Blowtherm®

INSTRUCTIONS MANUAL FOR BOILERS MODELS:

PACK-P AR 93
PACK-P AR 105
PACK-P AR 150
PACK-P AR 190
PACK-P AR 230
PACK-P AR 290
PACK-P AR 345
PACK-P AR 405
PACK-P AR 465
PACK-P AR 520
PACK-P AR 580
PACK P-AR 695
PACK-P AR 810
PACK-P AR 930
PACK-P AR 1045
PACK-P AR 1100
PACK-P AR 1250
PACK-P AR 1600
PACK-P AR 1800
PACK-P AR 2000
PACK-P AR 2500
PACK P-AR 3000
PACK P-AR 3500

nº1460040EN
Updated 04/2009

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Dear Customer,

Thank you for choosing a BLOWTHERM boiler of the range PACK-P AR.
This manual has been prepared to provide you with information, warnings and suggestions regarding the installation, the correct use and maintenance of the product.
In your interest and to maintain the highest level of performance of your appliance, we recommend that you carefully observe the instructions contained in this manual. A regular maintenance made by authorized technicians will grant a long life of the product.
We would like to remind you that failure to follow the instructions contained in this manual may invalidate the guarantee.

CONTENTS

1 GENERAL INFORMATION

1.1 GENERAL WARNINGS

This instruction manual is an integral and essential part of the product and provides important instructions for installation, operation and maintenance.

Should the appliance be sold or transferred to another owner, or if you move and leave the appliance behind, always ensure that this manual accompanies the appliance so that the new owner and/or installation technician can consult it.

This appliance must only be used for the purpose it has been specifically designed for: “to heat water to a maximum limit temperature which has to be lower than the boiling temperature at atmospheric pressure; the boiler must be connected to an hot water distribution system”.
All contractual or non-contractual responsibility of the manufacturer is excluded in the event of damages to persons, animals and/or things caused by errors in installation, adjustment, maintenance and improper use.

The manufacturer's responsibility is excluded for all damage to persons and/or things resulting from a clear risk for the user which he could have avoided by taking suitable safety measures.

After the receipt of the product, after having removed the packaging, check that it has not been damaged due to handling and transport.
Do not leave the packaging materials (wooden cage, nails, staples, plastic bags, polystyrene foam, etc.) within the reach of children, as they are potential sources of risk.
If you are in doubt do not use the appliance, contact your supplier.

The installation must be performed in compliance with the regulations in force, following the manufacturer's instructions, by professionally qualified personnel.
The term “professionally qualified personnel” means persons with specific technical skills in the sector of heating systems and components for domestic/industrial use and domestic/industrial hot water production.

The installer must observe the local standards in force regarding the choice of the site of installation of the boiler, the compliance with the required ventilation conditions, the chimney configuration, the connection to the fuel line, the electrical system and any other safety and technical standards.

To guarantee the efficiency of the appliance and ensure correct operation, it is indispensable to have regular maintenance performed by professionally qualified personnel, following the manufacturer's instructions.
Before performing any cleaning or maintenance operations, disconnect completely the appliance from the mains powers supply (electrical power, fuel supply,..).
Any repairs to the appliance must be carried out using only original spare parts.

If you decide do not to use the appliance for a long period, ensure you have professionally qualified personnel to carry out the necessary operations to preserve the generator:
- set the boiler main switch and the general switch on “off”;
- close fuel and water on-off valve;
- empty the thermal system in case of freezing conditions.

The failure to follow the instructions, suggestions and standards contained in this manual may void the warranty.
The warranty excludes all damages due to corrosion or formation of deposits caused by the use if hard or aggressive water.

1.2 CERTIFICATION

The EC mark attests that BLOWTHERM appliance is conform to the requirements contained in European Directives and norms.

In particular this appliance is conform to the following EEC Directives:
- Gas Directive (90/396EEC)
- Efficiency Directive (92/42/EEC)
- Low Voltage Directive (73/23/EEC)
- Electromagnetic compatibility Directive (89/336/EEC)

The PACK-P AR boilers are made according to the European standard EN 303, part 1.

1.3 SAFETY RULES

The use of any component utilising energy power, fuels and water requires that certain fundamental rules be respected, such as:

Do not allow children or unskilled people to use the appliance;

If you notice smell of gas, do not turn on electric switches, household appliances, telephone or any other objects that could cause sparks. If this is the case:
- open doors and windows immediately to clear the air in the room;
- turn off the fuel taps;
- contact professional qualified personnel.

Do not touch the appliance with wet or damp parts of the body and/or with bare feet.
Do not perform any maintenance and cleaning operations without having disconnected the electric power and turned off the fuel supply tap(s).

Do not pull, disconnect, unwind electric cables coming from the boiler, even if they are disconnected from the mains supply.

Do not block or reduce the ventilation openings in the room to prevent the formation or toxic and explosive mixtures caused by gas leakage; it is also uneconomic and polluting because it causes bad combustion.

Do not expose the appliance to atmospheric agents.
The generator has not been designed to work outdoors and is not provided with automatic anti-freezing systems. Keep the boiler turned on in freezing conditions.

Other important warnings to be respected:

- If the power cable of the appliance is damaged, have it replaced by professionally qualified personnel;
- do not fix (and do not allow other persons to fix) electric cables on the system pipes or near sources of heat;
- ensure that the earthing cables of the appliance are not connected to the water system;
- do not touch the hot parts of the system (in particular the door and the smoke box) as they normally remain hot even for some time after the appliance has been turned off.

In the event of a water leak, turn off the system and contact exclusively professionally qualified personnel.

1.4 DESCRIPTION OF THE APPLIANCE

The steel boilers of the PACK-P AR range are high performance generators for heating systems for temperatures up to 95°C (on request only for Export market the boilers are delivered for max temperature 115°C).
When combined with a hot water tank, this generator can be used also for the production of domestic hot water.

This is a pressurised combustion boiler with horizontal-cylinder configuration and flame reversal in the furnace, completely cooled. The flame produced by the burner develops into the furnace and as it is closed on the bottom, the flue gas returns to the anterior part, and through the cavity obtained in the front door insulation it enters into the tube system.
Here the flue gas is obliged to make a whirling run through the turbolators, which increase the convective heat transfer.
In this way it obtains the maximum absorption of heat without harmful thermal stresses and above all it has a useful output superior to 90%.

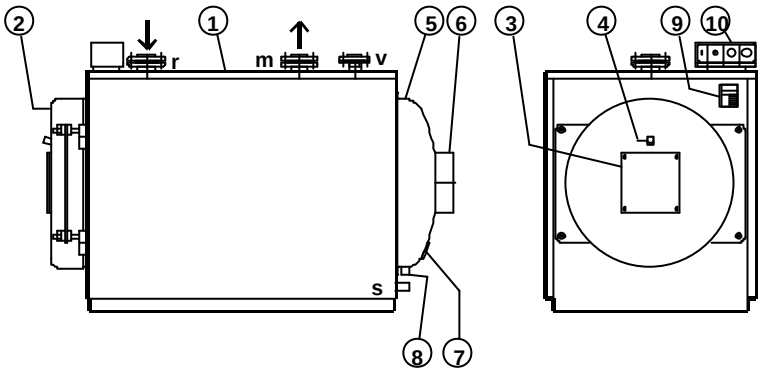
After the tube system, the flue gas is collected in the smoke chamber and conveyed to the chimney.

The boiler can be equipped with all the traditional liquid or gaseous burners.
The burner is installed on a hinge door; in this way the regulation and maintenance operation of the boiler and of the burner are facilitate, it is not necessary to disassemble the burner.

The thermal insulation of the boiler body is obtained by applying a pad of highly insulating mineral wall.
Elegant pre-painted steel panels complete the outside finish

The pre-wired control panel for the boiler automatic operation is positioned on top of the boiler itself.
The electrical diagram is housed inside the control panel.

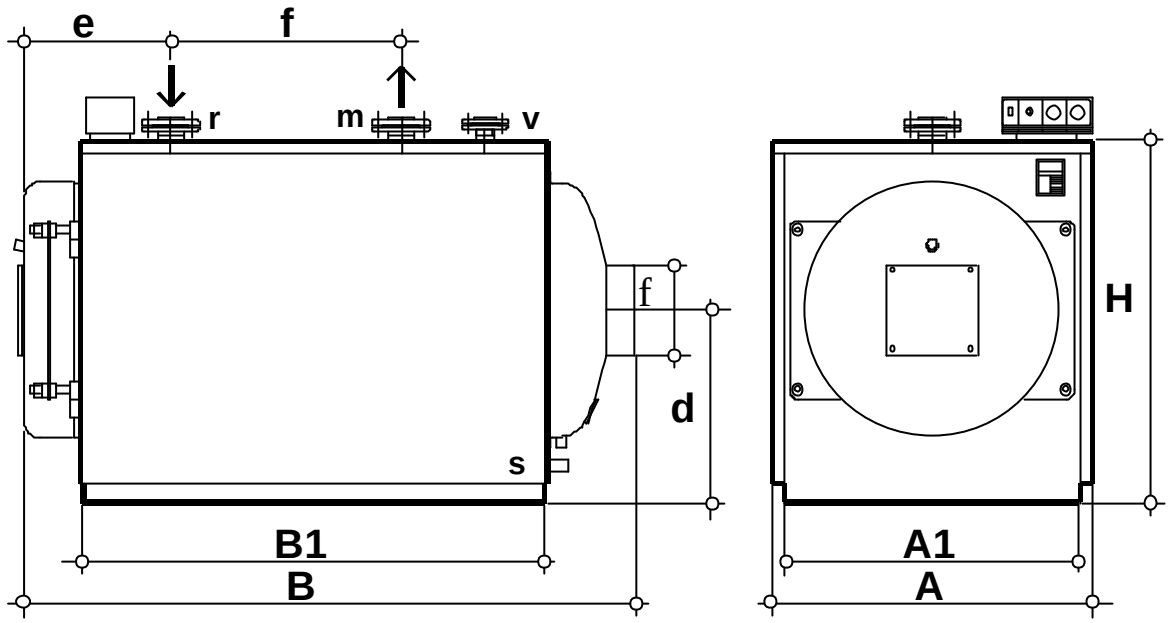
An electronic climate adjusting system can be installed on request and provides the boiler temperature adjustment as well as many other auxiliary functions.



1 Boiler body
2 Front door
3 Support burner plate
4 Pilot flam
5 Smoke chamber
6 Smoke exhaust
7 Cleaning door
8 Smokes condensate discharge
9 Identification plate
10 Control panel
r Heating return
m Heating flow
v Safety valve or espansion vessel
s discharge

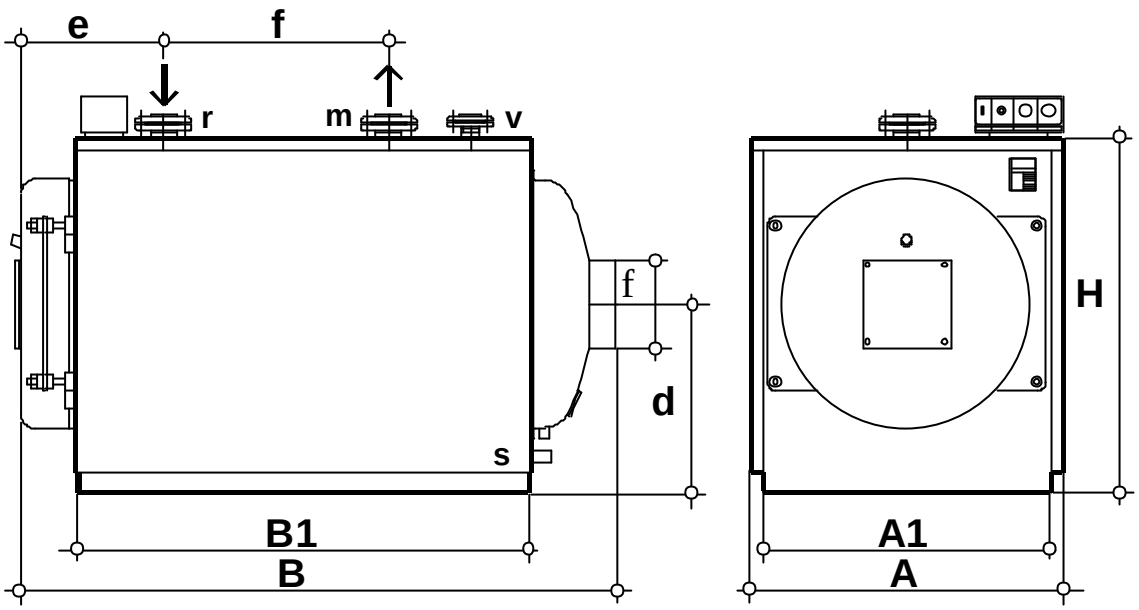
1.5 PACK-P/AR DIMENSIONS AND TECHNICAL FEATURES

1.5.1 PACK-P/AR 93-405



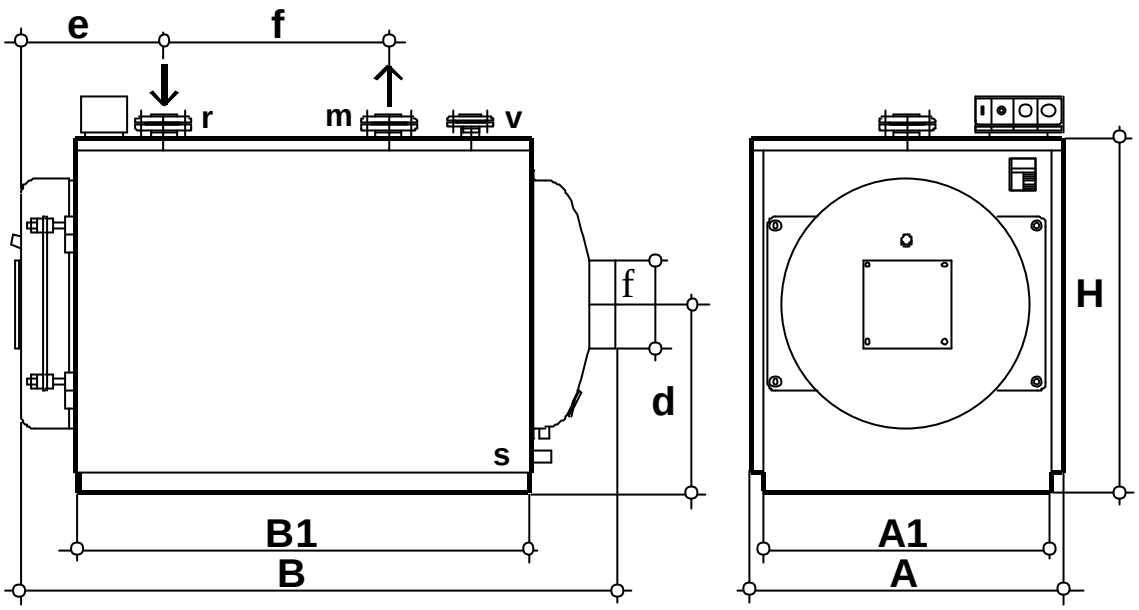
PACK-P/AR MODEL		93	105	150	190	230	290	345	405
Power Input	KW	103	115,5	167	211	257	320	384	449
	Kcal/h	88.600	99.300	143.600	181.500	220.600	275.000	330.200	386.100
Power Output	KW	93	104,7	151,2	192	233	291	349	407
	Kcal/h	80.000	90.000	130.000	165.000	200.000	250.000	300.000	350.000
Max Working pressure	bar	5	5	5	6	6	6	6	6
Weight of empty boiler + cover	Kg	250	270	310	460	480	540	550	610
Water content	litres	119	119	155	228	228	285	276	329
Water pressure drop with Δt 15°C	mbar	4.5	5.6	11.8	6.9	10	16.3	23	31
Pressure drop Comb. Chamber	mbar	0,5	0,7	1,2	1,2	1,5	2,3	3,3	4,4
H Height	mm	880	880	880	990	990	990	990	990
B Total width	mm	1110	1110	1360	1405	1405	1655	1655	1905
B1 Width of body only	mm	760	760	1010	1010	1010	1260	1260	1510
A Total length	mm	790	790	790	940	940	940	940	940
A1 Length of body only	mm	750	750	750	900	900	900	900	900
d Distance hydraulic connections	mm	460	460	460	510	510	510	510	510
e Water outlet connection position	mm	430	430	430	465	465	465	465	465
f Chimney connection height	mm	260	260	510	450	450	700	700	950
r/m Hydraulic connection	DN	2”	2”	2”	65	65	65	65	65
v Safety valve or expansion vessel	DN	1 ¼”	1 ¼”	1 ¼”	1 ½”	1 ½”	1 ½”	1 ½”	1 ½”
s Discharge	DN	¾”	¾”	¾”	¾”	¾”	¾”	¾”	¾”
Æ Chimney connection	mm	200	200	200	220	220	220	220	220

1.5.2 PACK-P/AR 465-1100



PACK-P/AR MODEL		465	520	580	695	810	930	1045	1100
Power Input	KW	511	577	637	771	899	1.027	1.156	1.349
	Kcal/h	439.000	494.000	548.000	663.000	773.000	884.000	994.000	1160000
Power Output	KW	465	523	581	700	820	940	1.060	1.240
	Kcal/h	400.000	450.000	500.000	602.000	705.000	808.000	911.000	1066000
Max Working pressure	bar	6	6	6	6	6	6	6	6
Weight of empty boiler + cover	Kg	870	890	940	1310	1380	1440	1620	2200
Water content	litres	402	402	476	697	795	733	817	1277
Water pressure drop with Δt 15°C	mbar	18	22	28	18	25	33	40	36
Pressure drop Comb. Chamber	mbar	3,3	4,3	4,8	4,5	5,6	5,4	6,0	6,5
H Height	mm	1150	1150	1150	1280	1280	1280	1280	1500
B Total width	mm	1990	1990	2290	2345	2545	2545	2795	2950
B1 Width of body only	mm	1512	1512	1812	1814	2014	2014	2264	2416
A Total length	mm	1040	1040	1040	1240	1240	1240	1240	1380
A1 Length of body only	mm	1000	1000	1000	1200	1200	1200	1200	1380
d Distance hydraulic connections	mm	595	595	595	640	640	640	640	810
e Water outlet connection position	mm	625	625	625	625	625	625	625	430
f Chimney connection height	mm	792	792	1092	974	1174	1174	1424	1700
r/m Hydraulic connection	DN	80	80	80	100	100	100	100	125
v Safety valve or expansion vessel	DN	2”	2”	2”	65	65	65	65	80
s Discharge	DN	¾”	¾”	¾”	¾”	¾”	¾”	¾”	1” ½
Æ Chimney connection	mm	250	250	250	350	350	350	350	400

1.5.3 PACK-P/AR 1250-3500



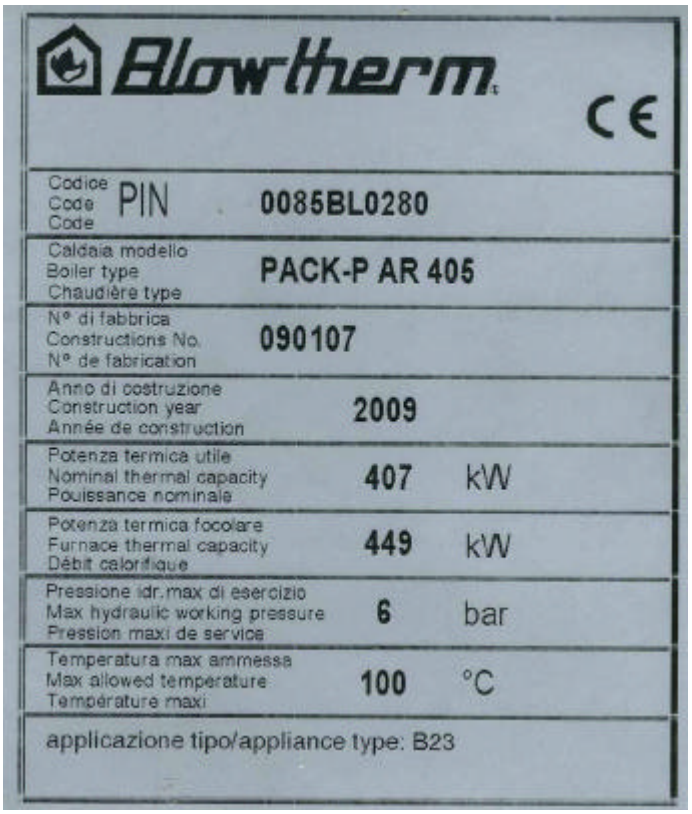
PACK-P/AR MODEL		1250	1600	1800	2000	2500	3000	3500
Power Input	KW	1.606	2.056	2.282	2.570	3.213	3.855	4.497
	Kcal/h	1381000	1768000	1963000	2210000	2762000	3315000	3867000
Power Output	KW	1480	1.890	2.100	2.360	2960	3550	4150
	Kcal/h	1273000	1625000	1806000	2030000	2545000	3053000	3569000
Max Working pressure	bar	6	6	6	6	6	6	6
Weight of empty boiler + cover	Kg	2770	3300	3640	3710	5280	5760	7490
Water content	litres	1372	2010	2204	2163	3155	3292	4839
Water pressure drop with Δt 15°C	mbar	54	45	68	70	64	90	120
Pressure drop Comb. Chamber	mbar	6,8	7,0	7,2	7,2	7,5	7,8	9,0
H Height	mm	1500	1800	1800	1800	2000	2000	2210
B Total width	mm	3200	3245	3535	3535	3955	4255	4790
B1 Width of body only	mm	2666	2680	2970	2970	3320	3620	4024
A Total length	mm	1380	1610	1610	1610	1800	1800	2000
A1 Length of body only	mm	1380	1610	1610	1610	1800	1800	2000
d Distance hydraulic connections	mm	810	965	965	965	1070	1070	1700
e Water outlet connection position	mm	430	430	430	430	510	510	522
f Chimney connection height	mm	1950	1440	1730	1730	1700	2000	2200
r/m Hydraulic connection	DN	125	150	150	150	200	200	200
v Safety valve or expansion vessel	DN	80	100	100	100	125	125	125
s Discharge	DN	1 ½"	1 ½"	1 ½"	1 ½"	1 ½"	1 ½"	1 ½"
Æ Chimney connection	mm	400	450	450	450	500	500	600

1.6 IDENTIFICATION ELEMENTS

The appliance can be identified through the TECHNICAL PLATE that contains the performing values and identification data.
The plate is applied in the front right upper part.

For any servicing and spare part the correct identification of the boiler model will facilitate all operations.

IMPORTANT: ensure that the technical plate has been applied onto the boiler: if not, ask your installation technician to apply it.



1.7 DOCUMENTS DELIVERED WITH THE BOILERS

All the boilers are delivered with a plastic envelope in which there are the following documents:

- Technical Instructions manual
- Warranty Certificate
- Stickers for Warranty claim
- Construction Certificate (Certifying that the water pressure test have been passed)
- Heating Central Booklet (Document to register the start-up of the boiler and the following periodic combustion analysis tests)

All these documents have to follow the boiler during all the life of the product.

1.8 STANDARD INSTRUMENT PANEL

The standard electrical control panel supplied with the boiler is made from a plastic case in which there are the control and safety devices.

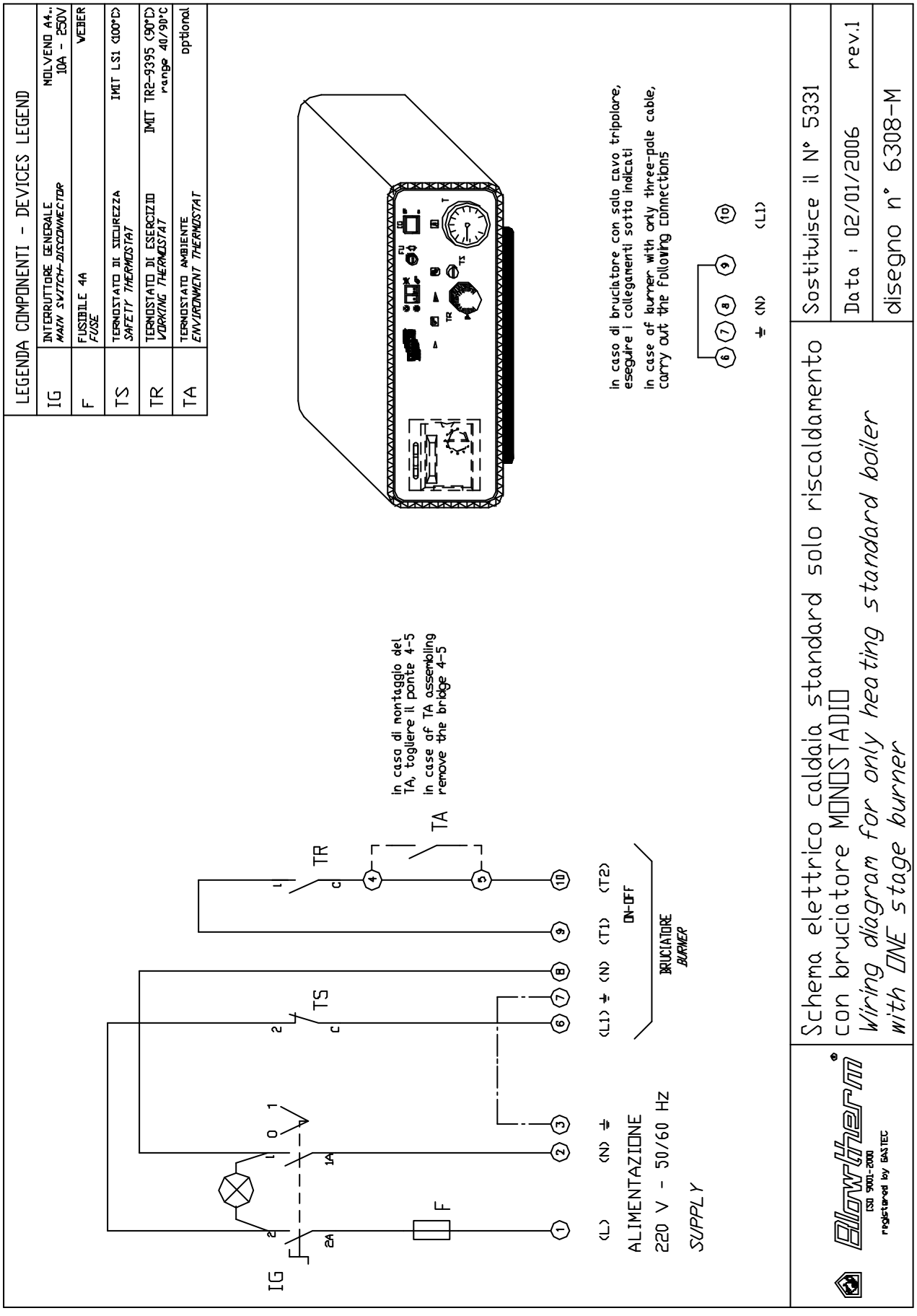
The electrical protection degree is IP 40.

The main devices are:

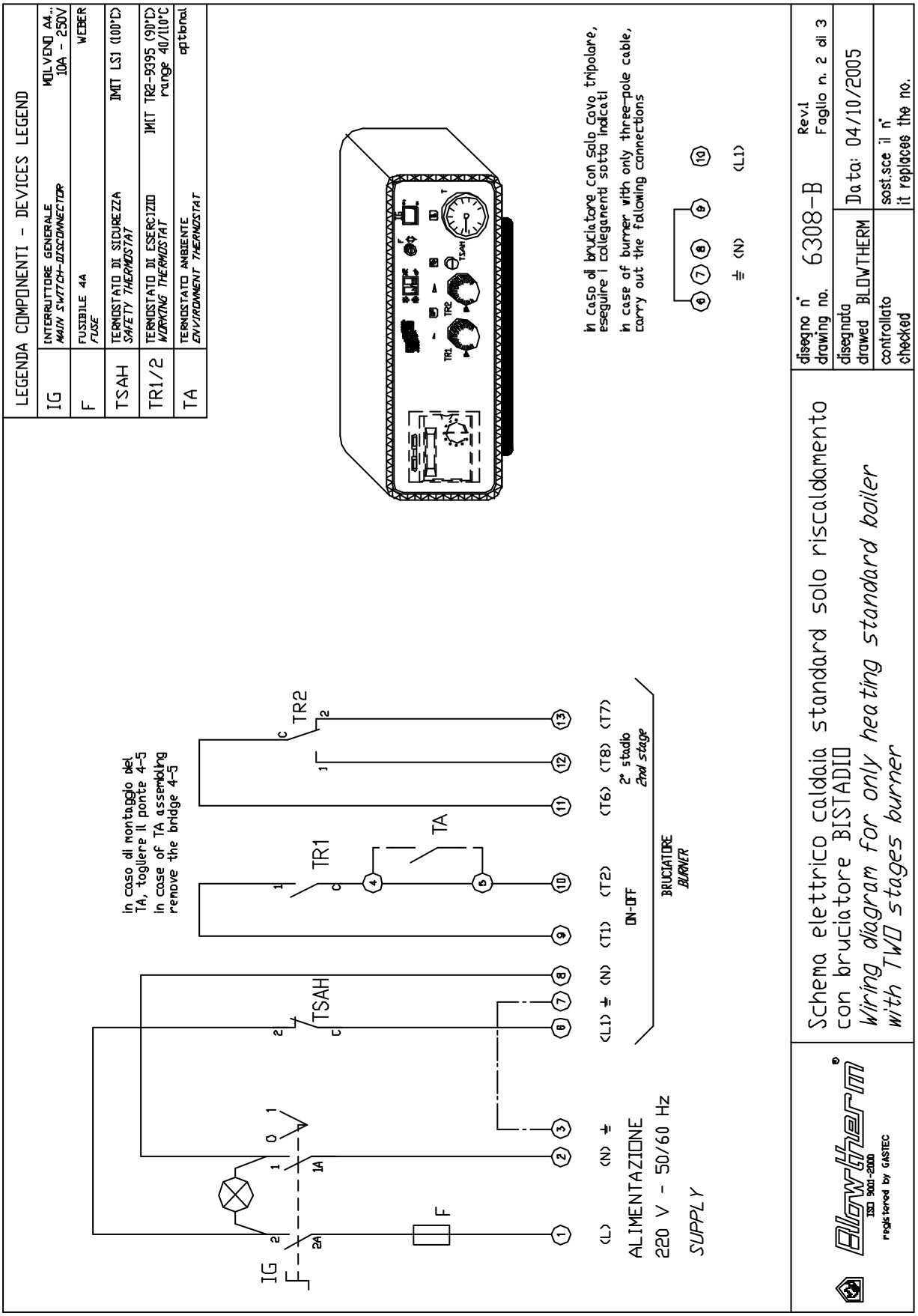
- General switch with working lamp
- Thermal fuse
- Working Thermostat Tmax 100°c (120°C on request)
- Safety Thermostat at manual reset Tmax 100°c (120°C on request)
- Dial manometer 0/120°C
- Predisposition for Digital Controller

The control panel is completed of EC norms terminal board for the electrical connection of the burner and other system devices.

1.9 STANDARD ELECTRICAL DIAGRAM



1.10 ELECTRICAL DIAGRAM (FOR 2 STAGES BURNERS)



2 USER

2.1 START-UP OPERATIONS

The boiler first start up operation must be carried out by professionally qualified personnel. Later, it will start automatically.

The user, for instance, may need to re-start the boiler personally after a long period of inactivity.

Therefore, ensure:

- that the fuel and thermal plant water cocks are open;
- that the hydraulic system pressure when not working is over 1 bar and lower than the boiler max allowed limit;
- that the boiler regulation thermostat is set between 60 and 90°C;
- that the environment thermostat is "ON" and set on 20°C;
- that the plant pumps are not blocked.

Turn on the main general switch and later the main switch from the control panel.

The appliance will run an ignition cycle which will last until set temperatures have been reached.

After this operation has been completed, the system will run automatically.

In case of ignition failures or malfunctioning, turn off the appliance and contact professionally qualified personnel.

2.2 TURNING OFF

In the event of temporary periods of inactivity (week-ends, short trips, etc.) with no danger of frost, follow the procedure below:

- turn off the main switch on the control panel (OFF);
- turn of the plant main switch.

CAUTION: if there is danger of frost, do not carry out the above operations but:

- set the ambient thermostat on approx. 10°C.

In the event of a long period of inactivity, follow the procedure below:

- turn off the main switch on the control panel (OFF)
- turn of the plant main switch.
- close fuel and thermal plant water cocks.

CAUTION: if there is danger of frost, have the thermal plant emptied by professional qualified personnel.

2.3 CLEANING

Before cleaning operations make sure that:

- the main switch on the control panel has been turned off (OFF);
- the plant main switch has been turned off.

The only part of the boiler that needs to be cleaned by the user is the outer panelling; use a wet soapy cloth.

If the dirt is particularly difficult to remove, soak with water and denaturated alcohol.
Do not use abrasive sponges or products and do not clean with jets of water.

2.4 MAINTENANCE

Periodic maintenance and measurement of the combustion efficiency are required by law and the person in charge of the heating system must ensure that these checks are carried out by professionally qualified personnel.

2.5 PRODUCT RECEIPT

Up to mod. PACK-P AR 1045:
- boiler body without insulation (the box of the electric board, the documentation, the mineral wool insulation and the ceramic fibre mattress to seal the fissure of the burner blast tube, is placed into the boiler furnace)
- n°1 cardboard box containing the casing.

The PACK-P AR 1100÷3500 boilers are delivered already insulated and cased.
The box of the electric board, the documentation and the ceramic fibre mattress to seal the fissure of the burner blast tube, is placed into the boiler furnace.

Handle the boiler body using appropriate equipment using the lifting hooks of the boiler upper part.
Due to its heavy weight it should not be handled manually.

3 INSTALLATION

3.1 PACKAGING AND HANDLING

The boilers are supplied complete of door.

Separately we deliver the following items:

- Kit of cover panels to be assembled in the place of installation (only for models PACK-P AR the panels are already assembled)
(this kit is delivered inside a protection cartoon box)

- Electrical control Panel
- Mineral wool insulation for boiler body
- Ceramic fibre joint for blast tube burner
(All these items are placed inside the combustion chamber)

3.2 INSTALLATION – BOILER ROOM

The boiler must be installed in a room, exclusively used for this purpose, that complies with the technical standards and legislation in force in the place of installation regarding: minimum distances from the wall and roof, sizes of permanent ventilation openings, electrical system, fuel supply line, etc., in relation to the type of used fuel.

The ventilation openings must be permanent, directly communicating with outside and located in both high and low position, complying the local standards in force.

The flat surface of the boiler must be positioned horizontally.
The flat surface should be raised from the floor.

CAUTION: if the burner is supplied with combustible gas with specific weight higher than the specific weight of air, the electric parts must be positioned above 0.5 meters from ground level.

The boiler must not be installed outside as it has not been designed for outdoor installation and is not provided with automatic anti-freezing systems.

To assist the cleaning of the flue gas circuit, free space must be left in front of the boiler. We advise a minimum distance correspondent to the length of the boiler and in any case not less than 1300mm.
Regarding the distance from lateral walls:
- To check that the opening of the door at 90° will be permitted. This verify has to be done considering the burner installed.
- To check that all the maintenance operations will be permitted
- To respect local standards or requirements.

3.3 DISCHARGE OF COMBUSTION PRODUCTS

Correct burner/boiler/flue coupling drastically reduces consumption, optimises combustion with low emission of contaminants and provides effective protection against condensation.

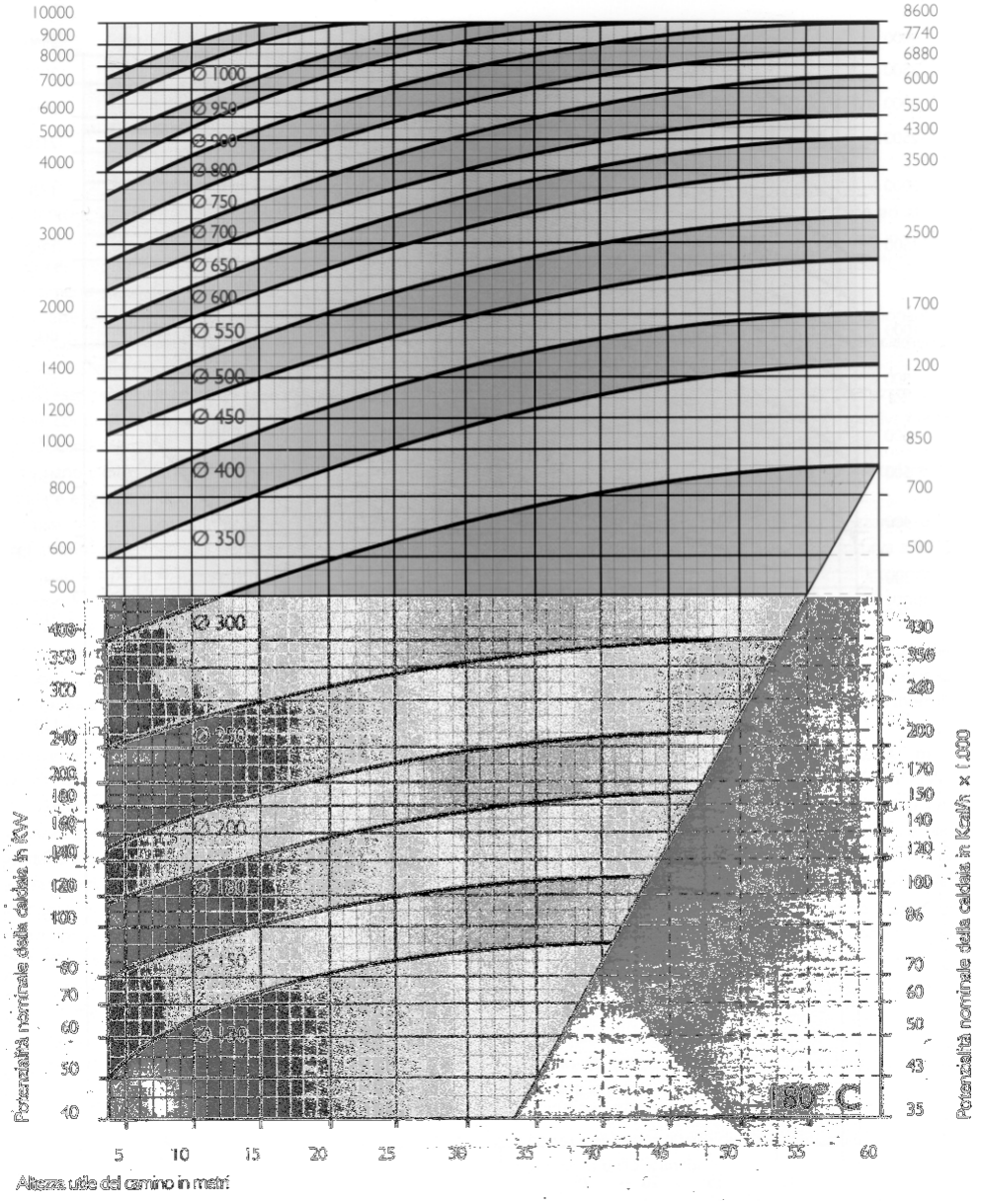
The FLUE must be resistant at high temperature and condensation, thermally insulated, hermetically sealed, without bottlenecks or obstructions, as vertical as possible and sized according to current regulations.
The flue must ensure the minimum negative pressure specified by the standards in force, considering a pressure “0” at the fitting to the flue.
Unsuitable or incorrectly sized flues may increase the noise produced during the combustion and/or can create combustion problems.

The CONNECTION BETWEEN THE BOILER AND THE FLUE must comply with the current regulations and legislation and consist of rigid hermetically sealed pipes resistant to high temperatures, condensation and mechanical stress. For sealing the joints, use materials that can withstand at least 250°C.

Badly sized and shaped flues and couplings between boiler and flue can amplify the combustion noise, negatively affect the combustion parameters and cause condensation problems.

CAUTION: non-insulated outlet pipes are a potential source of danger.

The following diagram it is a quick selection diagram for the height of the chimney (manufactured in stainless steel) referred to the UNI 9615 Norm.



3.4 HYDRAULIC CONNECTION

The choice and installation of the system components is the responsibility of the installer who must operate in accordance with correct working practice and the current legislation.
Here are some recommendations that should be taken in consideration:

- the boiler fittings and the safety valves must not be strained by the weight of the system connection pipes: this can be dangerous for the boiler and the latter must therefore be sustained and appropriately positioned

- Cut-off devices must not under any circumstances be fitted between the boiler and the expansion vessel and between the boiler and the safety valves.

- The expansion vessel must be correctly sized (there must be no leaks of water due to normal expansion) and, if the expansion vessel is closed, the safety valves must open only in exceptional cases in order to minimise any subsequent introduction of water and in any case to ensure that it is introduced and controlled by one single point in the system.

- Ensure that the safety valve outlets are connected to an outlet funnel. If not, when the valves cut in they will flood the room and the manufacturer will accept no liability for this.

- Ensure that the hydraulic pipes are not used as earth connections for the electrical or telephone system. They are not suitable for this use and can rapidly deteriorate leading to serious damage.

- Before connecting up the boiler, wash all the system pipes to remove any debris that could affect correct operation.

- After connection to the hydraulic system, ensure that the latter is completely de-aerated.

You are advised to insulate the heating system pipes to avoid heat dispersion resulting in increased fuel consumption and environmental pollution.

3.5 WATER SUPPLY

ATTENTION: To verify that the water pressure of the heating system is not bigger than the maximum working pressure of the boiler.

ATTENTION: If the water available for filling the system is hard (> 15/20 French degrees) or corrosive (pH < 7.2), it is recommended a treatment plant to avoid encrustation in the boiler and permanent damages. Similar damages are out of the warranty conditions.

Note that even encrustations (result of deposit of lime scale) of only few millimetres in thickness, due to their low thermal conductivity, can produce a considerable overheating of the sheeting of the body of the boiler creating expansion and deformations in various points with permanent damages for sheeting and welding.
Softened and/or demineralised water provides protection against lime scale and other deposits.

Anyway there is another phenomenon to be considered: the corrosion on water side due to the **dissolution of iron into its ions**. The presence of dissolved gases, in particular oxygen and carbonic dioxide, is the most important factor in this process. Softened and/or demineralised water is not solution for this problem. It is necessary that the water is treated with corrosion inhibitors.

ATTENTION: If the mains water supply contains impurities, a suitable filter must be fitted.

ATTENTION: Avoid any accidental contact between the heating system water and the sanitary water as the former is not drinkable.

3.6 WORKING CONDITIONS TEMPERATURE

The maximum water working temperature of the boilers PACK-P AR is 95°C (on request for the export market max 115°C).

The temperature difference (delta T) between outlet and inlet temperature should not exceed 20°C.
This differential must be maintained during normal working and during ignition phase.
Greater temperature differentials can produce serious damages to the boiler body.

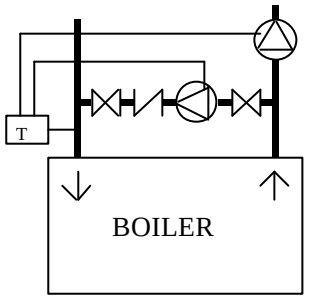
3.7 THE CONDENSATE PROBLEM

The condensation of the steam contained in the discharge smokes of the boiler (condensate), appears when the boiler temperature returning in the boiler is less than 50°C and it is important above all during the morning start up after than the boiler has been switched off all night long.

The condensate is acid and corrosive and, with the passing of time, corrodes the plates of the boiler.

To avoid the formation of condensate as much as possible, an anti-condensate pump must be installed as describe below.

When the burner starts, a thermostat (calibrated to 55°C) which is placed on the return water pipe makes contact, and starts the anti-condensate pump to reach the stated temperature, and the temporally extinguishes the anti-condensate pump and switches on the unit pump.



To eliminate totally the problem, it should make perfect the above mentioned design to maintaining the temperature of the boiler (55 °C) also by night and add a further temperature limit fuse thermostat that operate to the unit mixer valve not forward to the boiler, water not at 55 °C.
In this way it will guarantee a long life to the boiler.

The anti-condensate pump capacity is normally the 25-30% of the plant pump capacity, while the required lift is modest because it was to overcome only the boiler and the check valve resistance.

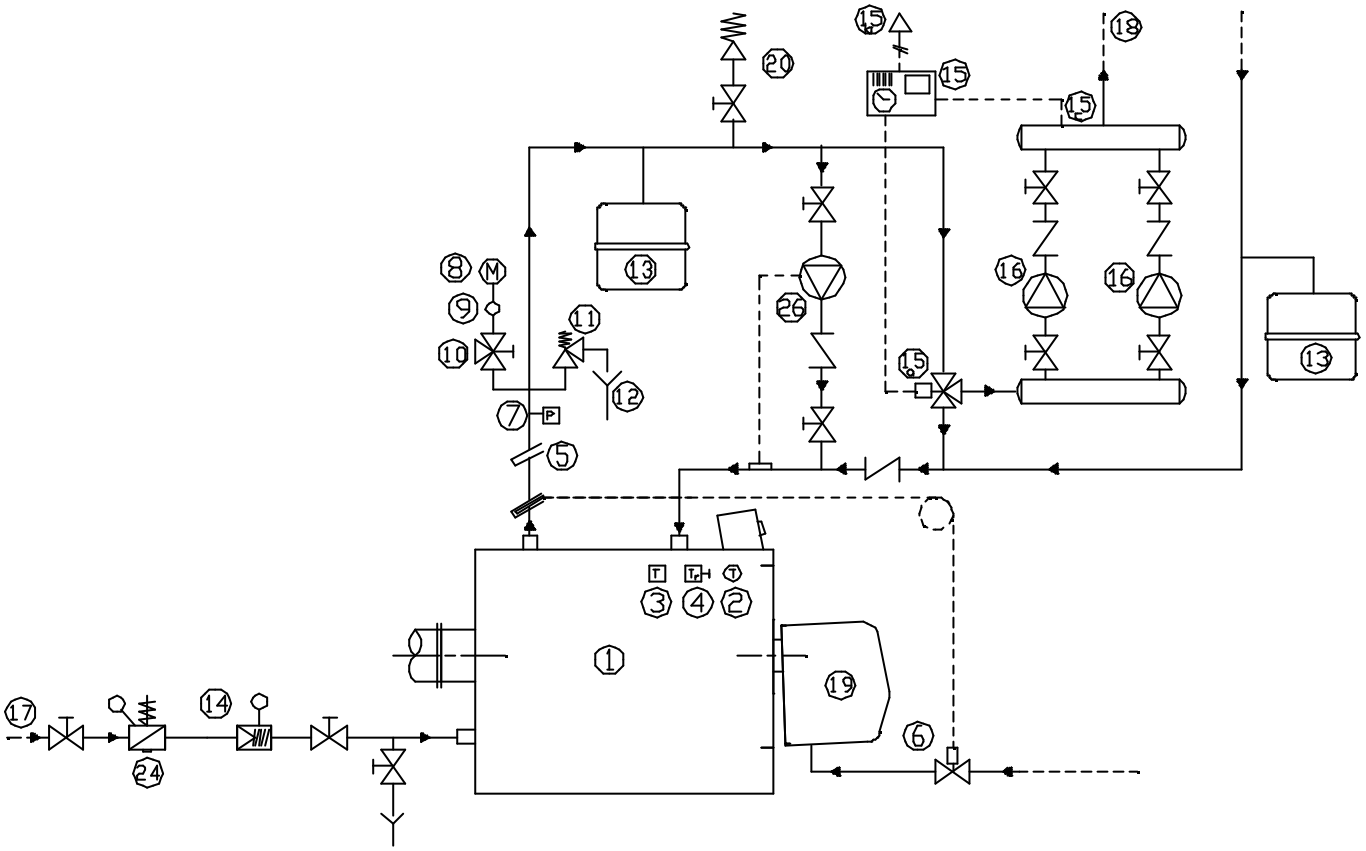
On the smoke chamber of the PACK-P AR boiler there is a connection for the discharge of eventual condensate that should form in the starting phase.

Do not connect directly the attach to the network of urban sewers, but to a gathering ground to control the extent of the phenomenon.
To survey exactly the phenomenon, check that the condensate formed in the chimney does not pour in the gathering ground.

The condensate is acid and corrosive, therefore polluting, if it is flown into the drainage system.

Therefore it is necessary, before to drain the tank into the drainage system, to restore the acidity level into levels between pH 6,5 and 9 using neutralizer products.

3.8 DIAGRAM OF A STANDARD HEATING INSTALLATION



1 BOILER
2 BOILER THERMOMETER
3 BOILER THERMOSTAT
4 SAFETY THERMOSTAT
5 PIT TO INSTALL THE THERMOMETER
6 FUEL CUT-OFF VALVE WITH POSITIVE ACTION
7 CUT-OFF PRESSURE SWITCH WITH HAND RESET
8 PRESSURE INDICATOR
9 DAMPING PIPE (TO KEEP THE REGULATION OF THE PRESSURE INDICATOR IN THE TIME)
10 MANOMETER HOLDING TAP
11 SAFETY VALVE
12 BASIN TO RECEIVE THE SAFETY VALVE OUTLET WATER (IF WISHED)
13 EXPANSION VESSEL
14 AUTOMATIC FEEDER WITH NON-RETURN VALVE AND MANOMETER
15 REGULATION AUTOMATIC UNIT, BALANCED WITH THE EXTERNAL TEMPERATURE, CONSISTING OF:
15A THREE-WAY VALVE, COMPLETE WITH SERVOMOTOR: TO MIX THE HOT BOILER OUTLET WATER WITH THE COLD INLET WATER.
15B EXTERNAL SENSOR
15C DIPPING SENSOR OR CIRCUIT DELIVERY
16 HEATING CIRCUIT ELECTRICAL PUMP (ONE WORKING + A SPARE ONE)
17 PLANT FEEDING WATER PIPE
18 HEATING CIRCUIT PIPES
19 BLOWN AIR BURNER
20 AIR PURGE UNIT, INCLUDING: AUTOMATIC VALVE AND CUT-OFF
24 PRESSURE GOVERNOR + MANOMETER
26 ANTICONDENSATION ELECTRICAL PUMP

3.9 ELECTRICAL SYSTEM

The electrical system must comply with the current regulations and be installed by professionally qualified personnel..

Electrical safety of the equipment is ensured only when it is correctly connected to an efficient earth system in compliance with the current safety regulations.
The manufacturer will not be liable for any damage caused by failure to earth the system.

Call professionally qualified personnel to check that the electrical system is suitable for the maximum power absorbed by the equipment, ensuring in particular that the system cable sections are suitable for the power absorbed by the equipment.

Adapters, multiple sockets and extension leads must not be used for general power supply of the equipment from the mains.

For connection to the mains, a twin-pole switch must be provided in compliance with the current regulations.

3.10 CONTROL PANEL INSTALLATION

The control panel is placed in a box inside the furnace or next to the boiler.
Voltage 220 V - 50 Hz.

Open the instrument panel by turning of the self-threading screws.
Extend the instrument gauge capillaries avoiding all damages and pass them through the hole at the bottom of the panel.
Later, take the cover of the boiler casing, pass the gauge capillaries through the hole and fix the instrument panel to the cover.
Lean the cover on the boiler and insert the gauges in the boiler bulbs avoiding any accidental breakage.

For mod. PACK-P AR 1100÷3500, fix the control panel in the most convenient position (upon or on the sides of the boiler) using the bracket in outfit.

CAUTION: all capillary gauges of the panel instruments must be inserted in the boiler body bulbs next to the flow fitting to the heating plant.

For the electrical connections, proceed according to the instructions in the attached electrical diagram.

Never fix the electrical cable to the sheet metal of the boiler body, door or smoxe box

Finally, close the panel and re-fit the cover on the boiler casing.

3.11 FUEL SUPPLY

The fuel supply line must comply with current regulations and be laid by professionally qualified personnel.

Before installation, you are advised to thoroughly clean the inside of all the fuel supply pipes in order to remove any debris that may affect correct operation of the boiler.

Check the internal and external seal of the fuel supply system.
If using gas, the connections must be perfectly sealed.

Check that the fuel supply system is provided with the safety and control devices prescribed by the current regulations.

Never use the plant fuel pipes to earth electric or telephone systems.

Ensure that the boiler can be fed with the type of fuel that will be used.

3.12 POSSIBLE FUELS

The PACK P/AR 93-3500 boilers can be matched with burners firing following combustibles::

- **Natural gas G20.**
- **Butane G30.**
- **Propane G31.**
- **Light oil, max 1.5°E a 20°C.**
- **Heavy oil 5-7°E a 50°C**

The expected ideal combustion parameters for **natural gas G 20** are following:
CO2 = 9.6%
CO< 50 ppm
NOx<100 ppm
Flue T°- Room T° = 180-200°C.

The expected ideal combustion parameters for **butane G30** are following:
CO2 = 11.0%
CO< 50 ppm
NOx<100 ppm
Flue T°- Room T° = 180-200°C.

The expected ideal combustion parameters for **propane G31** are following:
CO2 = 11.2%
CO< 50 ppm
NOx<100 ppm
Flue T°- Room T° = 180-200°C.

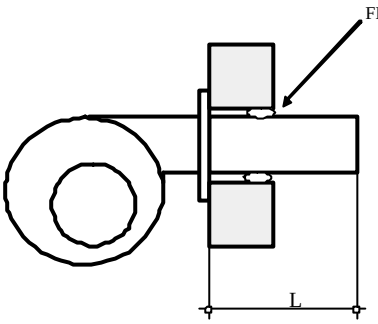
The expected ideal combustion parameters for **Diesel oil** are following:
CO2 = 13.0%
CO< 50 ppm
NOx<100 ppm
Bacharach < 2
Flue T°- Room T° = 180-200°C.

The expected ideal combustion parameters for **Heavy oil** are following:
CO2 = 12.5%
CO< 50 ppm
NOx<100 ppm
Bacharach < 2
Flue T°- Room T° = 180-200°C.

3.13 BURNER CONNECTION

IMPORTANT NOTE:
It is possible to install on these boilers, even other burners that are not included in our official lists, provided that the required values of furnace thermal output and drop pressure are respected.

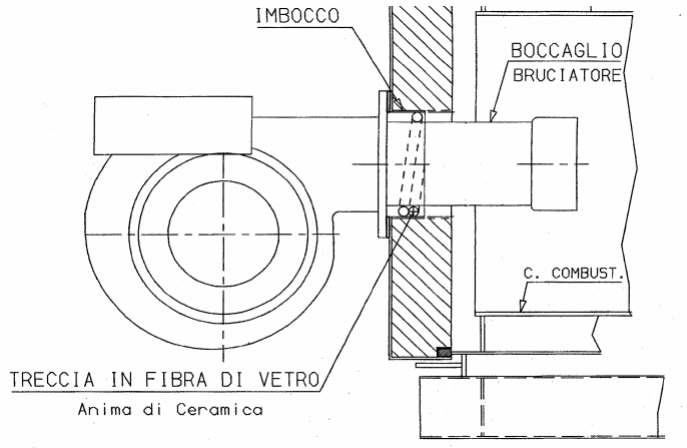
For installation of the burner, the electrical connections and the necessary settings, consult the burner instruction manual.
Ascertain that the correct type of burner has been chosen for the boiler, checking the technical specifications of both.
The burner draught tube must be sized as shown below:



Boiler type PACK-P/AR	Burner nozzle min./max L mm
93÷150	220 / 280
190÷405	250 / 330
465÷1045	320 / 400
1100÷2000	350 / 420
2500÷3500	370 / 500

Secure the burner to the door by means of the fixing plate so that the flame is parallel and centred in the furnace; if not, combustion problems can occur with the risk of seriously damaging the boiler.

IMPORTANT: after installing the burner, fill any crack between the draught tube and the hole of the door with the material provided, resistant to 1000°C (ceramic fibre mat).



This operation prevents overheating of the door which would otherwise be permanently deformed.

If the burner is provided with an air intake connect it through a rubber hose to the intake arranged over the flame pilot light: this way glass remains clear.
If burner has no air intake need to connect it through a rubber hose, remove the intake on the flame pilot light and close the hole with a tap ø 1/8" GAS.

The fuel connections to the burner must be positioned in order to permit complete opening of the boiler door with the burner fitted.

3.14 COVER ASSEMBLING (ONLY PACK-P/AR 93-1045)

WARNING: carry out the cover assembling after finished the installation works.

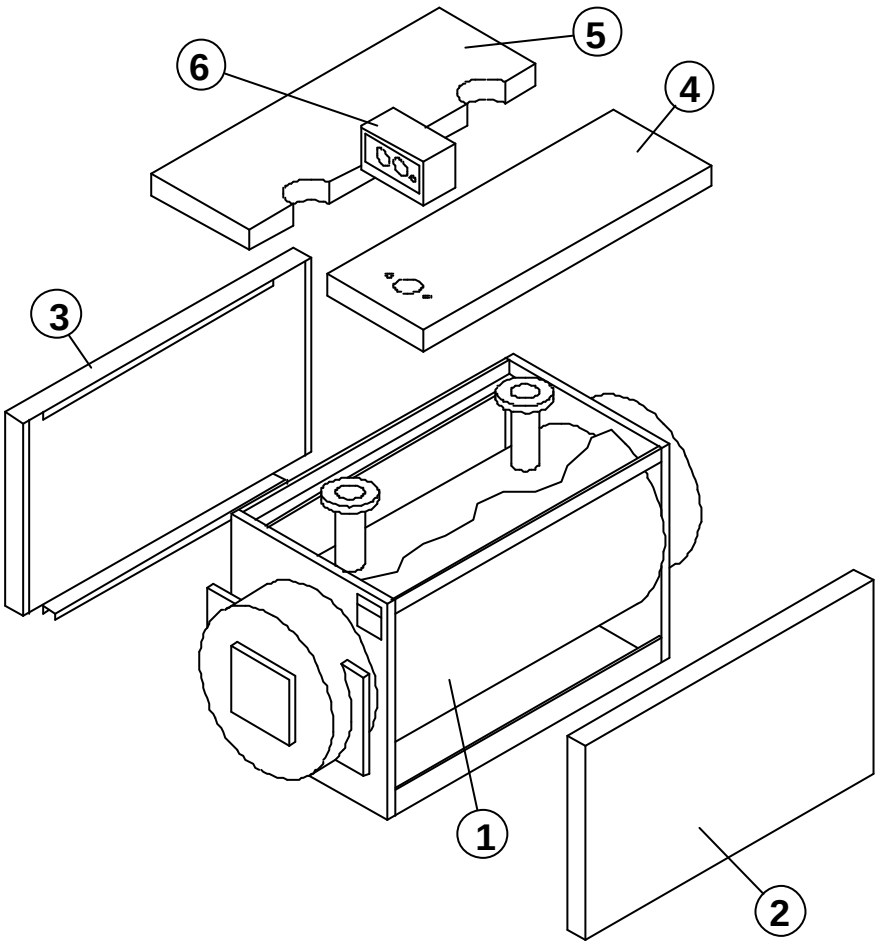
Extract the mineral wool (1) from the furnace and wrap it around the planting of the boiler, starting from the top fixing it obtaining a hole with the hands. to the inlet and outlet tubes.
Then lock it adherent to the plating with the out fit hose clamp.

Begin the assembling with the left lateral cover (3), taking care of putting first the inferior part and then the superior part of the cover on the boiler structural angles.

Mount the right lateral cover (2) maintaining the some rules used for the left one.

Position the superior covers (4) (5) on the boiler.
Before joining them together, prepare the control panel (6) as specified below and fix it on the right superior panel as follows: extend the feeler capillaries, make then pass through the cover hole and insert them in the wells located near the delivery tube.
Then fix the set to the cover.

Then connect the upper covers, placing them at joint on the side covers.



3.15 PRELIMINARY OPERATIONS BEFORE THE FIRST START-UP

Before starting up:

- check that the gauges of setting and control instruments have been correctly positioned in the bulbs;

- ensure that the turbolators do not protrude from the front of smoke tubes;

- check that the plant has been filled with water, de-aerated and that pressure is over 1 bar and lower than the instrument max. allowed pressure;

- check that all control and safety devices are working efficiently and calibrated appropriately;

- check that the furnace is free from foreign matters;

- ensure that door refractory casing is not broken;

- check that the burner tube has been plugged correctly;

- check that the door has been closed correctly;

- check that the plant on-off valves are completely open and pumps turn correctly;

- ensure that fuel is available and fuel cocks are open.

- check that the water pumps work and push the water to the right way.

- check that the burner is regulated according to the capacity of the boiler combustion chamber, so that the combustion values match with the ones specified by the maker.

- check that the safety valve in the closet vessel plants and the overflow in the open vessel plants, do not let water out (if it happens, it's due to a wrong sizing of the expansion vessels).

- In plants with open vessel check that there is no water circulation in this latter (if yes, fill-in and vent lines are incorrectly executed).

- check that the boiler water temperature at normal rate working, stays between 70°C and 80°C:

- check that the temperature of the boiler inlet water, at normal rate working, does not drop below 60°C.

- check that the net flue temperature stays between 180°C and 200°C .

3.16 FIRST START UP

After performing the preliminary checks, to power on the boiler it is necessary:

- that the boiler thermostat on the control panel is set between 60 and 90°C, according to the type of heating plant;

- that the environment thermostat is set on 20°C approx.;

- that the main switch is turned "ON";

- that the main switch is pressed from the control panel (the lighting button is lightened);

The appliance will run an ignition cycle which will last until set temperatures have been reached.
After this operation has been completed, the system will run automatically.

3.17 FIRST START UP AND FURTHER CHECKS

After the start up operations have been carried out, the appliance must be tested for standstill and further start up. Therefore:

- modify the boiler thermostat setting;
- actuate the main switch from the control panel;
- modify the environment thermostat setting.

Check the seal of all gaskets on the water and smoke sides.

This operation is of fundamental importance for the gaskets of the door, of the burner plate and of the smoke-box to prevent leakage of toxic and therefore hazardous combustion fumes into the boiler room. To guarantee the perfect seal, warm tighten.

The weight of the overhanging burner tends to loosen the gasket of the door at the top.

It is very important to inspect the boiler/flue fitting seal because of the above reasons.

Check the pumps correct sense of direction.

Check the total standstill of the appliance by turning off the main switch.

After all conditions have been satisfied, the burner must be tested at the boiler max. output by examining the combustion products to reach the correct combustion as well as the less polluting emissions as possible.

Smoke temperature under normal working conditions ranges from approx. 170-200°C.

When the boiler is working, the pressure of the water contained in the system increases. Therefore, ensure that its highest value does not exceed the boiler max pressure.

4 SERVICE

4.1 WARNINGS FOR THE SERVICE CENTER

Periodical maintenance is essential for safety, output and the generator life span.
Furthermore, it is mandatory and it must be carried out by professional qualified personnel.

Before any servicing, it is recommended that a combustion analysis be performed to find out the operating conditions as well as indications on how to intervene.

After the combustion analysis has been performed and before any other operations:
- power off the system by turning off the main general switch;
- close the fuel on-off cocks.

4.2 ROUTINE MAINTENANCE

A correct use and a regular maintenance are fundamental for a reliable working and the long life of the appliance:

- Check that the boiler exchange surfaces do not show any encrustations and/or soot layers (to be eventually removed by a vacuum cleaner).
- Check, at least once a year, the conditions of the flue turbulators; if needed replace them by new ones.
- Do not leave the boiler and the plant empty for long still periods of time; do not change the water if not necessary.
- During the plant still time, disconnect the boiler from the electrical main.
- Protect the electrical components from water spray and humidity.
- All the maintenance and cleaning operations should be carried out at the beginning of the boiler still time.
- Check periodically, at least once a year, that the burner regulation keeps being correct; following values should be controlled: flue temperature, carbon dioxide, carbon monoxide nitrogen oxides, flue opacity, etc.

4.3 OPENING AND ADJUSTMENT OF THE DOOR

The door can be opened from both sides (except for models 2500÷3500).
The opening is normally from left to right.
To open the door, remove the fixing nuts from the left side.

To change the direction of opening of the front door with help of lifting equipment, work as follow:
- hood the front door to the lifting equipment through the foreseen 2 holes that are in the superior part;
- take away the 4 tightening nuts;
- unthread the front door;
- unscrew the 2 jam nuts left on the tie rods and screw them on the tie rods on the other side;
- remount the big door having care of threading the jam nuts seat in the front door bushes;
- screw the 4 fixing nuts.

To adjust and tighten:
- release the regulation jam nuts without let them go out from the bush seat of the door;
- tighten the locking screw only as far as required to censure a uniform airtight closure.
- lock the regulation jam nuts against the door bush.

Normally, at all maintenance operations the door adjustment should be inspected.

4.4 CLEANING THE BOILER

The boiler should be cleaned at least once a year to remove carbon deposits from the heat transfer surfaces

Open the door, open the cleaning door and take the turbolators out.

Clean the smoke tubes using a steel brush and remove the soot from the furnace and the rear cleaning door.

4.5 CHECKS AFTER BOILER CLEANING OPERATIONS

After performing maintenance and cleaning operations, repeat the preliminary start up inspection (see page 23), check the burner calibration and perform a smoke analysis to ensure that the correct degree has been reached.

Check the seal of the fuel supply system. This inspection is absolutely necessary when gaseous fuels are used.

Check the perfect seal of the smoke circuit and, if needed, replace worn seals.

Check the seal of the pipe system to avoid time-wasting water changes and refilling which could also increase the risk of scaling.

Should the boiler inside walls be scaled, a chemical washing is needed to remove scale. This operation must be performed by qualified companies.

The specification of the plant water should be examined and, if needed, a treatmen system should be installed.

Never leave highly inflammable substance containers in the premises where the boiler has been installed.

4.6 TROUBLESHOOTING

Below is the description of the most common faults and their remedy:

FAULT: the burner does not turn on.
REMEDY:
- check electric connections;
- check the regular fuel supply;
- check the integrity and the cleanness of the fuel supply system and that no air is present;
- check that ignition sparks form regularly and the burner appliance works correctly;
- check the boiler safety thermostat intervention with manual reset;
- check the calibration of the environment thermostat.

FAULT: the burner turns on well but turns off immediately after.
REMEDY:
- check the pilot flame, the air calibration and that the burner appliance works correctly.

FAULT: the burner is difficult to be adjusted and/or no output.
REMEDY:
- check for the cleanness of burner, boiler, boiler/flue pipes and flue;
- check the hermetic seal of the smoke circuit (door, smoke box, boiler/flue connection);
- check that the fuel supply is flowing regularly and verify the effective power of the burner;
- check for the presence of scale and carry out a chemical washing

FAULT: the boiler gets easily covered with soot.
REMEDY:
- check the burner regulation (smoke analysis);
- check the fuel quality;
- check the flue for clogging and the cleanness of the burner air intake (dust).

FAULT: the boiler does not reach set temperature.
REMEDY:
- check that the smoke side and water side of the boiler are clean;
- check the combination, regulation and performance of the burner;
- check the regulation of the pressure switches and that they work correctly;
- check the position of the thermostat gauges;
- ensure that the boiler capacity is appropriate for the plant.

FAULT: the safety thermostat intervenes.
REMEDY:
- check electric wires;
- check that the gauges bulbs are positioned correctly and all thermostats are working correctly.

FAULT: smell of gas and/or un-combusted products.
REMEDY:
- check the seal of the fuel supply system (if gas fuel);
- check the hermetic seal of the smoke circuit (door, smoke box, boiler/flue connection);

FAULT: the boiler reaches the appropriate temperature but the heating system is cold.
REMEDY:
- check that no air is in the system and that circulation pumps are working well;
- check the ambience thermostat setting.

FAULT: the safety valve of the boiler intervenes often.
REMEDY:
- check the system loading pressure;
- check the efficiency of the expansion vessel;
- check the calibration of the valve itself.

FAULT: water on the floor near the smoke box (condensate).
REMEDY:
- check that the probes have been positioned correctly, the boiler thermostat has been regulated correctly (between 60 and 90°C) and works well.
- verify that the discharge in the fumes box is connected with a gathering ground;
- verify that the anti-condensate pump and its regulation (if it is present) correctly work;
- check that the temperature of the return water of the plant are not less than 50°C.

FAULT: membranes overheating due to lack of water in the boiler.
REMEDY:
Turn off the burner, do not pour water and do not open the door; wait until the ambience temperature is restored before performing any operation.

4.7 SPARE PART LIST

Spare parts recommended for two working years:

1 working thermostat	1 safety thermostat
1 door gasket	1 smoke box gasket
1 pilot flame glass	1 pilot flame gasket
1 burner plate gasket	1 complete set of turbolators

The following parts may also be supplied in the event of accidental damage or malfunctioning:

- thermometer
- complete control panel
- complete door
- complete smoke chamber
- complete or partial casing

4.8 WARRANTY

The exchange surfaces of the PACK P/AR boilers are guaranteed, starting from the invoice date, by a special **Guarantee Certficate** delivered with each boiler. The conditions stated below, needed to have the guarantee valid, are clearly specified in such certificate:

1) Installation complying with the existing laws.
2) Installation, putting into working, use and maintenance as per the state of the art and in accordance with Blowtherm specifications.
3) No modifications have been brought to the product.
4) Maintenance works carried out by authorized personnel.

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