

## FIREX 2S



34 - 45 - 55



**INSTALLATION AND MAINTENANCE INSTRUCTIONS**





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## 1.2 - SYMBOLS USED IN THE MANUAL

When reading this manual, pay special attention to the parts marked by the symbols:



**DANGER!**  
Serious danger for  
personal safety and life



**ATTENTION!**  
Possible dangerous  
situation for the product  
and the environment



**NOTE!**  
Tips  
for the user

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## 1.3 - APPROPRIATE USE OF THE APPLIANCE



The FIREX 2S appliance has been built according to the current level of engineering and acknowledged technical safety rules.

Nonetheless, improper use could result in hazards for the safety and life of the user or other persons, i.e. damage to the appliance or other property.

The appliance is designed to operate in hot water circulation heating systems.

Any other use must be considered improper.

UNICAL will not be held liable for any damage resulting from improper use.

Use according to the intended purposes also includes strict compliance with the instructions in this manual.

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## 1.4 - INFORMATION FOR THE USER



The user must be instructed on use and operation of the heating system, in particular:

- Deliver these instructions to the user, as well as other documents concerning the appliance inserted in the envelope inside the packaging. **The user must keep this documentation safe for future reference.**
- Inform the user about the importance of the air vents and the flue gas exhaust system, highlighting their essential features and the absolute prohibition of modifying them.
- Inform the user on how to control the system's water pressure as well as operations to restore it.
- Inform the user on correct temperature control, control units/thermostats and radiators for saving energy.
- Remember that the system must receive regular maintenance at least once a year and a combustion analysis must be performed every two years (as per national law).
- Should the appliance be sold or transferred to a new owner or if you move and leave the appliance, always make sure that the instruction manual accompanies the appliance so that it can be consulted by the new owner and/or installer.

**The manufacturer will not be held liable in the event of damage to persons, animals or objects resulting from failure to comply with the instructions contained in this manual.**

## 1.5 - SAFETY WARNINGS



### **ATTENTION!**

The appliance must not be used by people with reduced physical, sensory and mental abilities, without experience and knowledge. These people must be previously trained and supervised during manoeuvre operations. Children must be supervised so that they do not play with the appliance.



### **ATTENTION!**

The appliance must be installed, adjusted and maintained by professionally qualified personnel, in compliance with the standards and provisions in force. Incorrect installation can cause damage to persons, animals and property for which the manufacturer will not be held liable.



### **DANGER!**

The boiler must be serviced or repaired by professionally qualified personnel, authorised by Unical. We recommend stipulating a maintenance contract. Insufficient or irregular maintenance can jeopardise the operating safety of the appliance and cause damage to persons, animals and property for which the manufacturer will not be held liable.



### **Modifying parts connected to the appliance**

Do not modify the following parts:

- the boiler
- the air, water and electrical current lines
- the flue gas pipe, the safety valve and the exhaust pipe
- the construction parts which affect the operating safety of the appliance



### **Attention!**

Use only appropriate fixed spanners to tighten or loosen the screwed fittings. Incompliant use and/or inappropriate tools can cause damage (e.g. water or gas leakage).

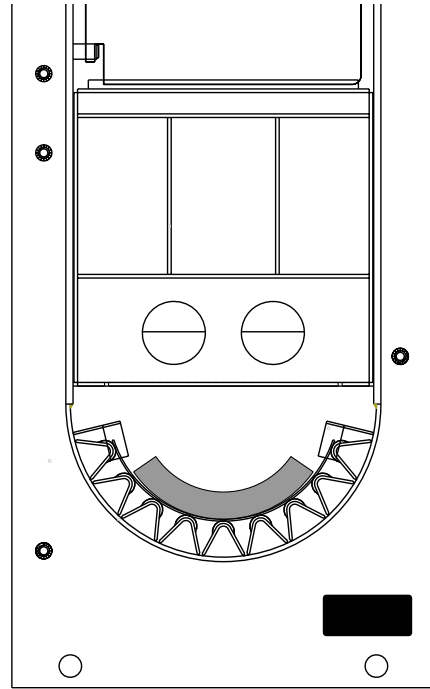


### **Explosive and easily flammable substances**

Do not use or store explosive or easily flammable materials (e.g. petrol, paints, paper) in the room where the appliance is installed.

## 1.6 - TECHNICAL DATA PLATE

The technical data plate is adhesive and is included in the document case; it must be applied by the installer on the outside of the casing.



The serial number of the boiler is on the riveted plaque on the front plate of the body (front right bottom side).

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Model	<input type="text"/>		
S.N°	<input type="text"/>	Year	<input type="text"/>
		WOOD	PELLET
Fuel type:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	
Pn	<input type="text"/>	<input type="text"/>	<input type="text"/>
Qmax	<input type="text"/>	<input type="text"/>	<input type="text"/>
Adjusted Qn	<input type="text"/>	<input type="text"/>	<input type="text"/>
<b>CE</b>			
PIN	<input type="text"/>	<input type="text"/>	<input type="text"/>
Fuel Class:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Boiler Efficiency: Class	<input type="text"/>	<input type="text"/>	<input type="text"/>
Emission Limits Class	<input type="text"/>	<input type="text"/>	<input type="text"/>
	Stock <input type="text"/> l	PMS <input type="text"/> bar	T max <input type="text"/> °C
	Stock <input type="text"/> l	PMW <input type="text"/> bar	T max <input type="text"/> °C
	230 V - 50 Hz	A	W

Key		Destination country
Symbol		IT
(Model) (S.N.) (*)	Boiler Model Serial Number: See on boiler body	Modello Caldaia Matricola: vedi il numero di fabbricazione sul corpo caldaia
Year	Year of manufacturing	Anno di costruzione
(Fuel) type:	Fuel 1 - WOOD 2 - PELLETT	Combustibile 1 - LEGNA 2 - PELLETT
(Pn) (Qmax) (Adjust Qn)	Nominal Output Nominal Input Input adjusted at ...	Potenza Utile Nominale Potenza Termica Portata termica Regolata a ...
(CE) (PIN)	Surveillance notify body P.I.N. code	Ente di sorveglianza CE Numero Identificazione Prodotto
 (Stock) (PMS) (T. max)	BOILER data: Water content [ l ] Max Working Pressure Max Working Temperature	Specifiche CALDAIA Contenuto acqua calda [ l ] Pressione Massima Esercizio Temperatura Massima Esercizio
 (Stock) (PMW) (T. max)	D.H.W. TANK data: Water content [ l ] Max Working Pressure Max Working Temperature	D.H.W. TANK data: Contenuto acqua calda [ l ] Pressione Massima Esercizio Temperatura Massima Esercizio
	Electrical supply	Alimentazione Elettrica
EN 303-5 Classification	Fuel Class Boiler Efficiency Emission Limits	Classe Combustibile Classe di Efficienza Classe di Emissioni

# 2

## TECHNICAL FEATURES AND DIMENSIONS

### 2.1 - TECHNICAL FEATURES

The heat generator mod. **FIREX 2S** is a steel boiler running with natural wooden logs, total gasification, flame inverted, with the combustion chamber under negative pressure.

It is supplied in the following models:

**FIREX 2S 34**  
**FIREX 2S 45**  
**FIREX 2S 55**

#### DESCRIPTION OF COMPONENTS:

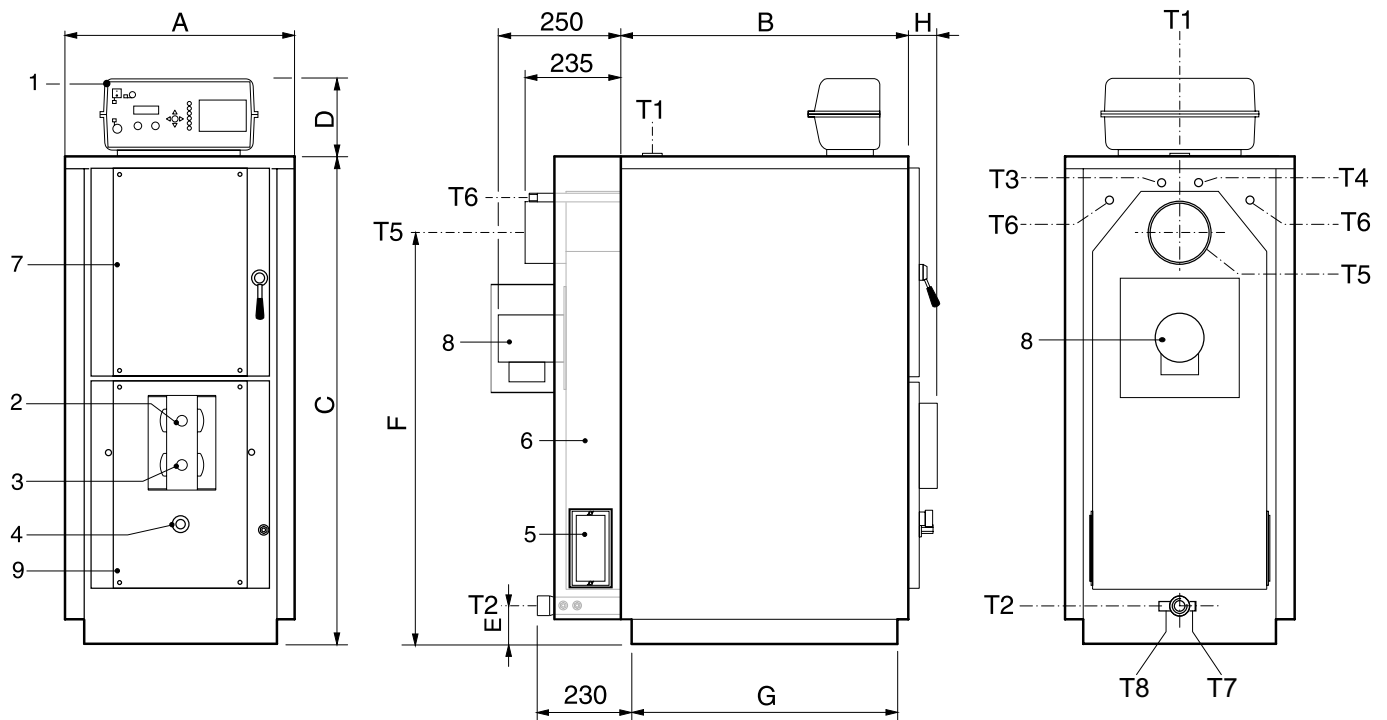
- Steel boiler body with combustion chamber partially covered with refractory material
- Burner in refractory material
- Horizontal smoke ducts
- Front door for loading wood covered with refractory material
- Bottom door covered with refractory material, complete with combustion air adjustments and fitted with flame sight glass
- Rear smoke chamber with side inspection and ash removal doors
- Flue gas extraction with intake modulating fan
- Safety heat exchanger
- Boiler body insulated with 50 mm thick mineral wool panels
- Powder painted sheet steel casing

#### PANEL BOARD COMPONENTS:

- Main switch with light indicating presence of voltage
- Safety thermostat for boiler overheating
- General fuse
- Display



## 2.2 - HYDRAULIC DIMENSIONS AND CONNECTIONS



1. Panel board
2. Primary air adjustment
3. Secondary air adjustment
4. Flame sight glass
5. Cleaning doors
6. Rear smoke chamber
7. Loading door
8. Modulating fan
9. Bottom inspection and cleaning door

- T1. Central heating flow
- T2. Central heating return
- T3. Safety thermostat probe bulb holder, boiler flow probe
- T4. Connection for any temperature relief valve probe bulb holder
- T5. Chimney connection
- T6. Safety heat exchanger connections
- T7. Boiler drain
- T8. Return probe connection

DIMENSIONS		FIREX 2S 34	FIREX 2S 45	FIREX 2S 55
A	(mm)	510	610	610
B	(mm)	680	680	880
C	(mm)	1230	1380	1380
D	(mm)	190	190	190
E	(mm)	78	81	81
F	(mm)	1025	1150	1150
G	(mm)	628	628	828
H	(mm)	65	65	65
CONNECTIONS	T1 - T2	UNI ISO 228/1	G 1¼	G 1½
	T5	(Ø mm)	150	200
	T6	UNI ISO 228/1	G ½	G ½
	T3 - T4 - T7 - T8	UNI ISO 228/1	G ½	G ½

## 2.3 - TECHNICAL DATA

MODELS		FIREX 2S 34	FIREX 2S 45	FIREX 2S 55
MAXIMUM NOMINAL OUTPUT*	(kW)	30.6	40.1	49.10
FURNACE MAXIMUM OUTPUT	(kW)	34.2	45.0	55.16
EFFICIENCY	(%)	89.5	89.1	89.1
O <sub>2</sub>	(%)	4.73	5.10	6.10
CO <sub>2</sub>	(%)	13.9	13.74	13.6
CO 10%	(mg/Nm <sup>3</sup> )	361	469	367
CO 13%	(mg/Nm <sup>3</sup> )	262	341	267
NO <sub>x</sub> 10%	(mg/Nm <sup>3</sup> )	180	183	189
NO <sub>x</sub> 13%	(mg/Nm <sup>3</sup> )	131	133	137
Hc 10%	(mg/Nm <sup>3</sup> )	1.1	10	11
Hc 13%	(mg/Nm <sup>3</sup> )	0.8	7.3	8
Dust 10%	(mg/Nm <sup>3</sup> )	27	25	27
Dust 13%	(mg/Nm <sup>3</sup> )	19	18	19
MAX OPERATING PRESSURE	(bar)	3	3	3
MINIMUM DRAUGHT REQUIRED BY CHIMNEY	(Pa)	20	20	20
MIN. FLOW TEMPERATURE	(°C)	70	70	70
MAX. FLOW TEMPERATURE	(°C)	85	85	85
MIN. RETURN TEMPERATURE	(°C)	55	55	55
WATER SIDE PRESSURE DROPS (10K)	(m.w.c. - Pa)	0.2 - 1961	0.4 - 3922	0.5 - 4903
WATER SIDE PRESSURE DROPS (20K)	(m.w.c. - Pa)	0.05 - 490	0.07 - 486	0.07 - 486
DURATION OF COMBUSTION	(h)	5	6	6
MAXIMUM HEATABLE VOLUME **	(m <sup>3</sup> )	876	1149	1408
WOOD STORAGE VOLUME	(l)	108	160	218
LOADING OPENING	(mm)	334 x 419	434 x 519	434 x 519
LOG LENGTH	(cm)	50	50	70
NOMINAL LOADING FLUE GAS TEMPERATURE	(°C)	171	177	178
NOMINAL LOADING FLUE GAS MASS FLOW RATE	(kg/s)	0.02	0.026	0.032
BOILER WATER CONTENT	(l)	59	71	93
EMPTY BOILER WEIGHT	(kg)	363	475	623
MAXIMUM OUTPUT	(W)	146	146	146
OUTPUT IN STAND-BY	(W)	5	5	5
NOISE LEVEL	(dB)	<50	<50	<50
BOILER CLASS ACCORDING TO EN 303-5 (2012)		5	5	5
FUEL CHARACTERISTICS		See par. 2.7		
THERMAL STORAGE VOLUME (Recommended) (If Q <sub>min</sub> > 30% of Q <sub>n</sub> )	(l)	1256	1682	2089
MAX. FEED WATER TEMPERATURE SAFETY HEAT EXCHANGER	(°C)	15	15	15
FEED WATER PRESSURE SAFETY HEAT EXCHANGER	(bar)	1.5	1.5	1.5
BOILER OPERATION		WITH FAN		
COMBUSTION CHAMBER OPERATION		UNDER NEGATIVE PRESSURE		
OPERATION IN CONDENSATION		NO		

\* Power achieved with good quality wood containing 15% humidity.

\*\* Considering a thermal power requirement of 34 kcal/m<sup>3</sup>

## 2.3.1 - TECHNICAL DATA ACCORDING TO ErP DIRECTIVE

Commission Delegated Regulation (EU) 2015/1187 of 27 April 2015 supplementing Directive 2010/30/EU with regard to the energy labelling of solid fuel boilers and packages of a solid fuel boiler, supplementary heaters, temperature controls and solar devices (1).

FIREX 2S 34					
Manual loading		type			
Manual loading puffer volume	I.	1256	Automatic loading puffer volume	I.	612
Non-condensation boiler		type			
Cogeneration		NO			
Combined boiler		NO			

FIREX 2S 34						
Fuel	Preferred fuel (only one):	Others suitable fuels:	Seasonal emissions			
			mg / m <sup>3</sup> 10%			
			PM	OGC	CO	NOX
Logs moisture content ≤ 25 %	<b>X</b>		<b>27</b>	<b>1.1</b>	<b>361</b>	<b>180</b>
Chips, moisture content 15-35 %						
Chips, moisture content > 35 %						
Compressed wood in the form of pellets or briquettes						
Sawdust, moisture content ≤ 50 %						
Other wood biomass						
Non-wood biomass						
Bituminous coal						
Lignite (including briquettes)						
Coke						
Anthracite						
Briquettes of fossil fuel mixture						
Other fossil fuels						
Briquettes of biomass mixture (30-70 %) and fossil fuels						
Other mixtures of biomass and fossil fuels						

Operating characteristics with preferred fuel:	
Seasonal energy efficiency of central heating $\eta_s$ [%]:	<b>79</b>
Energy efficiency index EEI:	<b>117</b>

Entry	Symbol	Value	U.M.	Entry	Symbol	Value	U.M.
Effective heat Output				Useful Efficiency			
At nominal heat output	$P_n$	30.62	kW	At nominal heat output	$\eta_n$	83.4	%
At [30 %/50 %] of nominal heat output, if pertinent	$P_p$	n.p	kW	At [30 %/50 %] of nominal heat output, if pertinent	$\eta_p$	n.p	%
For solid fuel cogeneration boilers: Electrical efficiency				Auxiliary electricity consumption			
At nominal heat output				At nominal heat output	$e_{l,max}$	0.146	kW
				At [30 %/50 %] of nominal heat output, if pertinent	$e_{l,min}$	0.000	kW
				If required, integrated equipment for the abatement of secondary emissions		n.p.	kW
				Standby mode	$P_{SB}$	0.005	kW

FIREX 2S 45					
Manual loading		type			
Manual loading puffer volume	l.	1682	Automatic loading puffer volume	l.	802
Non-condensation boiler		type			
Cogeneration		NO			
Combined boiler		NO			

FIREX 2S 45						
Fuel	Preferred fuel (only one):	Others suitable fuels:	Seasonal emissions			
			mg / m <sup>3</sup> 10%			
			PM	OGC	CO	NOX
Logs moisture content ≤ 25 %	<b>X</b>		<b>25</b>	<b>10</b>	<b>469</b>	<b>183</b>
Chips, moisture content 15-35 %						
Chips, moisture content > 35 %						
Compressed wood in the form of pellets or briquettes						
Sawdust, moisture content ≤ 50 %						
Other wood biomass						
Non-wood biomass						
Bituminous coal						
Lignite (including briquettes)						
Coke						
Anthracite						
Briquettes of fossil fuel mixture						
Other fossil fuels						
Briquettes of biomass mixture (30-70 %) and fossil fuels						
Other mixtures of biomass and fossil fuels						

Operating characteristics with preferred fuel:	
Seasonal energy efficiency of central heating $\eta_s$ [%]:	<b>79</b>
Energy efficiency index EEI:	<b>116</b>

Entry	Symbol	Value	U.M.	Entry	Symbol	Value	U.M.
Effective heat Output				Useful Efficiency			
At nominal heat output	$P_n$	40.1	kW	At nominal heat output	$\eta_n$	82.9	%
At [30 %/50 %] of nominal heat output, if pertinent	$P_p$	n.p	kW	At [30 %/50 %] of nominal heat output, if pertinent	$\eta_p$	n.p	%
For solid fuel cogeneration boilers: Electrical efficiency				Auxiliary electricity consumption			
				At nominal heat output	$el_{max}$	0.146	kW
				At [30 %/50 %] of nominal heat output, if pertinent	$el_{min}$	0.000	kW
At nominal heat output	$\eta_{el,n}$	n.p	%	If required, integrated equipment for the abatement of secondary emissions		n.p.	kW
				Standby mode	$P_{SB}$	0.005	kW

FIREX 2S 55					
Manual loading		type			
Manual loading puffer volume	I.	2089	Automatic loading puffer volume	I.	982
Non-condensation boiler		type			
Cogeneration		NO			
Combined boiler		NO			

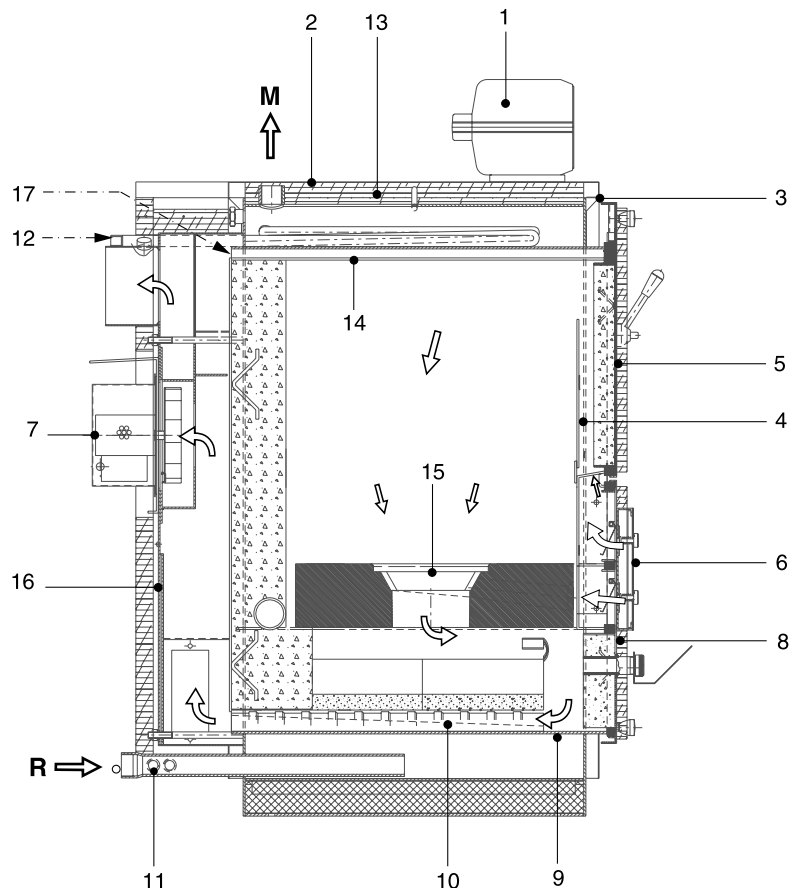
FIREX 2S 45						
Fuel	Preferred fuel (only one):	Others suitable fuels:	Seasonal emissions			
			mg / m <sup>3</sup> 10%			
			PM	OGC	CO	NOX
Logs moisture content ≤ 25 %	<b>X</b>		<b>27</b>	<b>11</b>	<b>367</b>	<b>189</b>
Chips, moisture content 15-35 %						
Chips, moisture content > 35 %						
Compressed wood in the form of pellets or briquettes						
Sawdust, moisture content ≤ 50 %						
Other wood biomass						
Non-wood biomass						
Bituminous coal						
Lignite (including briquettes)						
Coke						
Anthracite						
Briquettes of fossil fuel mixture						
Other fossil fuels						
Briquettes of biomass mixture (30-70 %) and fossil fuels						
Other mixtures of biomass and fossil fuels						

Operating characteristics with preferred fuel:	
Seasonal energy efficiency of central heating $\eta_s$ [%]:	<b>79</b>
Energy efficiency index EEI:	<b>116</b>

Entry	Symbol	Value	U.M.	Entry	Symbol	Value	U.M.
Effective heat Output				Useful Efficiency			
At nominal heat output	$P_n$	49.1	kW	At nominal heat output	$\eta_n$	82.9	%
At [30 %/50 %] of nominal heat output, if pertinent	$P_p$	n.p	kW	At [30 %/50 %] of nominal heat output, if pertinent	$\eta_p$	n.p	%
For solid fuel cogeneration boilers: Electrical efficiency				Auxiliary electricity consumption			
At nominal heat output				At nominal heat output	$el_{max}$	0.146	kW
				At [30 %/50 %] of nominal heat output, if pertinent	$el_{min}$	0.000	kW
				If required, integrated equipment for the abatement of secondary emissions		n.p.	kW
				Standby mode	$P_{SB}$	0.005	kW

## 2.4 - MAIN COMPONENTS

1. Panel board
  2. Top cover
  3. 2 side panels
  4. Anti-smoke door
  5. Wood storage door with refractory material and gasket
  6. Primary and secondary air adjustment unit
  7. Fan
  8. Combustion chamber door with refractory material, gasket, flame sight glass
  9. Steel combustion chamber
  10. Heat exchange fin
  11. Boiler drain
  12. Safety heat exchanger
  13. Boiler body insulation in mineral wool
  14. Steel boiler body
  15. Burner built with refractory material with bars and grate
  16. Smoke chamber
  17. By pass
- M Heating system flow  
R Heating system return



N.B.: The fire bars and the refractory steel grate are subject to wear; it is therefore advisable to carry out an annual inspection to prevent faulty boiler operation.

## 2.5 - GENERAL INFORMATION

### A BRIEF SUMMARY OF INVERTED FLAME COMBUSTION

Everybody knows that to make a match last it must be held with its head upwards. This is because in its convective motion, the flame must not meet fuel other than that which has generated it. As in residential heating the fuel is usually in the form of wood logs which are loaded from the top, the flame has to go in the opposite direction, i.e. downwards.

Natural draught is a source of negative pressure which varies greatly depending on the type of chimney, on weather conditions, on the type of fuel, etc.

Therefore, it is necessary to integrate it with a forced ventilation unit to stabilise its effects.

By fitting a fan, it is possible to considerably reduce the section of the gas ducts on the grate and, furthermore, there are no problems with cold chimney starts.

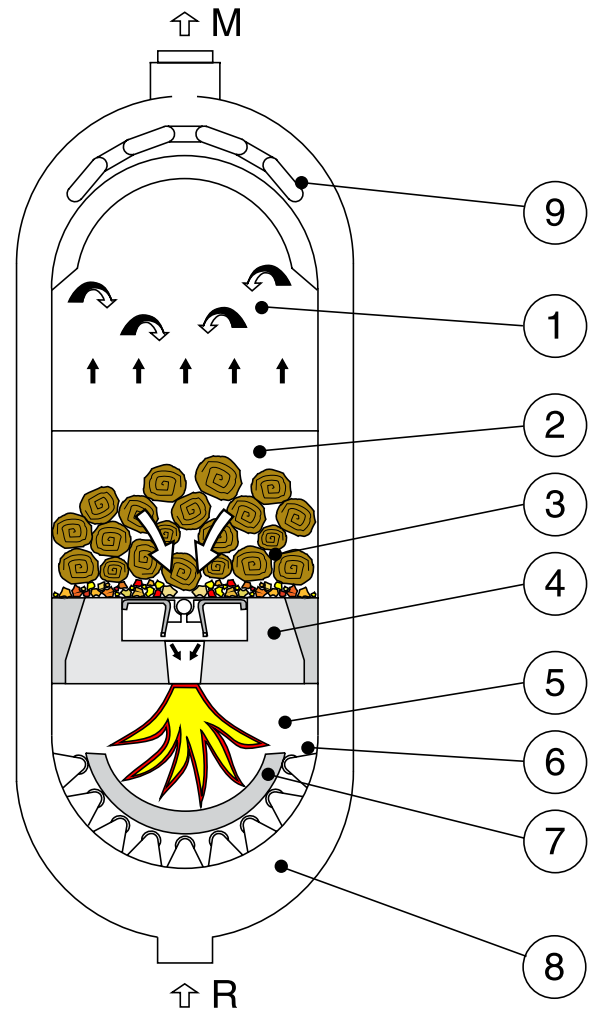
The small grate permits more controlled passage of combustion air, contrarily to what happens with large traditional grates.

The air can be perfectly adjusted because the grate, covered with burning wood, has the same crossing resistance and thus combustion will always be optimal.

## FIREX 2S BOILER STRUCTURE

The boiler body is composed of two oval elements placed one inside the other so that a water cavity is created between the two. The large capacity wood storage has a special thermal and mechanical high resistance refractory press, for the purpose of keeping the bypass area dry in all operating conditions. The following parts can be distinguished:

1. Wood storage, drying zone
  2. Gasification zone
  3. Embers zone
  4. Burner in refractory material
  5. Combustion chamber
  6. Heat exchange surface
  7. Cradle in refractory material
  8. Boiler water
  9. Safety heat exchanger
- M System hot water flow  
R System return



### GASIFICATION ZONE (2)

Gasification takes place in the lower part of the wood storage compartment.

It is very important for gasification to be as regular as possible, so as not to overload the burner with gas.

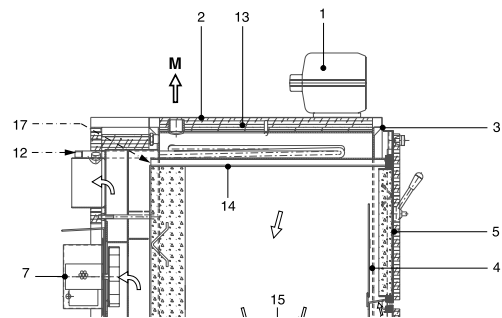
Gasification speed depends on the amount of fuel and the size of the drying area. Generally, it is better to use large logs if they are dry and small logs if the wood is moist. The quantity of primary air, proportional to the delivered output, is regulated via the adjustment system.

### EXCHANGE SURFACE (6)

Operating on wood and without very high sulphur percentages, it is important to achieve very low flue temperatures to improve water efficiency. Accordingly, a dry-passage exchange surface was adopted, which is already well tested for diesel-fired boilers operating with low temperature water, providing low flue gas temperatures without the risk of condensation.

The surfaces of the dry ducts "A" feature cuts, to avoid dilation issues.

The solid combustion residues (ashes), laid on the high temperature refractory cradle will become, over time, increasingly lighter until they are carried by the gas speed and deposited in the lowest area of the rear smoke chamber, from which they will be removed during cleaning.







## 2.6 - FEATURES OF THE WOOD



Wood is formed mainly by cellulose and lignite. It also contains other substances, such as resin (fir - pine), tannin (oak - chestnut) and, obviously, a large quantity of water.

Good quality woods are oak, ash, beech, maple and fruit trees, except cherry; medium quality wood is: chestnut and birch; sufficient quality wood: lime tree, poplar and willow. Resinous trees are, normally, second-rate quality fuels.

Wood is therefore an extremely heterogeneous fuel, due to different essences (beech, oak, fruit, resinous), different moisture content, and due to different shapes and dimensions.

Boiler operation will inevitably be effected by all these factors. Especially by the log dimensions, the moisture content and the way wood is loaded in the boiler.



### DIMENSIONS

The dimensions, together with the moisture content, contribute to determine the boiler's output. Small pieces (with a length, however, conforming to indications indicated hereby) are more easily flammable and therefore have the tendency to increase the boiler's output and therefore to reduce its autonomy. Moreover, they fall with greater facility, in the lower chamber, reducing the risk of the formation of "bridges". The so-called "bridge" is an empty space in the wood storage compartment, where unburnt wood logs remain. In this case, the bed of embers is not fed with continuity and the refractory burner's slot is uncovered. In these conditions, preferential air ducts are created with a very small flame due to an excess of air.

### WOOD MOISTURE



The calorific value of the different types of wood depends on their moisture content, as illustrated in the table. Boiler output and autonomy will diminish as the moisture increases. The table provides the power reduction factor based on the moisture of the wood being used. The heat output of the FIREX 2S boiler is calculated for wood with a 17% moisture content. As an example, wood which has been dried for 2 years in a sheltered area has a 25% moisture content.

Example:

moisture of the wood being used = 25%

output = nominal output x 0.86

Correction factors for wood moisture

% OF HUMIDITY	CALORIFIC VALUE kWh/kg	CALORIFIC VALUE MJ/kg	CORRECTION FACTOR
15	4.50	16.20	1
20	4.18	15.05	0.93
25	3.87	13.93	0.86

# INSTRUCTIONS FOR INSTALLATION

## 3.1 - GENERAL WARNINGS



### ATTENTION!

This boiler is intended solely for the use it was expressly designed for. Any other use is to be considered improper and therefore dangerous.

This boiler heats water at a temperature lower than the atmospheric pressure boiling temperature.



### ATTENTION!

The appliances are designed to be installed inside suitable rooms or technical spaces only. The appliances cannot be installed or operate outdoors. Outdoor installation can cause malfunctioning and be dangerous. Choose specifically designed appliances for outdoor installation.



Before connecting the boiler, have professionally qualified personnel:

- a) Thoroughly wash all the piping of the system to remove any residue or impurities which could jeopardise proper operation of the boiler;
- b) Check that the chimney/flue has an

appropriate draught, without any bottlenecks, and that no exhausts from other appliances are inserted, unless the flue has been implemented to accommodate several utilities according to specific standards and prescriptions in force. Only after this check can the fitting between the boiler and chimney/flue be mounted;



### ATTENTION!

The appliance must be installed by a qualified technician with the technical-professional requirements according to Italian Ministerial Decree 37/08, which, under his own responsibility, guarantees compliance with the standards according to good practice rules.



The boiler must be connected to a central heating system and/or domestic hot water production network compatible with its efficiency and output.

---

## 3.2 - INSTALLATION STANDARDS

It must be installed by a professionally qualified technician, **who shall take the responsibility of observing all local and/or national laws published in the Official Journal, as well as applicable technical standards.**

---

## 3.3 - INSTALLATION ON OLD OR RETROFITTABLE SYSTEMS

Before installing this appliance on old systems, check that:

- The chimney is able to withstand the temperature generated by the combustion products, has been measured and designed according to the regulations in force, is airtight and insulated, and does not have any obstructions or constrictions.
- The chimney has a connection for draining condensation.
- The electrical system has been set up by a qualified technician in compliance with the rules in force.
- The rate, head and direction of the flow of the circulation pumps are appropriate.
- The expansion vessel(s) can fully absorb any dilation of the fluid in the system.
- The expansion vessels can fully absorb dilation of the fluid in the system.
- The system has been cleaned and cleared of all sludge and scale, has been vented, and all of its seals have been checked.
- There is a treatment system for feed/recirculation water.

### 3.4 - PACKAGING

FIREX 2S boilers are delivered unassembled: the casing, fan, panel board, handles and cleaning accessories are all shipped in separate boxes.



After having removed all packaging, make sure that the supply is complete and undamaged. If in doubt, do not use the appliance and contact the supplier.

The document envelope, inserted in the wood storage compartment, contains:

- Hydraulic test certificate
- User/System manager instruction manual
- Installation and maintenance instruction manual
- Warranty
- Coupons for returned spare parts
- Technical data adhesive label

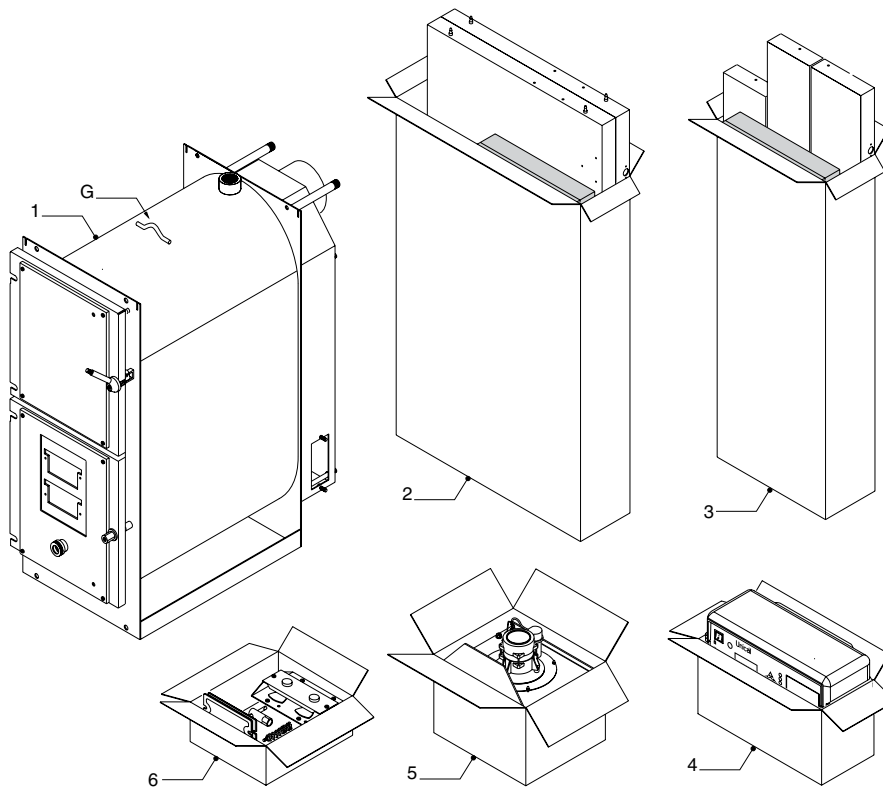


Keep the packaging material (cardboard boxes, straps, plastic bags, etc.) **out of the reach of children as they are potential sources of danger.**

**Unical** will not be held liable for damage to persons, animals or objects due to failure to comply with the instruction above.



**If the boiler is stored for long periods, it should be adequately protected.**

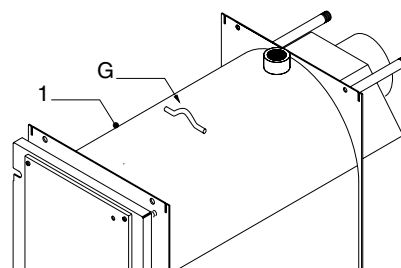


Description of packs:

1. Boiler body
2. Package containing casing and boiler insulation
3. Package containing casing and smoke chamber insulation
4. Package containing the panel board
5. Package containing the flue gas sucking fan
6. Package containing: air intake header, smoke chamber inspection covers, turbulators, handles, sundry screws, flame control mirror, cleaning accessories. This package is sent inside the wood storage compartment (top door).

### 3.5 - TRANSPORTATION

To make boiler transport, loading and unloading easier, it features special "G" hooks on the top for lifting.



### 3.6 - INSTALLATION

**FIREX 2S** is a heat generator which withdraws the combustion air required for the combustion process directly from the environment in which it is installed.

For this reason, and above all for the safety of the persons using **FIREX 2S**, it must be installed in a ventilated room so that a continuous flow of combustion air is always assured.

It is therefore essential to make air vents linked with the outside which, in compliance with that indicated by Standard UNI 10683, have the following features:

1. A minimum free section of 100 cm<sup>2</sup>, or regardless preventing pressure in the installation area from exceeding 4 Pa;
2. Be made close to the floor;
3. Be appropriately protected by metallic mesh or grate so that the minimum air passage cross-section is not reduced;
4. Be positioned in such a way that it cannot be obstructed.



**The correct air influx can also be guaranteed by using openings towards an adjacent room as long as that room is provided with direct ventilation and that it is not a room with a fire risk such as depots, garages or storerooms as regulated by standard UNI 10683.**

**FIREX 2S** should be installed in rooms without natural draught equipment or appliances which can create a vacuum in the room in relation to the outside environment and therefore hinder the draught of the flue gas exhaust system (UNI 10683).

**To make it easier to clean, there must be a clearance space in front of the boiler** no less than the length of the stove itself. You must at least make sure that the door can open 90° unobstructed.

**FIREX 2S** can be placed directly on the floor as it is equipped with a self-supporting frame.



When inspecting compatibility of the heating system, you should make sure that the support surface (floor) has a support capacity (kg) suitable to bear the weight of the product. If it is not adequate, suitable safety measures should be taken (e.g. load distribution plate).

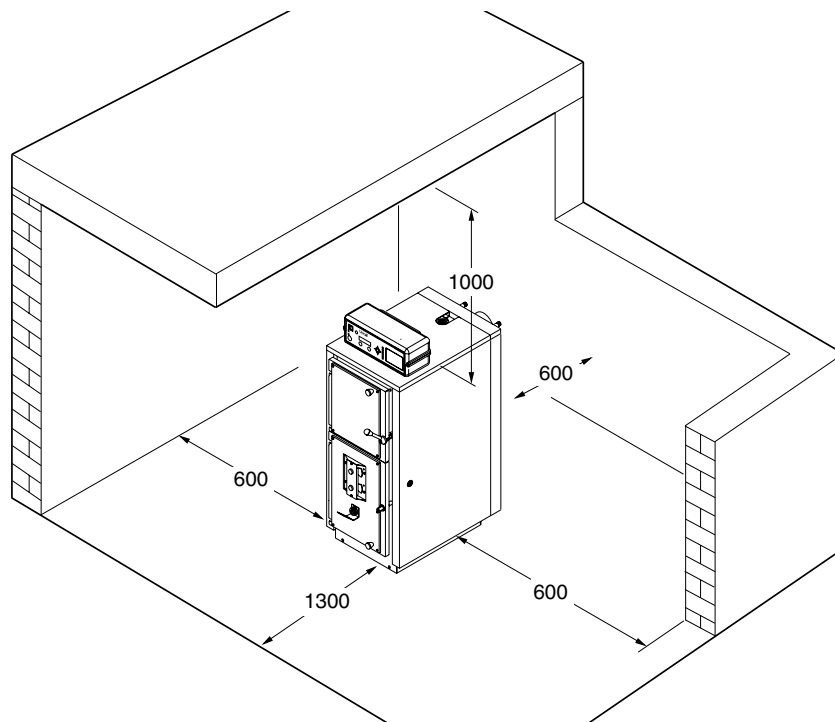
Furthermore, should the floor be made of combustible material (such as parquet) it should be protected by placing a sheet of fireproof material underneath the **FIREX 2S** and adequately wider than the base.

When installation is complete, the boiler must be horizontal and stable, in order to reduce vibrations and noise.

However, clearance space must be left behind the boiler and on both sides to allow the casing to be opened for maintenance.

There must also be sufficient clearance for loading the pellet tank.

**Do not approach or touch the outer surfaces of the combustion chamber with flammable material as it can reach high temperatures following continuous use.**



### 3.7 - BOILER CONNECTION TO SYSTEM



**Attention!**  
Make sure that there are no mechanical tension points while connecting the pipes to avoid the risk of leakage!

Heating flow and return pipes must be connected to the boiler at the respective fittings as shown on page 6.

For the dimensioning of the heating circuit pipes, you must take into account pressure drops caused by radiators, thermostatic valves, radiator stopping valves and by the configuration of the system.

The laying of the pipes must be designed taking every necessary precaution to avoid air pockets and to facilitate continuous degassing of the system.



Make sure that the pipes of the water and heating system are not used as earthing electrodes of the electric or telephone system. They are absolutely not suitable for this type of use. Serious damage could result for the piping, boiler and radiators in a short amount of time.

---

### 3.8 - HYDRAULIC CONNECTIONS



**ATTENTION!**  
Before connecting the boiler to the heating system, thoroughly clean the piping with an appropriate product compliant with UNI-CTI 8065, in order to eliminate metallic residue from processing and welding, oil and grease which could be present and which, reaching the boiler, could alter its functioning.



**Attention!**  
The fittings of the boiler must not take the weight of the connecting pipes of the system; suitable supporting devices should be installed to do this.

The dimensions of the supply and return pipes for each boiler model are given in the DIMENSIONS table.

Check that the system is fitted with a sufficient number of vent valves.

### 3.8.1 - CONNECTION TO THE SAFETY HEAT EXCHANGER DRAIN



Solid fuel fired boilers must be installed with the safety devices foreseen by the relevant laws in force.  
For this purpose, FIREX 2S boilers are equipped with a safety heat exchanger.

A thermal discharge valve **must** be installed on the **safety heat exchanger** by the installation technician, with the control bulb set up inside the sheath located on the rear side of the **FIREX 2S** boiler.

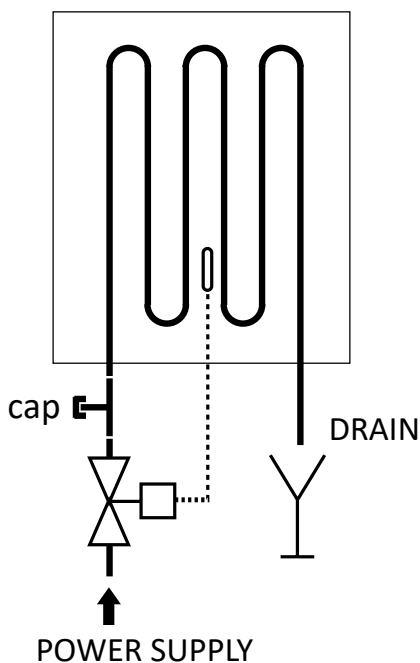
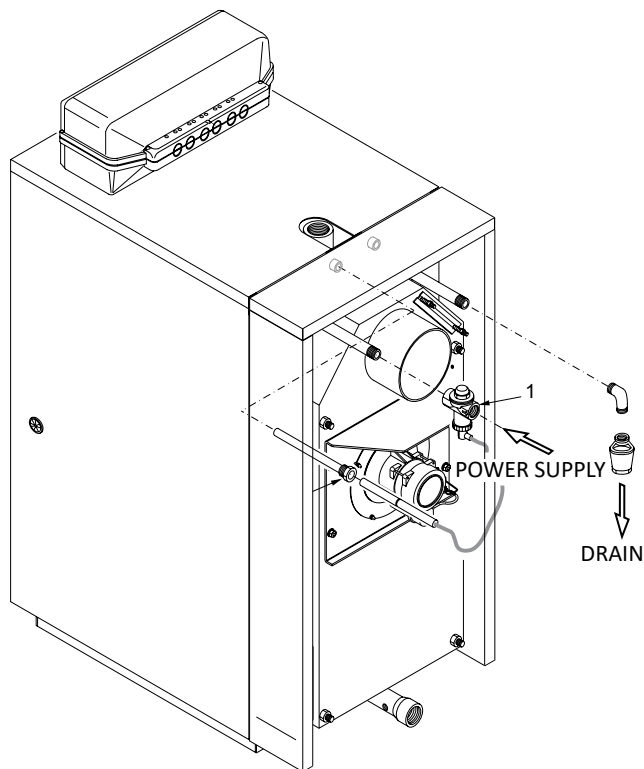


**Attention!**  
The input or output can be inverted as long as the valve is installed on the cold water intake.

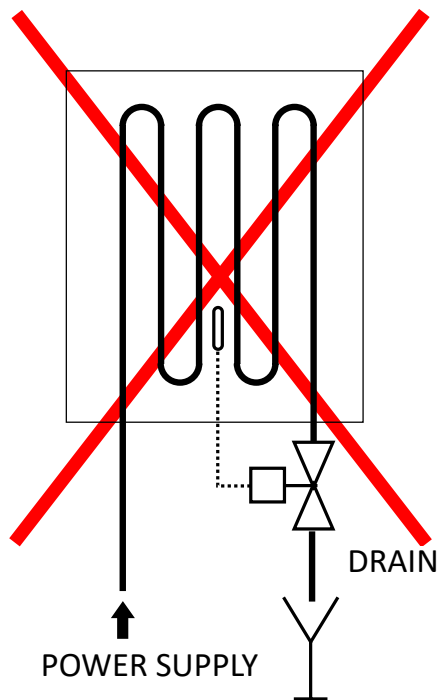
Provide a drain pipe with a funnel and a siphon leading to an appropriate drainage at the heat exchanger outlet. It must be possible to inspect this drain visually.



**Attention!**  
If this precaution is not taken, triggering of the thermal discharge valve can cause damage to persons, animals and objects for which the manufacturer cannot be held responsible.



**CORRECT ASSEMBLY**



**INCORRECT ASSEMBLY**

### 3.8.2 - RECIRCULATION KIT

For correct generator operation, a recirculation pump must be installed in the boiler.

The recirculation pump, supplied in an optional kit, must be connected as indicated in the figure.

The recirculation pump must assure a return temperature equal to or greater than 55°C.

It must be controlled exclusively from the boiler control panel.

If it is not installed, besides limiting the boiler's lifespan, it will invalidate the warranty.



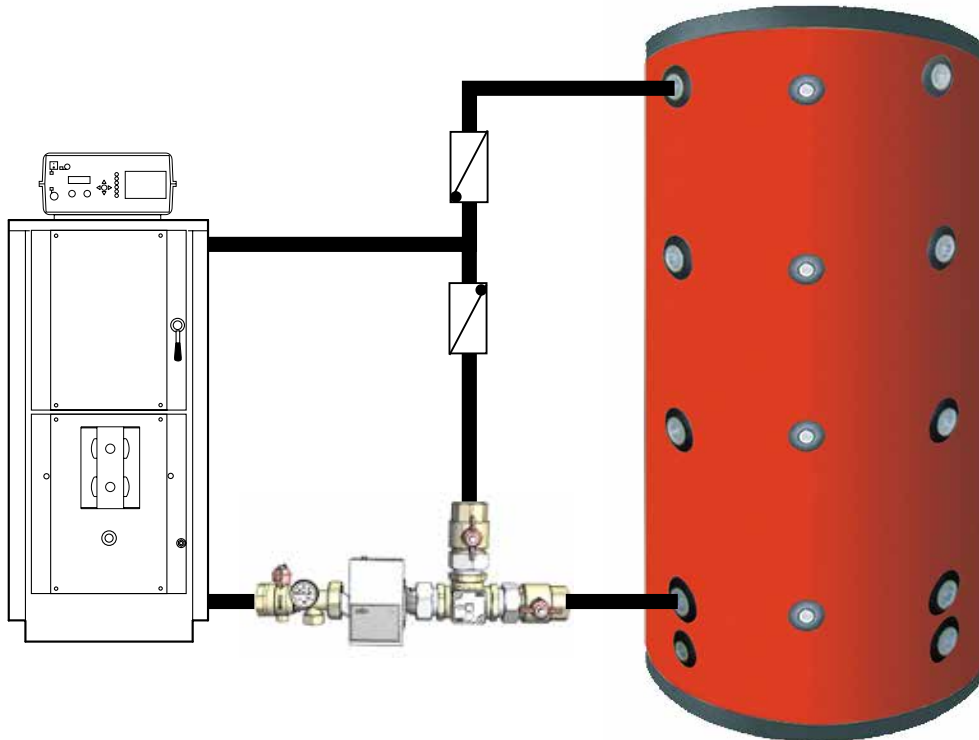
#### ATTENTION!

The hardness of the feed water affects the boiler's lifespan.

It is always recommended to treat feed water with a hardness greater than 15°f.

Unical has designed a "RECIRCULATION KIT FOR OPERATION WITH STORAGE TANK" for its customers.

The kit is supplied as an option and is available by indicating the model of your boiler.



### 3.8.3 - ASSEMBLY INSTRUCTIONS

#### Fan assembly

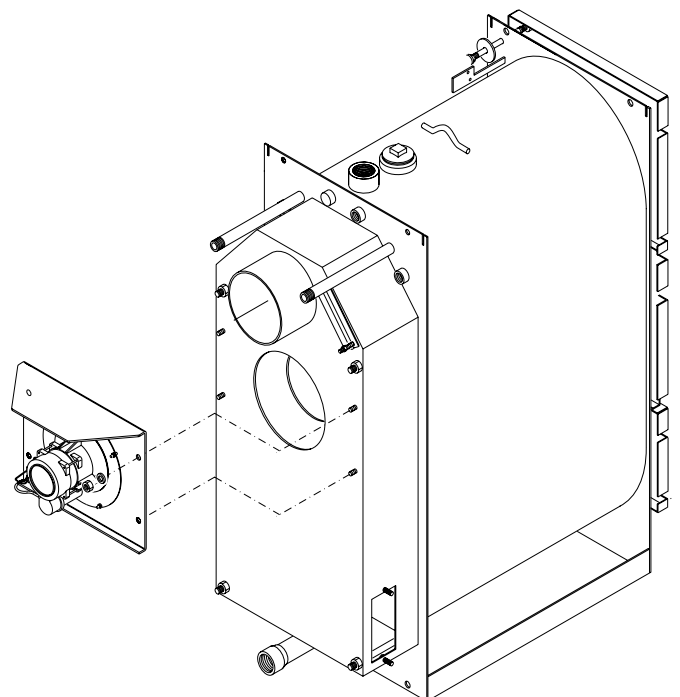
Fit the fan to the smoke chamber.



#### IMPORTANT!

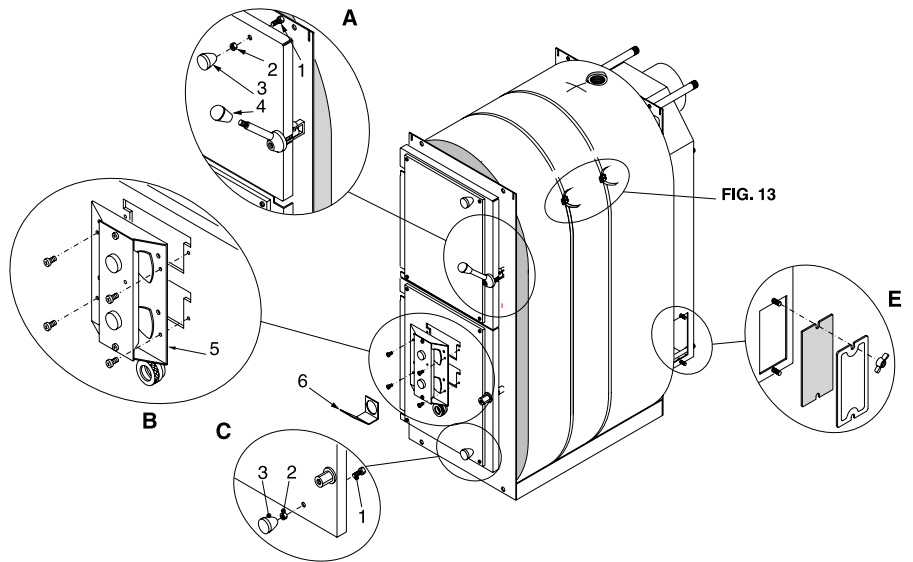
When the fan is being installed the smoke chamber gasket must be perfectly sealed, otherwise the wall of the gasket would deform, causing serious damage to the impeller and/or fan motor.

This issue occurs even more quickly the more the wood loading door is opened.



## Insulation and casing assembly

- Detail "A": assemble the knob pos. 4 on the top door closing handle.  
Mount the screw and nut on the top door and screw the knob on (pos. 1, 2, 3).
- Detail "B": assemble the air header pos. 2.  
Primary and secondary air draught adjustment is described on page 30.
- Detail "C": assemble the screw and nut on the bottom door and screw the knob on (pos. 1, 2, 3).
- Detail "E": assemble the smoke chamber inspection doors.
- Attach the flame control mirror (pos. 6) to the sight glass on the bottom door.
- Install the body insulation by making a suitable cut where the top flow fitting is.

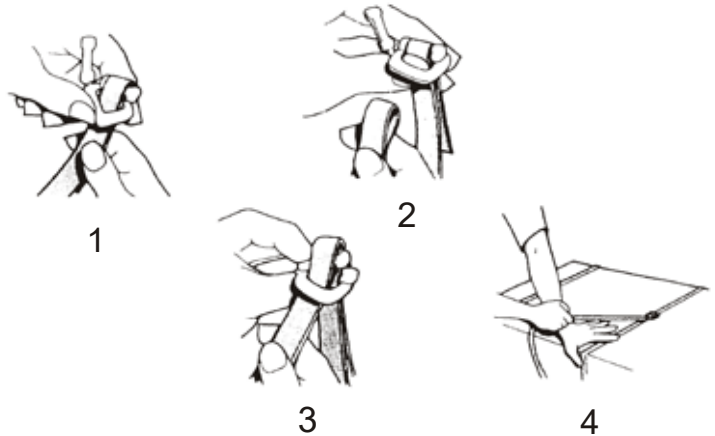


Install the body insulation by making a suitable cut where the top flow fitting is.

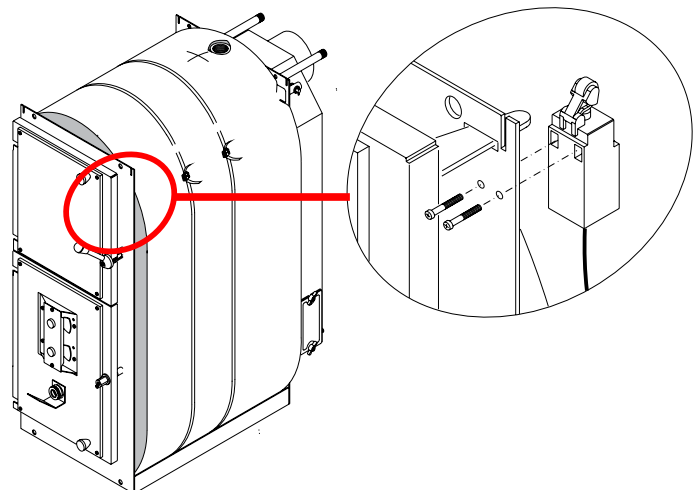
- Wrap the plastic strap around the mineral wool insulation and insert one of its ends in the locking slot as shown in detail 1.
- Holding the end of the strap already inserted, proceed with the other end by folding the plastic pin inward as shown in detail 2.
- Pull the two ends of the strap (as shown in details 3 and 4) until the strap adheres to all the mineral wool covering the boiler body.

**It is recommended not to overstretch the strap; excessive crushing of the mineral wool would cause inconsistent insulation.**

In case of maintenance, it is possible to remove the strap by acting on the locking slots.



Fasten the micro-switch to the inside of the front plate and adjust the axis of the thrust washer so that it is controlled every time the top wood loading door is closed.





- Hook the left side panel onto the body of the boiler (pos. 1).
- Hook the right side panel (pos. 2) onto the body of the boiler.
- Put the panel board and the casing cover together (on the ground) (pos. 3, 4, 5, and 6).
- Attach the rear cable clamp support profile to the top cover, pos. 7.
- Fit the smoke chamber rear cover (pos. 8,9,10,11, and 12)
- Open the panel board, turning the two side screws with a screwdriver.

Lift the cover from the back, rotating it frontwards.

Pass all of the thermostat capillaries by unrolling them carefully through the two rectangular slots on the base of the panel board, namely: the fan/s connecting cable (output), the door opening micro-switch cable (input) and the connecting cable to the power line (input).

- Place the casing cover on the boiler and direct the end of the capillaries towards the rear of the boiler.
- Attach the boiler's TECHNICAL DATA plate and, only for models < 35 kW, the LOCAL VENTILATION STANDARDS plate, on the right side of the casing, once this area has been cleaned and degreased with a suitable product.

Remove the protective film from the plates and apply them making sure they stick perfectly.

Do not remove the plates as they would then no longer stick.

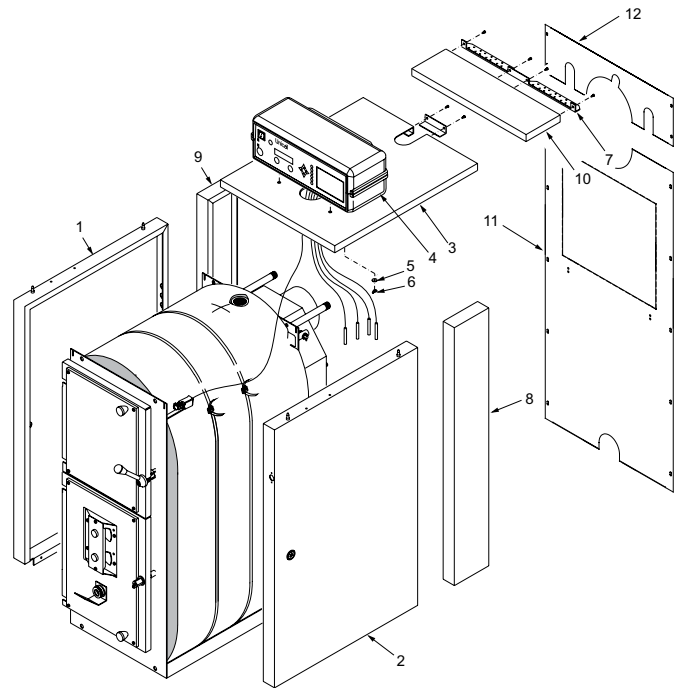
The thermostat bulbs are identified by labels attached to their respective capillaries; accordingly, be careful not to tear any of these labels during any maintenance operations.

- A) Place the bulb of flow probe S4, the bulb of safety thermostat (Ts) in the suitable bulb holder.

Place the bulb of the flue gas probe in the suitable bulb holder.

Place the bulb of the flow probe S5 in the suitable bulb holder.

- B) Install the fan socket pos. 3 on the rear panel.



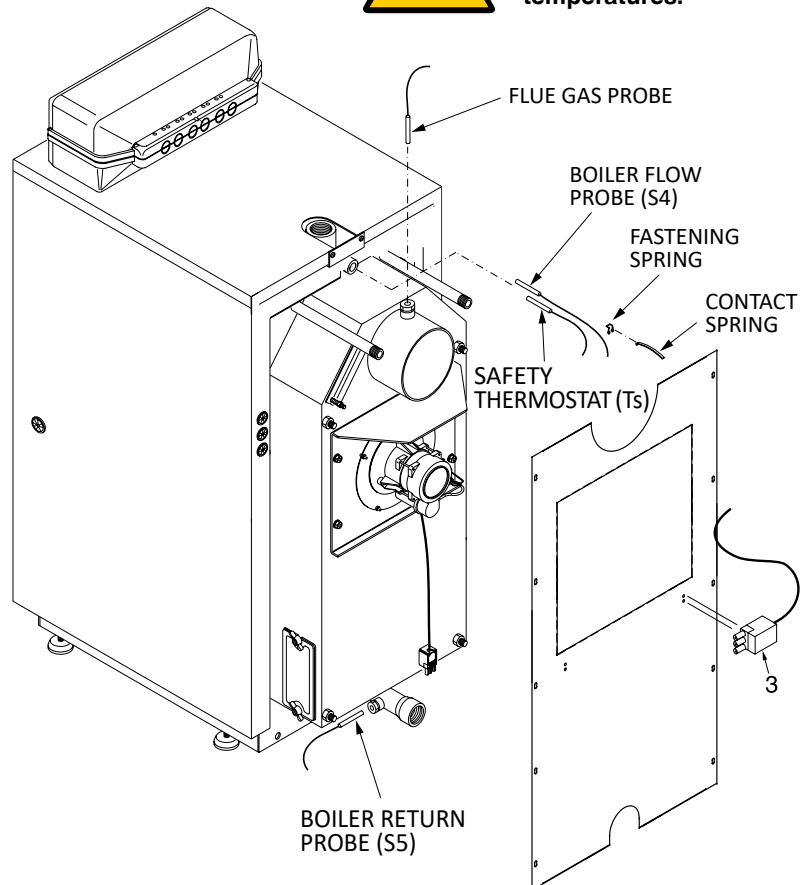
- C) Plug the fan plug into the socket.

- D) Set up the electrical connections for the loads and line as illustrated in the diagrams contained in chapters 3.12 and 3.13.

Close the panel board.



**Make sure the electrical cables do not come into contact with the smoke chamber. During operation, the chamber reaches high temperatures.**



### 3.9 - CONNECTION TO THE CHIMNEY

To connect the flue gas exhaust pipe, local and national standards must be observed.

The chimney is essential to good boiler operation: accordingly, the chimney needs to be waterproof and well-insulated.

Old or new chimneys, built without respecting the specific requirements, can be recovered by "piping" the chimney itself.

It will be necessary to introduce a metallic pipe inside the existing chimney and insulate the space between the metallic pipe and the chimney.

Chimneys made of prefabricated blocks must have perfectly sealed joints to avoid flue condensate from smudging the walls due to permeation.

The entrance to the chimney should be at a 45° angle.

A flue inspection opening has to be made at the base of the chimney.

It is recommended to insulate the pipe connecting to the chimney to reduce heat loss and noise.

The dimensions of the chimney must guarantee the draught required to properly operate the boiler.

An insufficient draught, besides causing smoke leakage from the generator, significantly reduces the heat output. On the contrary, an excessive draught causes an abnormal heat output increase, a higher flue gas temperature in the chimney and an excessive fuel consumption.



**Use only exhaust pipes suitable for the type of fuel used.**

**The supplier will have no contractual or extra-contractual liability for damage caused due to incorrect installation and use and for failure to comply with the instructions provided by the manufacturer.**



**It is forbidden to exhaust FIREX 2S combustion products in shared flues.**



**The chimney must comply with the standards in force.**

**The flue gas chimney must be made properly to promote the normal flow of flue gas from the combustion chamber towards the outside in the case of a power outage.**

**Remember that the elimination of excess heat is managed optimally by the electronic heating controller.**

**The following are the main features of the flue gas exhaust pipe according to that established by standards UNI 7129 and UNI 10683:**

- The flue gas exhaust must be equipped with watertight inspection openings;
- The minimum height of the pipe connected directly to the flue gas exhaust is between 2-3 m;
- If a horizontal section is inevitable, it is recommended that it be no longer than 1.5 m at most and sloping 3-5% to promote the escape of the flue gas;
- **A weatherproof and windproof terminal must be used** to avoid changing the slight state of overpressure of the chimney (do not fit a horizontal section at the end of the chimney);
- The exhaust ducts must be made with material resistant to combustion products and condensation (the inspection valve can drain any condensation which may be formed);

- Pipes must be built in such a way to guarantee maximum smoke tightness (UNI 10683);
- It is recommended to insulate the piping, especially the outside part exposed to foul weather.

**Do not make sections fully horizontal.**

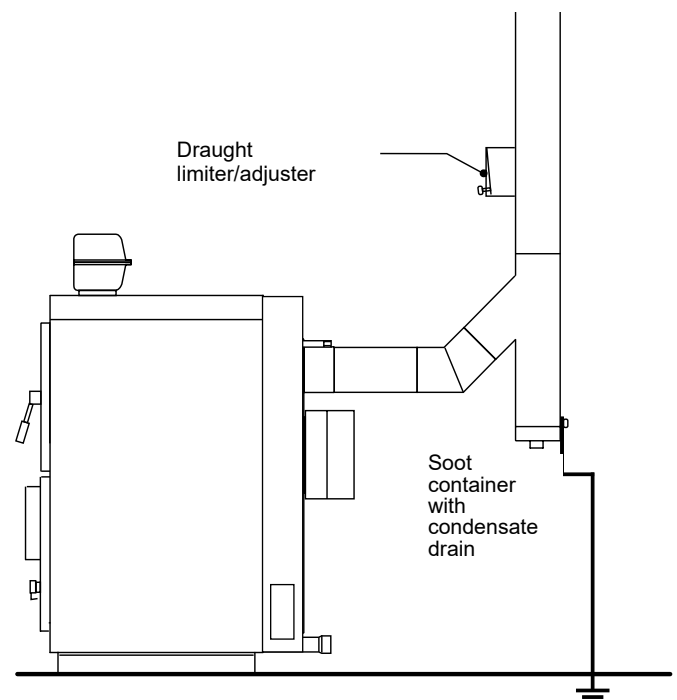
**There must be no flue gas exhaust hoods installed or already existing in the room where the heat generator is installed to avoid creating a vacuum in the environment.**

**It is prohibited to close the air vents.**

**Have the chimney cleaned at least once a year; we therefore recommend having both the chimney and the flue gas fitting thoroughly cleaned.**

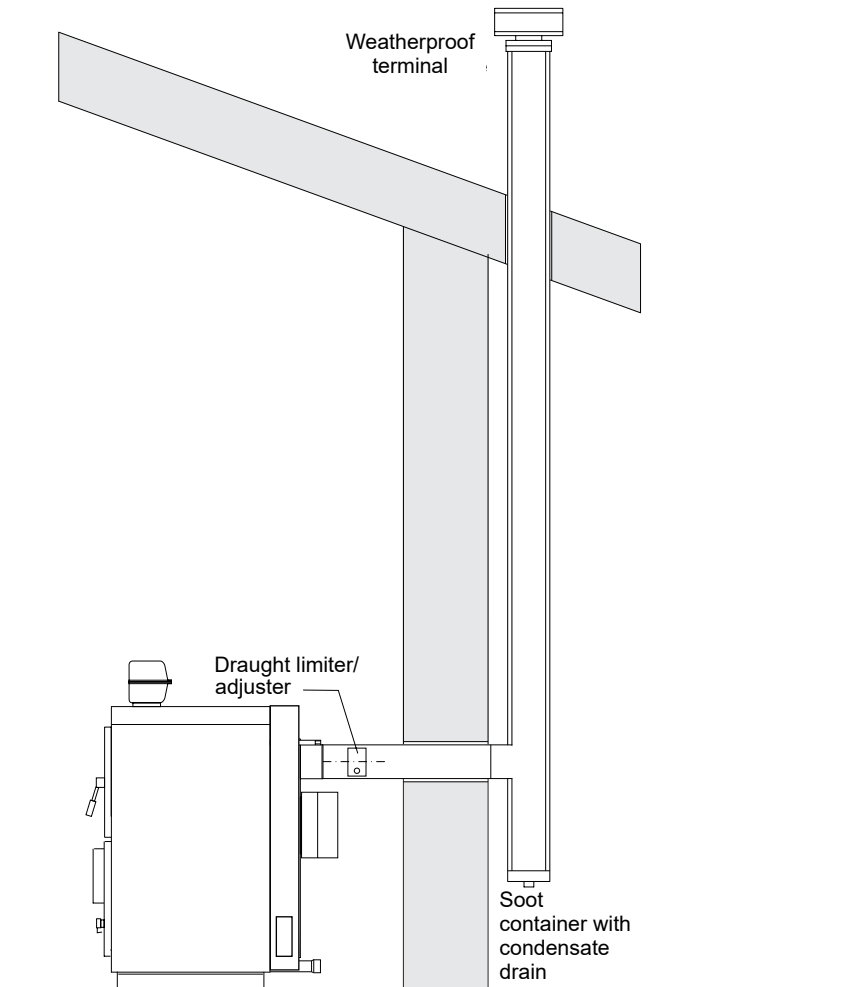


**Should the chimney or piping catch fire, immediately switch the boiler off and disconnect it from the household electrical mains.**



**Special attention must be paid to the installation of the earthing device to protect from atmospheric electric charges. The protection is important not only for the present electronic devices but mainly for the safety of the users.**

### 3.9.1 - EXHAUST THROUGH EXTERNAL WALL

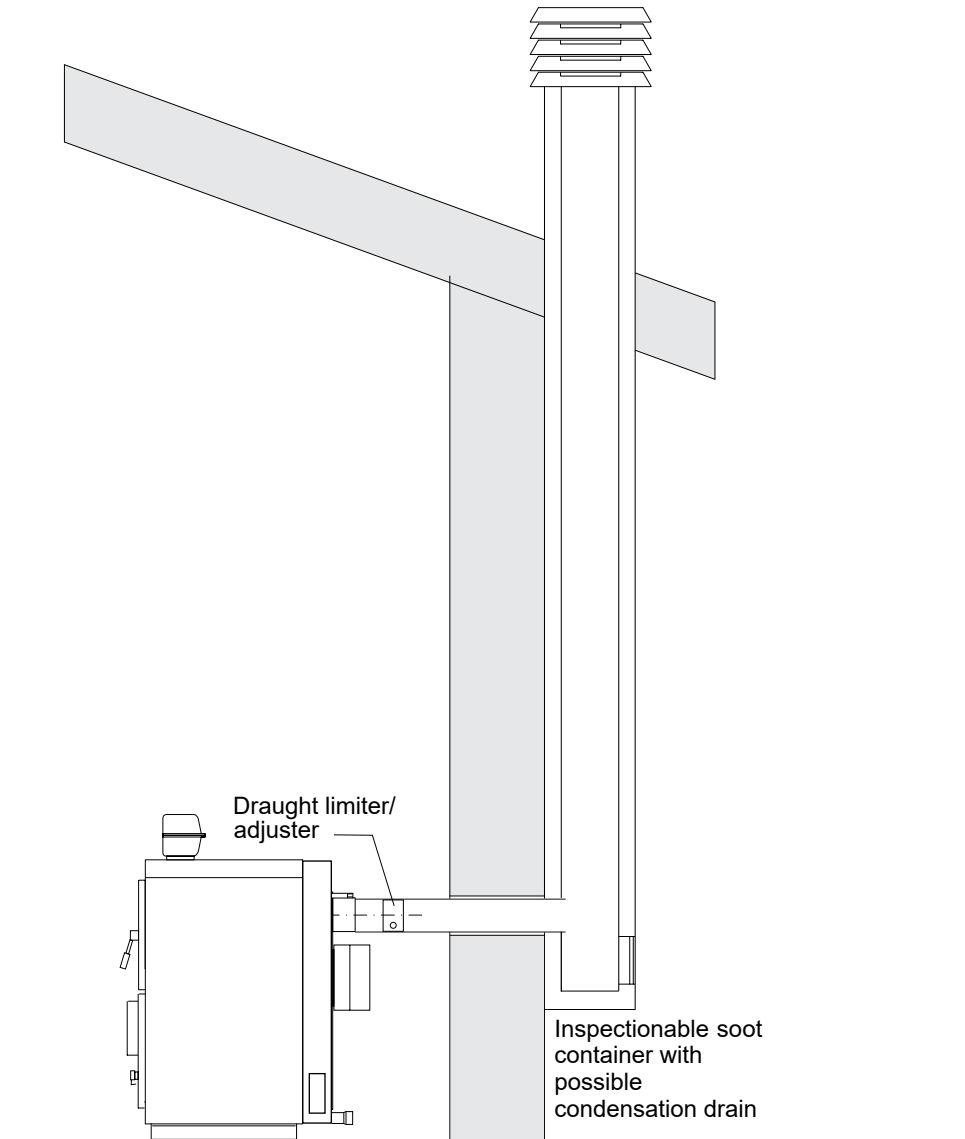


One of the installation solutions which can be adopted is that of positioning the FIREX 2S near a perimeter wall of the home so that flue gas is discharged directly outside. Here are some guidelines from the standard UNI 7129 for this particular type of system configuration:

- Always provide an inspection valve which allows you to perform efficient and periodical cleaning as well as draining any condensation formed;
- The chimney must be strictly weatherproof;
- Appropriately insulate the flue gas exhaust pipe in the section passing through the wall.

The flue gas exhaust pipe, if completely outside, should be made in double wall stainless steel to guarantee both greater resistance to atmospheric agents and a sufficient flue gas exhaust temperature.

### 3.9.2 - EXHAUST THROUGH ROOF BY MEANS OF TRADITIONAL CHIMNEY



The pellet combustion flue gas can also be discharged using a traditional pre-existing chimney as long it is made according to the indications of the technical standards in force.

We will briefly list some of the main features highlighted by the standard which characterise a good chimney:

- Adequate insulation especially in the outside section exposed to the atmosphere;
- Constant internal cross-section (there must be no cross-section constrictions);
- Made with material resistant to high temperatures, to the action of combustion products and to the corrosive action of condensation which could be formed;
- Predominately vertical with deviations no greater than 45°;

It is recommended to provide a solid material and/or condensation collection chamber which can be inspected through an airtight door.

It is recommended to abide by that established by standards UNI 9615 and 9731 for the dimensioning of the chimney cross-sections and anyhow not to make pipes with a cross-section less than 100 mm.

If there are larger cross-sections, a steel pipe must be inserted inside the masonry duct.



**The steel pipe must be sufficiently insulated with high temperature resistant material and sealed from the outer chimney.**

### 3.10 - ELECTRICAL CONNECTIONS

#### General warnings

The electrical safety of the appliance is guaranteed only when it has been properly connected to an efficient earthing system carried out as intended by safety standards in force: pipes of the gas, water and heating systems are absolutely unsuitable as earthing connections.

It is necessary to verify this fundamental safety requirement. If in doubt, have the electric system carefully checked by professionally qualified personnel as the manufacturer is not liable for damage caused by failure to provide an earthing system.

Have professionally qualified personnel check that the electric system is adequate for the maximum power absorbed by the appliance, indicated on the data plate. Make sure in particular that the cross-section of the cables is suitable for the power absorbed by the appliance.

Adapters, multiple sockets and/or extension cords cannot be used to power the appliance.

Use of any type of component using electric energy requires the observance of some fundamental rules, such as:

- do not touch the appliance with wet and/or moist parts of the body and/or bare feet;
- do not pull the electric cables;
- do not leave the appliance exposed to atmospheric agents (rain, sun, etc.) unless expressly designed;
- do not allow children or unskilled persons to use the appliance.

#### 230V electric power supply connection

Electrical connections are shown in section 3.11.

Boiler installation requires connection to a 230 V - 50 Hz electric mains.

This connection must be set up according to standard, as intended by current IEC regulations.

#### Danger!



**Only a qualified technician may perform the electrical installation. Before performing connections or any type of operation on electrical parts, always disconnect the electrical power and make sure that it cannot be reconnected accidentally.**

Remember that a bipolar switch must be installed on the boiler power line with over 3 mm between contacts, easy to access, making maintenance quick and safe.

The power cable must be replaced by authorised technical personnel. Failure to comply with the above can jeopardise the safety of the appliance.

#### Attention!



- Before opening the panel board, move the switch to pos. "0"!
- Do not connect loads to the panel board which absorb more than 6A overall!

#### Approvals

The UNICAL panel board for FIREX 2S boilers has received the EC approval according to standard EN 60335-1.

#### Technical data plate and serial number of the panel board.



The identification plate of the panel board is glued on the base.

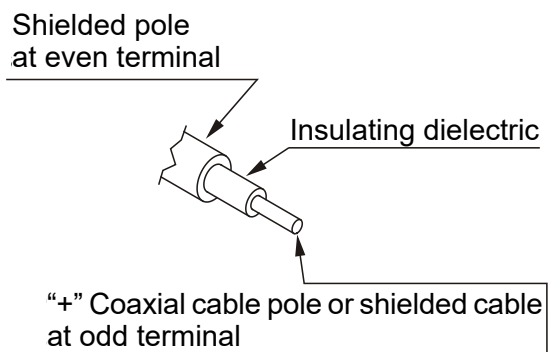
#### Use

**This panel board must be used to operate a boiler intended to heat water at a temperature that does not exceed the boiling point when installed.**

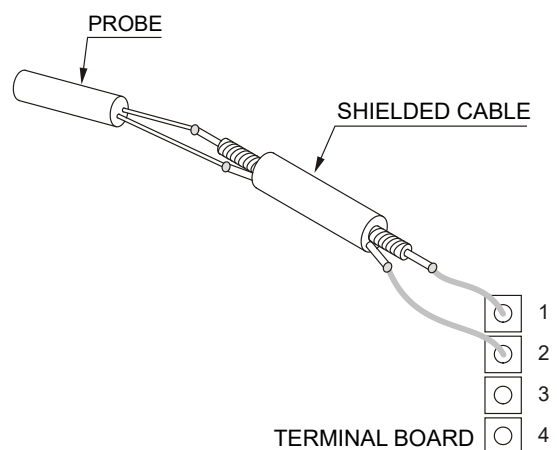


#### CORRECT CONNECTION OF THE PROBES

N.B. to correctly view the temperature measured by the probe, if the cable passes near electric cables or has an extension of over 3 metres, a shielded cable must be used for connection.



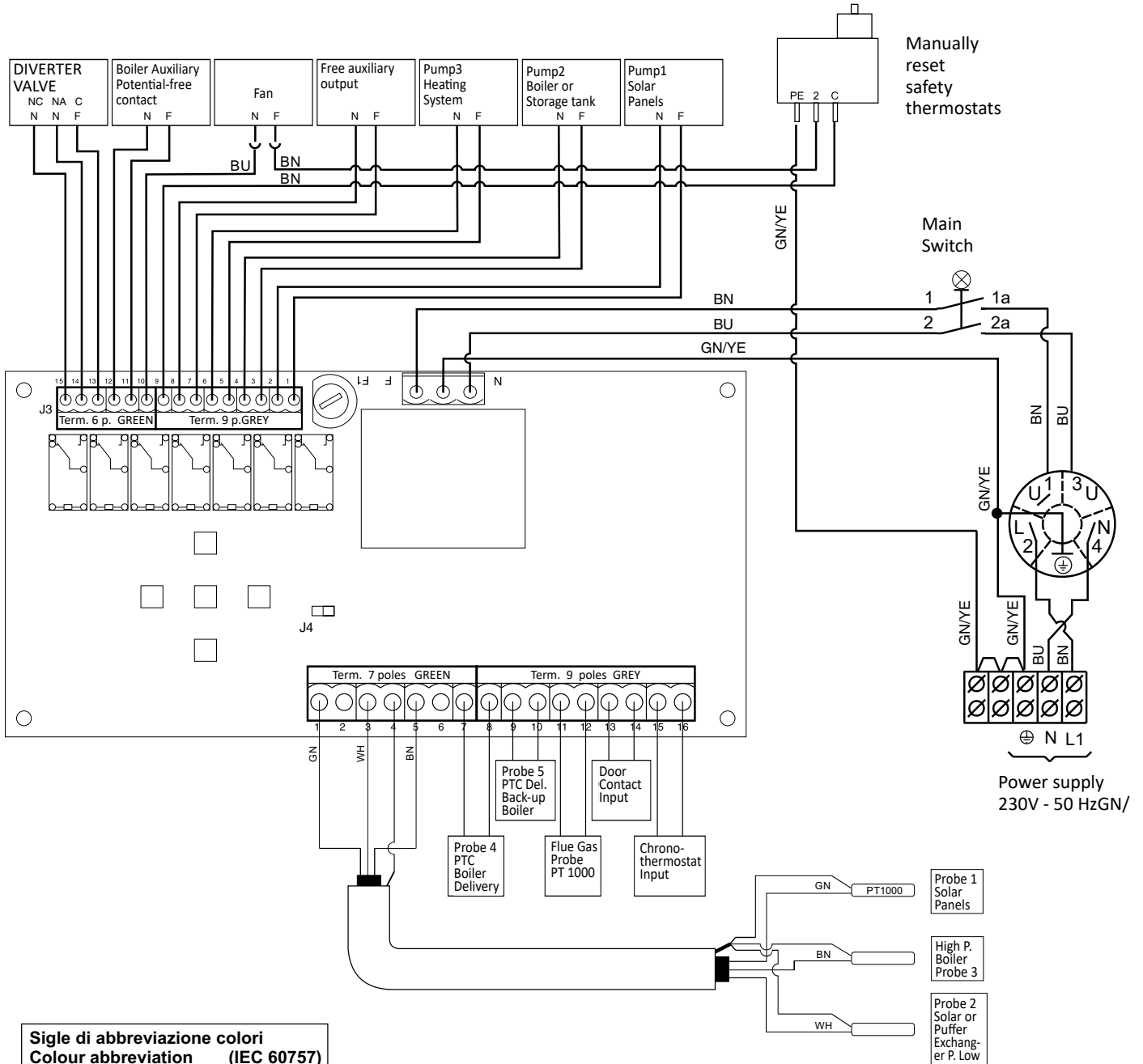
The following drawing specifies that the positive pole of the shielded cable must be connected to the odd number terminal while the braid shield of the cable must be connected to the even number terminal. This shields the probe line and eliminates disturbances.



### 3.11 - CONNECTIONS



**Please note:**  
**Connection of the pump may change depending on the selected plumbing diagram.**  
**Comply with the connections set out in the diagrams.**



Sigle di abbreviazione colori Colour abbreviation (IEC 60757)		
Nero	Black	BK
Marrone	Brown	BN
Rosso	Red	RD
Arancione	Orange	OG
Giallo	Yellow	YE
Verde	Green	GN
Blu	Blue	BU
Viola	Violet	VT
Grigio	Grey	GY
Bianco	White	WH
Rosa	Pink	PK
Turchese	Torquoise	TQ
Giallo/Verde	Yellow/Green	GN/YE

### 3.12- HYDRAULIC BASE DIAGRAMS

The following diagrams are for reference only and therefore are not binding. Unical declines any responsibility for errors or omissions.

#### 3.12.1 - FIREX BOILER SYSTEM FOR HEATING AND FOR THE PRODUCTION OF DOMESTIC HOT WATER, WITH TANK IN TANK TYPE STORAGE TANK

In the following configuration, pump **P2** is in operation until the temperature detected by probe **S4** meets the value set by parameter **P1**. After that, its function is controlled by the counter-exchange between probe **S4** and probe **S2**.

The temperature differential which controls operation of pump **P2** based on the temperatures detected by probe **S4** and by probe **S2** is represented by the value set in parameter **P9** (adjustable).

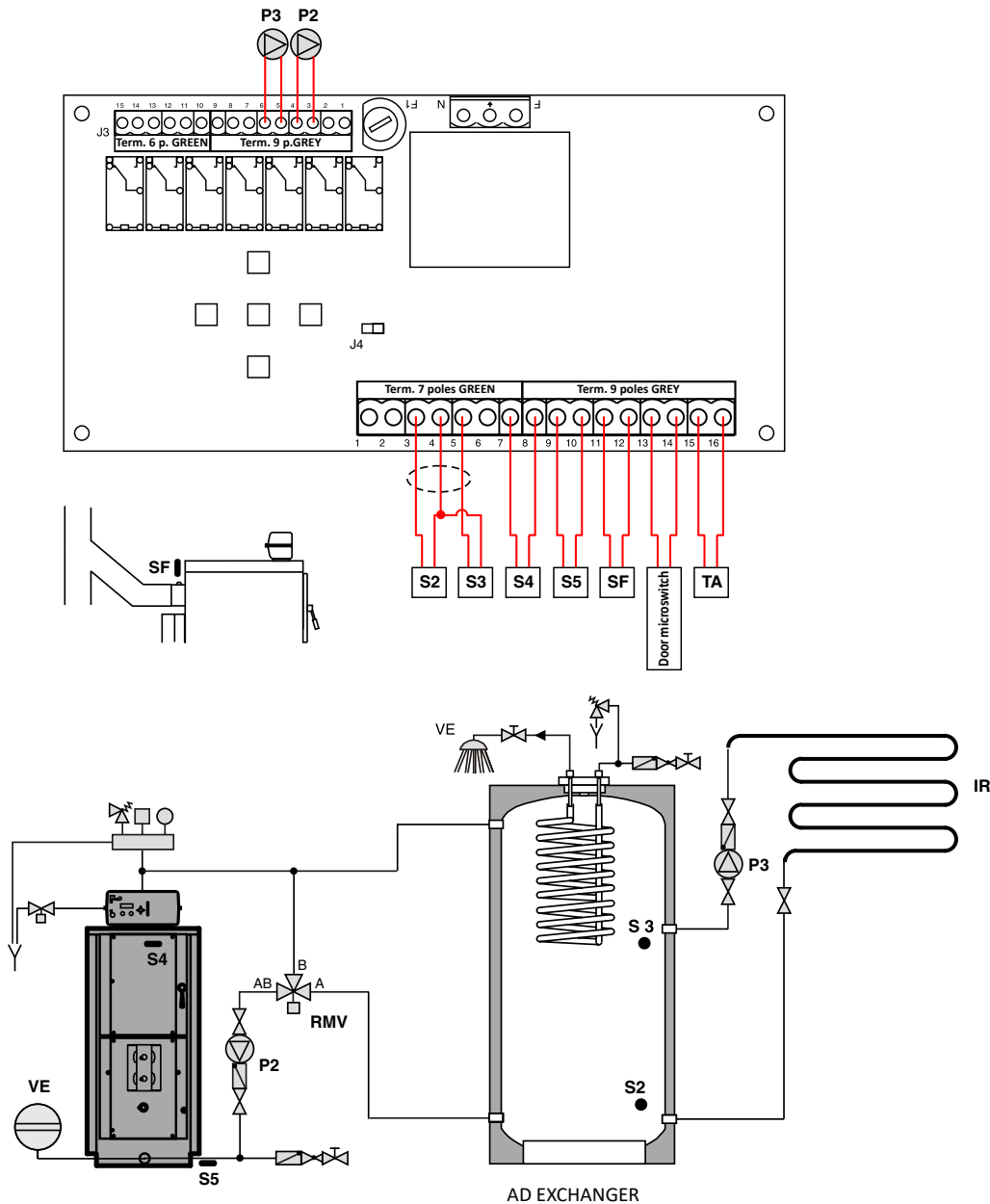
The pump **P2** is active if  $S2 = S4 - P9$ , it is stopped if  $S2 = S4 - P9 + 2$ .

Pump **P3** is on if **S3** reaches the temperature set in parameter **P5** and **TA** is in demand.

The Tank in Tank is heated until allowed by the counter-exchange control. With this configuration, the settings of parameters **P5** and **P6** are not complied with.

Probe **S5** allows the boiler return connection temperature to be controlled.

The fan stops when probe **S4** reaches the temperature set in parameter **P0**.



Key:

- IR:** heating system
- P2:** Tank in Tank loading pump
- P3:** C.H. pump
- RMV:** mixing valve (55°C)
- SF:** flue gas probe

- S2:** storage tank temperature sensor (low point)
- S3:** storage tank temperature sensor (high point)
- S4:** flow temperature sensor of the boiler
- S5:** return temperature sensor of the boiler
- VE:** expansion vessel

	<b>LIST OF PARAMETERS</b>	<b>DEFAULT SETTINGS</b>
<b>Parameter</b>		
0	Boiler operating temperature	80
1	Minimum boiler temperature for starting the circulating pumps	55
2	Maximum boiler temperature for alarm	88
3	Minimum auxiliary boiler temperature	55
4	Auxiliary boiler operating temperature	80
5	Temperature at which boiler starts being filled or storage tank heat. circulator start	50
6	Temperature at which the boiler stops being filled or storage tank DHW production ends	60
7	Maximum temperature for storage tank or solar protection storage tank	90
8	Thermostating thermal Delta for heating	2
9	Thermal Delta for filling storage tank	8
10	Thermal Delta for operating solar panels	10
11	Shutdown delay time for wood function standby	50
12	Modulation of fuel and air in relation to wood boiler temperature	2
13	Fan speed during wood combustion	190 (34 kW) 210 (45 kW) 240 (55 kW)
14	Minimum flue gas temperature for detecting boiler ignition	120
15	Maximum wood flue gas temperature with modulation of -15°C	240
16	Maximum operating temperature of solar panels	160
17	<b>PROBE CONFIGURATION PARAMETER</b>	
	Probe 1 = 0-> absent 1-> present (solar PT1000)	0
	Probe 2 = 0-> absent 2-> present (low storage tank)	2
	Probe 3 = 0-> absent 4-> present (high storage tank)	4
	Probe 4 = 0-> absent 8-> present (wood boiler flow)	8
	Probe 5 = 0-> absent 16-> present (wood boiler return)	16
	<b>Parameter to be entered for configuring probes</b>	<b>30</b>
18	<b>FUNCTIONAL CONFIGURATION PARAMETER</b>	
	1, Pred. = 0> Boiler/storage tank absent 1-> Boiler/storage tank present	1
	2, Pred.= 0> Coil type storage tank 2-> Combi or Puffer type storage tank	2
	3, Pred. = 0> Solar absent 4-> Solar present	0
	4, Pred. = 0> Wood only 8-> Wood + auxiliary boiler	0
	5, Pred. = 0> Separate or wall-mounted boiler 16-> Combi overlapped boiler	0
	<b>Parameter to be entered for settings</b>	<b>3</b>
19	Language selection: 0 = Italian - 2 = English - 4 = French - 6 = Spanish	0

To enable or disable the probes, enter a numerical value, which is the result of the sum of the weights attributed to each individual probe, in PARAMETER 17 (probe setting parameter).

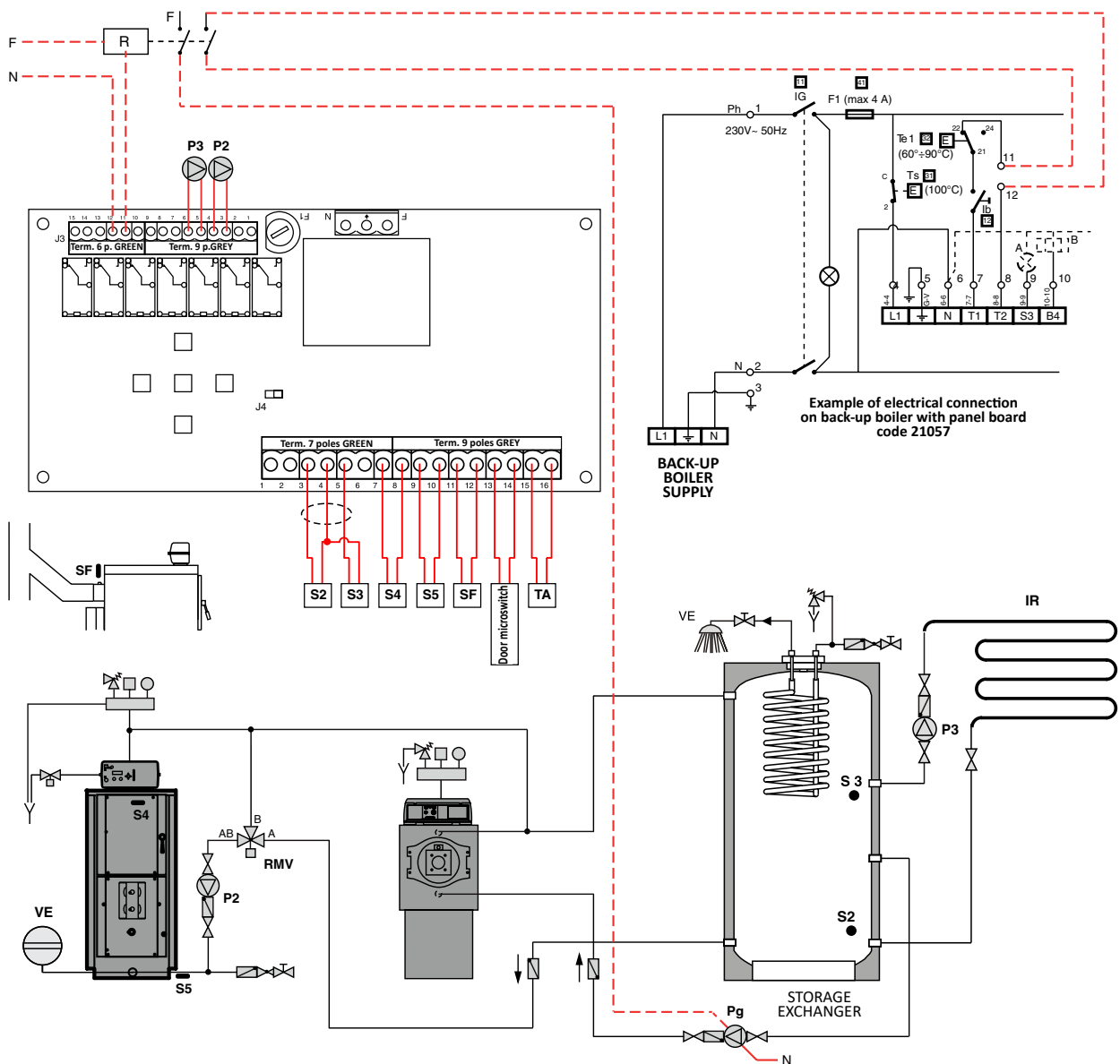
The same procedure is performed with PARAMETER 18 (functional setting parameter).



### 3.12.2 - FIREX 2S BOILER SYSTEM FOR HEATING AND FOR THE PRODUCTION OF DOMESTIC HOT WATER WITH TANK IN TANK STORAGE TANK AND BACK-UP BOILER (oil-fired)

In the following configuration when the wood-fired boiler runs out of loaded wood, if the automatic function has been selected on the control board and **TA** is in demand, clean contact J3 11-12 on the wood-fired control board closes. In this way, pump **Pg** is powered and the back-up boiler burner switches on. The burner switches off either because **TA** requirement is met (in this case pump **Pg** also stops), or because the temperature set in the working thermostat of the back-up boiler has been reached (in this case pump **Pg** does not stop). In the event of wood-fired boiler over-temperature, during back-up boiler operation, when the temperature in **S4** reaches the value of parameter P1, pump **P2** starts and some of the energy in the boiler is discharged into the puffer.

If the temperature in **S4** should further increase until reaching the temperature value set in parameter P2, both the burner of the back-up boiler and pump **P4** switch off, the C.H. pump **P3** switches on and an audible alarm will signal the over-temperature. In case of a demand for DHW, clean contact J3 11-12 on the wood-fired boiler's control board closes, the burner of the back-up boiler switches on and pump **Pg** starts. The request occurs when the temperature in **S3** reaches the temperature set in P5 and ends when **S2** reaches the temperature set in P6; the burner switches off and pump **Pg** stops. The counter-exchange between probe **S4** and probe **S2** is controlled by the wood-fired boiler.



Key:

- IR:** heating system
- Pg:** back-up boiler loading pump
- P2:** loading/recirculation pump
- P3:** C.H. pump
- RMV:** mixing valve (55°C)
- SF:** flue gas probe

- S2:** storage tank temperature sensor (low point)
- S3:** storage tank temperature sensor (high point)
- S4:** flow temperature sensor of the boiler
- S5:** return temperature sensor of the boiler
- VE:** expansion vessel

	<b>LIST OF PARAMETERS</b>	<b>DEFAULT SETTINGS</b>
<b>Parameter</b>		
0	Boiler operating temperature	80
1	Minimum boiler temperature for starting the circulating pumps	55
2	Maximum boiler temperature for alarm	88
3	Minimum auxiliary boiler temperature	55
4	Auxiliary boiler operating temperature	80
5	Temperature at which boiler starts being filled or storage tank heat. circulator start	50
6	Temperature at which the boiler stops being filled or storage tank DHW production ends	60
7	Maximum temperature for storage tank or solar protection storage tank	90
8	Thermostating thermal Delta for heating	2
9	Thermal Delta for filling storage tank	8
10	Thermal Delta for operating solar panels	10
11	Shutdown delay time for wood function standby	50
12	Modulation of fuel and air in relation to wood boiler temperature	2
13	Fan speed during wood combustion	190 (34 kW) 210 (45 kW) 240 (55 kW)
14	Minimum flue gas temperature for detecting boiler ignition	120
15	Maximum wood flue gas temperature with modulation of -15°C	240
16	Maximum operating temperature of solar panels	160
17	<b>PROBE CONFIGURATION PARAMETER</b>	
	Probe 1 = 0-> absent    1-> present (solar PT1000)	0
	Probe 2 = 0-> absent    2-> present (low storage tank)	2
	Probe 3 = 0-> absent    4-> present (high storage tank)	4
	Probe 4 = 0-> absent    8-> present (wood boiler flow)	8
	Probe 5 = 0-> absent    16-> present (wood boiler return)	16
	<b>Parameter to be entered for configuring probes</b>	<b>30</b>
18	<b>FUNCTIONAL CONFIGURATION PARAMETER</b>	
	1, Pred. = 0> Boiler/storage tank absent    1-> Boiler/storage tank present	1
	2, Pred.= 0> Coil type storage tank    2-> Combi or Puffer type storage tank	2
	3, Pred. = 0> Solar absent    4-> Solar present	0
	4, Pred. = 0> Wood only    8-> Wood + auxiliary boiler	8
	5, Pred. = 0> Separate or wall-mounted boiler    16-> Combi overlapped boiler	0
	<b>Parameter to be entered for settings</b>	<b>11</b>
19	Language selection: 0 = Italian - 2 = English - 4 = French - 6 = Spanish	0

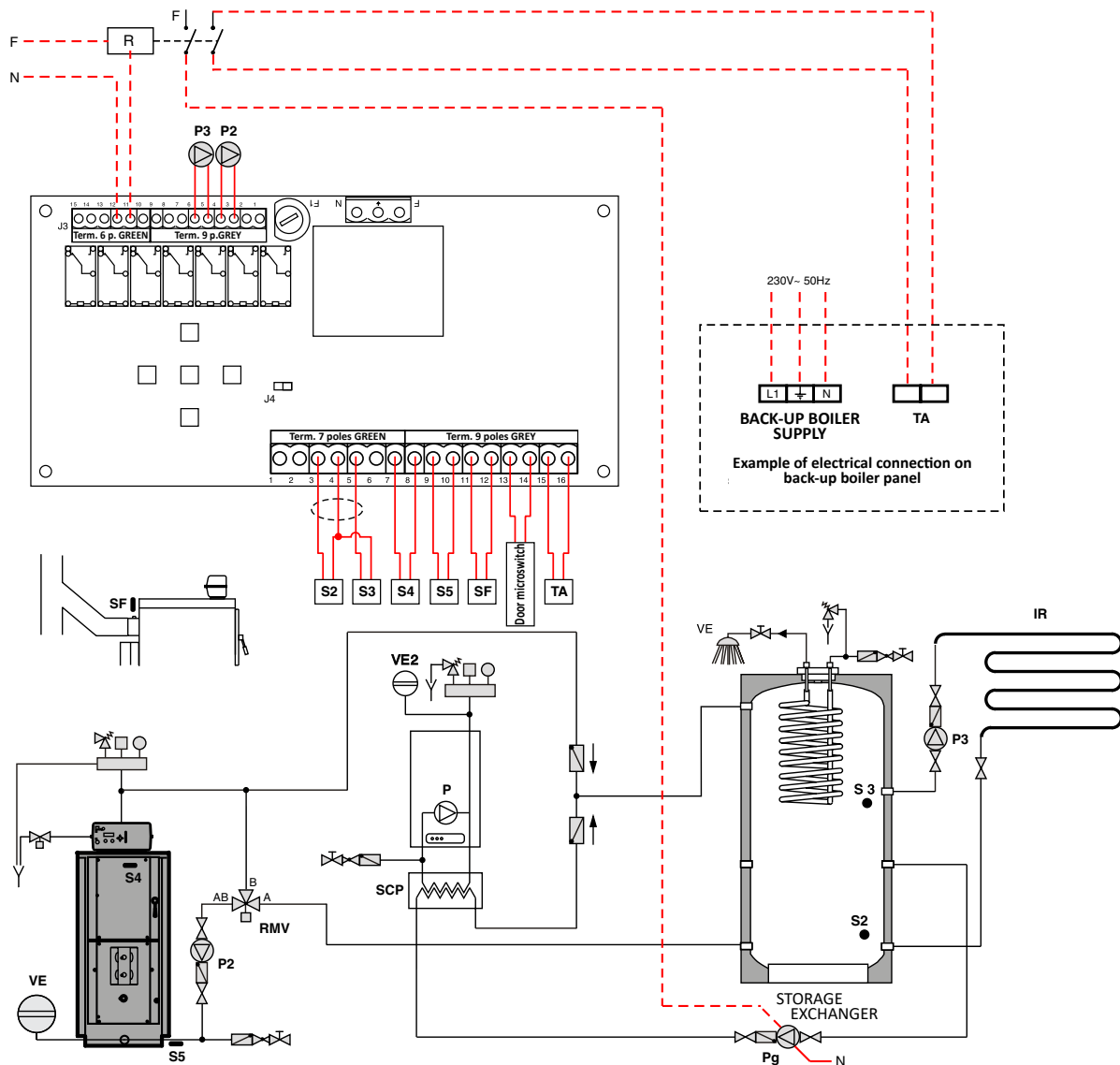
To enable or disable the probes, enter a numerical value, which is the result of the sum of the weights attributed to each individual probe, in PARAMETER 17 (probe setting parameter).

The same procedure is performed with PARAMETER 18 (functional setting parameter).

### 3.12.3 - FIREX 2S BOILER SYSTEM FOR HEATING AND FOR THE PRODUCTION OF DOMESTIC HOT WATER WITH TANK IN TANK STORAGE TANK AND BACK-UP BOILER (wall-mounted)

In the following configuration when the wood-fired boiler runs out of loaded wood, if the automatic function has been selected on the control board and **TA** is in demand, clean contact J3 11-12 on the wood-fired control board closes. In this way, pump **Pg** is powered and the back-up boiler burner switches on. The burner switches off either because **TA** requirement is met (in this case pump **Pg** also stops), or because the temperature set in the working thermostat of the back-up boiler has been reached (in this case pump **Pg** does not stop). In the event of wood-fired boiler over-temperature, during back-up boiler operation, when the temperature in **S4** reaches the value of parameter P1, pump **P2** starts and some of the energy in the boiler is discharged into the puffer.

If the temperature in **S4** should further increase until reaching the temperature value set in parameter P2, both the burner of the back-up boiler and pump **P4** switch off, the C.H. pump **P3** switches on and an audible alarm will signal the overtemperature. In case of a demand for DHW, clean contact J3 11-12 on the wood-fired boiler's control board closes, the burner of the back-up boiler switches on and pump **Pg** starts. The request occurs when the temperature in **S3** reaches the temperature set in P5 and ends when **S2** reaches the temperature set in P6; the burner switches off and pump **Pg** stops. The counter-exchange between probe **S4** and probe **S2** is controlled by the wood-fired boiler.



Key:

- IR:** heating system
- P:** wall-mounted boiler pump
- Pg:** back-up boiler loading pump
- P2:** loading/recirculation pump
- P3:** C.H. pump
- PMV:** storage tank thermostatic valve
- RMV:** mixing valve (55°C)
- SCP:** plate exchanger

- SF:** flue gas probe
- S2:** storage tank temperature sensor (low point)
- S3:** storage tank temperature sensor (high point)
- S4:** flow temperature sensor of the boiler
- S5:** return temperature sensor of the boiler
- TA:** room thermostat
- VE:** expansion vessel

	<b>LIST OF PARAMETERS</b>	<b>DEFAULT SETTINGS</b>
<b>Parameter</b>		
0	Boiler operating temperature	80
1	Minimum boiler temperature for starting the circulating pumps	55
2	Maximum boiler temperature for alarm	88
3	Minimum auxiliary boiler temperature	55
4	Auxiliary boiler operating temperature	80
5	Temperature at which boiler starts being filled or storage tank heat. circulator start	50
6	Temperature at which the boiler stops being filled or storage tank DHW production ends	60
7	Maximum temperature for storage tank or solar protection storage tank	90
8	Thermostating thermal Delta for heating	2
9	Thermal Delta for filling storage tank	8
10	Thermal Delta for operating solar panels	10
11	Shutdown delay time for wood function standby	50
12	Modulation of fuel and air in relation to wood boiler temperature	2
13	Fan speed during wood combustion	190 (34 kW) 210 (45 kW) 240 (55 kW)
14	Minimum flue gas temperature for detecting boiler ignition	120
15	Maximum wood flue gas temperature with modulation of -15°C	240
16	Maximum operating temperature of solar panels	160
17	<b>PROBE CONFIGURATION PARAMETER</b>	
	Probe 1 = 0-> absent    1-> present (solar PT1000)	0
	Probe 2 = 0-> absent    2-> present (low storage tank)	2
	Probe 3 = 0-> absent    4-> present (high storage tank)	4
	Probe 4 = 0-> absent    8-> present (wood boiler flow)	8
	Probe 5 = 0-> absent    16-> present (wood boiler return)	16
	<b>Parameter to be entered for configuring probes</b>	<b>30</b>
18	<b>FUNCTIONAL CONFIGURATION PARAMETER</b>	
	1, Pred. = 0> Boiler/storage tank absent    1-> Boiler/storage tank present	1
	2, Pred.= 0> Coil type storage tank    2-> Combi or Puffer type storage tank	2
	3, Pred. = 0> Solar absent    4-> Solar present	0
	4, Pred. = 0> Wood only    8-> Wood + auxiliary boiler	8
	5, Pred. = 0> Separate or wall-mounted boiler    16-> Combi overlapped boiler	0
	<b>Parameter to be entered for settings</b>	<b>11</b>
19	Language selection: 0 = Italian - 2 = English - 4 = French - 6 = Spanish	0

To enable or disable the probes, enter a numerical value, which is the result of the sum of the weights attributed to each individual probe, in PARAMETER 17 (probe setting parameter).

The same procedure is performed with PARAMETER 18 (functional setting parameter).

### 3.12.4 - SOLAR SYSTEM MANAGEMENT

The panel board of the FIREX 2S boiler is able to control the operation of solar panels in plumbing circuits where a storage tank or double coil storage tank is installed.

It is necessary to enable probe S1 and probe S2 in parameter 17, and storage tank in parameter 18.

Connect solar pump P1 into the suitable output (J3 1-2) provided on the boiler's control board.

The solar pump P1 switches on when the differential between probe S1 and probe S2 reaches the value set in parameter 10 and stops when the temperature differential between S1 and S2 reduces to P10 - 3°C.

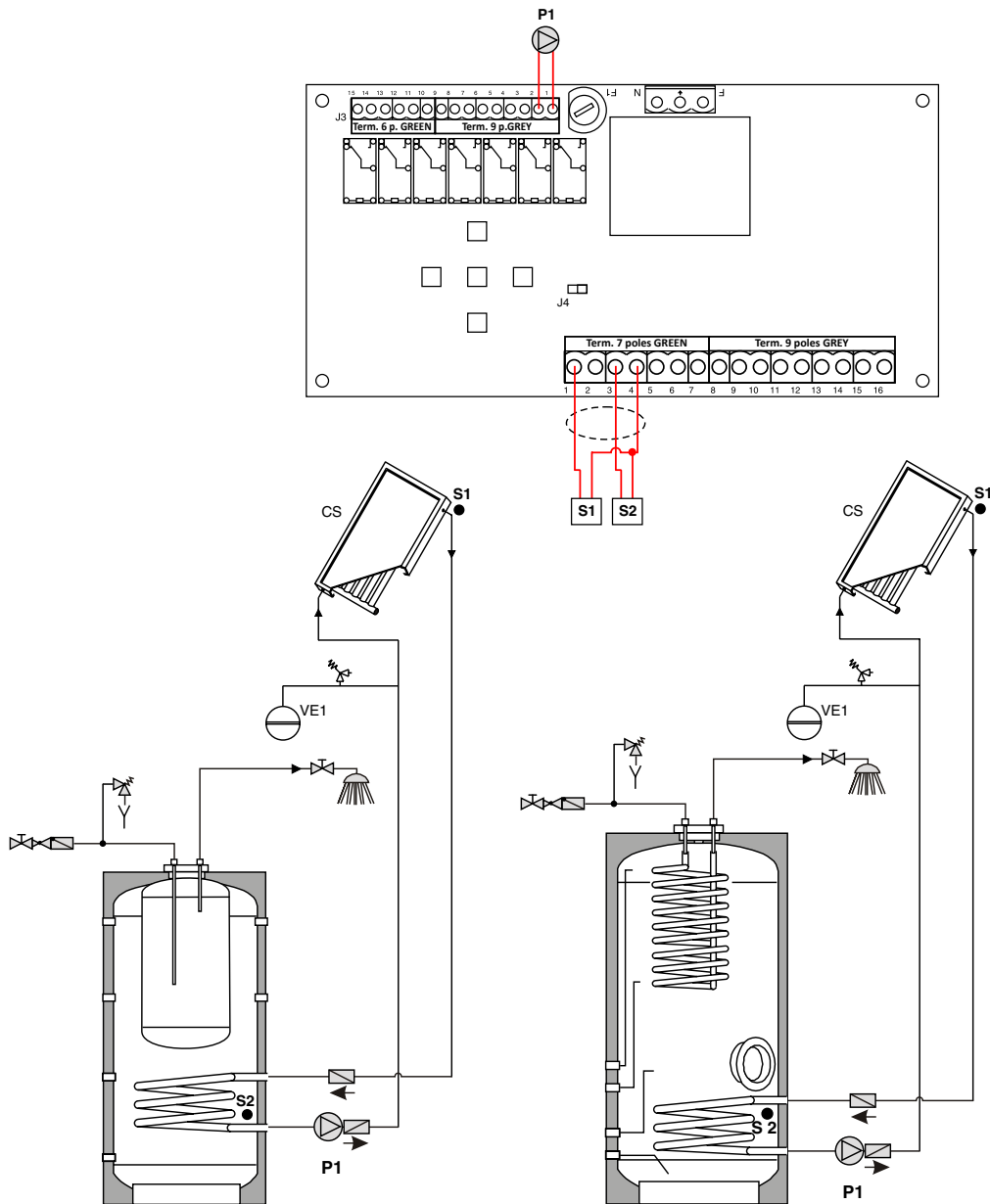
To enable the solar system, you must access parameter 17, assign value 1 to probe 1 (present).

The final value to be entered in parameter 17 is given by the sum of the weights of the selected probes. If for instance all the probes are enabled, the number value to be assigned to the parameter is 31.

The same operation must be repeated for parameter 18.

Enable function 3 and assign weight 4 (solar present).

The sum of the weights given to FUNCT establishes the value to be entered in parameter 18.



Key:

**P1:** solar C.H. pump

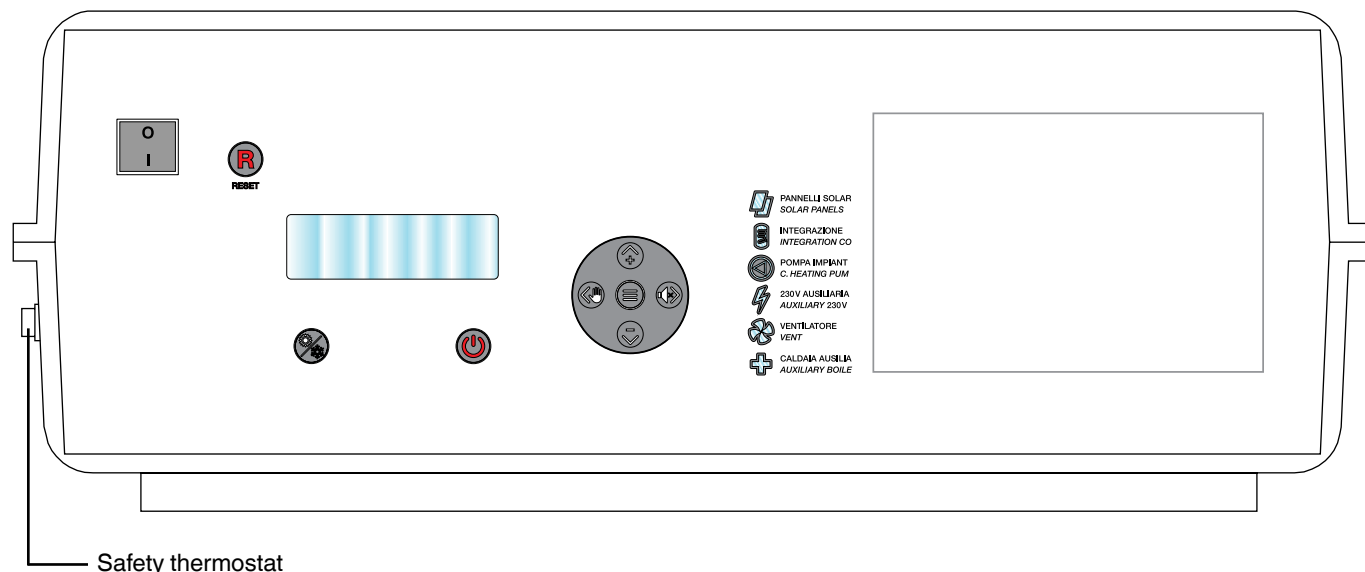
**S1:** solar panels probe (PT1000)

**S2:** solar exchanger or low puffer probe











**VE1:** solar expansion vessel

### 3.13 - PANEL BOARD







#### 3.13.1 - FRONT VIEW OF PANEL BOARD



#### Functions of switches:


-  Luminous main switch (green)
-  fan start key
-  control unit RESET key
-  summer / winter key
-  safety thermostat reset key (located on the left side)
-  boiler functions adjustment MENU key
-  functions value increase key
-  functions value decrease key
-  key changing domestic hot water /heating priority
-  boiler maximum temperature sound alarm silencing

#### Functions of indicator lights:


-  solar panel pump start indicator light
-  load pump start indicator light storage tank
-  heating pump start indicator light
-  free indicator light
-  fan start indicator light
-  auxiliary boiler start indicator light oil/gas

## FUNCTIONS OF CONTROL SWITCHES / KEYS:



Pressing the  switch powers the panel and all the operations connected to it.



By holding key  for a few seconds, it is possible to select the following operation options:

- **WOOD COMB**
- **AUTO COMB**
- **BURN COMB**
- - - - Stand-by (all off)

### WOOD COMB

In this mode, the wood boiler is in operation.  
When boiler operation stops, the back-up boiler is NOT activated.

### AUTO COMB


In this mode, the wood boiler is in operation and the words Leg Auto flash on the display; the boiler is working on wood.  
When loading is completed, in the event of demand, the back-up boiler is automatically activated.

### BURN COMB


In this mode, the back-up boiler is in operation

After selecting the **WOOD COMB** or **AUTO COMB** mode, by




pressing  for one second the fan is powered. This will remain active as long as there is wood in the boiler wood compartment. This cycle is timed; therefore, when activated with this key, the board controls the boiler's ability to produce heat; when it runs out, the boiler returns to the standby status after a preset time during which no more heat is available. The load end status is brought about by the flue gas temperature



The  key changes the SUMMER / WINTER setting; in SUMMER mode, the heating system pump is disabled.



The  key changes the priority between domestic hot water and heating.

This key is active if there is a storage tank with a coil. It stops heating in favour of DHW production and vice versa.

The storage tank water production cycle or storage tank loading will automatically activate when the storage tank minimum temperature is reached and it will deactivate when the storage tank has reached the desired temperature.


When room heating is managed by the chronothermostat (or room thermostat) control, with closed contact and sufficient boiler temperature, the board activates the heating system pump.

The arrangement will be viewed on the display according to the following phases:

- "DHW" setting, the boiler automatically activates domestic hot water priority when the storage tank has reached the minimum temperature.

- "OFF" setting when the boiler has requested neither DHW or CH.
- "CH" setting when the boiler has heating demand through the chronothermostat (or room thermostat) input contact.
- "MAINT" when a DHW or heating request is activated, and parameter "P 0" is met.




The  key silences the sound alarm in case of an overtemperature alarm.

In case of an alarm, all the pumps configured according to the programmed operating mode are activated to disperse excess heat (ANTI-INERTIA FUNCTION) and the fan stops.

The sound alarm is triggered automatically should the boiler's flow temperature exceed the "P 2" value. At the same time, the STORAGE TANK PUMP function LED and the C.H. PUMP function LED on the display switch on.



The  key is used to reset the "self-diagnostics" heating controller.



This operation does not affect the set parameters, which are not modified.

### 3.13.2 - USE OF USER INTERFACE


The front display of the board provides direct reading of the temperatures and operating status of the boiler; you may use the keyboard to scroll the screens to check the operating conditions according to the following wordings:



- 1 **“Boiler Temp.”** is the boiler flow temperature.
- 2 **“Boiler Ret.”** is the boiler return temperature.
- 3 **“Flue Gas”** is the combustion flue gas outlet temperature.
- 4 **“Solar Pan.”** is the temperature measured at the solar panel flow.
- 5 **“Solar Exch.”** is the low point temperature of the dual coil storage tank or combined storage tank (TANK in TANK) or PUFFER also called Solar Exchanger because it is usually in the low point.
- 6 **“Storage Tank Temp.”** is the temperature available in the domestic hot water tank; in case of a combined storage tank (TANK in TANK) or PUFFER, it measures the available heat with regards to the heating system (Puffer High Point).
- 7 **“Fan Speed”** .
- 8 **“Residual Time”** is the residual time activated during the boiler ignition phase




#### Display procedure:


The screens can be scrolled by using the direction arrows  and  present on the panel.


#### Boiler temperature adjustment procedure:

Boiler temperature may be adjusted by pressing key  for about 3 seconds; in this way, the list of parameters is accessed.

Scroll the parameter list with the direction keys  and  on the panel and select parameter “P 0”.

Press key  and the selected parameter will start flashing; increase or decrease the value respectively with keys  and .

Confirm the change by pressing key .

To exit the parameter list, press key  for about 3 seconds.

**Parameter “P 0“ is the only parameter of the list of which the user may change the adjustment range between 70 and 85°C.**

**Changing the values of the remaining parameters is reserved to the qualified technical personnel.**

**Changing these parameters by unskilled persons may lead to incorrect operation of the appliance and jeopardise its integrity.**



### 3.13.3 - GENERAL FEATURES AND STANDARD EQUIPMENT

- Microprocessor circuit board with alphanumeric four line LCD display, keyboard and indicator lights indicating activation of servomechanisms.
- EPROM non-volatile memory (in case of a power outage, all settings remain valid). Stored data remain in the memory for about 10 years without power.
- Wiring board for electrical connections.
- Basic probe supplies:
  - 4 PTC probes with insulation (3 metres long)
  - 1 PT1000 probe with insulation for solar system (3 metres long)
  - 1 PT1000 probe for measuring flue gas temperature (2 metres long)
- Self-diagnosis program for incorrect installation or fault for PTC temperature probes.
- 1 manual reset mechanical safety thermostat.
- Limit switch to be fitted on door opening mechanism (TKS).

#### OPERATING MODES:

Various operative modes may be controlled with the electronic board:

- 1 HEATING ONLY
- 2 HEATING + PRODUCTION OF DOMESTIC HOT WATER with single coil storage tank or HEATING + PRODUCTION OF DOMESTIC HOT WATER with double coil storage tank with control of supporting SOLAR PANEL SYSTEM.
- 2 HEATING + PRODUCTION OF DOMESTIC HOT WATER with immersion storage tank (TANK in TANK) or HEATING + STORAGE TANK CONTROL (PUFFER) both with option to have one coil and relevant supporting SOLAR PANEL SYSTEM + BACK-UP BOILER CONTROL

**Before commissioning the boiler, you must choose the operating mode and follow the instructions for configuration of the board according to the type of system to be managed (see diagrams below).**

#### BOARD SUPPLY:

The circuit board has the following inputs:

- general 230 Vac power supply input
- probe S1 input to measure solar panel temperature (J1 1-2)
- probe S2 input to measure storage tank low point temperature (solar exchanger) (J1 3-4)
- probe S3 input to measure storage tank high point temperature (domestic hot water production) (J1 5-6)
- probe S4 input to measure BOILER FLOW temperature (J1 7-8)
- probe S5 input to measure BOILER RETURN temperature (J1 9-10)
- FLUE GAS TEMPERATURE probe input (J1 11-12)
- wood loading door micro-switch contact input (TKS) (J1 13-14)
- room thermostat or chronothermostat input for winter heating system management (J1 15-16)

The board has the following outputs to control the servomechanisms:

- solar panel pump output (P1) (J3 1-2)
- storage tank pump output (P2) (J3 3-4)
- heating system pump output (P3) (J3 5-6)
- free output
- currently not powered (J3 7-8)
- fan output (for boilers without inverter)
- auxiliary boiler output (gas / oil) (J3 11-12)
- diverter valve output (J3 13-14-15)

### 3.13.4 - MODULATION OF COMBUSTION OUTPUT

The circuit board simultaneously performs two combustion output modulations:

- 1 Modulation of flue gas temperature
- 2 Modulation of boiler temperature

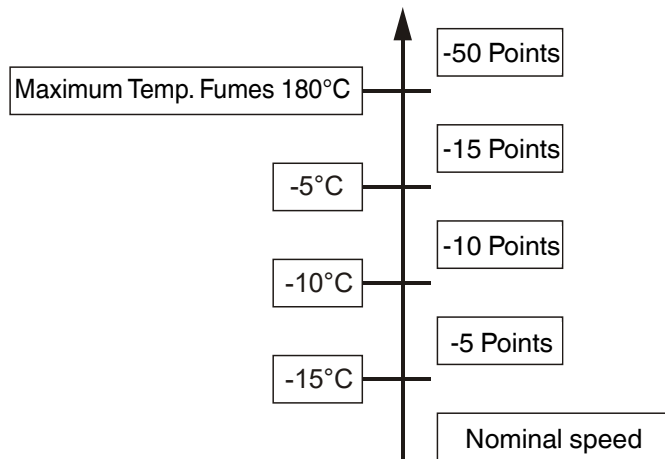
The modulation of the flue gas temperature limits the temperature of the gas coming out of the flue.

The limitation is defined by parameter no. 15 (Maximum Flue Gas Temperature) which is the maximum limit allowed for outlet flue gas.

The board acts on the fan speed by decreasing the speed 15°C before parameter no. 15 in three 5°C steps.

For example, if the maximum allowed temperature is 180°C, when the flue gas temperature rises, the fan is slowed down at a set rate of 5 points for each step.

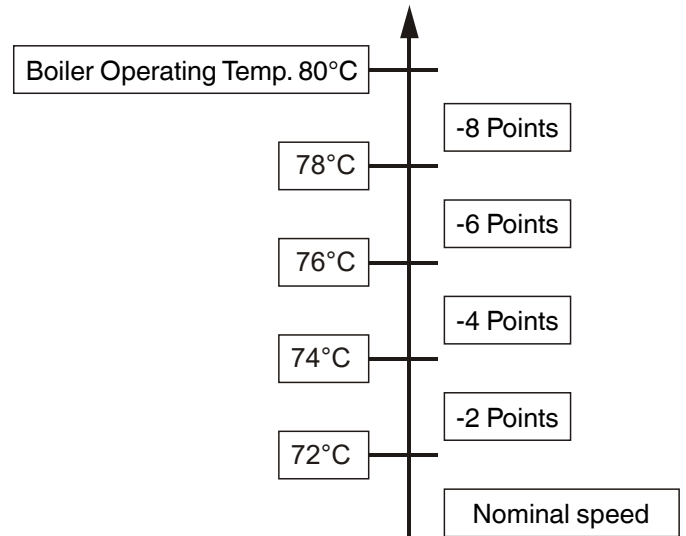
If the flue gas temperature reaches the maximum, the fan is stopped by 50 points.



Modulation of the boiler temperature is performed on an 8°C scale in four 2°C steps, starting from the boiler working temperature defined by parameter no. 0 (see the list of parameters electro-plumbing diagram page 23).

Furthermore, it is possible to set higher or lower modulation according to parameter no. 13 (Modulation Step) to adjust the fan stopping points as the temperature rises.


For example, if parameter no. 0 (Boiler working temperature) is set at 80°C and parameter no. 13 (Modulation Step) is set at 2 points, the fan speed will be decreased by a total of 8 points.





The two modulations can overlap if both are required generating the sum of the stopping points of both modulations.





### 3.13.5 - TECHNICAL PROGRAMMING MODE (ONLY QUALIFIED PERSONNEL)



#### Programming procedure:


**STAGE 1** In order to enter functional parameter programming, press and hold button  for about 8 seconds, until "PROGRAMMING MODE" is displayed.

**STAGE 2** The next page displays the first parameter (Parameter 0) with the data saved in the memory.

**STAGE 3** You can scroll through the parameters using the arrow keys  and  on the panel.

**STAGE 4** Select a parameter and press the arrow key . The parameter will start flashing and you can edit it. Press keys  and  to edit the parameter. When the desired value is reached, it is stored by pressing .

**STAGE 5** To edit other parameters, repeat the sequence by scrolling with the direction arrows  and .

**STAGE 6** After setting or editing the parameters, key  must be held down for 8 seconds to transfer the data on the non-volatile memory.

---

### 3.13.6 - CONFIGURATION OF THE PROBES (Parameter 17)

To enable or disable the probes, enter a numerical value, which is the result of the sum of the weights attributed to each individual probe, in "Parameter 17 Probes":

The number is calculated by adding up the weight of the probes required for the work environment selected in the following "Functional settings parameter".  
SEE ATTACHED DIAGRAMS



#### Please note:

If you have any trouble installing (and therefore enabling or disabling) a probe, you can use a wire to bridge the two connectors of the terminal block on the board to disable the missing or defective probe alarm.

---

### 3.13.7 - FUNCTIONAL SETTINGS OF THE BOILER AND ACCESSORIES (Parameter 11)

This parameter allows you to configure the printed circuit-board in either of two ways:

- Heating only,
- Heating and domestic hot water with coil-type storage tank
- Heating and domestic hot water with coil-type storage tank + solar panel
- Heating and use of a Puffer storage tank
- Heating and use of a Puffer storage tank + solar panel
- Controlling a back-up boiler

The functional settings use the same logic as the "Function 1 parameter".

To calculate the value to be entered, add the loads assigned to the various functions of the functional parameters as follows:

**Functional settings (Ref. Fig. pages 28..32):**

### 3.14- FILLING THE SYSTEM



#### NOTE

Before filling the system, check the preload of the expansion vessel, which must be 1.5 bar, and adjust it if the pressure is any less.

In systems equipped with a closed expansion vessel, the water pressure in the heating system - with the system cold - must not drop below 1 bar; open the filling tap when the pressure is too low

This operation must be performed with a cooled system.

The pressure gauge fitted on the system allows you to read the circuit pressure.



#### Attention!

**Do not mix the heating water with incorrect concentrations of antifreeze or anti-corrosion substances! This could damage the gaskets and cause noise during operation.**

**Unical will not be held liable for damage to persons, animals or objects due to failure to comply with the instruction above.**



**After making all the water connections, fill the boiler to check the tightness of all the connections.**

This operation must be performed carefully, respecting the following stages:

- open the bleeder valves of the radiators, radiant batteries and/or distribution manifolds;
- open the system filling tap gradually, making sure that the automatic air release valves installed on the system work properly;
- close the bleeder valves of the radiators, radiant batteries and/or distribution manifolds as soon as water comes out;
- check the pressure gauge until pressure reaches approximately 1 bar;
- close the system filling tap and bleed air once again through the bleeder valves of the radiators, radiant batteries and/or distribution manifolds;
- make sure that all the connections are watertight;
- after commissioning the boiler and bringing the system to the operating temperature, stop the pumps and repeat the air bleed operations;
- let the system cool off and, if necessary, return the water pressure to 1 bar;

### 3.15 - BOILER START-UP

#### 3.15.1 - PRELIMINARY CHECKS



Commissioning must be done by professionally qualified personnel. Unical will not be held liable for damage to persons, animals or objects due to failure to comply with the aforesaid instructions.

The preliminary checks must be carried out by the installation firm.

After connecting the hydraulic and electrical system and the fuel line to the boiler, and before starting up the boiler, it is advisable to check the following:

	YES	NO
Have all the hydraulic and electrical systems and the safety devices been connected in compliance with the domestic and local laws in force?	<input type="checkbox"/>	<input type="checkbox"/>
are the expansion vessel and the safety valve (when applicable) connected correctly and cannot be shut off?	<input type="checkbox"/>	<input type="checkbox"/>
are the bulbs of flow probe S4 and safety thermostat locked in the relevant sheaths?	<input type="checkbox"/>	<input type="checkbox"/>
are the control and safety devices working and configured correctly?	<input type="checkbox"/>	<input type="checkbox"/>
are the refractory linings intact?	<input type="checkbox"/>	<input type="checkbox"/>
Is the grate of the burner installed correctly?	<input type="checkbox"/>	<input type="checkbox"/>
Are the combustion air adduction line and the flue gas evacuation line compliant with the applicable standards in force?	<input type="checkbox"/>	<input type="checkbox"/>
are the mains voltage and frequency compatible with the burner and the electrical equipment of the boiler?	<input type="checkbox"/>	<input type="checkbox"/>
Is the system full of water and does not contain any air?	<input type="checkbox"/>	<input type="checkbox"/>
are the drain valves closed and the system shut-off devices fully open?	<input type="checkbox"/>	<input type="checkbox"/>
Is the outside main switch ON?	<input type="checkbox"/>	<input type="checkbox"/>
is the pump/are the pumps working correctly?	<input type="checkbox"/>	<input type="checkbox"/>
has the system been checked for water leaks?	<input type="checkbox"/>	<input type="checkbox"/>
are the ventilation conditions and minimum distances to perform any maintenance guaranteed?	<input type="checkbox"/>	<input type="checkbox"/>
has the operator been trained and has the documentation been supplied?	<input type="checkbox"/>	<input type="checkbox"/>

Please tick the completed operations

### 3.15.2 - START-UP

#### IGNITION



Ensure the checks referred to in point 3.15.1 have been performed.

Once the air has been adjusted in accordance with paragraph 3.15.3, close the bottom door and power the electric control board.

The first ignition of the new boiler could be difficult due to moist refractory cement casting.

Accordingly, we advise opening the primary air well and lowering the secondary air.

Open the top loading door and place some dry wood kindling crosswise on the main stone, above the central slot.

Use highly flammable material, and avoid large and square logs. Light the wood using thin sheets of paper (newspaper or the like). Leave the top door ajar and turn on the fan.

Wait a few minutes for the fire to light and produce embers (5 - 10 minutes approximately).

After a few minutes, if looking through the flame sight glass of the lower door you see that flame inversion is beginning, add other larger logs.

Close the top door.

The wood must have the following length:

- a) 50 cm (+ 1 cm, - 4 cm)  
for model FIREX 2S 34
- b) 50 cm (+ 1 cm, - 4 cm)  
for models FIREX 2S 45
- c) 70 cm (+ 1 cm, - 4 cm)  
for model FIREX 2S 55

**These measurements must be strictly observed.**

As even wood feeding is essential for good combustion, it is necessary to ensure the length of the wood logs fed, their shape and the manner of loading do not prevent regular feeding of the fuel. The wood logs must be placed lengthwise and horizontally. No log should be tilted or placed sideways.

Once you have checked flame inversion, it is possible to proceed with further loading (bear in mind that the primary and secondary air adjustment indications in the table are approximate).

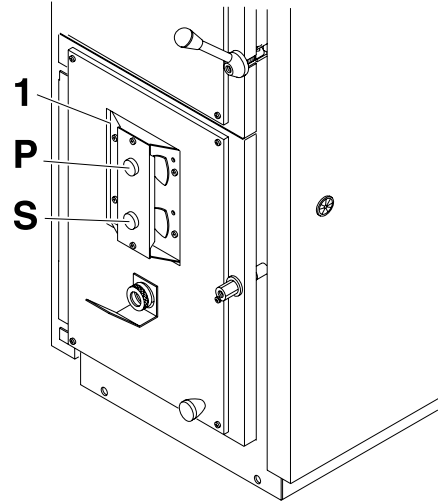
#### FURTHER LOADING

Before loading wood once again, consume the previous one as much as possible.

You can add more wood when the bed of embers in the firewood compartment has reduced to about 5 cm deep.

Open the top loading door and the internal anti-smoke door slowly. It is necessary to use wood logs with the length stated in the previous paragraph.

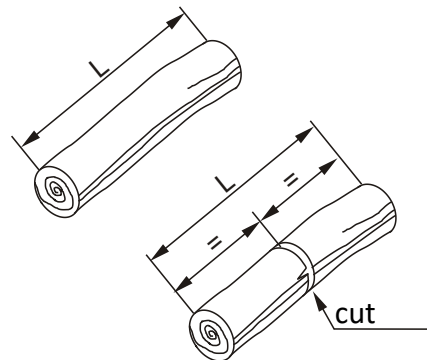
Place the new wood logs as described above.



- 1 Air adjustment unit
- S Secondary air adjustment
- P Primary air adjustment

#### USEFUL TIPS AND WHAT TO AVOID

- Logs which are too long do not fall down properly and can cause "bridges".
- Logs which are too short cause irregular air passages, with consequent reduction in output and efficiency.
- If the quality of the wood causes "bridges", it could become necessary to load logs cut in half so that the total length "L" is as indicated in the previous paragraph.  
To avoid the formation of "bridges", it is **unadvisable** to place logs against the side walls of the wood storage compartment. (see fig.3).
- Always open the upper door slowly, in order to avoid blowbacks and smoke formation.
- During normal boiler operation, it is absolutely forbidden to open the lower combustion chamber door.



### 3.15.3 - COMBUSTION AIR ADJUSTMENT

#### PRIMARY AND SECONDARY AIR ADJUSTMENT



The FIREX 2S boiler is equipped with a combustion air intake fan, a combustion air adjustment unit and primary and secondary air regulators.

When commissioning the boiler, the primary and secondary air need to be adjusted bearing in mind that the primary air determines the boiler heat output and therefore the amount of wood that is burned, and the secondary air completes combustion. The following are the optimal adjustments of primary and secondary air using good quality wood (beech) with low moisture content (15%).

	primary air pos.	secondary air pos.
FIREX 2S 34	3-4	~1
FIREX 2S 45	4-5	1-2
FIREX 2S 55	3-4	1-2

For proper air adjustment based on the type of wood used and its actual moisture level, it is necessary to observe the flame through the flame sight glass placed on the lower door. The flame should fill about two-thirds of the lower combustion chamber and gently lap the bottom cradle, without dragging too much ash and without noise.

The flame must have an orange-pink-white colour, it must not be too transparent and the centre should have a bluish colour. To bring the flame to optimum conditions you should then adjust primary air by turning the knob (pos. P). Do the same for secondary air (pos. S).

Example no.1

#### Thick damp wood that is difficult for combustion

S - Very closed (try to obtain the maximum dimension of the flame, but not reddish in colour).

P - Reasonably open in order to obtain sufficient gasification.

Example no. 2

#### Very flammable wood logs

S - Completely open.

P - Slightly closed in order to keep gasification low, but sufficiently open to evacuate the ash that might close the combustion head.

#### GENERAL ADVICE

- Better performance will be achieved after two or three days of running. In fact, the refractory material must be fired and the tar must encrust the upper walls of the wood storage compartment.
- The flame should have a good size and fairly fill the combustion chamber.
- The flame should not be too red (lack of secondary air S).
- The flame should not be too blue (excess of secondary air S).
- The flame should not be too noisy (excess of primary air P).
- The flame should not be too small (lack of primary air P).
- If the ashes do not go down well, increase the primary air (P).
- If too many ashes fall, decrease the primary air (P).
- If the chimney is smoky, open the secondary air (S) all the way.
- If smoke continues to escape, open the secondary air (S) to a maximum, closing the primary air (P) partially as well.

#### AIR ADJUSTMENT FAULTS

1) If the primary air is excessive, a lot of ash and small pieces of coal will fall. The flame is too fast, dry, has a cold colour and is noisy.

The boiler is consuming a lot of wood and the door's insulation is white.

2) If the primary air is insufficient, the flame will be slow, hesitant, affected by air currents and by the chimney draught, very small, it will not be able to touch the lower cradle, with low ash production and the door's refractory insulation will be dark coloured.

3) If the secondary air is excessive, the flame will be small, bluish in colour and very transparent.

4) If the secondary air is insufficient, the flame will be big, it will touch the lower cradle, it will fill the combustion chamber completely and, above all, it will be red and not at all transparent.

### 3.15.4 - CHECKS TO BE CARRIED OUT ON COMMISSIONING



#### THE BYPASS

The bypass is a direct passage between the wood storage compartment and the chimney.

By opening the wood loading door, the bypass allows the accumulated flue gas in the storage compartment to be extracted and conveyed directly to the chimney.

The bypass, in conclusion, allows the smoke to be discharged to the chimney without escaping from the top door when loading the wood or lighting.

However, it is essential to open the top loading door slowly and just as gradually to rotate the anti-smoke flap to achieve effective flue gas extraction.

#### BYPASS INSPECTION

During the installation stage and, in any case, before starting to use the boiler, it is necessary to check the tightness and then operation of the bypass.

Make sure the bypass rod works and that the micro-switch is positioned correctly. Check that the fan starts up as soon as the door opens.

#### CHECKING SEALS



During the initial start-up, check the tightness of the smoke circuit and connection to the chimney. If there is any noticeable flue gas leak, alert the installer and/or our After-Sales Service. If there is any noticeable air suction through the door seals, tighten the handle with greater force.

Make sure the working thermostat  $T_e$  is in good running order at full power until it stops the fan. Check for leaks from plumbing connections.

After the initial start, with the boiler off, open the lower door and inspect the internal walls and insulation of the door: they should be of a light colour, indicative of proper air adjustment.

Otherwise, if the walls are blackened, it means the secondary air is not adjusted properly.

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### 3.16 - SUMMER MODE



The use of the boiler in summer only for the production of domestic hot water is not advisable, unless the boiler is run strictly following these rules:

- 1) Use very dry wood
- 2) Load a small amount of wood in the boiler 2 or 3 times a day as needed.



#### Important.

It is very wrong to load the boiler completely, providing it with long self-sufficiency (for example 24 hours). This way the boiler (with fan stopped) would produce much acid condensation corroding the wood storage compartment.

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### 3.17 - WARNINGS

#### HOW TO AVOID CORROSION IN THE WOOD STORAGE COMPARTMENT

The use of wood with a high moisture content (higher than about 25%) and/or loads not proportioned to the system's heat request (long OFF periods with the wood storage full) can cause considerable condensate formation in the storage compartment's internal wall.

Check the steel walls of the upper wood storage once a week.

They must be covered by a slight layer of dry tar, opaque coloured, with bubbles tending to break and fall off. On the other hand, the tar will have a glossy, runny appearance and liquid will appear if it is removed with a poker: accordingly, it is necessary to use wood that is less damp and/or reduce the amount of loaded wood.

If, despite these measures, the tar does not dry, it is obligatory to report the anomaly to the After-Sales Service.



**The condensate inside the wood storage compartment causes the steel sheets to corrode. Corrosion is not covered by the warranty, as it is caused by improper use of the boiler (wet wood, excessive loading, etc.).**

#### CORROSION OF THE FLUE CIRCUIT

Flue gas is rich in water vapour, due to combustion and the use of wood which retains water.

If the flue gas comes into contact with relatively cold surfaces (having a temperature below 60 - 70 °C), the water vapour condensates and, combining with other combustion products, originates corrosion of the metallic parts.

Check daily whether there are signs of flue gas condensation (black liquid on the floor and behind the boiler). In this case, wood with a lower moisture content must be used; check recirculation pump operation and the flue gas temperature at partial load, and



increase the operating temperature. In order to control the room temperature, it is therefore necessary to install a mixing valve.

**The corrosion caused by flue gas condensation is not covered by the warranty, as it is caused by the wood's moisture content and the way the boiler is used.**

## WARNINGS DURING USE

Every time the air is adjusted, wait 5-10 minutes before proceeding with the next adjustment. When you have established the best air adjustment, at the end of the day check the surfaces of the combustion chamber and the door insulation, which should be white.

There must be only a few unburnt embers in the ash deposited in the cradle.

**If primary air is excessive**, there will be embers and small pieces of coal in the ashes, the flame will be quick, dry, a cooler colour and will be noisier, excessively powerful.

**If primary air is insufficient**, the flame will be slow, small, it will not lap the lower cradle, dragging few ashes and the heat output will be insufficient.

If the flame is dark orange, the secondary air is insufficient and the surfaces of the combustion chamber will not be white; if it is small and blue, there is too much secondary air.

Always open the top loading door and the internal anti-smoke door slowly.

If blowbacks occur regardless of this warning, it will be necessary to use larger logs, a bit damper, and ensure the boiler does not have prolonged downtime (reduce primary air), that no broken bars, changes to the grates or foreign matter (nails, metal pieces) have obstructed the hole in the refractory burner.

---

## 3.18 - TROUBLESHOOTING

### Problem:

- The panel board does not switch on.

### Remedy:

- Make sure the panel board is powered.
- Check integrity of the fuse on the board.

### Problem:

- When opening the loading door there are blowbacks and smoke escape.

### Remedy:

- Open slowly.
- Use damper wood, make sure that the boiler does not have prolonged downtime (see par. 3.15.3).
- Use larger logs.
- Consume the previous load of wood before reloading.

### Problem:

- The boiler does not reach the requested temperature. The flame is small and there is too much air. Inspecting the wood storage, the formation of log bridges is found.

### Remedy:

- Check the length of the logs (see par. 3.15.2).
- Check the arrangement of the logs (see par. 3.15.2).
- Cut the logs in half (see par. 3.15.2).
- Use smaller logs (round or square, about 5-7 cm diameter).
- Mix medium-large sized logs (round or square, about 15-20 cm diameter) with small sized logs (see previous point).

### Problem:

- The boiler does not reach the required temperature. The flame is very small.

### Remedy:

- Check the fan.
- Check if the doors are properly closed.


If you cannot solve the problem, do not attempt any other interventions and **contact an authorised UNICAL After-Sales Service.**

## 3.19 - ALARMS AND TROUBLESHOOTING CHART

### Probe alarm signal:

In case of failure or disconnection of one or more temperature probes, the control unit signals that they are missing, indicating the number of the missing probe by a short beep of the buzzer. To eliminate the problem, check the connection of the probe and/or replace it.

### Maximum boiler temperature alarm signal:

If the boiler reaches the maximum operating temperature, the alarm sounds automatically and the display flashes indicating the safety status; at the same time, the control unit activates all enabled pumps, according to the type of system controlled, in order to disperse excess heat. To silence the alarm, press the Buzzer silencing key .

### Boiler door open alarm signal:

When the wood loading door opens, the bypass connected mechanically opens allowing the fan to directly extract the flue gas at maximum speed through the bypass.

After the door has closed, the system continues working automatically following the panel board logic.

A microswitch is connected to the bypass opening system which is activated when the door opens; the controller will begin to emit a series of short beeps at regular intervals and the message "BOILER DOOR OPEN" will appear at the bottom of the display.

- The fan will run at full speed to suction the flue gas through the bypass.
- After the door has closed, the system continues working automatically following the panel board logic.

Just close the door to silence the alarm.

Remember that keeping the door open for long periods "during reloading", could deform the flue gas extraction impeller.

### Faulty probe temperature measurement:

Should one or more probes supply faulty temperature measurements, try to replace it/them; also check to ensure no voltage reaches the input of a possible chronothermostat.

In case of faulty readings, try to disconnect the wires from any chronothermostat input.

### Safety device trip:

When the set boiler water temperature has been reached (PARAMETER 0), the boiler fan stops.

If this temperature is exceeded and the temperature set in PARAMETER 2 is reached, an acoustic alarm signal will be triggered and all pumps will be enabled to run.

When the water temperature of the system drops, boiler operation will be restored automatically; if on the other hand the temperature increases beyond the safety thermostat calibration value (100°C), standard operating conditions must be restored manually by resetting the safety thermostat: the key is on the left side of the panel board.

### Power outage:

Safety is assured by the thermal discharge valve (the mounting of which is **mandatory** for all solid fuel fired appliances), which disposes of excess inertia.

## 3.20 - AUDIBLE ALARMS

### MAXIMUM TEMPERATURE AUDIBLE ALARM

The boiler triggers an audible alarm when it is overheated.

The temperature threshold is set in parameter 3, which is pre-configured at 88°C by the printed circuit board.

It can happen that, in certain cases, the working temperature of the boiler has to be set much higher (e.g. unit heaters or fan coils situated far from the boiler) than parameter 1 (working temperature 80°C).

In this case, the overheating audible alarm could be triggered frequently.

It is advisable to set parameter 3 (max temperature for thermal inertia in boiler) at a higher value of up to 90°C.

If instead the alarm is triggered without the boiler overheating, the cause may be an operating fault of the system like excess draught in the chimney, obstruction of the C.H. pump or storage tank pump, obstruction of the recirculation pump, or a defect with the printed circuit board.

**Advice for the user:** if it is necessary to set a working temperature of more than 80°C, it is advisable to proportionally increase parameter 2 (max temperature for thermal inertia in the boiler).

### PROBE AUDIBLE ALARM

The boiler has an intermittent alarm system that signals one or more faults with the probes due to these being disconnected or out of range; in any case, a message is displayed on the screen referring to the probe or probes (in order) that are defective or disconnected or out of range (e.g. "Probe S4 disconnected"). If the temperature to which the probes are subjected is out of range, you need to wait for the temperature to return to a normal level. Replace the probe if you are certain the temperature is not out of range.

If the problem relates to the connection of a probe, and the message on the display indicates that a probe is disconnected, check the connection concerned: if the probe is disconnected, simply reconnect it; but if it is connected, despite the alarm message, contact the assistance centre because the probe is clearly defective.

## INSPECTIONS AND MAINTENANCE



Inspections and maintenance performed professionally and according to a regular schedule as well as the use of original spare parts are of the utmost importance for fault-free operation of the boiler and to guarantee its long life.

**The appliance must be serviced according to the indications stated herein, and in accordance with local legislation and/or regulations.**



**Failure to perform Inspections and Maintenance can entail material and personal damage**

We therefore recommend stipulating an inspection or maintenance contract.

Inspections help to determine the actual status of the appliance and to compare it with the nominal status. This is done through measurements, controls and observation.

Maintenance is required to eliminate any differences between the actual status and the nominal status. This is normally done by cleaning, setting and replacing individual components subject to wear.

Maintenance intervals and their extent are determined by a specialist based on the status of the appliance ascertained through inspection.

### Inspection and maintenance instructions



To assure long-term functioning of your appliance and to avoid altering its approved status, only original Unical spare parts must be used.

Before proceeding with maintenance, always perform the following operations:

- Isolate the appliance from the electric mains by means of an isolated device with a contact opening of at least 3 mm (e.g. safety devices or power switches) and make sure that it cannot be re-connected accidentally.
- Close the supply gas shut-off valve to the back-up boiler, upstream of the boiler itself.
- Close the shut-off valves on the heating flow and return pipes, as well as the cold water inlet valve.

#### Upon completing maintenance operations:

- any solid residues and any parts that have been removed must be disposed of in accordance with legislation in force.
- the initial connections must be restored.
- regular appliance ignition must be ascertained, ensuring there is no return of combustion products during operation.
- in case of any faults, the following must be checked:
  - the air inlets are working correctly
  - that the chimney draught is correct
  - that the difference in pressure between installation room and outdoor environment is greater than 4 Pa.
- the professionally qualified technical personnel will issue a service report to the user, indicating:
  - any parts that have been replaced or installed
  - any remarks, strong advice and requirements
- the user must store the report carefully together with the documents supplied with the appliance so it is available for future use.

## Boiler body maintenance



**Danger!**  
**Before performing any maintenance on the boiler, make sure the boiler and its components have cooled down.**

### Warnings

- Never drain water from the system, even partially, unless absolutely necessary.
  - Periodically check the proper operation and integrity of the flue gas exhaust pipe and/or device.
  - If work or maintenance is performed on the structures near the flue gas pipes and/or flue gas exhaust devices and their accessories, switch the appliance off and, when the work is over, check their efficiency.
  - Do not clean the boiler and/or its parts with easily flammable substances (e.g. petrol, alcohol, etc.).
  - Do not leave flammable substances in the room where the boiler is installed.
  - Do not clean the boiler room while the boiler is running.
  - At the end of each heating period, inspect the boiler to keep the system in perfect efficiency.
- Thorough maintenance always enhances energy saving and safety.



### IMPORTANT

Clean with brushes and a vacuum cleaner; if you use any rags, make sure you collect all these. Keep screws and nuts oiled and protect them with grease.

## CLEANING AND ROUTINE MAINTENANCE OF THE WOOD-FUELLED BOILER

### Every day

- Remove the ashes from the lower cradle
- Shake down, with the scraper supplied with the boiler, the embers so that the ashes, accumulated in the wood storage compartment will fall down through the slots in the grate. This operation will help to avoid the grate from becoming obstructed and the subsequent bad operation of the boiler. This operation has to be done when the flame dies down, before loading wood.

### Every week

- Carefully remove all the residues of combustion accumulated in the wood storage compartment.
- Use the supplied brush to clean the triangular ducts in the furnace.
- Remove the ashes contained in the smoke chamber from the side doors using a scraper.
- Make sure that the slots in the grate are not obstructed: if they are, clear them up using the poker.
- If the boiler continues to operate badly, even after having cleaned it as described above, the cause can be attributed to bad distribution of the secondary air.

In this case:

- 1) check the adjustment of the air heat transfer, according to the instructions given in the paragraph "Combustion air adjustment".
- 2) make sure that the two secondary air heat transfer holes that come through the grate are not obstructed: if they are, use a **soft brush** to clean out each duct.

### Every month

Check bypass operation in the manner described in par. 3.15.4 and its perfect tightness when the door is closed.

### Every year

See chart

MAINTENANCE OPERATIONS	Every year
Door micro-switch adjustment	X
Bypass seal/cleaning	X
Primary and secondary air duct cleaning	X
Fan: general overhaul and inspection of the state of the impeller, cleaning and lubricating the bearings, checking the direction of rotation and that the impeller spins freely	X
Check the hermetic seal of the doors	X
Make sure that the sealing gaskets are intact	X
Check the operation of the safety devices	X
Clean the smoke ducts	X
Make sure that the refractory stones/catalyst are intact	X
Cleaning and re-positioning the fire bars/burner	X
Lubricate/grease the hinges and door opening levers	X
Thorough cleaning of the furnace and smoke ducts, removing any build-up and soot	X
Calibrate the draught adjuster	X
Safety heat exchanger check and/or replacement	X





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