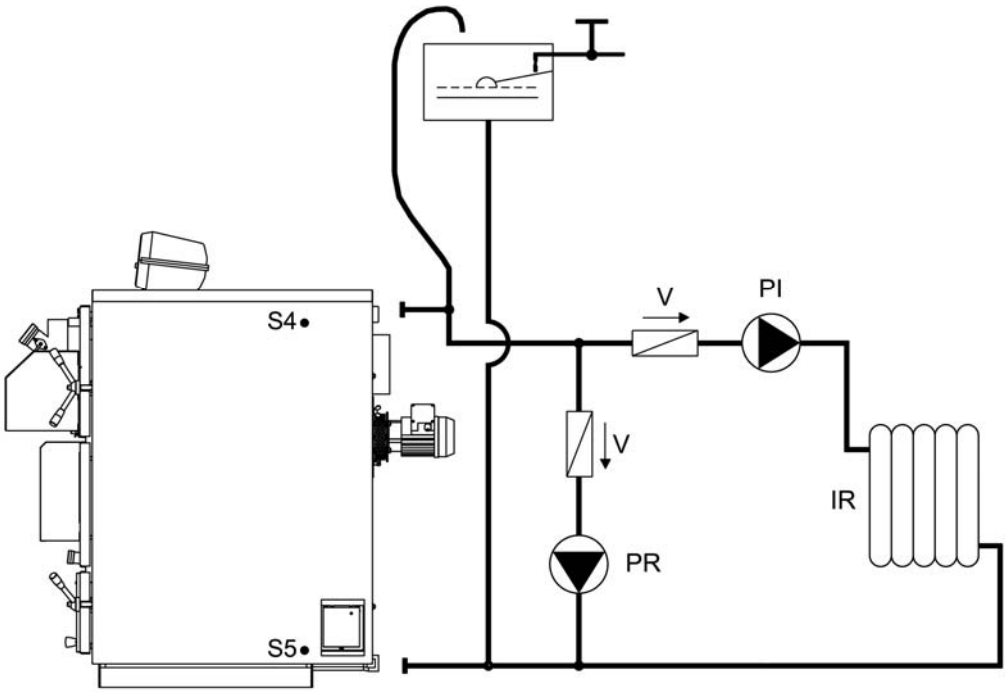
The absence of the bypass pump will void the warranty.

9.1. General connection diagrams for heating only with open side expansion tank

A heating only arrangement may be divided in the following parts:

1. **Boiler delivery side temperature sensor (S4):** is located in its receptacle close to the boiler water delivery connection (A6) and is used by the electronic control to decide whether and when the boiler must pass from a step to another and to activate the various pumps.
2. **Boiler return side temperature sensor (S5):** is located in its receptacle close to the boiler water delivery connection (A7) and is used by the electronic control to activate or deactivate the bypass pump (PR).
3. **Heating system circulation pump (PI):** is ready to be activated when the temperature reaches the value **TH-HEATING-SYS-PUMP[A01]**, but will be really turned on if the room thermostat asks for other heat. It remains steady on, independently from the room thermostat, in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**), or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**).
4. **Bypass pump (PR):** is ready to be activated when the temperature reaches the value **TH-BYPASS-PUMP[A14]**, but will be really turned on only if the boiler delivery side water temperature value will be bigger than that of the return side by a difference equal to **DIFFERENCE FOR BYPASS [d00]** in the protected menu. It remains steady on in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**) or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**).

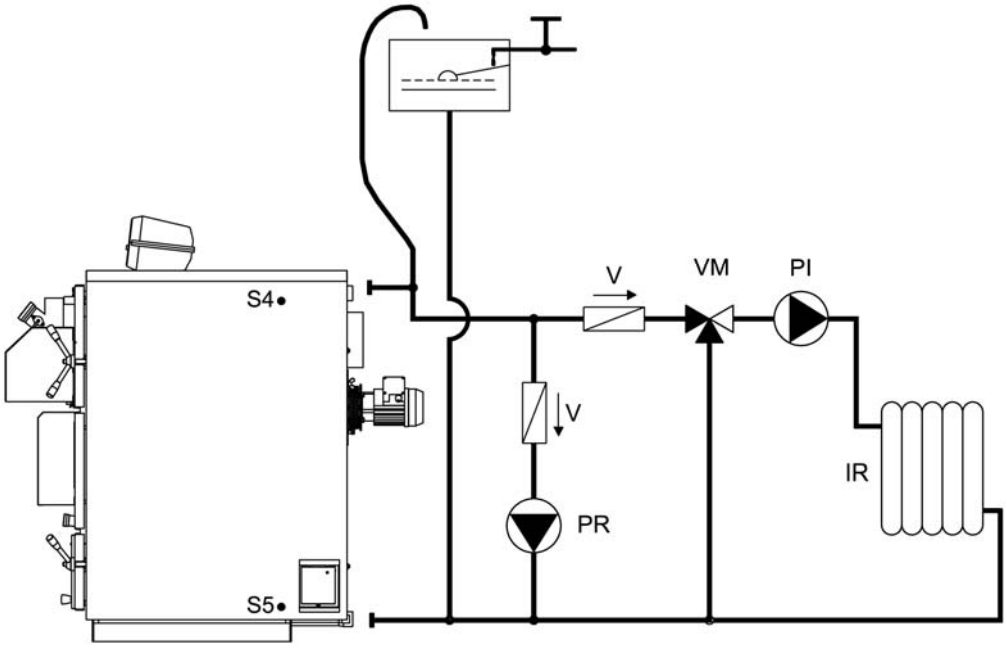
9.1.1. General connection diagram for heating only purposes - open expansion tank



Key

PI	System pump	**V**	Non return valve
PR	Bypass pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor

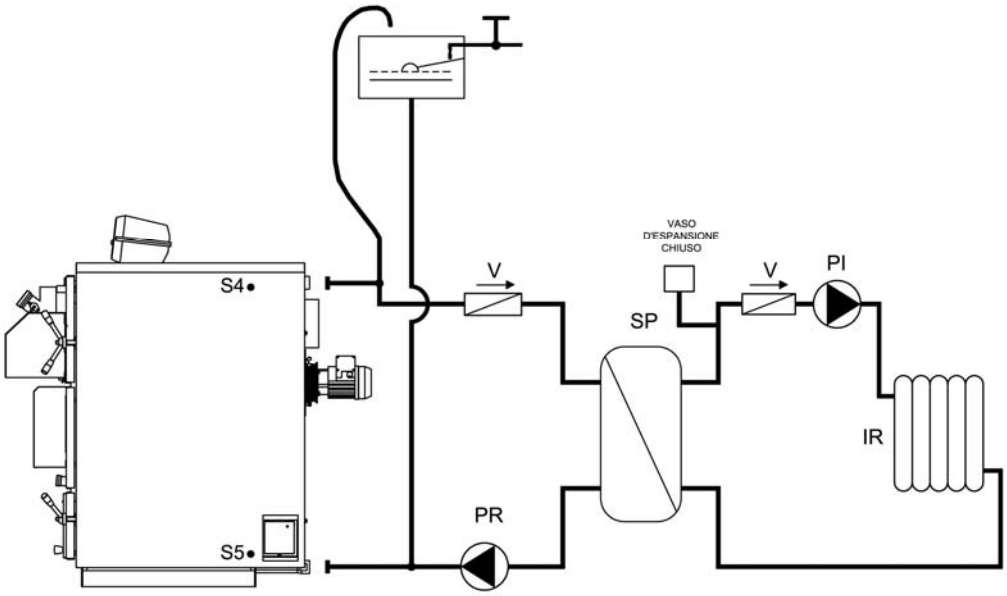
9.1.2. General connection diagram for heating only purposes - open expansion tank and mixing valve



Key:

PI	System pump	**V**	Non return valve
PR	Bypass pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
VM	Mixing valve		

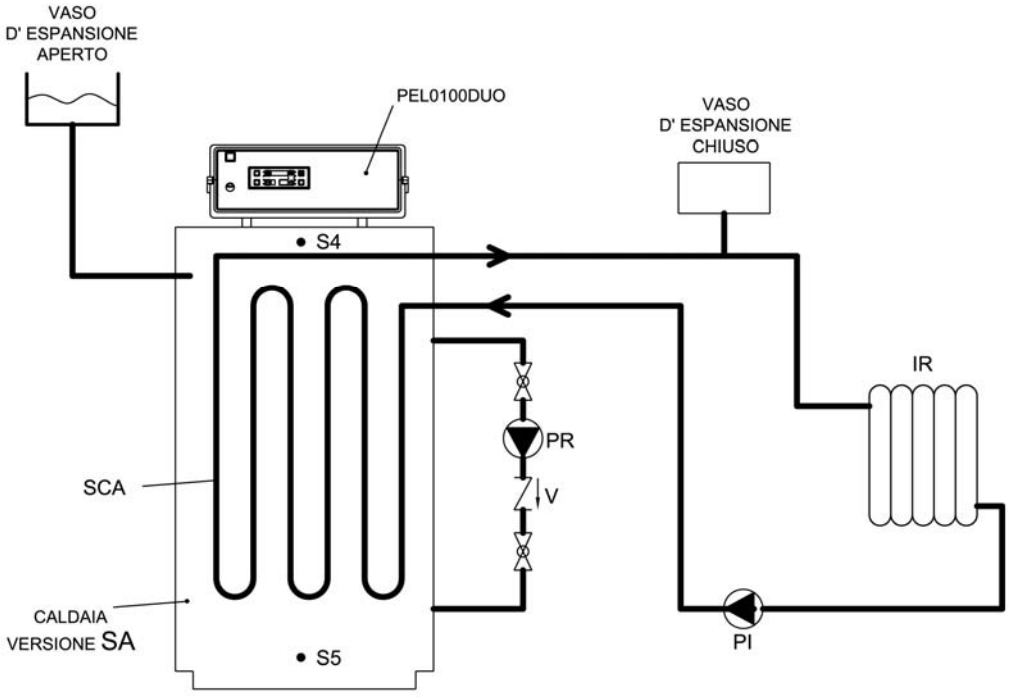
9.1.3. General connection diagram for heating only purposes - plate type heat exchanger



Key:

PI	System pump	**V**	Non return valve
PR	Bypass pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
SP	Plate heat exchanger		

9.1.4. General connection diagram for heating only purposes - closed type expansion tank on the hot sanitary water circuit (SA version)



Key:

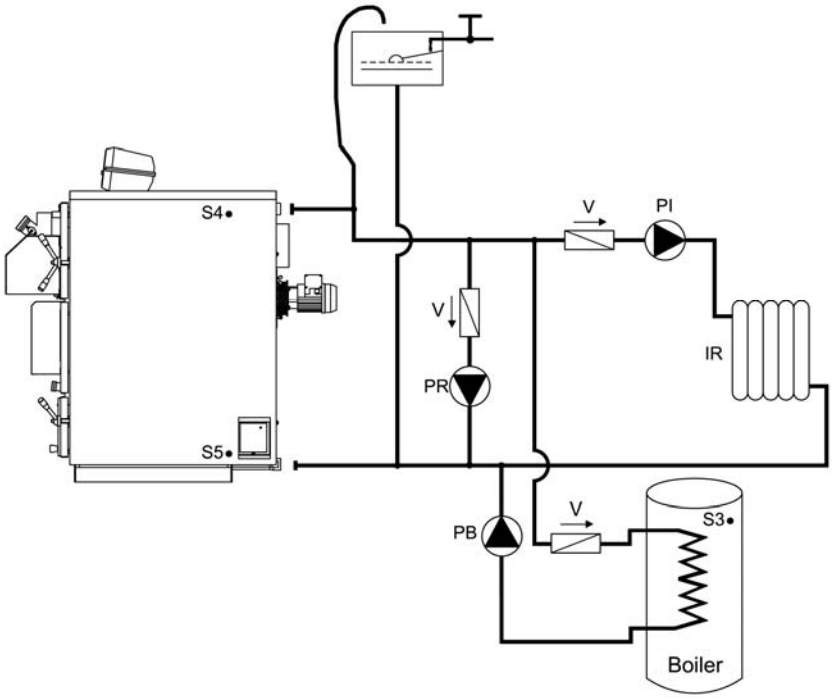
PI	System pump	**V**	Non return valve
PR	Bypass pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
SCA	Coil type copper sanitary water heat exchanger.		

9.2. General schematic diagrams for heating purposes with hot sanitary water storing tank

A heating system with hot sanitary water storing tank arrangement may be divided in the following parts:

1. **Boiler delivery side temperature sensor (S4):** is located in its receptacle close to the boiler water delivery connection (A6) and is used by the electronic control to decide whether and when the boiler must pass from a step to another and to activate the various pumps.
2. **Boiler return side temperature sensor (S5):** is located in its receptacle close to the boiler water delivery connection (A7) and is used by the electronic control to activate or deactivate the bypass pump (PR).
3. **Hot sanitary water storing tank top side temperature sensor (S3):** the sensor is inserted into the case located on the top side of the hot sanitary water storing tank and is used to control the hot sanitary water circulation pump (PB).
4. **Hot sanitary water storing tank bottom side temperature sensor (S2):** the sensor is inserted into the case located on the bottom side of the hot sanitary water storing tank and is used to control the solar panels circulation pump (PS).
5. **Solar panels temperature sensor (S1):** is located onto the solar panels hot water outlet and is used to control the solar panels pump (PS).
6. **Heating system circulation pump (PI):** is ready to be activated when the temperature reaches the value **TH-HEATING-SYS-PUMP[A01]** with hot sanitary water storing tank circulation pump off, but will be really turned on if the room thermostat asks for other heat. It remains steady on, independently from the room thermostat, in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**), or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**).
7. **Bypass pump (PR):** is ready to be activated when the temperature reaches the value **TH-BYPASS-PUMP[A14]**, but will be really turned on only if the boiler delivery side water temperature value will be bigger than that of the return side by a difference equal to **DIFFERENCE FOR BYPASS [d00]** in the protected menu. It remains steady on in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**) or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**).
8. **Hot sanitary water storing tank circulation pump (PB):** is ready to be activated when temperature reaches the value **TH-PUMP-BOILER[A15]**, but will be really activated only if the top side hot sanitary water storing tank temperature is below the value **TH-BOILER-SANITARY[A32]**. The pump will be driven off when the top side hot sanitary water storing tank temperature reaches the above value. The pump will remain steady on, independently from the room thermostat, in case of antifreeze alarm (boiler delivery side water temperature below the value **TH-BOILER-ICE[A00]**) or in case of anti-thermal inertia operation (boiler delivery side water temperature higher than **TH-BOILER-SECURITY[A04]**).
9. **Solar panels pump (PS):** will be turned on if the solar panels collector water temperature is higher than that of the bottom part of the hot sanitary water storing tank by a difference equal with the value of **DIFFERENCE FOR SOLAR[d16]** of the protected menu. If the hot sanitary water storing tank top side water temperature reaches the value **TH-BOILER-SICUR[A35]**, then for security reasons the pump will be turned off. In case of solar panels antifreeze alarm (solar panels water temperature below the value **TH-SOLAR-ICE[A48]**) the pump will be turned on periodically with pause times equal with the value **TIME SOLAR ICE OFF[t37]** and working times equal with the value **TIME SOLAR ICE ON[t36]**.

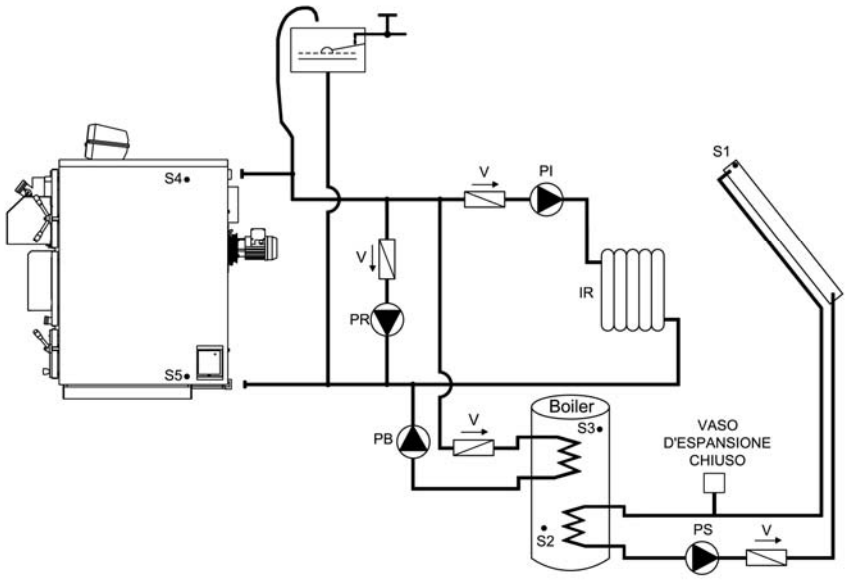
9.2.1. General connection diagram for heating purposes withhot sanitary water storing tank



Key:

PI	System pump	**V**	Non return valve
PR	Bypass pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
PB	Hot sanitary water tank circuit pump	**S3**	Hot sanitary water tank sensor - top side

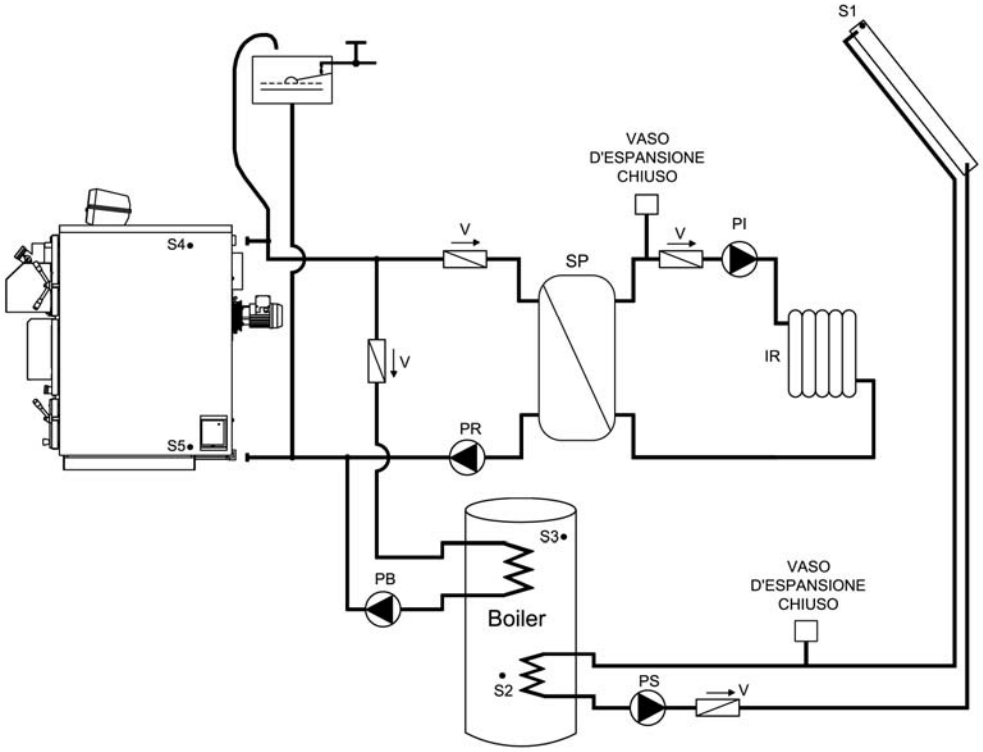
9.2.2. General connection diagram for heating purposes with hot sanitary water storing tank equipped with double coil type heat exchanger and solar panels



Key:

PI	System pump	**S1**	Solar panels temperature sensor
PR	Bypass pump	**S2**	Hot sanitary water tank sensor - bottom side
PB	Hot sanitary water tank circuit pump	**S3**	Hot sanitary water tank sensor - top side
PS	Solar panels pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
V	Non return valve		

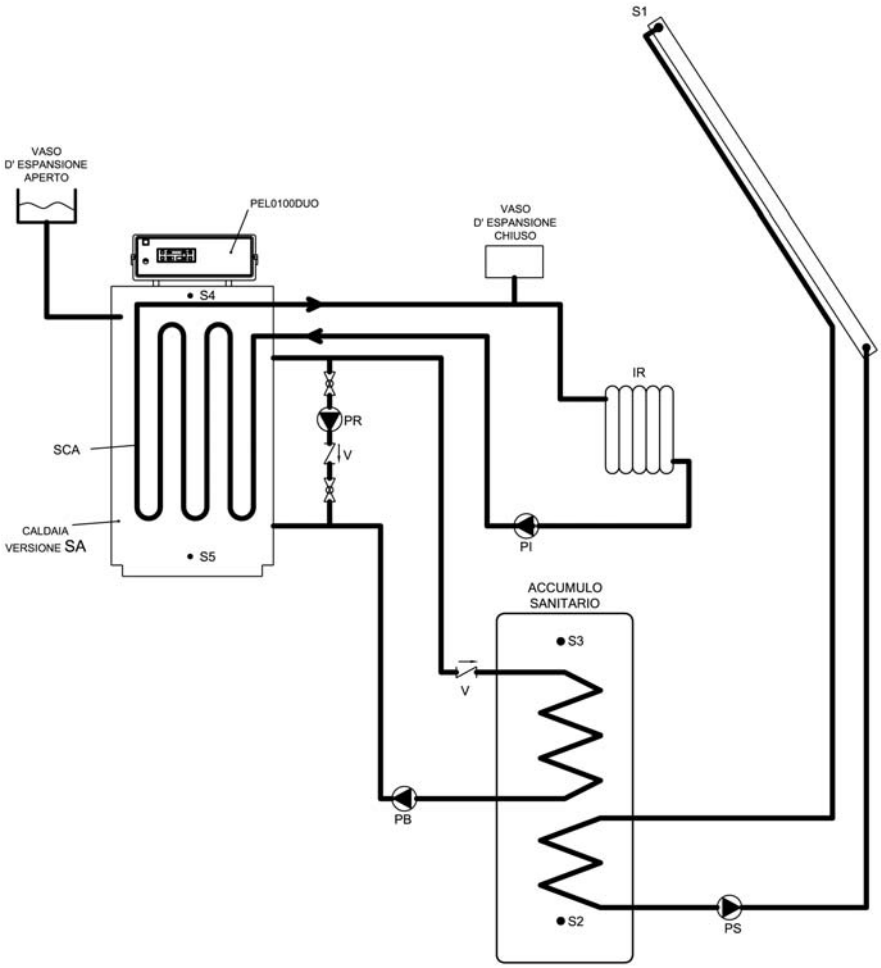
9.2.3. General connection diagram for heating purposes with closed type expansion tank on the plate type heat exchanger circuit, with hot sanitary water storing tank equipped with double coil type heat exchanger and solar panels



Key :

PI	System pump
PR	Bypass pump
PB	Hot sanitari water tank circuit pump
PS	Solar panels pump
IR	Heating system
V	Non return valve
SP	Plate heat exchanger
S5	Heating system return temperature sensor
S4	Heating system delivery temperature sensor
S3	Hot sanitary water tank sensor - top side
S2	Hot sanitary water tank sensor - bottom side
S1	Solar panels temperature sensor

9.2.4. General connection diagram for heating purposes with closed expansion tank on the hot sanitary water circuit heat exchanger, with hot sanitary water storing tank equipped with double coil type heat exchanger and solar panels



Legenda :

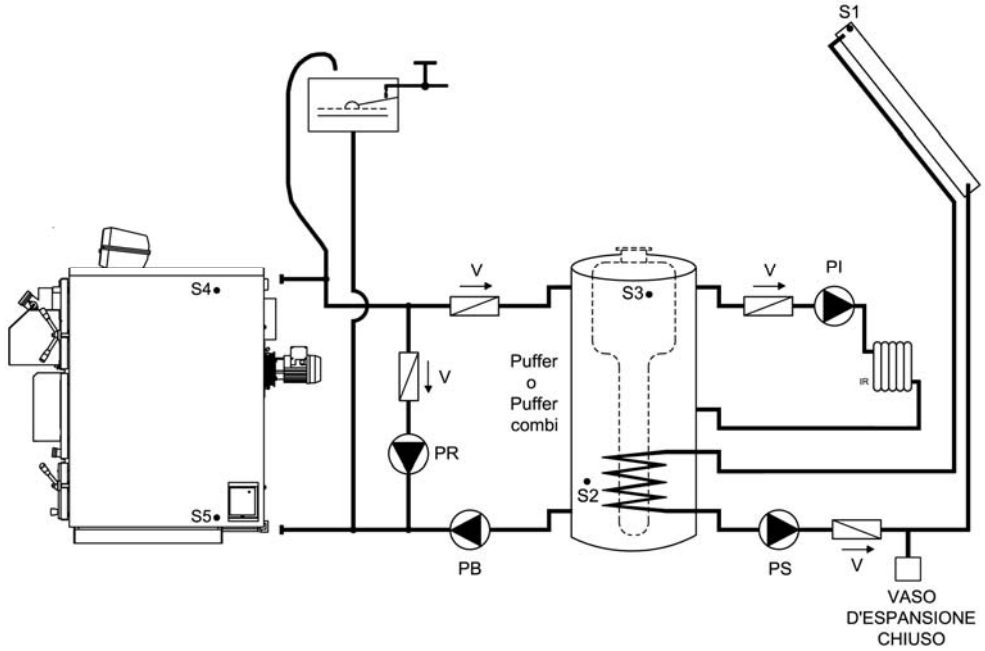
PI	System pump
PR	Bypass pump
PB	Hot sanitari water tank circuit pump
PS	Solar panels pump
IR	Heating system
V	Non return valve
SCA	Coil type copper sanitary water heat exchanger.
S5	Heating system return temperature sensor
S4	Heating system delivery temperature sensor
S3	Hot sanitary water tank sensor - top side
S2	Hot sanitary water tank sensor - bottom side
S1	Solar panels temperature sensor

9.3. General connection diagrams for a system with "puffer" or "puffer combi" tank

A system with "puffer" or "puffer combi" tank can be divided in the following parts:

1. **Boiler delivery side temperature sensor (S4):** is located in its receptacle close to the boiler water delivery connection (A6) and is used by the electronic control to decide whether and when the boiler must pass from a step to another and to activate the various pumps.
2. **Boiler return side temperature sensor (S5):** is located in its receptacle close to the boiler water delivery connection (A7) and is used by the electronic control to activate or deactivate the bypass pump (PR).
3. **"Puffer" tank temperature sensor - top side (S3):** is inserted in its case located in the top side of the puffer tank and easy used to control the puffer tank pump (PB) and the heating system circulation pump (PI).
4. **"Puffer" tank temperature sensor - bottom side (S2):** is inserted in its case located in the bottom side of the puffer tank and easy used to control the puffer tank pump (PB) and the solar panels pump (PS).
5. **Solar panels temperature sensor (S1):** is located onto the solar panels hot water outlet and is used to control the solar panels pump (PS).
6. **Heating system circulation pump (PI):** is ready to be activated when the temperature reaches the value **TH-HEATING-SYS-PUFFER[A01]**, but will be really turned on if the room thermostat asks for other heat. It remains steady on, independently from the room thermostat, in case of **antifreeze alarm** (boiler delivery side water temperature value less than TH-BOILER-ICE[A00]), or in case of **anti thermal inertia** operation (boiler delivery side water temperature value bigger than TH-BOILER-SECURITY[A04]).
7. **Bypass pump (PR):** is ready to be activated when the temperature reaches the value **TH-BYPASS-PUMP[A14]**, but will be really turned on only if the boiler delivery side water temperature value will be bigger than that of the return side by a difference equal to **DIFFERENCE FOR BYPASS [d00]** in the protected menu. It remains steady on in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**) or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**).
8. **"Puffer" tank pump (PB):** is ready to be activated when temperature reaches the value **TH-PUMP-BOILER[A15]**, but will be really activated only if the top side hot sanitary water storing tank temperature is below the value **TH-PUFFER-ON[A32]**. The pump will be driven off when the top side hot sanitary water storing tank temperature reaches the value TH-PUFFER-OFF[A48]. The pump will remain steady on, independently from the room thermostat, in case of **antifreeze alarm** (boiler delivery side water temperature below the value TH-BOILER-ICE[A00]) or in case of **anti-thermal inertia** operation (boiler delivery side water temperature higher than TH-BOILER-SECURITY[A04]).
9. **Solar panels pump (PS):** will be turned on if the solar panels collector water temperature is higher than that of the bottom part of the hot sanitary water storing tank by a difference equal with the value of **DIFFERENCE FOR SOLAR[d16]** of the protected menu. If the hot sanitary water storing tank top side water temperature reaches the value **TH-BOILER-SICUR[A35]**, for security reasons the pump will be turned off. In case of solar panels antifreeze alarm (solar panels water temperature below the value **TH-SOLAR-ICE[A48]**) the pump will be turned on periodically with pause times equal with the value **TIME SOLAR ICE OFF[t37]** and working times equal with the value **TIME SOLAR ICE ON[t36]**.

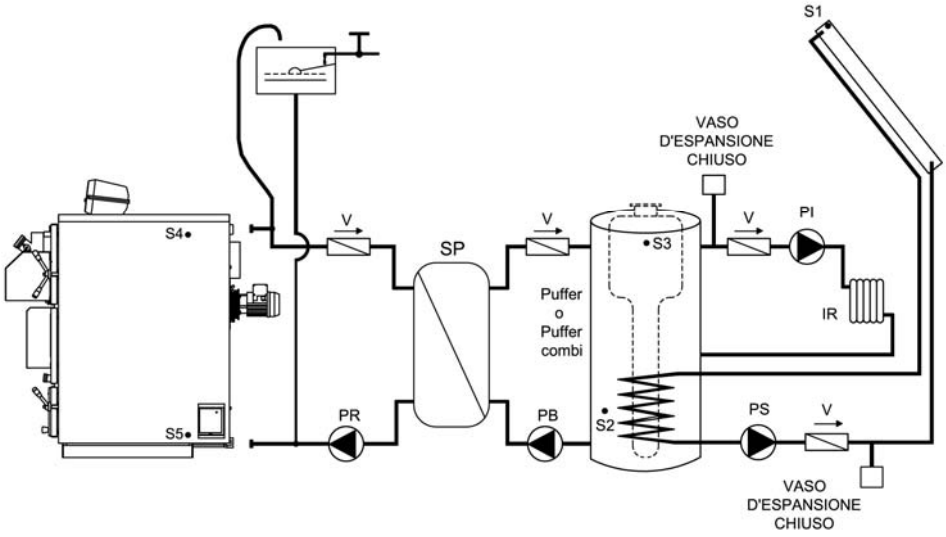
9.3.1. General connection diagram with "puffer combi" tank and solar panels



Key:

PI	System pump	**S1**	Solar panels temperature sensor
PR	Bypass pump	**S2**	"Puffer" tank bottom side temperature sensor
PB	"Puffer" tank pump	**S3**	"Puffer" tank top side temperature sensor
PS	Solar panels pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
V	Non return valve		

9.3.2. General connection diagram for heating purposes with closed expansion tank on the plate type heat exchanger circuit, with "puffer combi" tank and solar panels



Key:

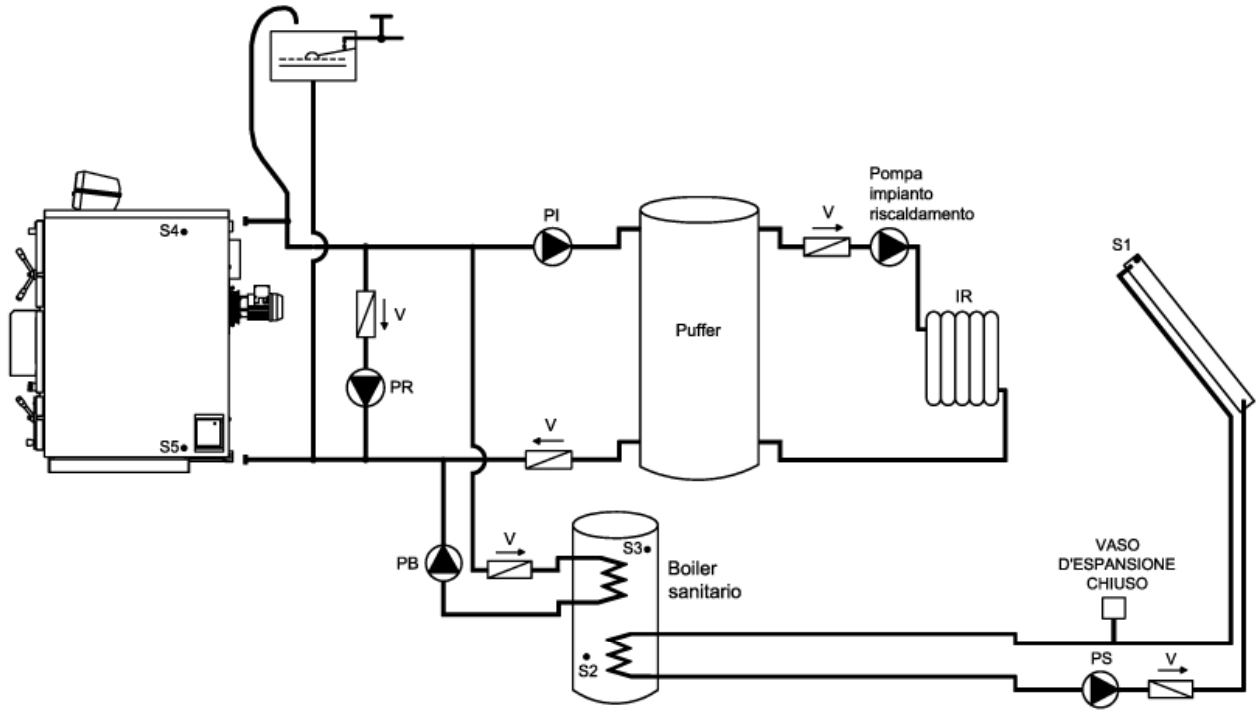
PI	System pump	**S1**	Solar panels temperature sensor
PR	Bypass pump	**S2**	"Puffer" tank bottom side temperature sensor
PB	"Puffer" tank pump	**S3**	"Puffer" tank top side temperature sensor
PS	Solar panels pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
V	Non return valve	**SP**	Plate heat exchanger

9.4. General connection diagrams for heating purposes, with hot sanitary water storing tank and "puffer" tank

A heating system with hot sanitary water storing tank and "puffer" tank can be divided in the following parts:

1. **Boiler delivery side temperature sensor (S4):** is located in its receptacle close to the boiler water delivery connection (A6) and is used by the electronic control to decide whether and when the boiler must pass from a step to another and to activate the various pumps.
2. **Boiler return side temperature sensor (S5):** is located in its receptacle close to the boiler water delivery connection (A7) and is used by the electronic control to activate or deactivate the bypass pump (PR).
3. **Hot sanitary water storing tank top side temperature sensor (S3):** the sensor is inserted into the case located on the top side of the hot sanitary water storing tank and is used to control the hot sanitary water circulation pump (PB).
4. **Hot sanitary water storing tank bottom side temperature sensor (S2):** the sensor is inserted into the case located on the bottom side of the hot sanitary water storing tank and is used to control the solar panels circulation pump (PS).
5. **Solar panels temperature sensor (S1):** is located onto the solar panels hot water outlet and is used to control the solar panels pump (PS).
6. **"Puffer" tank pump (PI):** is ready to be activated when the temperature reaches the value **TH-HEATING-SYS-PUMP[A01]**, but will be really turned on if the room thermostat asks for other heat. It remains steady on, independently from the room thermostat, in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**), or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**). ???
7. **Bypass pump (PR):** is ready to be activated when the temperature reaches the value **TH-BYPASS-PUMP[A14]**, but will be really turned on only if the boiler delivery side water temperature value will be bigger than that of the return side by a difference equal to **DIFFERENCE FOR BYPASS [d00]** in the protected menu. It remains steady on in case of antifreeze alarm (boiler delivery side water temperature value less than **TH-BOILER-ICE[A00]**) or in case of anti thermal inertia operation (boiler delivery side water temperature value bigger than **TH-BOILER-SECURITY[A04]**).
8. **Hot sanitary water storing tank circulation pump (PB):** is ready to be activated when temperature reaches the value **TH-PUMP-BOILER[A15]**, but will be really activated only if the top side hot sanitary water storing tank temperature is below the value **TH-BOILER-SANITARY[A32]**. The pump will be driven off when the top side hot sanitary water storing tank temperature reaches the above value. The pump will remain steady on in case of antifreeze alarm (boiler delivery side water temperature below the value **TH-BOILER-ICE[A00]**) or in case of anti-thermal inertia operation (boiler delivery side water temperature higher than **TH-BOILER-SECURITY[A04]**).
9. **Solar panels pump (PS):** will be turned on if the solar panels collector water temperature is higher than that of the bottom part of the hot sanitary water storing tank by a difference equal with the value of **DIFFERENCE FOR SOLAR[d16]** of the protected menu. If the hot sanitary water storing tank top side water temperature reaches the value **TH-BOILER-SICUR[A35]**, for security reasons the pump will be turned off. In case of solar panels antifreeze alarm (solar panels water temperature below the value **TH-SOLAR-ICE[A48]**) the pump will be turned on periodically with pause times equal with the value **TIME SOLAR ICE OFF[t37]** and working times equal with the value **TIME SOLAR ICE ON[t36]**.

9.4.1. General connection diagram for heating purposes with "puffer" tank and hot sanitary water storing tank equipped with double coil type heat exchanger and solar panels



Key:

PI	"Puffer" tank pump	**S1**	Solar panels temperature sensor
PR	Bypass pump	**S2**	Hot sanitary water storing tank temperature sensor - bottom
PB	Hot sanitary water tank circuit pump	**S3**	Hot sanitary water storing tank temperature sensor - top
PS	Solar panels pump	**S4**	Heating system delivery temperature sensor
IR	Heating system	**S5**	Heating system return temperature sensor
V	Non return valve		

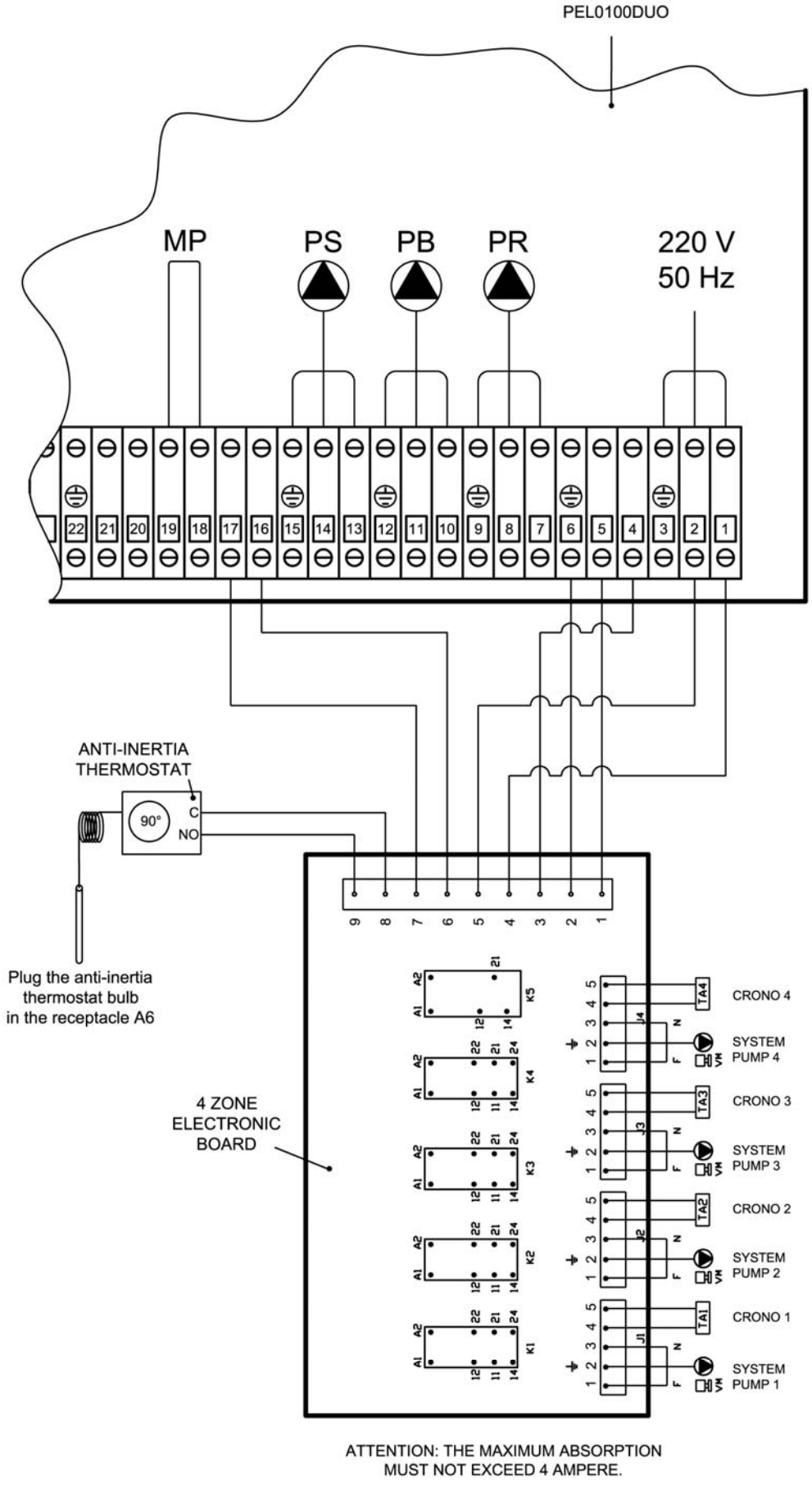
WARNING:

In this kind of heating system the main circulation pump (PI) is used to charge the "puffer" with heat, while the "heating system circulation pump" shown in the diagram is the pump which delivers heat to the building. Therefore, this pump will have to be controlled outside the main boiler control panel and wired directly to the room thermostat.
The boiler control panel terminals nr. 16 and 17 must be wired together to have the "puffer" tank heat charging pump operating correctly in function of the boiler temperature parameters.

We recommend installing a minimum "puffer" tank temperature thermostat (set to 50 / 60°C), which must be mounted in the top part of the inertial tank and directly wired to the room thermostat in order to have the "main heating system circulation pump" turned on only if the "puffer" tank has reached the temperature set on the thermostat.

10. “N” ZONES SYSTEMS CONNECTIONS

As a separate accessory, Arca S.r.l. may supply the 4 zones control board to control a 4 zone heating system (code SCH 0005C) which will be connected to the main control system SY400.



ATTENTION: THE MAXIMUM ABSORPTION
MUST NOT EXCEED 4 AMPERE.

11. MAINTENANCE AND CLEANING

- Before proceeding with any maintenance operation the boielr must be turned OFF and wait until has reached the room temperature.
- Empty the heating circuit only if absolutely necessary.
- Periodically check the proper operation of the smoke exhausting devices and of the flue duct.
- Do not perform any cleaning operation on the boiler using flammable liquids (gasoline, alcool, solvents, etc.)

Do not leave flammable liquids or materials in the same room where the boiler is installed!

An accurate maintenance program will always mean fuel economy and safe operation.

11.1. Daily cleaning (wood operation)

- Remove the residual ash layer using the special fitted tool supplied; let the ashes fall in the bottom chamber and check that the upper part of the cast iron grate is free from any ash. This operation will avoid plugging of the grate and, consequently, a defective boiler operation; will be avoided cast iron bars overheating and a consequent quick wear.
- Remove any ash from the catalyst zone.

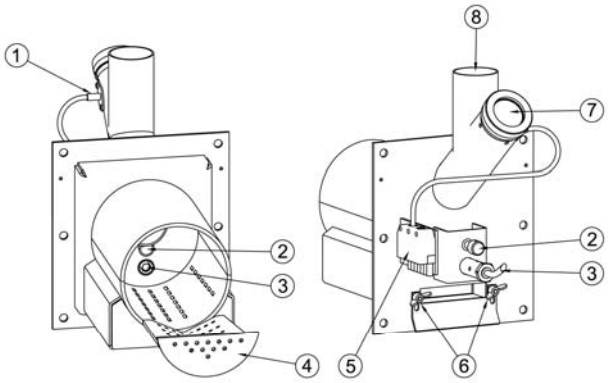
11.2. Weekly cleaning

Wood only operation

- Remove from any part of the wood chamber any residual combustion product.
- Using the special brush supplied, clean the triangular smoke passages in the heat excanging zone (lower door).
- Empty the back part of the smoke chamber from any ash working through the side doors.
- Check for plugged grate slots.

Pellet operation with burner

- Remove from any part of the wood chamber any residual combustion product.
- Using the special brush supplied clean the triangular smoke passages in the heat excanging zone (lower door).
- Empty the back part of the smoke chamber from any ash working through the side doors.



- Opened the outdoor, take off the stainless steel grate (4) and, with a steel brush, take off the combustion clinker.

WARNING: if, after 8-20 hours of continuous operation, on the grate (4) combustion buildups are found, the pellet used is of poor quality, with a high loam or tree bark part, or other uncombustible materials.
These kinds of unsuitable materials cause a lot of firing and combustion problems if the grate (4) is not cleaned frequently; we recommend using good quality and certified pellets only.

- Clean the burner combustion area from flying ashes and clinkers.
- Clean the photocell bull's eye (1).
- Clean the flame bull's eye (7).

11.3. Monthly maintenance

- Clean the fan impeller from buildups. Usually, with compressed air or a soft brush a perfect cleaning can be gotten. If the buildups are harder to be swept away, we recommend to work softly anyway to avoid unbalancing the fan subassembly, which may cause a noisy operation and a less efficient drafting action.
- Lubricate the top fan motor bearing.
- Periodically control the flue duct and its natural drafting level.
- Clean the smoke temperature sensor.

Pellet operation with burner

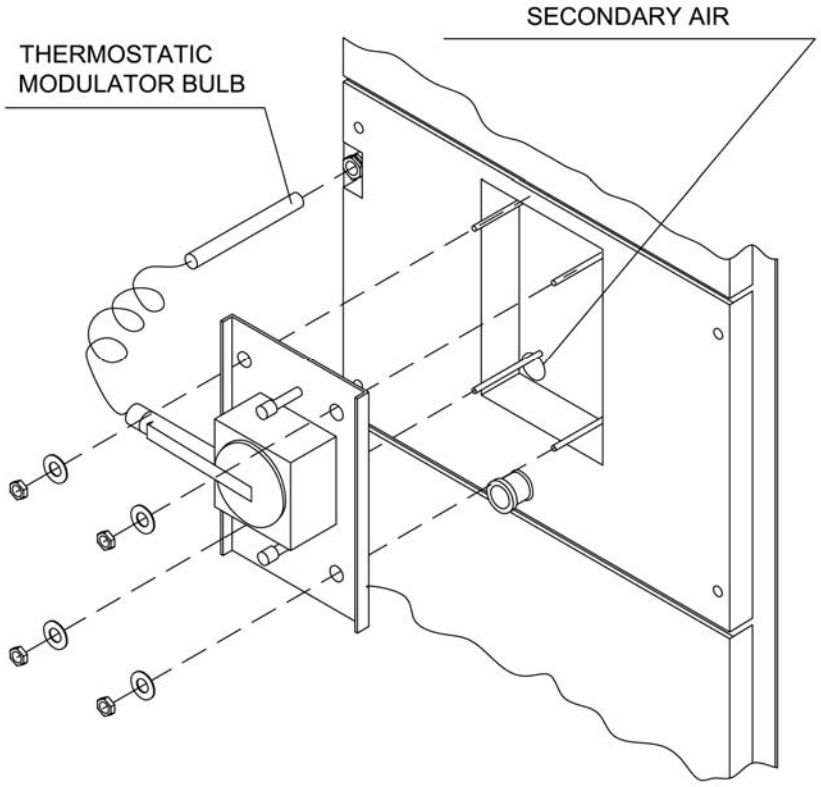
- Check the primary air passages for plugging by ashes or clinkers. Unscrew the air flow adjusting screws (6), completely open the duct and vacuum clean the ashes.

11.4. Special maintenance

- At the end of each season a deeper cleaning must be performed on the boiler, removing any residual ash from the wood chamber.

Wood only operation

- Thoroughly clean the air distribution subassembly, its mounting area and the secondary air passages, removing pieces of wood, tar and dust which may have collected during the winter season.



IMPORTANT: we recommend to have such deeper maintenance operations carried out by qualified personnel only, or by an authorized technical assistance center. If spare parts are required, we recommend using original ARCA spare parts only.

12. TROUBLESHOOTING

12.1. Electronic control system problems fixing

- **Display/State/Alarms/Clock:** the 4 digits display shows the current boiler state code, the active alarms and the time.

  The dysplayed codes to identify the boiler current state are the followings:

   = Check UP

   = Firing

   = Stabilization

   = Firing retry

   = Modulation

   = Standby

   = Security state

   = Cutting off

   = Boiler cut off due to alarm issues

  In case the boiler is cut off for alarm related issues, on the display will be shown "Alt" and the alarm type. The messages which can be displayed due to the various *errors* are the followings:

   = security thermostat trip

   = second security thermostat trip (optional)

   = water overheating

   = pellet box security thermostat trip (optional)

   = internal clock error

   = firing failed

   = accidental cutting off

   = security pressure switch trip (optional)

  TO RESET THE ERROR, KEEP PRESSED THE START BUTTON NR. 10 FOR AT LEAST FIVE SECONDS.

- **Temperature display:** the 2 digits display shows the boiler water temperature (a numeric value in the range 1 - 99, **Lo** for 0 and **Hi** for value bigger than 99) and the value of the boiler thermostating temperature when it is being modified.

- **Service display:** the 1-digit display shows an animation every time the auger is on and the letter **"t"** if the the value of the boiler thermostating temperature is being modified.

For any problem we recommend to have the boiler inspected by qualified personnel only and/or an authorized assistance center.

12.2. Boiler problems fixing (wood operation)

Symptoms	Possible causes	Solutions
The boiler tends to cut off leaving a curved unburnt wood mass in the wood chamber. The refiring takes much time with difficulties in flame formation.	a) The grate is plugged. b) Not enough primary air	a) Unplug the grate slots b) Increase the primary air
The flame is noisy and a lot of white and black ash is produced. The boiler shows high fuel consumption.	a) Too much primary air.	a) Decrease the primary air.
The flame is short, slow, the power is abnormally low and the lower door refractory plate is black.	a) Not enough primary air.	a) Increase the primary air.
The boiler produces a lot of liquid tar in the wood chamber.	a) Too wet wood b) Boiler temperature too low. c) Long standby times with wood chamber full of wood.	a) Charge more dry wood b) Rise the operation temperature thermostat to 75 - 80 °C c) Adequate the total wood quantity charged into the boiler to the real heat needings.
The fan does not stop and the boiler does not reach the operation temperature.	a) Boiler plugged. b) Pumps not connected. c) Wood charged without respecting the recommended prescriptions. d) Boiler not correctly dimensioned to the real heat needings. e) See 16,1	a) Clean the boiler in all its parts. b) Correrctly wire the pumps to the control board. c) When charging the wood, be careful not to leave empty spaces. d) Progressively open one after the other the existing heating system zones.

For any problem we recommend to have the boiler inspected by qualified personnel only and/or an authorized assistance center.

12.3. Boiler problems fixing (automatic burner operation)

Symptoms	Possible causes	Solutions
The boiler does not fire or cuts off frequently.	a) The fuel is not feeded.	a) Check the fuel tank: - could be empty. - the auger motordrive could be blocked for mechanical or electric reasons (call an authorized technical assistance Center).
	b) The electric ignition resistance does not get hot.	b) Replace the resistance.
	c) The burner grate is plugged by combustion clinkers.	c) Open the boiler top door and check the combustion area of the burner. If required, unplug the ignition resistance air passage and clean all over the grate surface.

13. GENERAL TECHNICAL TIPS

13.1. Settings and maximum allowed temperatures

High power boilers are often used to heat industrial plants in wood processing plants.
In such situations, the different processes wastes are frequently used to fuel the boiler.
Often the waste materials are very dry and contain synthetic resins and paints which should not be used as fuel. Their thermal specific power is very high, and consequently the boiler output power and the smoke exhaust temperature as well increase significantly

WARNING!: if the smoke exhaust temperature raises beyond 200°C, drafting fan motor problems may occur (the bearings lubricating grease gets dry), the burner grate bar cast iron elements may quickly wear out, the same thing happens to the catalyst elements and so on.

Therefore, we recommend to monitor the smoke temperature, proportionally reducing the combustion air supply and mixing with the dry wood wastes other less dry wood with a lower specific thermal power.
For a proper operation of the boiler the smoke exhaust temperature must be in the range 150°C - 180°C.
If lower, condensation and corrosion problems may appear.
If higher, fan problems may occur and the burner bar elements and the catalyst may wear out quickly.

Obviously, a correct boiler setting “on the place” is required for the many specific thermal power differences among the various wood types used.

13.2. First firing

Any kind of boiler, especially the high power models, require a progressive first firing to allow the refractory parts to dry out completely.
At the first firing, we recommend to use only a small amount of wood, letting the water temperature raise gradually, otherwise the outer layers of the refractory cement inner parts may detach, or cracks may appear.
In some cases, if the humidity cannot escape outside gradually from the cement blocks, dull explosions may be heard.

13.3. Refractory cement components in the boiler

It is pretty normal that the refractory blocks show small imperfections.
For this reason, the refractory blocks thickness is overdimensioned; by this way, even if happens what outlined above, (paragraph 16.2.), the boiler overall insulation degree is anyway maintained.

13.4. Boiler autonomy and fuel charging intervals

Under normal operating conditions, the boiler will require to be charged two times every day. With “normal operating conditions” we intend using the boiler at an average output power about in the middle of the recommended power range.
This is obtained if the building has a good insulation from the thermal point of view, for an external average temperature around 5°C, etc.
In extreme conditions the fuel charging operations will be more frequent (3-4 every day), while in the middle seasons a single charge will be enough.

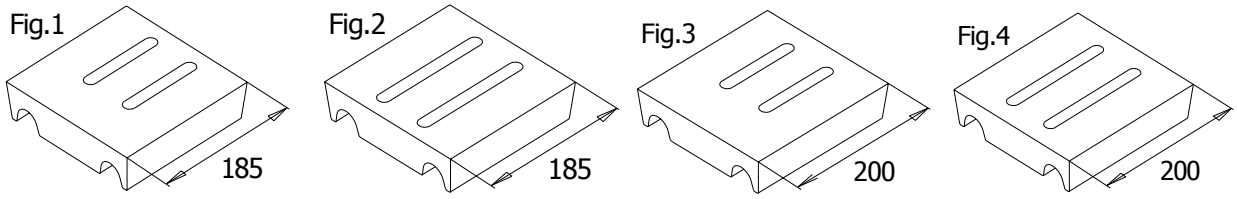
13.5. Explosions

With low flue duct drafting action, when using very dry wood and too much wood logs charged in the boiler, the gas released by wood can accumulate in the wood box; when the drafting fan starts again, the air-gas mixture could cause noisy explosions. Anyway, the boiler won't get damaged because antideflagration doors are present the in the back side.

13.6. Consumable materials

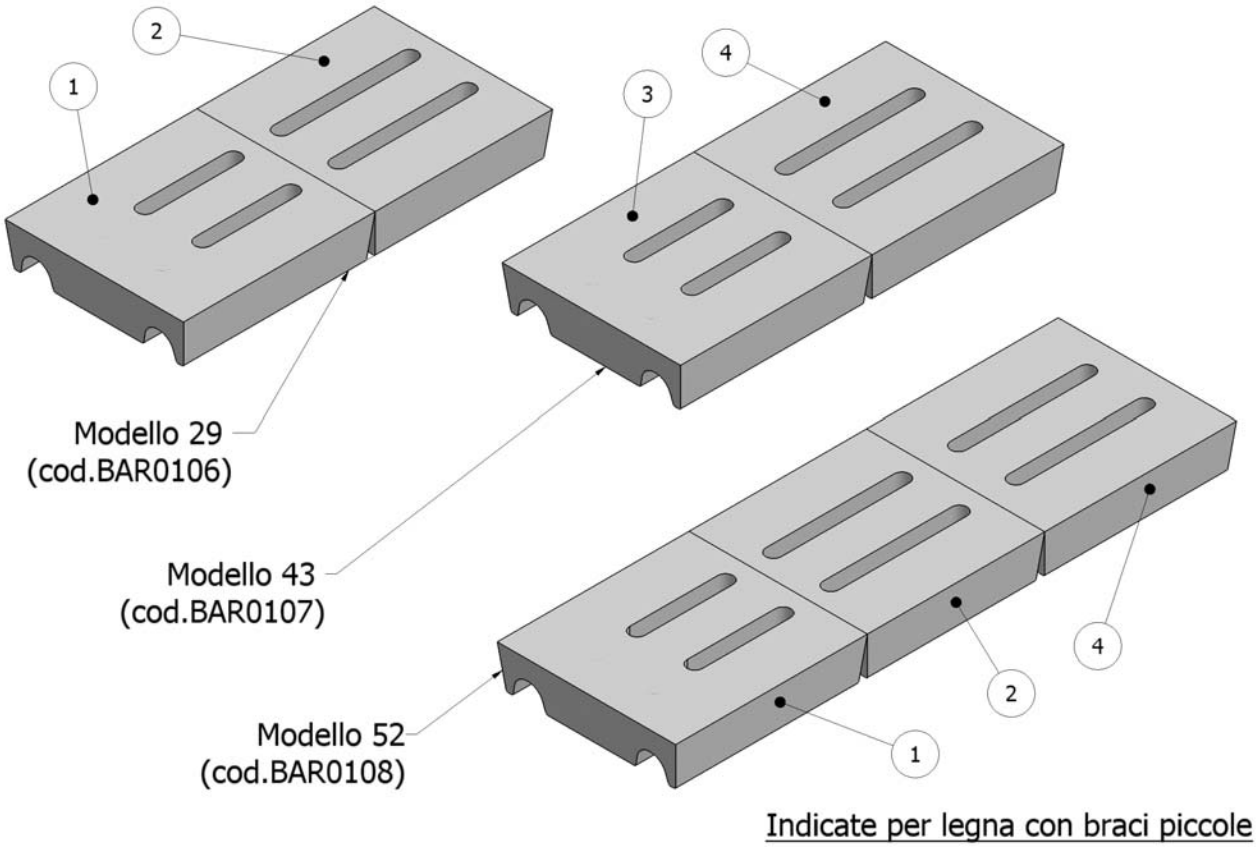
The burner cast iron bar elements are high temperature proof and the cast iron used has a high resistance to the combustion gases. Therefore, they are well suited for many hours of operation, whose number will depend anyway upon the average boiler working temperature which is determined by many other factors, such as the type of wood more frequently used, its humidity degree, the number and duration of the standby periods, etc.. How long they will last depends upon the flame acidity degree as well, more or less accurate cleaning and maintenance operations of the grate zone, if the boiler operates correctly using the standard paramenters or not.
Therefore, they are excluded from the warranty covering and must be considered from any point of view **consumable materials.** The same considerations are valid for the catalyst elements and for the fan.

CAST IRON BAR ELEMENTS WITH LONGITUDINAL SLOTS



CAST IRON BAR ELEMENTS WITH LONGITUDINAL SLOTS

Model	Number of bar elements	Code
29	2	BAR 0106
43	2	BAR 0107
52	3	BAR 0108



Indicate per legna con braci piccole

Mounting warnings: the piece with longer slots must be firstly positioned on the boiler back plate side.
The grate with longitudinal slots (pic. 1,2,3,4) is better suited with types of wood producing thinner ashes. When changing the grate for wearing related issues, it is important taking into adequate account the kind of wood usually used.
Warning: in function of the wood type used, its thermal power, the humidity degree and the average ash dimensions, may be required a grate with different slots shape in order to prevent slots plugging.
Usually the two grates, the ones with longitudinal slots and the other ones with transverse slots ensure similar thermal yields and powers. The transverse slotted grate (pic.5 and pic.6), is more suitable for very dry wood with high thermal specific power, with bigger ash dimensions.

TRANSVERSELY SLOTTED BAR ELEMENTS

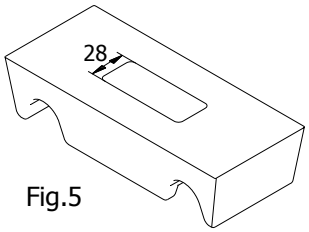


Fig.5

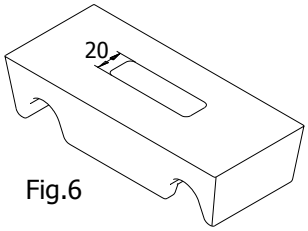
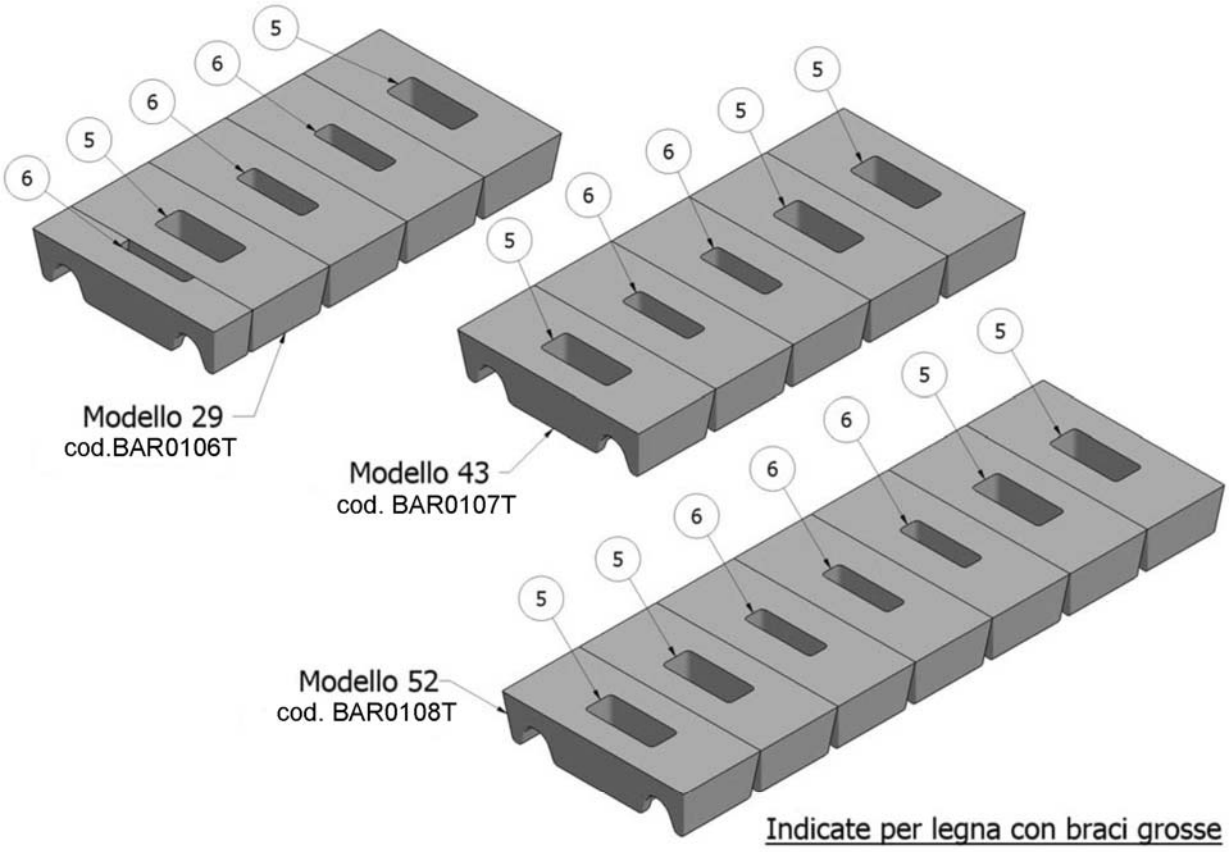


Fig.6

TRANSVERSELY SLOTTED BAR ELEMENTS

Models	Number of bar elements	Code
29	4.5	BAR 0106T
43	5	BAR 0107T
52	7	BAR 0108T



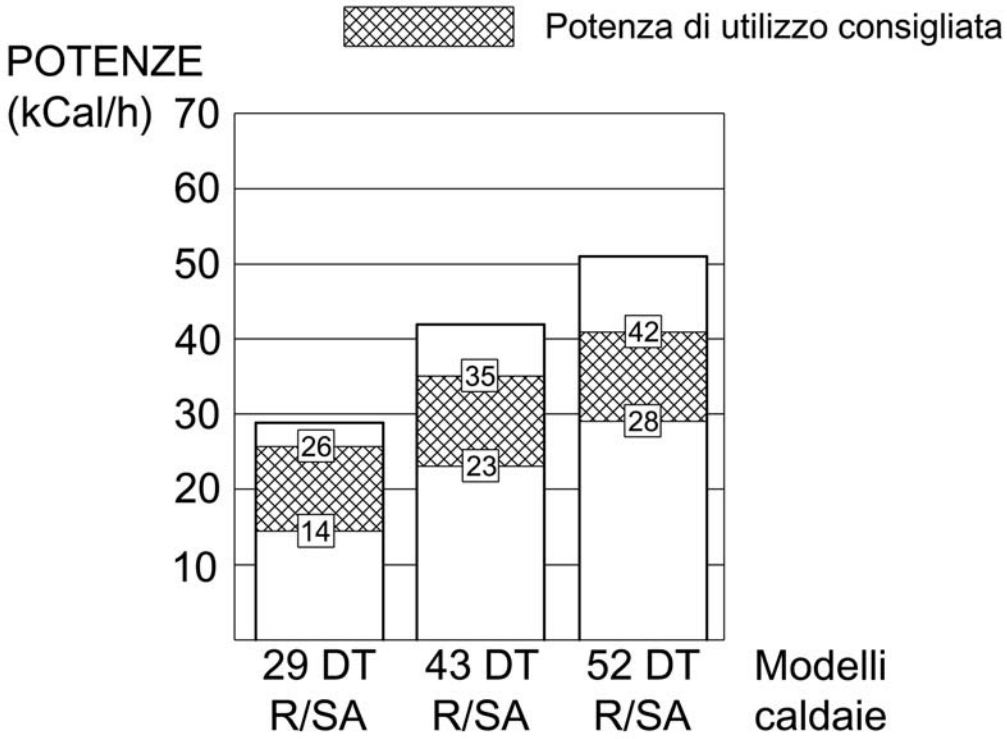
13.7. Warnings

Using wet wood (greater than 25%) and/or a total amount of fuel not suited for the heating system needings (with long stop periods with the wood chamber full of unburnt wood) is cause of relevant condensation issues in the wood chamber.
Once a week, control the wood chamber steel walls. They should be covered by a thin layer of dry and mat tar, with bubbles which tend to break and to detach from the wall. Otherwise, if the tar layer is glossy, almost liquid in more parts, the wood used is too wet and the quantity for each charge is too much. Condensation liquids stick to the inner surfaces and cause corrosion issues. Such corrosion is not covered by the warranty because is due to improper use of the boiler (wet wood, excessive quantity, etc.).
The flue gases circulating in the boiler contain a certain amount of water steam, coming from the water content of the employed wood. When such vapours come in touch with relatively colder metal surfaces (about 60°C), condensating water mixed with other corrosive combustion products appears causing corrosion problems. Frequently check if any such sign of corrosion is visible (e.g. blackish liquid on the boiler bottom area). If so, less wet wood must be used; also check the correct operation of the bypass pump and the smoke temperature; raising the normal operation boiler temperature will help (in this case, better install a mixing valve to lower the boiler delivery side water temperature). Corrosion issues are not covered by the warranty because they are a consequence of too wet wood.

14. MODEL CHOOSING

14.1. BOILER POWER

For each model the minimum power, the rated power (corresponding to a standard wood type featuring a specific thermal power of 3500 kcal/Kg with humidity degree of 15%) and the maximum output power vary; the maximum output power value is only given for correct security devices dimensioning purposes: valves, relief pipe diameter and so on.
We recommend to address to a qualified technician to assist in choosing the right model, taking into account the specific average thermal power and humidity degree of the intended wood.



NOTE:
The average thermal spiecific power of wood may vary in the range 1600 kcal/Kg - 3500 kcal/Kg (see the catalogs). Wood from dead trees or from trees grown in shadowy places is much harder to be burnt because, in the first case, the carbon content is reduced due to prolonged lack of alimentation of the tree and to the natural slow combustion process of the residual parts. For "natural combustion process" (without flame) we mean the slow carbon loss when much time passes by after the death of the tree due to the intrinsic carbon instability in the slow drying process. In the second case, the tree has had a low photosynthesis grade due to the shadow, and the wood will be poor in carbon content whereas will have a higher than normal cellulose content.

ARCA s.r.l.

Head office and steel boilers production
MN Nord) 46030 San Giorgio (Mantova)P.IVA IT 01588670206
Tel.: 0376/372206 - Fax: 0376/374646 - E-mail: arca@arcacaldaie.com - Tlx 301081 EXPMN I
Sales direction - Tel.: 0376/372617 - **Customers management** - Tel.: 0376/371454
Technical Department - Ph.: 0376/371454

Gas boilers production
Via Papa Giovanni XXIII, 105 - 20070 San Rocco al Porto (Lodi)
Ph.: 0377/569677 - Fax: 0377/569456