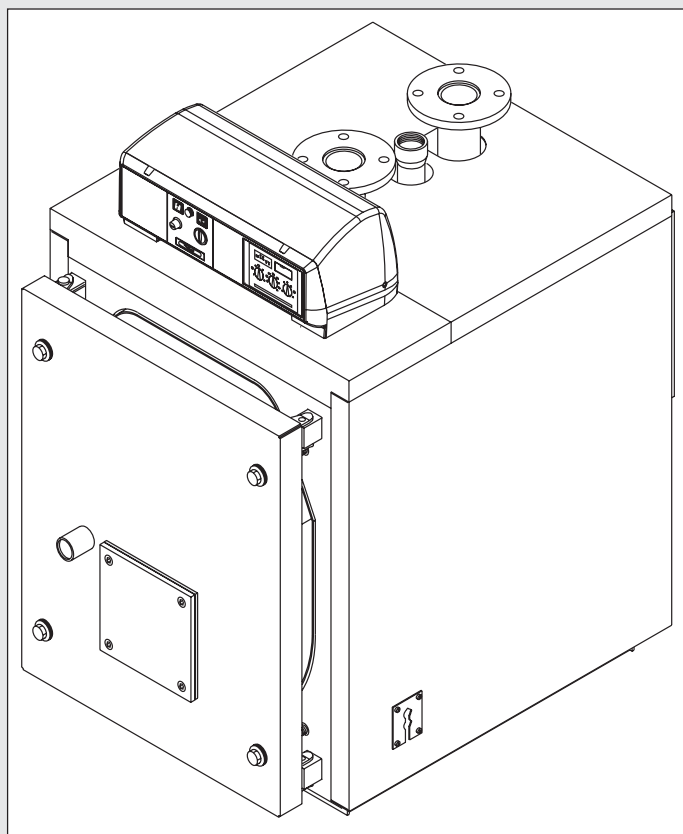


Unical[®]

ELLPREX



**INSTALLATION, USE AND
SERVICING INSTRUCTION**
(to be kept by the user)

WARNING

When the boiler is operated with a pressure jet gas burner, because it does not belong to any of the categories among those listed in the Annex II to the Directive 97/23/CE (regarding pressure equipment) and being, furthermore, mentioned in the Directive 90/396/CE (Gas Appliance Directive) to which the art. 1, clause 3, paragraph 6.5 makes reference, it is excluded from the scope of the Directive.

GENERAL INFORMATIONS

Introduction

The instruction manual is an integral and essential part of the product and must be delivered to the user.

Read carefully the instructions contained in the book as they supply important indications concerning the safety of installation, of use and maintenance.

Preserve with care the book for every further consultation.

This manual supplies a summary of what has to be followed during the installation, use and servicing of the UNICAL boilers, ELLPREX range. In the course of this text the short name ELL can be used to indicate the ELLPREX boiler.

Choice of the boiler

For a correct choice and application of the ELLPREX boilers it is necessary to follow the instructions given in this manual.

Installation

The installation of the boilers and the auxiliary equipments, related to the heating system, must be in conformity with all the regulations and rules in force.

It is law that all the gas appliances are installed, commissioned and serviced by a registered installer in accordance with the regulations below. A wrong installation can cause damages to people, animals or things, for which the manufacturer is not responsible.

Failure to install appliances correctly could lead prosecution. It is in your own interest, and that of the safety, to ensure the law is complied with.

The following must be complied with:

Current Building Regulations and Clean Air Act.

Water authority regulations.

Local Authority Regulations and Regional Bylaws.

Gas Safety Regulations.

Any special regional requirements of local Electricity and Gas undertaking.

Fire Service and Insurance Company requirements.

Commissioning

The main purpose of the commissioning is to verify the correct operation of all the safety and control devices.

Before leaving the installation the commissioner has to control the operation of the boiler for, at least, a complete working cycle.

Guarantee

The boiler guarantee is bound to the compliance of the requirements stated in this manual, and any non-fulfilment or modification will make it void.

Normative

It is the responsibility of the installer to fulfil all the regulations concerning the boiler house, the safety devices, the chimney, the fuel supply lines, the electrical installations and all the other local requirements and safety instructions.

Approvals

The UNICAL boilers, ELLPREX range, have been tested and CE certified for the gas operation by TECHNIGAS (BELGIUM), who has recognised to these boilers the conformity certificate according to the following directives:

- Gas Appliances Directive (90/396 CE), compulsory as per 1st January 1996;
- Efficiency Directive (92/42 CE), compulsory as per 1st January 1998;
- The conformity to the Low Voltage Directive (73/23 CE), compulsory as per 1st January 1997 has been verified and ascertained by GASTEC ITALIA.

The conformity to the EMC (Electro Magnetic Compatibility 89/336 CE), compulsory as per 1st January 1996, is not applicable to the ELLPREX boilers because they do not have electronic components.

For the time being there are no European Directives covering the oil fired boilers, except the Efficiency Directive (92/42 CE).

Data plate and Serial No.

The data plate, supplied in a separate envelope with the relevant documents, makes reference to a serial No, embossed in an aluminium plate riveted to the front tube plate in the lower RH side corner.

Use of the boiler

This boiler has to be used for heating the water at a temperature not higher than the boiling temperature in the installation conditions.

Every other use is considered improper and therefore dangerous.

Any contractual or extracontractual responsibilities of the manufacturer, for the damages caused by errors in the installation and in the use and, however, from non-observance of the instructions given by the manufacturer himself, are excluded.

If the boiler has to be sold or transferred to an other owner or if you have to move and to leave the boiler in the previous house, always make sure that the instruction manual accompanies the boiler so that it can be consulted by the new owner and/or by the technician.

GAS SAFETY (INSTALLATION AND USE) REGULATIONS, 1994

It is law that **all** gas appliances are installed and serviced by a CORGI registered installer in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

It is in your own interest, and that of safety, to ensure the law is complied with.

The installation of the boiler **MUST** also be in accordance with the latest I.E.E. Wiring Regulations, local building regulations, byelaws of the local water authority, the building regulations and the Building Standards

(Scotland) and any relevant requirements of the local authority.

Detailed recommendations are contained in the following British Standard Codes of Practice:

- | | |
|---------|--|
| BS 6891 | Low pressure installation pipes. |
| BS 5449 | Forced circulation hot water systems. |
| BS 5546 | Installation of gas hot water supplies for domestic purposes (2nd Family Gases). |
| BS 6644 | Ventilation (for gas appliances of rated input exceeding 60 kW). |

HEALTH & SAFETY DOCUMENT No. 635

The Electricity at Work Regulations, 1989.

The manufacturer's notes must **NOT** be taken, in any way, as overriding statutory obligations.

IMPORTANT. These appliances are CE certificated for safety and performance. It is, therefore, important that no external control devices, e.g. flue dampers, economisers etc., are directly connected to these appliances unless covered by these Installation and Servicing Instructions or as otherwise recommended by **Unical** in writing. If in doubt please inquire.

Any direct connection of a control device not approved by **Unical** could invalidate the certification and the normal appliance warranty.

Notes.

To obtain the gas consumption:

- For l/s divide the gross heat input (kW) by C.V. of the gas (MJ/m³).
- For ft³/h divide the gross heat input (Btu/h) by C.V. of the gas (Btu/ft³).

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1

CONSTRUCTIONAL-DIMENSIONAL TECHNICAL CHARACTERISTICS

1.1 - CONSTRUCTION OF THE ELLPREX BOILERS

The ELLPREX boilers are of horizontal type (oval till the ELL 970 and cylindrical from ELL 1100) with flame reversion in the combustion chamber and with third pass in the smoke pipes.

The construction completely satisfies the requirements of the EN 303 - part 1.

The sheet metal parts of the pressure vessel are manufactured of certified carbon steel, type S235JRG2, according to EN 10025, with melting certificate 3.1.B, according EN 10024; where as the pipes are of steel ST 37.0 according to DIN 1626.

The welders and the WPS (Welding Procedures Specifications) have been approved according to EN 287 and EN 288 by TÜV (DE). These boilers have been also approved by - ISCIR (RO).

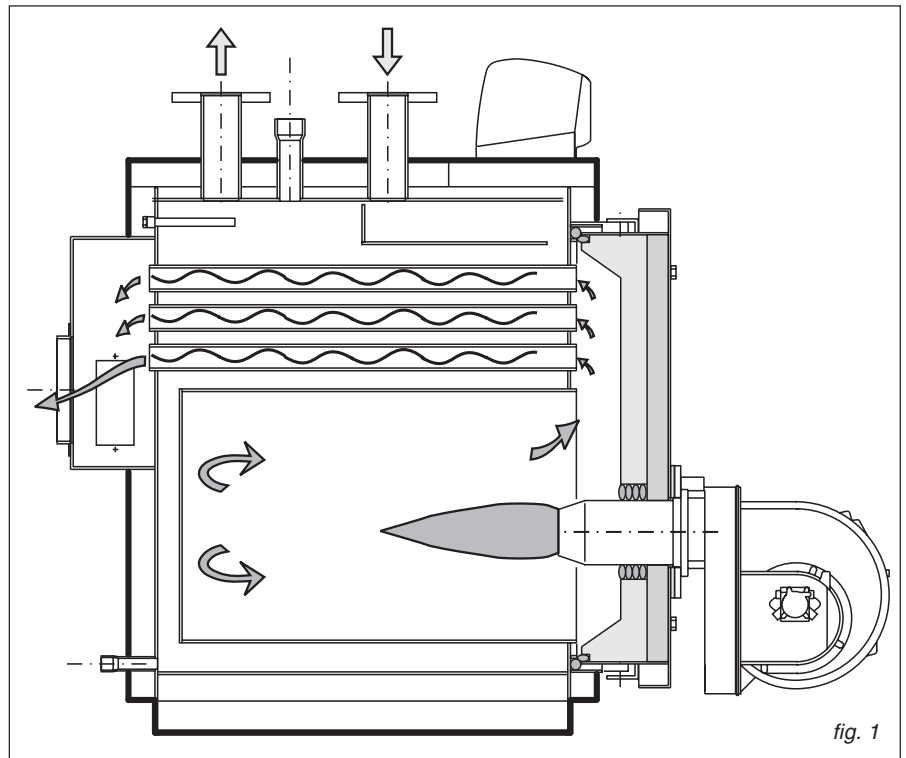
Up to the model ELL 630 the furnace is linked to the rear tube plate.

For the larger models (ELL 760 to ELL 3500) the furnace is free to dilate (it is supported only by the double welding seam (inner and outer) to the front tube plate.

The boilers are equipped with a reversible hinged door, which can be opened, for this reason, from L.H. or R.H. side.

The outer shell is insulated with a glass wool mattress, thick 80 mm, protected by a textile in mineral fiber.

The upper part of the outer shell is equipped with uplift hook(s).



Note:The ELLPREX boilers are to be equipped with ON/OFF burner; alternatively they can be equipped with a two stage or modulating burner, provided the minimum reachable heat input is not lower than the figure shown on the data plate for the fuel used on site. The boilers are provided with two 1/2" bulb

holders with inner diameter of 15 mm (for 3 bulbs each), suitable to locate the thermostats and thermometer bulbs.

The casing side panels are provided with holes for the cables of the electrical supply, of the pumps, of the burner and any other auxiliary equipment.

1.2 - WORKING PRINCIPLE

The ELLPREX boilers are provided with a blind furnace in which the burner makes a central flame, the combustion gases come back to the front door and then they enter the upper or peripheral tube bundle, according to the boiler model, to be collected on the

rear smoke chamber, and from here to the chimney.

During the operation of the burner within the output range of the boiler, the combustion chamber is always under positive pressure.

For the value of this pressure see tables on

pages 6 to 9, under the column "Smoke side pressure losses".

The chimney has to be calculated in such a way that at its base there is no positive pressure.

1.3 - DIMENSIONS AND HYDRAULIC CONNECTIONS FOR ELLPREX 170÷630

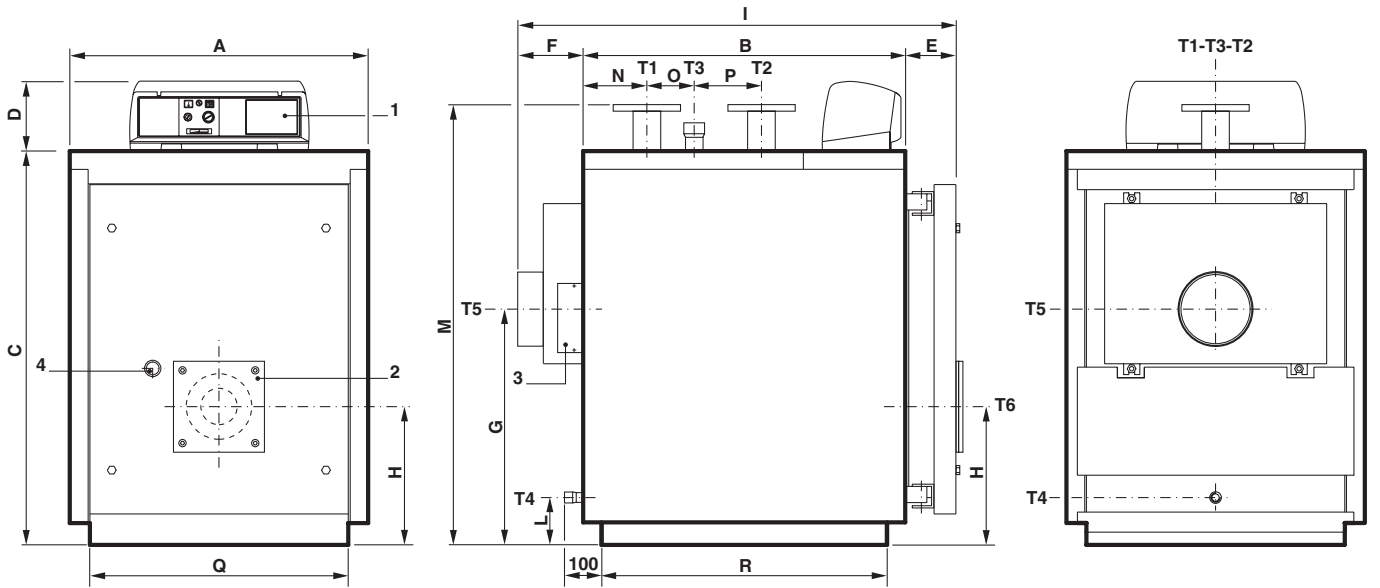


fig. 2

- 1 Panel board
- 2 Burner fixing plate
- 3 Smoke chamber cleaning door
- 4 Sight glass

- T1 C.H. flow
- T2 C.H. return
- T3 Expansion vessel connection
- T4 Boiler drain

- T5 Flue socket
- T6 Max. burner blast tube dia.

ELLPREX Model	Nominal Output kW	Nominal Input kW	Water content l	Water side pressure loss(**) m w.c.	Smoke side pressure loss mm w.c.	Maximum working pressure bar	Weight kg	CONNECTIONS				
								T1 T2 UNI 2278 PN16	T3 ISO 7/1	T4 ISO 7/1	T5 Øi mm	T6 Ø mm
ELL 170	130÷170	140÷186	190	0,09÷0,15	9÷15	6	435	DN 65	Rp 1 ½	Rp ¾	200	180
ELL 240	180÷240	195÷262	251	0,19÷0,33	15÷28	6	510	DN 65	Rp 1 ½	Rp ¾	200	180
ELL 290	220÷290	239÷317	264	0,12÷0,21	13÷25	6	588	DN 80	Rp 2	Rp ¾	250	210
ELL 340	255÷340	277÷371	298	0,16÷0,28	17÷34	6	629	DN 80	Rp 2	Rp ¾	250	210
ELL 420	315÷420	342÷459	398	0,09÷0,17	16÷29	6	796	DN 100	Rp 2	Rp ¾	250	210
ELL 510	385÷510	418÷557	462	0,14÷0,25	24÷43	6	919	DN 100	Rp 2	Rp ¾	250	210
ELL 630	480÷630	520÷688	565	0,21÷0,38	32÷55	6	1049	DN 100	Rp 2	Rp ¾	300	210

ELLPREX Model	DIMENSIONS															
	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm	L mm	M* mm	N mm	O mm	P mm	Q* mm	R* mm
ELL 170	820	885	1082	190	139	190	648	380	1214	130	1210	175	130	185	710	785
ELL 240	820	1145	1082	190	139	190	648	380	1474	130	1210	175	390	185	710	1045
ELL 290	860	1080	1182	190	139	190	708	400	1411	130	1310	215	210	250	750	982
ELL 340	860	1210	1182	190	139	190	708	400	1541	130	1310	215	340	250	750	1112
ELL 420	890	1275	1352	190	139	190	748	440	1606	125	1485	255	285	315	780	1177
ELL 510	890	1470	1352	190	139	190	748	440	1801	125	1485	255	480	315	780	1372
ELL 630	890	1780	1352	190	139	190	748	440	2113	125	1485	255	790	315	780	1682

(*) Minimum dimensions for boiler room access requirements.
 (**) Hydraulic resistance for delta T 15K.

DETAIL FOR DOOR DRILLING
ELL 170÷240

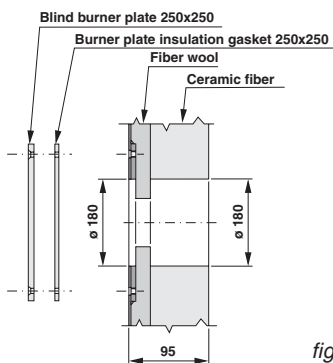


fig. 3

DETAIL FOR DOOR DRILLING
ELL 290÷630

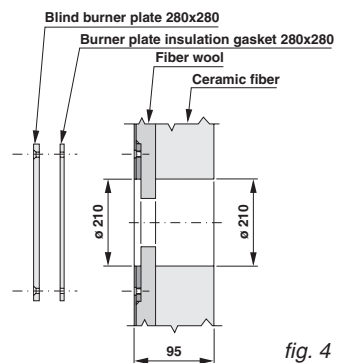
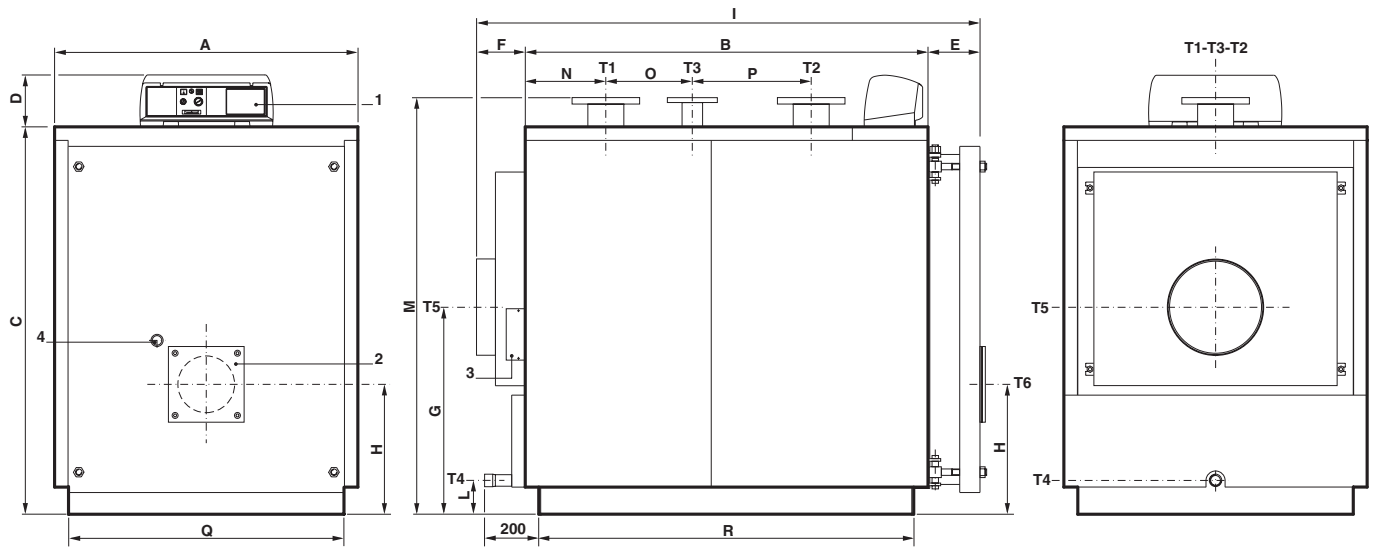


fig. 4

DIMENSIONS AND HYDRAULIC CONNECTIONS FOR ELLPREX 760÷970



- 1 Panel board
- 2 Burner fixing plate
- 3 Smoke chamber cleaning door
- 4 Sight glass

- T1 C.H. flow
- T2 C.H. return
- T3 Expansion vessel connection
- T4 Boiler drain

- T5 Flue socket
- T6 Max. burner blast tube dia.

fig. 5

ELLPREX Model	Nominal Output kW	Nominal Input kW	Water content l	Water side pressure loss(**) m w.c.	Smoke side pressure loss mm w.c.	Maximum working pressure bar	Weight kg	CONNECTIONS				
								T1 T2 UNI 2278 PN16	T3 UNI 2278 PN16	T4 ISO 7/1	T5 Øi mm	T6 Ø mm
ELL 760	580÷760	630÷830	671	0,15÷0,26	29÷51	6	1341	DN 125	DN 65	Rp 1¼	350	270
ELL 870	660÷870	715÷950	753	0,19÷0,33	33÷57	6	1447	DN 125	DN 65	Rp 1¼	350	270
ELL 970	750÷970	815÷1060	836	0,24÷0,41	29÷49	6	1553	DN 125	DN 65	Rp 1¼	350	270

ELLPREX Model	DIMENSIONS															
	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm	L mm	M* mm	N mm	O mm	P mm	Q* mm	R* mm
ELL 760	1122	1605	1432	190	195	190	765	480	1989	125	1540	298	435	440	1020	1504
ELL 870	1122	1800	1432	190	195	190	765	480	2184	125	1540	298	630	440	1020	1699
ELL 970	1122	1995	1432	190	195	190	765	480	2379	125	1540	298	825	440	1020	1894

(*) Minimum dimensions for boiler room access requirements.
 (**) Hydraulic resistance for delta T 15K.

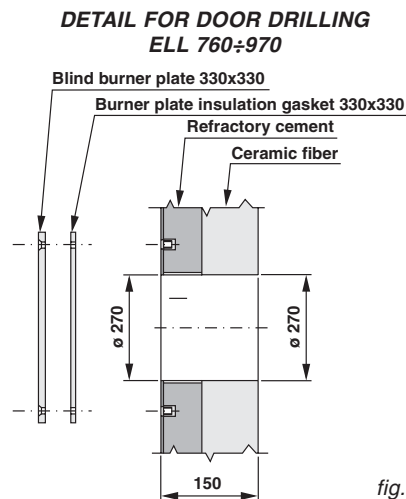
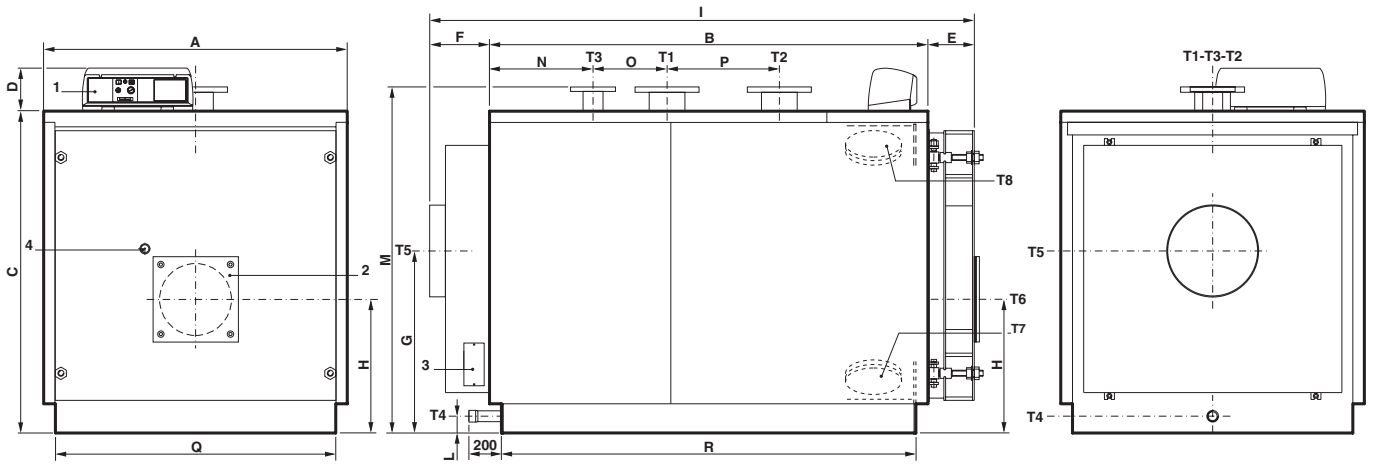


fig. 6

DIMENSIONS AND HYDRAULIC CONNECTIONS FOR ELLPREX 1100÷2650



- 1 Panel board
- 2 Burner fixing plate
- 3 Smoke chamber cleaning door
- 4 Sight glass

- T1 C.H. flow
- T2 C.H. return
- T3 Expansion vessel connection
- T4 Boiler drain

- T5 Flue socket
- T6 Max. burner blast tube dia.
- T7 Sludge drain
- T8 Inspection door

fig. 7

ELLPREX Model	Nominal Output kW	Nominal Input kW	Water content l	Water side pressure loss(**) m w.c.	Smoke side pressure loss mm w.c.	Maximum working pressure bar	Weight kg	CONNECTIONS				
								T1 T2 UNI 2278 PN16	T3 UNI 2278 PN16	T4 ISO 7/1	T5 Øi mm	T6 Ø mm
ELL 1100	860÷1100	935÷1200	1040	0,18÷0,30	32÷52	6	1821	DN 150	DN 80	Rp 1½	400	320
ELL 1320	1000÷1320	1087÷1442	1242	0,20÷0,35	38÷67	6	2030	DN 150	DN 80	Rp 1½	400	320
ELL 1570	1200÷1570	1304÷1715	1418	0,19÷0,33	35÷60	6	2780	DN 175	DN 100	Rp 1½	450	320
ELL 1850	1400÷1850	1520÷2020	1617	0,26÷0,45	42÷73	6	3280	DN 175	DN 100	Rp 1½	450	320
ELL 2200	1700÷2200	1845÷2400	2086	0,21÷0,34	39÷65	6	4145	DN 200	DN 125	Rp 1½	520	380
ELL 2650	2000÷2650	2170÷2890	2324	0,28÷0,48	43÷76	6	4465	DN 200	DN 125	Rp 1½	520	380

ELLPREX Model	DIMENSIONS															
	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm	L mm	M* mm	N mm	O mm	P mm	Q* mm	R* mm
ELL 1100	1352	1952	1432	190	207	187	810	595	2346	180	1540	461	330	500	1250	1846
ELL 1320	1352	2292	1432	190	207	187	810	595	2686	180	1540	461	670	500	1250	2186
ELL 1570	1462	2282	1542	190	227	272	880	640	2781	75	1650	561	510	550	1360	2176
ELL 1850	1462	2652	1542	190	227	272	880	640	3151	75	1650	561	880	550	1360	2546
ELL 2200	1622	2692	1702	190	259	274	950	690	3225	75	1810	661	670	700	1520	2590
ELL 2650	1622	3014	1702	190	258	273	950	690	3545	75	1810	662	990	700	1520	2910

(*) Minimum dimensions for boiler room access requirements.
 (**) Hydraulic resistance for delta T 15K.

DETAIL FOR DOOR DRILLING
ELL 1100÷1320

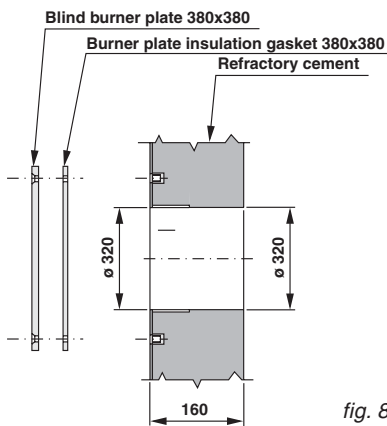


fig. 8

DETAIL FOR DOOR DRILLING
ELL 1570÷1850

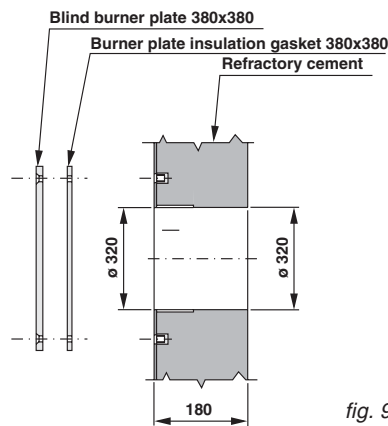


fig. 9

DETAIL FOR DOOR DRILLING
ELL 2200÷2650

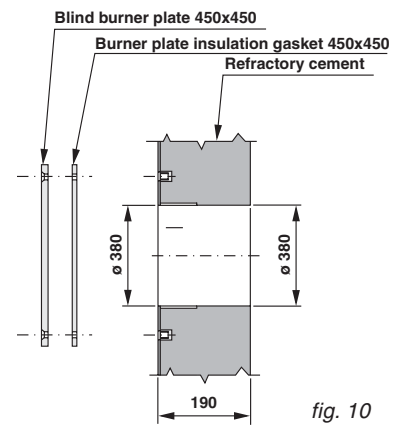
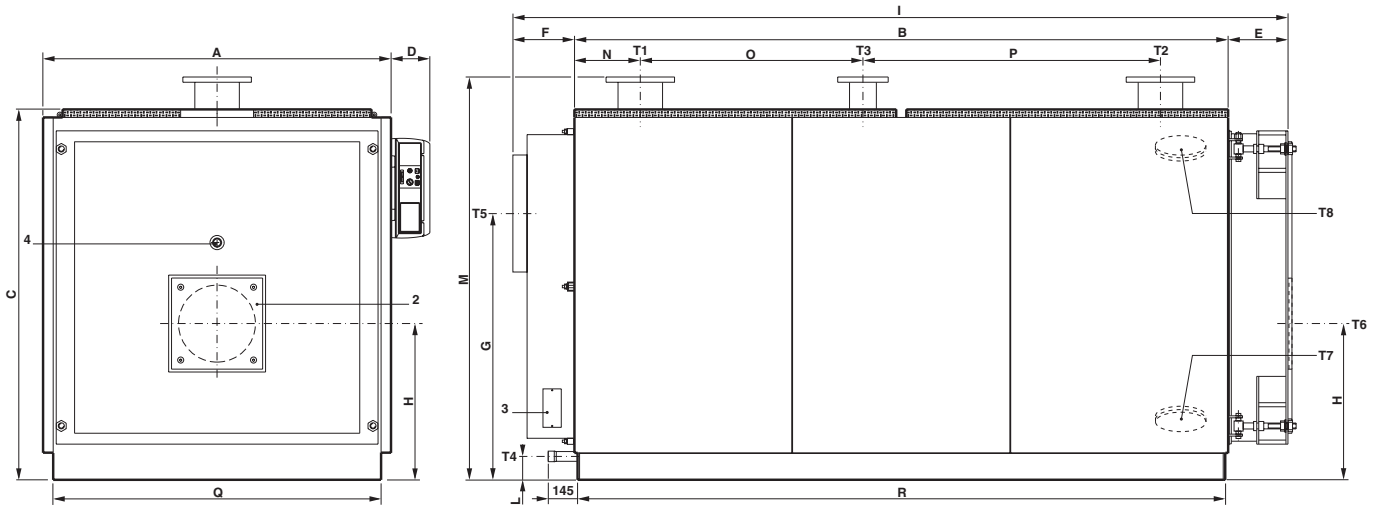


fig. 10

DIMENSIONS AND HYDRAULIC CONNECTIONS FOR ELLPREX 3000÷3500



- 1 Panel board
- 2 Burner fixing plate
- 3 Smoke chamber cleaning door
- 4 Sight glass

- T1 C.H. flow
- T2 C.H. return
- T3 Expansion vessel connection
- T4 Boiler drain

- T5 Flue socket
- T6 Max. burner blast tube dia.
- T7 Sludge drain
- T8 Inspection door

fig. 11

ELLPREX	Nominal Output	Nominal Input	Water content	Water side pressure loss(**)	Smoke side pressure loss	Maximum working pressure	Weight	CONNECTIONS				
								T1 T2	T3	T4	T5	T6
Model	kW	kW	l	m w.c.	mm w.c.	bar	kg	UNI 2278 PN16	UNI 2278 PN16	ISO 7/1	Øi mm	Ø mm
ELL 3000	2300÷3000	2492÷3280	2667	0,36÷0,62	35÷60	6	5110	DN 200	DN 125	Rp 1½	570	380
ELL 3500	2700÷3500	2930÷3825	4142	0,54÷0,84	47÷78	6	6700	DN 200	DN 125	Rp 1½	620	380

ELLPREX	DIMENSIONS															
	A	B	C	D	E	F	G	H	I	L	M*	N	O	P	Q*	R*
Model	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
ELL 3000	1720	3230	1830	190	295	340	1315	772	3835	115	1990	325	1100	1330	1620	3200
ELL 3500	1970	3194	2090	190	325	390	1535	915	3879	144	2271	377	1060	1280	1870	3164

(*) Minimum dimensions for boiler room access requirements.
 (**) Hydraulic resistance for delta T 15K.

DETAIL FOR DOOR DRILLING ELL 3000÷3500

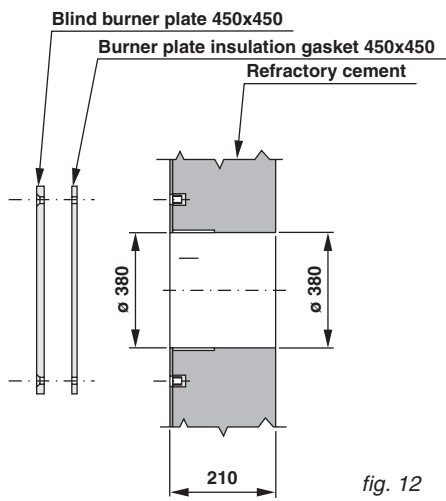


fig. 12

2

INSTALLATION

2.1 - PACKAGING

The ELLPREX boilers are supplied complete with door and smoke chamber already fitted, whilst the casing with the insulation mattress are contained in separate cardboard packaging(s).

After having removed every packing make sure the content is undamaged.

In case of doubt do not use the boiler and revert your self to the supplier.

The elements of the packing must not be left to the course of the children as potential sources of danger.

The panel board and the accessories are inside the combustion chamber.

Before starting the installation make sure that the length and the width of the boiler body

received correspond to the dimensions **M, Q e R** of the ordered boiler, shown in the previous tables and that the cartons, containing the casing, or part of it, are marked with the same model.

The casing of the boilers **ELL 170 to ELL 510**, complete with the insulation mattress, is contained in just one carton.

The casing of the boilers **ELL 630 to ELL 2200** is contained in 3 cartons.

The casing of the boilers **ELL 2650** is contained in 4 cartons.

The casing of the boilers **ELL 3000 ed ELL 3500** is contained in 3 cartons.

In addition to the a. m. panel board, packaged in its own carton, in the combustion chamber,

as accessories, there are also:

- a carton containing the flanges for flow, return and safety connections (if applicable) with relevant gaskets and bolts, the cylindrical brush for the cleaning of the smoke pipes.
- cleaning brush handle extension.
- turbulators extractor.
- ceramic fiber rope for the insulation between the door and burner blast tube.
- the turbulator cores, only for models ELL 170÷ELL 870 (for their positioning, see table on page 28).

2.2 - HANDLING

The boiler can be moved into position by lifting, through the upper hooks(s), or by the use of rollers placed under the strong L profiles of

the basement.

If it necessary, due to the dimensions of the boiler, it is possible to remove the front door

and the smoke chamber to facilitate the introduction in the boiler house.

2.3 - POSITIONING IN THE BOILER HOUSE

The installation of the boiler must be in accordance with the relevant requirements of the Gas Safety Regulations, current I.E.E. Regulations, local water authority bye-laws and it should also comply with any relevant requirements of the local gas supplier, local authority and the relevant Standard Codes of Practice and building regulations.

The boiler house must be ventilated through permanent openings having a total surface not lower than 1/30th of the floor area of the boiler house, with a minimum of 0.5 m².

Ventilation by grilles communicating directly with the outside air is required at both, high and low levels.

Do not obstruct the grates of aspiration of the air or dissipation of the heat.

The boiler must be positioned so that there is enough space available for the following:

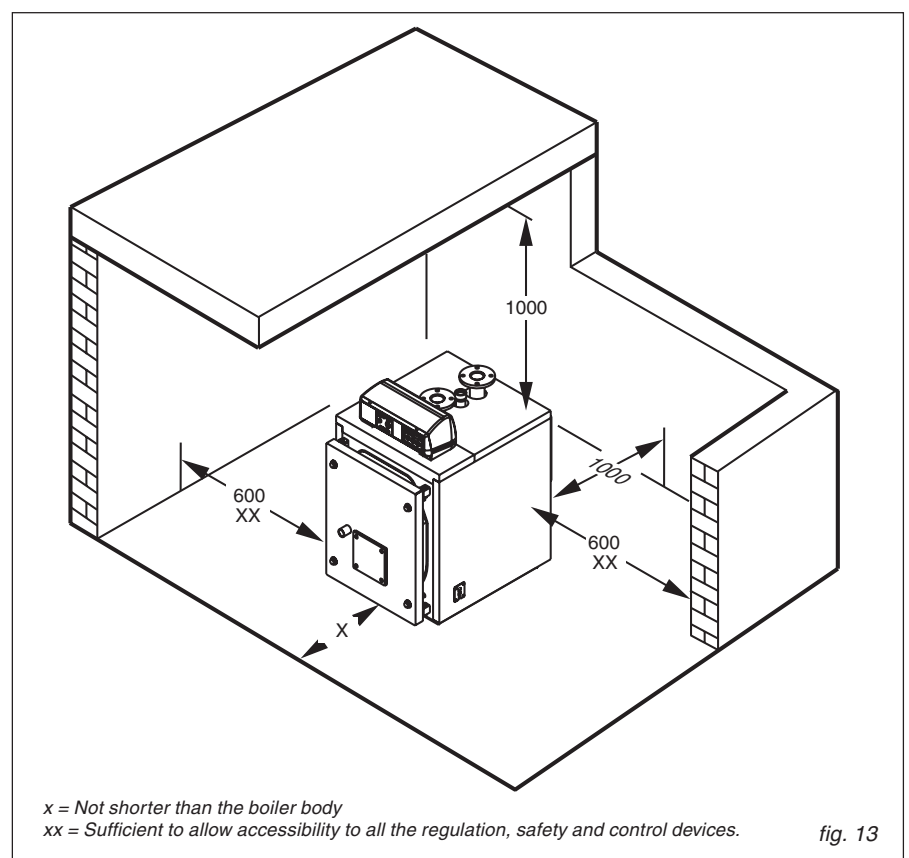
- Access around the boiler fore servicing
- Space to open the boiler front door
- Space to access the burner.

The installation of the boiler as close as possible to the chimney position is highly recommended.

To allow the cleaning of the smoke pipes, in front of the boiler a clearance equal to the length of the boiler, has to be available.

With the boiler door opened at 90°, the distance between the front of the door and the adjacent wall must be equal, at least, at the length of the burner.

The boiler must stand on a non-combustible floor (i.e. concrete or brick), of dimensions **Q x R** (see dimensions table) which must be



flat, level and of a suitable load bearing capacity to support the weight of the boiler (when filled with water) and any ancillary equipment.

Once the installation has been made the boiler must result perfectly horizontal and well stable (to avoid vibrations and noise).

2.4 - CONNECTION TO THE CHIMNEY

The chimney has a fundamental importance for the good operation of the boiler. Due to the low temperature of the smokes during the intermittent operation, it is necessary that the chimney is perfectly impermeable to the condensate of the combustion products and manufactured with corrosion resistant materials.

The different connections must be sealed with an approved boiler putty so that the inlet of fresh air, with consequent increase of the possibility of condensate formation, is avoided. Furthermore the possible condensate or rain water coming from the chimney must be avoided from entering the smoke chamber of the boiler.

As far as the cross section and the high of the chimney is concerned, it is necessary to make

reference to the local and national rules in force.

In the flue pipe, between the boiler and the chimney, convenient sampling points for smoke temperature and combustion products analysis must be provided.

2.5 - WATER CONNECTIONS

2.5.1 - FEEDING WATER QUALITY

- The chemical-physical characteristics of the C.H. system and reinstatement water are fundamental for the good operation and safety of the boiler.
- Among the inconvenients caused by the bad quality of the feeding water the most frequent and serious is the scaling of the heat exchange surfaces.
- Less frequent, but also dangerous, is the corrosion of the water side surfaces of all the circuit.
- It is well known that the lime, due to its very low thermal conductivity, reduces the

heat transfer so that also a scaling of a few millimeters produces very dangerous localized overheating.

1mm of lime reduces the heat transfer from metal to water by 10%.

It is suggested to make a water treatment in the following cases:

- A- high hardness of the water available on site (higher than 20°f).
- B- very large C.H. systems.
- C- large quantities of reinstatement water due to water leaks.
- D- subsequent fillings of the system due to maintenance works.
- E- mixing of different metals in the CH circuit.

For the treatment of filling water it is suggested to address them self to specialized firms.

The same firms are able to provide for the descaling of the boilers.

Every C.H. system needs reinstatements of water, due to evaporation, small or large water leaks or for maintenance works.

It is, therefor, necessary to be able to evaluate the entity of the reinstatement water to avoid inconvenients due to untreated water.

For that reason it is suggested to fit, in the feeding line to the boiler, a water meter for small capacities.

2.5.2 - C.H. FLOW AND RETURN CONNECTIONS

The dimensions of flow and return connections are shown, for each boiler model, in the table DIMENSIONS. Before connecting the boiler to the C.H.

system, this one has to be throughly cleaned. Make sure in the system there is a sufficient number of air venter.

When connecting flow and return pipes avoid to create mechanical stress onto the boiler flanges.

The boiler is not made to support the piping of the C.H. system, which needs dedicated supports.

Once the complete C.H. system is finished, check for water leaks all the connections.

2.5.3 - CONNECTION OF FILLING AND DRAIN TAP

For the filling and drain of the boiler a dedicated tap can be connected to the point T4, which is in rear part of the boiler.

2.5.4 - CONNECTION OF THE PRESSURE RELIEF VALVE

Fit onto the point T3 or onto the supply pipe, within 0.5m from the flow flange, a pressure relief valve properly dimensioned for the

boiler capacity and in conformity with the local rules in force.

It is forbidden to put any gate valve between the boiler and the pressure relief valve.

The maximum working pressure of the boiler

is 6 bar; the pressure relief valve has to be selected accordingly.

2.5.5 - CONNECTION OF THE EXPANSION PIPE AND VESSEL

An expansion vessel is always necessary, to compensate the water volume increase due to the heating.

The ELLPREX boilers are suitable for fully pumped systems, which can be open vented or sealed.

In the 1st case the height of the hydrostatic column must be, at least, 3m above the boiler

casing and the capacity of the expansion cistern shall be able to contain, between the water surface and the overflow pipe, the volume increase of all the water of the C.H. system. Preference shall be given to high and narrow cisterns, to expose to the air a surface as small as possible, thus reducing the water evaporation.

In the 2nd case the vessel capacity has to be calculated taking into consideration:

- The total volume of the water contained in the system. The maximum working pressure of the system (see setting of PRV).
- The maximum working pressure of the expansion vessel.
- The initial preloading of the expansion vessel.
- The maximum working temperature of the boiler (the maximum setting of the thermostat fitted onto the panel board is

90 °C; under this aspect it is suggested to consider 100 °C.

The expansion pipe connects the C.H. system to the expansion vessel.

This pipe which starts from the connecting point T3 (see table DIMENSIONS), must have NO gate valve on it.

2.5.6 - SHUNT PUMP

The ELLPREX boilers must always operate in forced circulation hot water systems and with a minimum return temperature of 55 °C.. So, it is suggestable to adopt a shunt pump, having also an anti-condensation purpose,

installed between the flow and return connections, upstream an eventual 3 or 4 way mixing valve.

This pump will be sized according to the following formula:

$$Q = P \times 22$$

where **Q** = Water flow rate in liter/h
P = Boiler nominal output in kW
 and the manometric head 1-2 m w.c.

2.6 - FURNACE DOOR: ADJUSTMENT, OPENING & CLOSING

2.6.1 - BOILERS "ELL 170 - ELL 630"

For all these models the hinging and the fixing of the door are made according the schema of fig. 14.

In these cases the door is mounted with 4 hinges of the same type: the two ones on the L.H. side, with the shaft **A** inserted, are normally used as rotating hinges (from Right to Left), whilst the two ones on the R.H. side are used as door support; the door is then blocked with four screws.

Exactly the contrary will happen when the door is hinged on the R.H. side and the door needs to be opened from Left to Right.

To get the reversion of the opening it is sufficient to move the shafts **A** on the opposite side.

On the door of these models of boiler the following adjustments are possible:

A) Adjustment in vertical way: it is possible only by introducing some washers of convenient thickness under the hinge on which the door rotates.

B) Adjustment in transversal way: it is possible by unscrewing and side moving the hinges fixed to the front tube plate.

C) Adjustment in axial way: it is possible by screwing more or less the fixing screws.

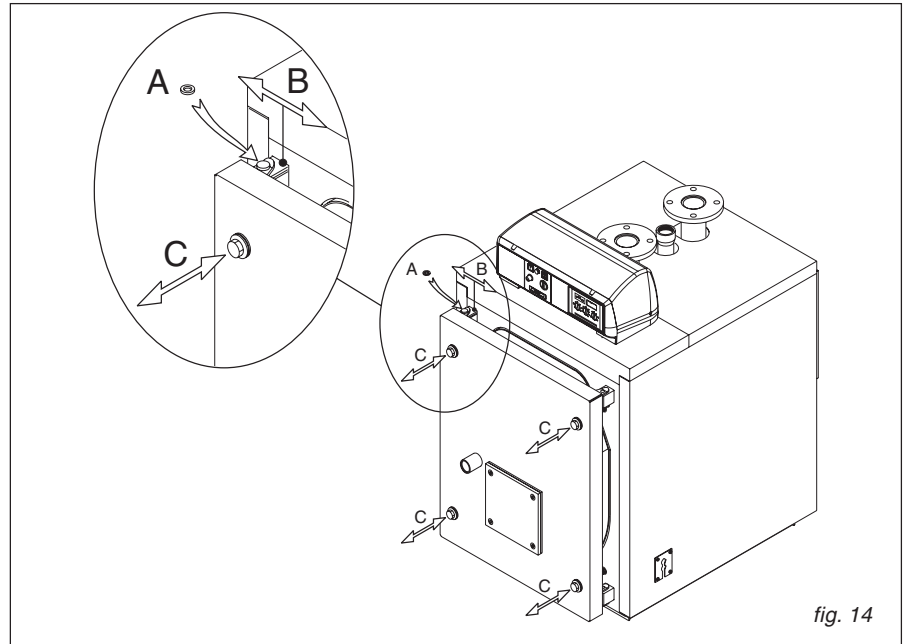


fig. 14

2.6.2 - BOILERS "ELL 760 - ELL 970"

For all these models the hinging and the fixing of the door are made according the schema of fig. 15.

In these cases the two hinges on the L.H. side are normally used as rotating hinges (from Right to Left), whilst the two ones on the R.H. side are used as closing hinges.

Exactly the contrary will happen when the door is hinged on the R.H. side and the door needs to be opened from Left to Right.

To get the reversion of the opening it is sufficient to move the rear couternuts onto the opposite side.

On the door of these models of boiler the following adjustments are possible:

A) Adjustment in vertical way: it is possible by acting on the nut of the upper shaft of the rotating hinge.

B) Adjustment in transversal way: it is possible by unscrewing and side moving the hinges fixed to the front tube plate.

C) Adjustment in axial way: it is possible by screwing more or less the fixing screws.

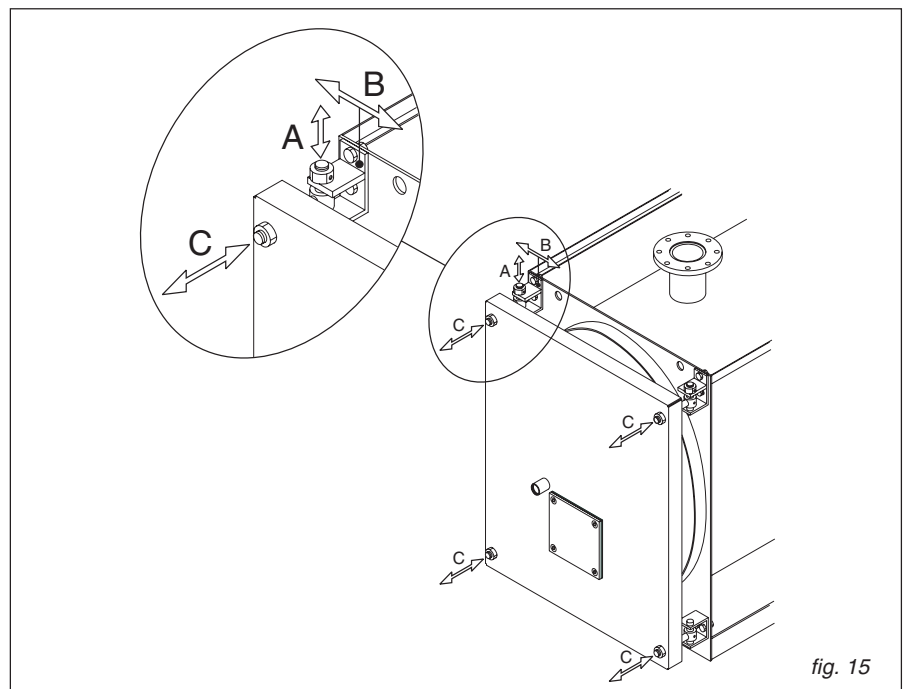


fig. 15

2.6.3 - BOILERS “ELL 1100-ELL 3500”

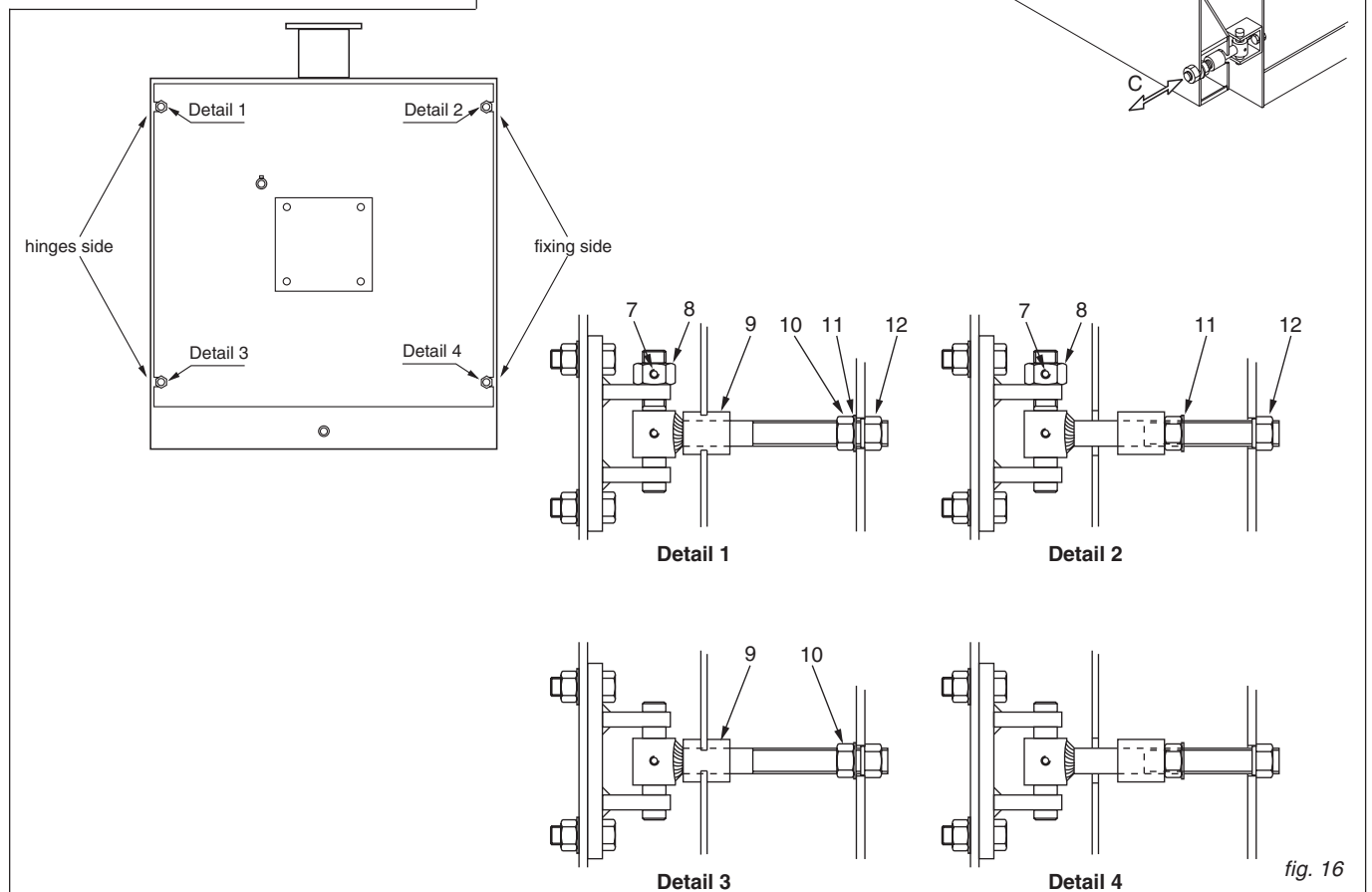
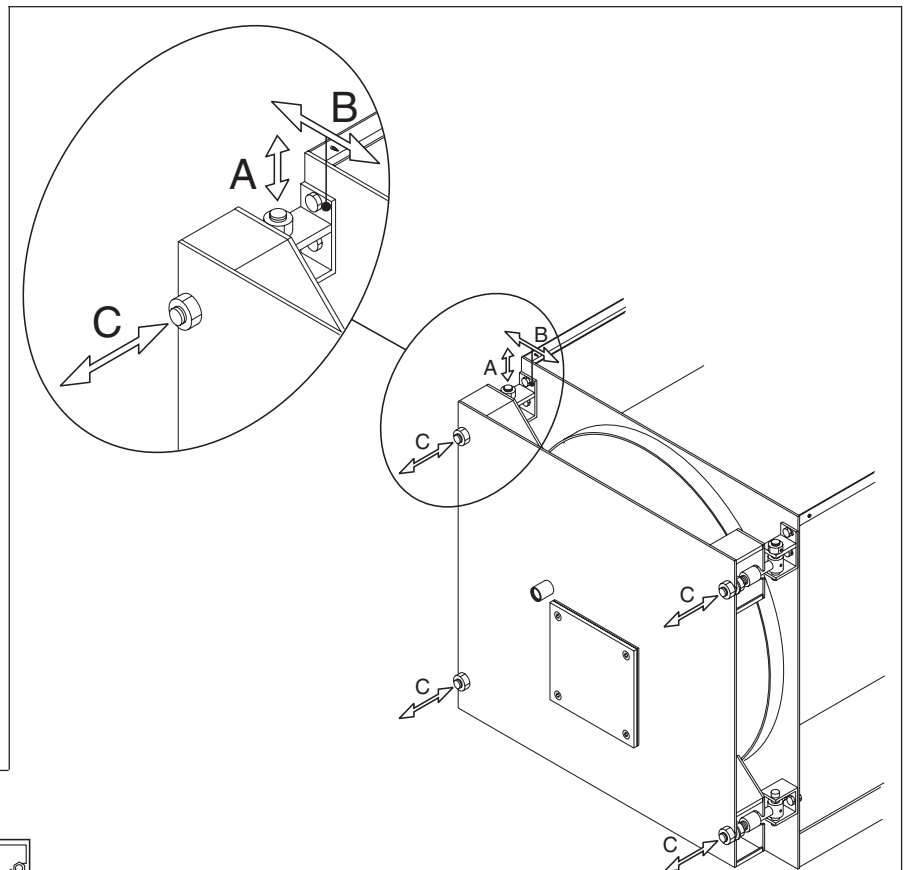
For all these models the hinging and the fixing of the door are made according to the schema of fig. 16.

In these cases the two hinges on the L.H. side are normally used as rotating hinges (from Right to Left), whilst the two ones on the R.H. side are used as closing hinges. Exactly the contrary will happen when the door is hinged on the R.H. side and the door needs to be opened from Left to Right.

To get the reversion of the opening it is sufficient to move le bussole di sostegno della porta.

On the door of these models of boiler the following adjustments are possible:

- A) Adjustment in vertical way:** is possible by means of rotation of nut after removal of the grub screw.
- B) Adjustment in transversal way:** is possible only by loosening the hinges fixed to the front tube plate of the boiler and moving them a little bit sideways.
- C) Adjustment in axial way:** further adjustment to the position of the door in relation to the chamber can be achieved through adjustment of the nuts (12) and counter-nuts (10).



2.6.4 - IMPORTANT NOTE

Before opening the furnace door it is necessary to adopt the following precautions:

- Close the fuel cock (oil or gas) to the burner.
- Cool down the boiler by keeping the water

circulating through it, and only then switch off the power.

- Put on the boiler a Warning notice with the following text: DO NOT USE, BOILER

UNDER SERVICE, OUT OF ORDER.

2.7 - BURNER

2.7.1 - CONFORMITY OF THE BURNER

All the burners equipping the ELLPREX boilers must be CE certificated and must conform

to the following directives and standards:

- Gas Appliances Directive (90/396/CEE);
- EMC Directive (89/336/CEE).
- EN 267 - Automizing oil burners of monobloc type - Testing -

- EN 676 - Automatic forced draught burners for gaseous fuels.

2.7.2 - CHOICE OF THE BURNER

The correct choice and the adjustment of the burner are fundamental for the best operation of the boiler and then they shall be accurate and not underevaluated.

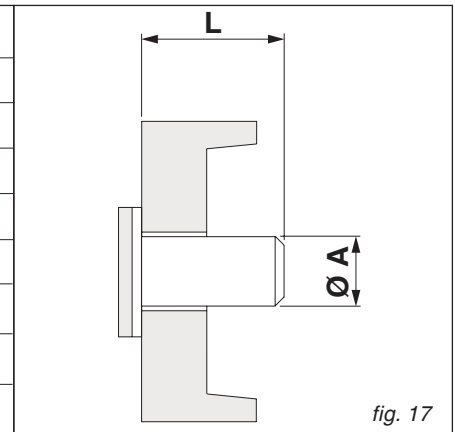
The burner will be selected by verifying that its working diagram (fuel flow rate - pressure in the furnace) is compatible with the same features declared for the boiler.

Remember that the smoke side resistance, i.e. the counterpressure in the furnace, are referred to "0" draught at the chimney base. It is also convenient that the burner blast tube have its length not shorter than that shown in table 17 and that the flame have a shape suitable to the characteristics of the ELLPREX furnace.

In fact to better exploit all the heating surface of the reversed flame furnace it is necessary to use burners capable to guarantee a long and narrow flame at all operating conditions or also at minimum input in case of two stage or modulating burners.

Too short flames can cause a localized overheating of the front part of the furnace, and the combustion products, not sufficiently

BOILER MODEL	øA mm	L mm
ELLPREX 170 - 240	180	250
ELLPREX 290 - 630	210	250
ELLPREX 760 - 970	270	270
ELLPREX 1100 - 1320	320	300
ELLPREX 1570 - 1850	320	320
ELLPREX 2200 - 2650	380	350
ELLPREX 3000 - 3500	380	400
BURNER BLAST TUBE MIN. LENGTH		



cooled down, entering the smoke pipes at a too high temperature, can cause important damages to the boiler.

The burner manufacturing companies are able to supply the flame dimensions developed by their burners.

More informations are given in the paragraph

"Commissioning".

2.7.3 - BURNER INSTALLATION

Before fitting the burner it is necessary to verify the position of the turbulators inside the smoke pipes: each pipe must have its turbulator and this one has to be positioned as indicated in the table on page 28.

When mounting the burner to the boiler front door, check for soundness around the burner flange and its gasket.

Each boiler is supplied with a length of ceramic fibre rope (cross section 25x25 mm).

This rope has to be put around the burner tube to completely seal the tube and the hole in the door insulation.

Be careful not to leave fissures between the burner tube and the hole in the door.

In case a cone, having a diameter larger than the burner tube, the cone is to be removed before fitting the burner and refitted later on. After the burner has been fitted, check that the flexible hoses for the oil and the electrical

cables are long enough to allow the 90° opening of the boiler door.

For gas burners the use of flexible pipes for the gas is not allowed; so the final part of the gas feeding line to the burner must have the possibility to be removed, via a threaded or flanged connection.

2.8 - CONNECTION OF THE SIGHTGLASS TO THE BURNER VIA A COOLING LINE

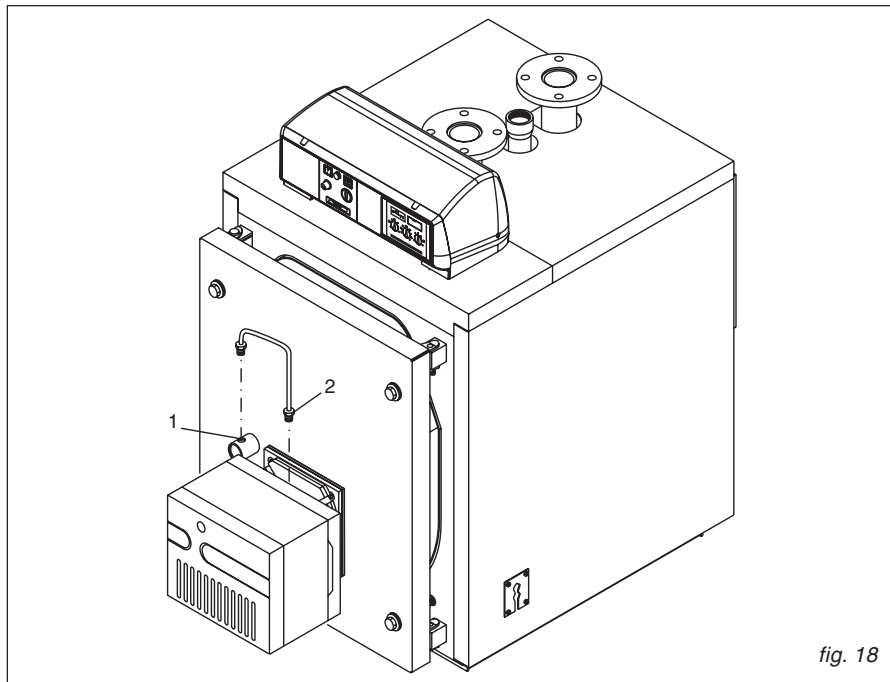
The flame sightglass is equipped with a 1/8" threaded connection (pos. 1) on which a pressure test nipple (9mm dia.) is fitted. This can be used with a silicon pipe for the measurement of the counterpressure in the combustion chamber.

At the place of this pressure test nipple, which must be held, a special microbore pipe (pos. 2) will connect the flame sightglass directly to the pressure room downstream the fan of the burner.

The air, blown by the fan, will cool down and clean the sightglass.

If the sightglass is not cooled down it can be broken down.

WARNING: In the proximity of the sightglass the temperature is very high: be careful!!!



2.9 - CASING ASSEMBLY

N.B. It is suggested to verify that the boiler is positioned in its final place and that all the hydraulic connections are made correctly before starting the casing assembly.

Before opening the casing carton(s) make sure they are stamped with the right boiler model, corresponding to the boiler to be installed.

N.B.: The packaging containing the panel board is delivered inside the combustion chamber, as well as the documents and the guarantee certificate.

N.B. For the models **ELL 170 to ELL 510** (ref. fig. 19), the casing and the insulation are contained in one carton stamped:

24182 (ELLPREX 170)
24183 (ELLPREX 240)
24184 (ELLPREX 290)

24185 (ELLPREX 340)
24186 (ELLPREX 420)
24187 (ELLPREX 510)

N.B. For the model **ELL 630** (ref. fig. 19) and for the models **ELL 760 to ELL 2200** (ref. fig. 21 & 22), the casing and the insulation are contained in 3 cartons stamped:

25038 (casing front part ELLPREX 630)
25039 (casing rear part ELLPREX 630)
25040 (casing upper part ELLPREX 630)
21497 (casing front part ELLPREX 760)
21498 (casing rear part ELLPREX 760)
22045 (casing upper part ELLPREX 760)

21497 (casing front part ELLPREX 870)
21499 (casing rear part ELLPREX 870)
22046 (casing upper part ELLPREX 870)
21497 (casing front part ELLPREX 970)
21500 (casing rear part ELLPREX 970)
22047 (casing upper part ELLPREX 970)
24004 (casing front part ELLPREX 1100)
24005 (casing rear part ELLPREX 1100)
24006 (casing upper part ELLPREX 1100)
24004 (casing front part ELLPREX 1320)
24007 (casing rear part ELLPREX 1320)

24008 (casing upper part ELLPREX 1320)
22692 (casing front part ELLPREX 1570)
22693 (casing rear part ELLPREX 1570)
22694 (casing upper part ELLPREX 1570)
22692 (casing front part ELLPREX 1850)
22696 (casing rear part ELLPREX 1850)
22697 (casing upper part ELLPREX 1850)
22698 (casing front part ELLPREX 2200)
22699 (casing rear part ELLPREX 2200)
22700 (casing upper part ELLPREX 2200)

N.B. For the model **ELL 2650** (ref. fig. 23) the casing and the insulation are contained in 4 cartons.
For the models **ELL 3000 & ELL 3500** (ref. fig. 24), the casing and insulation are contained in 3 cartons.

22698 (casing front part ELLPREX 2650)
22702 (casing rear part ELLPREX 2650)
22703 (casing upper part ELLPREX 2650)
22704 (casing central part ELLPREX 2650)
26026 (casing front part ELLPREX 3000)
26027 (casing rear part ELLPREX 3000)

26028 (casing central part ELLPREX 3000)
26029 (casing front part ELLPREX 3500)
26030 (casing rear part ELLPREX 3500)
26031 (casing central part ELLPREX 3500)

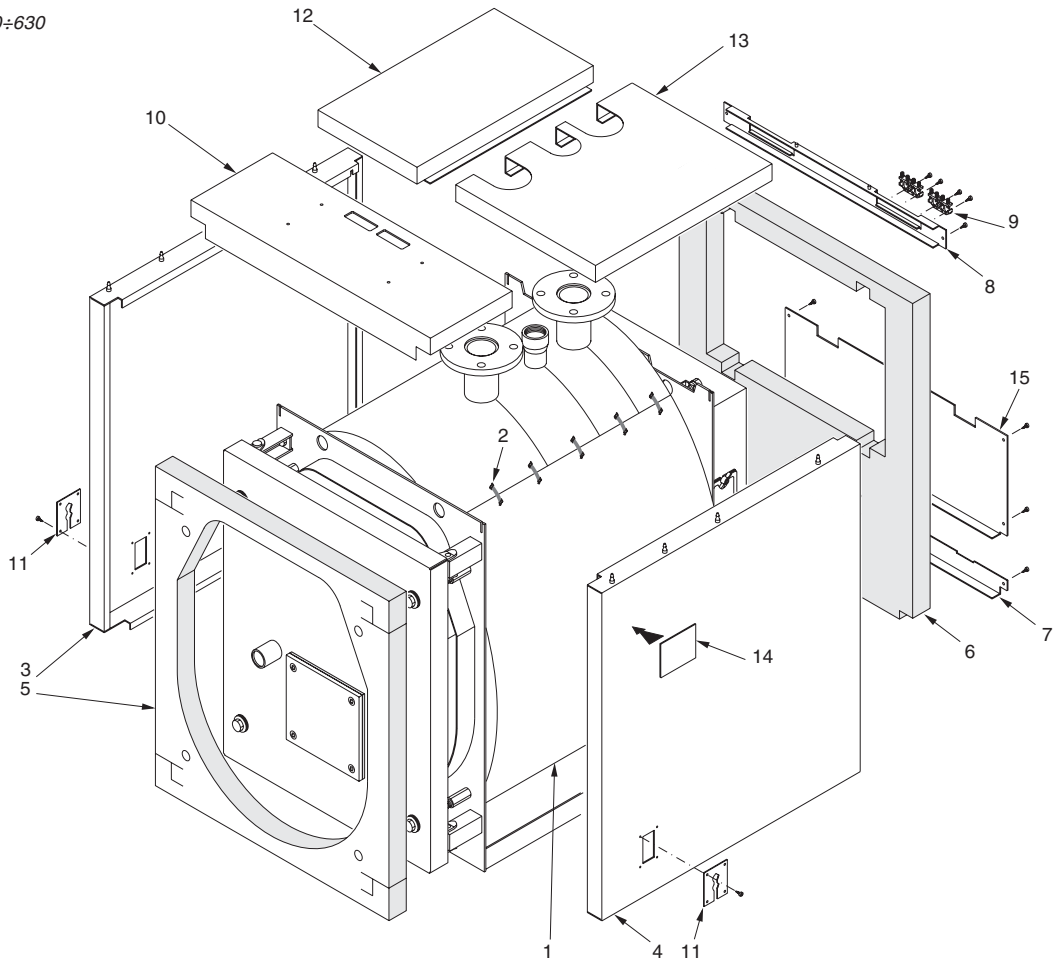


fig. 19

Assembly of the casing should be carried out in the following steps:

Refer to diagram on fig. 19 for details

- A. Fit the insulation blanket (1) onto the boiler shell and secure it in to place using the elasticated straps (2) provided, ensuring that the metal clips grip in to the external surface of the insulation.
- B. Locate the side panels (3) and (4) with the lower bend inside the bottom L profiles and the upper bend in the seats of front and rear tube plates.
To determine which is the left and right panel ensure that the cable clamp plates are positioned facing toward the front edge.
- C. Open the combustion chamber door and fit the front insulation (5), inserting the hinges in the pre-cuts.
Insert the side ends of the insulation under the bend of the two side panels (3 & 4).
- D. Fit the rear insulation (pos. 6), fix the rear lower, intermediate and upper panels (pos. 7, 15 & 8) with the self tapping screws.
Fit the plastic cable clamps (9) to the upper rear panel (8).
- E. After removal of the two side screws from the panel board rotate its cover towards the front and insert the cables and the capillaries of thermometer and thermostats through the slots on its base.
Fit the panel board to front upper panel (10).
Fit the upper panel (10), complete with the panel board to the side panels (3 & 4).
- F) Insert the thermometer and thermostat bulbs in the bulb holders as shown in fig. 20

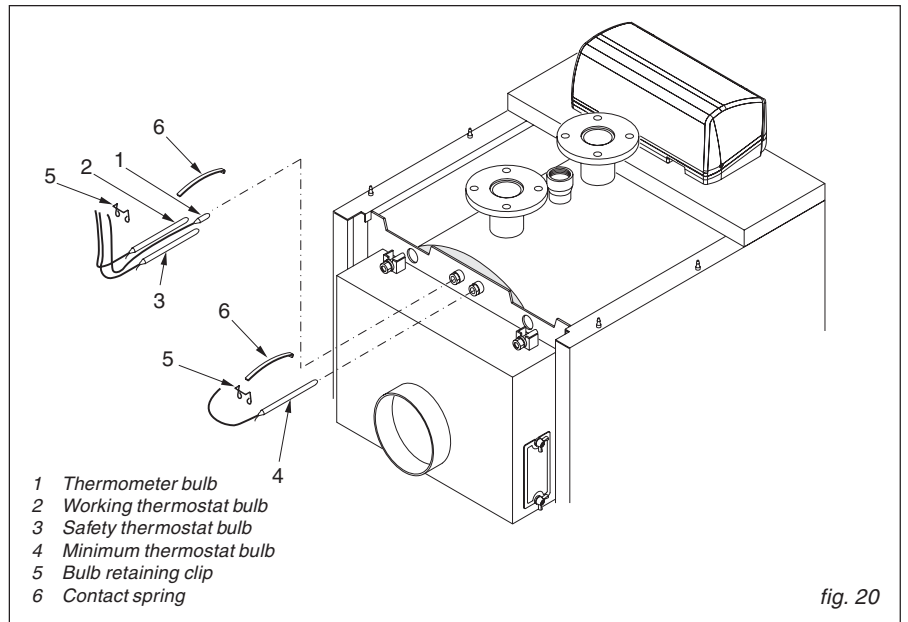


fig. 20

and connect the mains, the burner, the pump(s) and any ancillary equipment to the panel board.
Close the panel board.
Guide the burner plug through the side cable clamp plate (11) on the preferred side and clamp the cable using the cable clamp supplied.
Fix the side cable clamp plates (11) to the casing side panels (3 & 4).
Fit the cables, leaving the boiler from the back side, with the plastic screws of the

cable clamps (9).
G. Position the upper panels (12 and 13) and press them against the side panels.
H. Remove the protective paper film from data plate and ventilation requirement label (14) and fit them at the top front corner of the most accessible side panel after removal of dust from the surface.
The data plate and label are in the documents envelope.

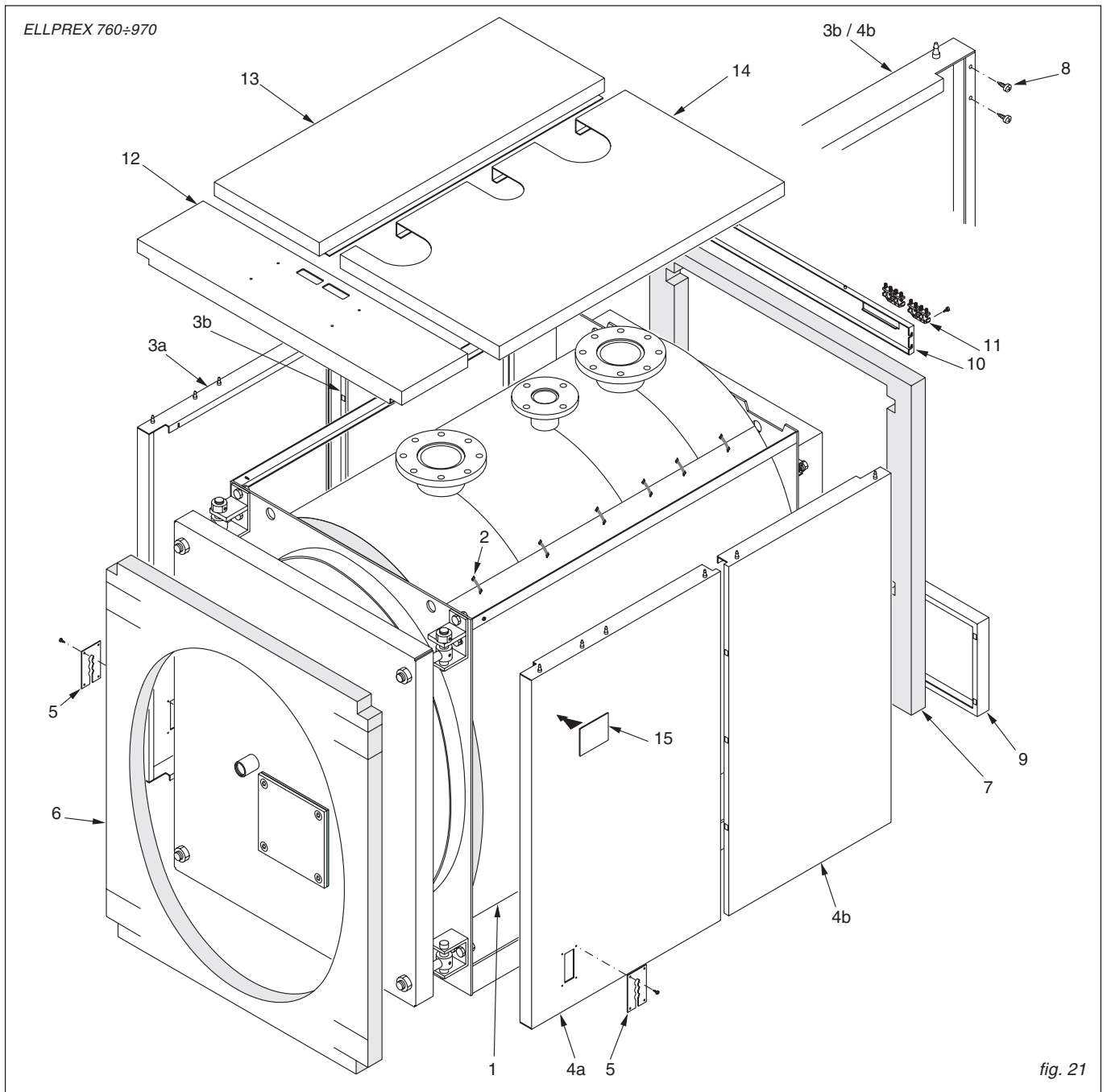


fig. 21

Mounting sequence (Ref. fig. 21)

- A) Fit the insulation blanket (1) onto the boiler shell and secure it in to place using the elasticated straps (2) provided in the accessories box, ensuring that the metal clips grip in to the external surface of the insulation.
- B) Locate the side panels (3a, 3b and 4a, 4b) with the lower bend inside the bottom L profiles and hooking the upper bend to the upper L profile.
To determine which is the left and right panel ensure that the cable clamp plates are positioned facing toward the front edge.
Fit the four flathead screws (8) to the on the inner bend of the rear side panels 3b & 4b.
- C) Open the combustion chamber door and fit the front insulation (6), inserting the hinges in the pre-cuts.
- D) Fit the rear insulation (7), fix the rear lower panel (9) hook the upper rear panel (10) to the screws (8).
Fit the plastic cable clamps (11) to the upper rear panel (19).
- E) After removal of the two side screws from the panel board rotate its cover towards the front and insert the cables and the capillaries of thermometer and thermostats through the slots in its base.
Fit the panel board to front upper panel (12).
Fit the upper panel (12), complete with the panel board to the side panels (3 & 4)
- F) Insert the thermometer and thermostat bulbs in the bulb holders as shown in fig. 20 and connect the mains, the burner, the pump(s) and any ancillary equipment to the panel board.
Close the panel board.
Guide the burner plug through the side cable clamp plate (5) on the preferred side and clamp the cable using the cable clamp supplied.
Fix the side cable clamp plates (5) to the casing side panels (3a & 4a).
Fit the cables, leaving the boiler from the back side, with the plastic screws of the cable clamps (11).
- G) Position the upper panels (13 and 14) and press them against the side panels.
- H) Remove the protective paper film from data plate and ventilation requirement label (15) and fit them at the top front corner of the most accessible side panel after removal of dust from the surface.
The data plate and label are in the documents envelope.

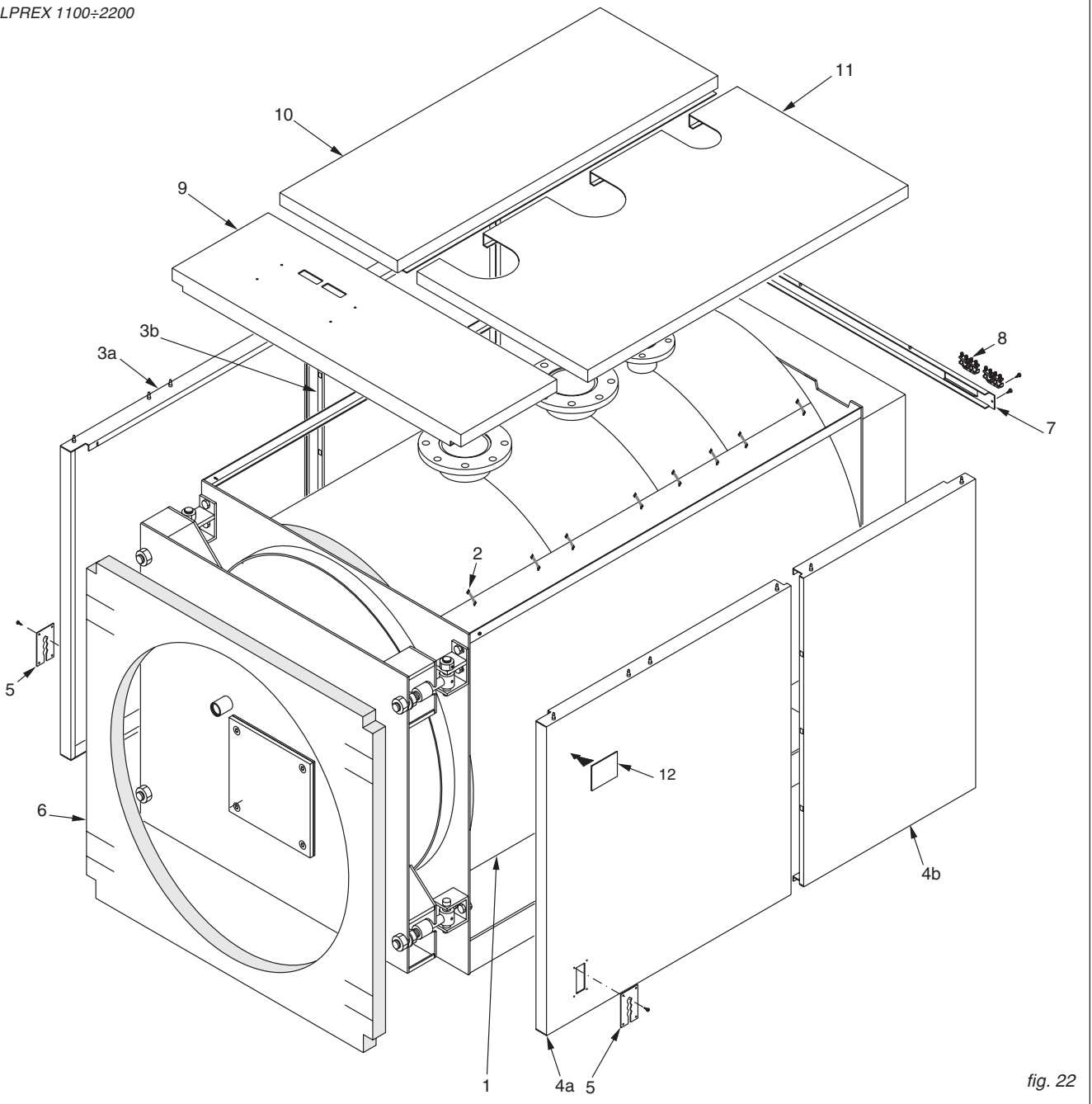


fig. 22

Mounting sequence (Ref. fig. 22)

- A) Fit the insulation blanket (1) onto the boiler shell and secure it in to place using the elasticated straps (2) provided, ensuring that the metal clips grip in to the external surface of the insulation. Make a convenient cut in the upper part of the insulation blanket to get easy access to the bulb holders.
- B) Locate the side panels (3a, 3b and 4a, 4b) with the lower bend inside the bottom L profiles and hooking the upper bend to the upper L profile. To determine which is the left and right panel ensure that the cable clamp plates (5) are positioned facing toward the front edge.
- C) Open the combustion chamber door and fit the front insulation (6), inserting the hinges in the pre-cuts. Insert the side ends of the insulation under the bend of the two side panels (3a & 4a).
- D) Fit the rear upper panel (7). Fit the plastic cable clamps (8) to the upper rear panel (7).
- E) After removal of the two side screws from the panel board rotate its cover towards the front and insert the cables and the capillaries of thermometer and thermostats through the slots on its base. Fit the panel board to front upper panel (9). Fit the upper panel (9), complete with the panel board to the side panels (3a & 4a).
- F) Insert the thermometer and thermostat bulbs in the bulb holders as shown in fig. 25 and connect the mains, the burner, the pump(s) and any ancillary equipment to the panel board. Close the panel board. Guide the burner plug through the side cable clamp plate (5) on the preferred side and clamp the cable using the cable clamp supplied.
- G) Position the upper panels (10 and 11) and press them against the side panels.
- H) Remove the protective paper film from data plate and ventilation requirement label (12) and fit them at the top front corner of the most accessible side panel after removal of dust from the surface.

The data plate and label are in the documents envelope.

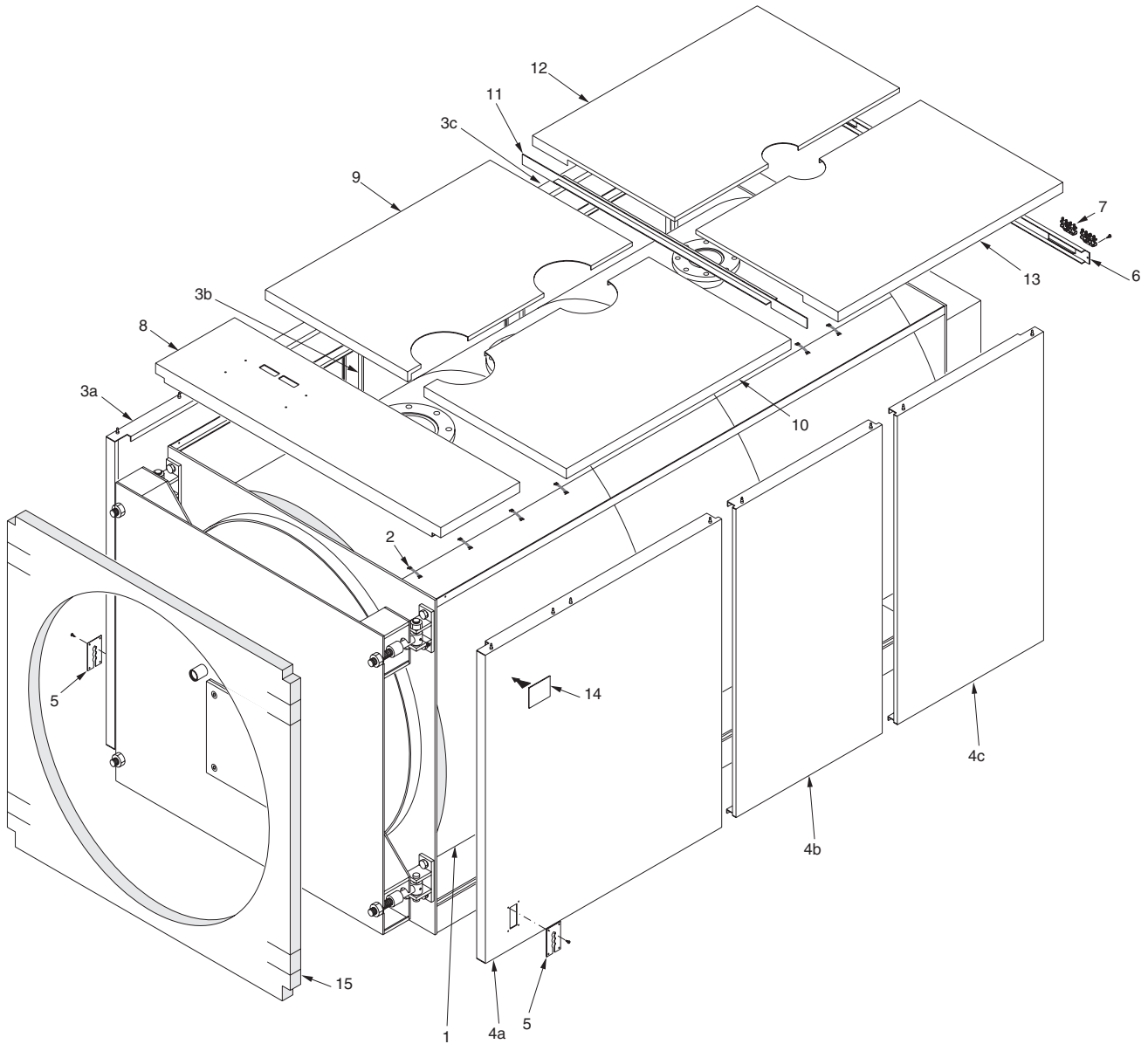


fig. 23

Mounting sequence (Ref. fig. 23)

- A) Fit the insulation blanket (1) onto the boiler shell and secure it in to place using the elasticated straps (2) provided, ensuring that the metal clips grip in to the external surface of the insulation. Make a convenient cut in the upper part of the insulation blanket to get easy access to the bulb holders. Open the combustion chamber door and fit the front insulation (6), inserting the hinges in the pre-cuts.
- B) Locate the side panels (3a, 3b, 3c and 4a, 4b, 4c) with the lower bend inside the bottom L profiles and hooking the upper bend to the upper L profile. To determine which one of the front side panels is the left or the right ensure that the cable clamp plates (5) are positioned facing toward the front edge.
- C) Fit the rear upper panel (6). Fit the plastic cable clamps (7) to the upper rear panel (6).
- D) After removal of the two side screws from the panel board rotate its cover towards the front and insert the cables and the capillaries of thermometer and thermostats through the slots on its base. Fit the panel board to front upper panel (8). Fit the upper panel (8), complete with the panel board to the side panels (3a & 4a).
- E) Insert the thermometer and thermostat bulbs in the bulb holders as shown in fig. 25 and connect the mains, the burner, the pump(s) and any ancillary equipment to the panel board. Close the panel board. Guide the burner plug through the side cable clamp plate (5) on the preferred side and clamp the cable using the cable clamp supplied. Fix the side cable clamp plates (5) to the casing side panels (3a & 4a). Fit the cables, leaving the boiler from the back side, with the plastic screws of the
- F) Position the upper panels (9 and 10) and press them against the side panels.
- G) Slide the support (11) of the upper panels under the panels 9 & 10 and rest it on the side panels 3b & 4b.
- H) Position the upper panels (12 and 13) and press them against the side panels.
- I) Remove the protective paper film from data plate and ventilation requirement label (14) and fit them at the top front corner of the most accessible side panel after removal of dust from the surface. **The data plate and label are in the documents envelope.**

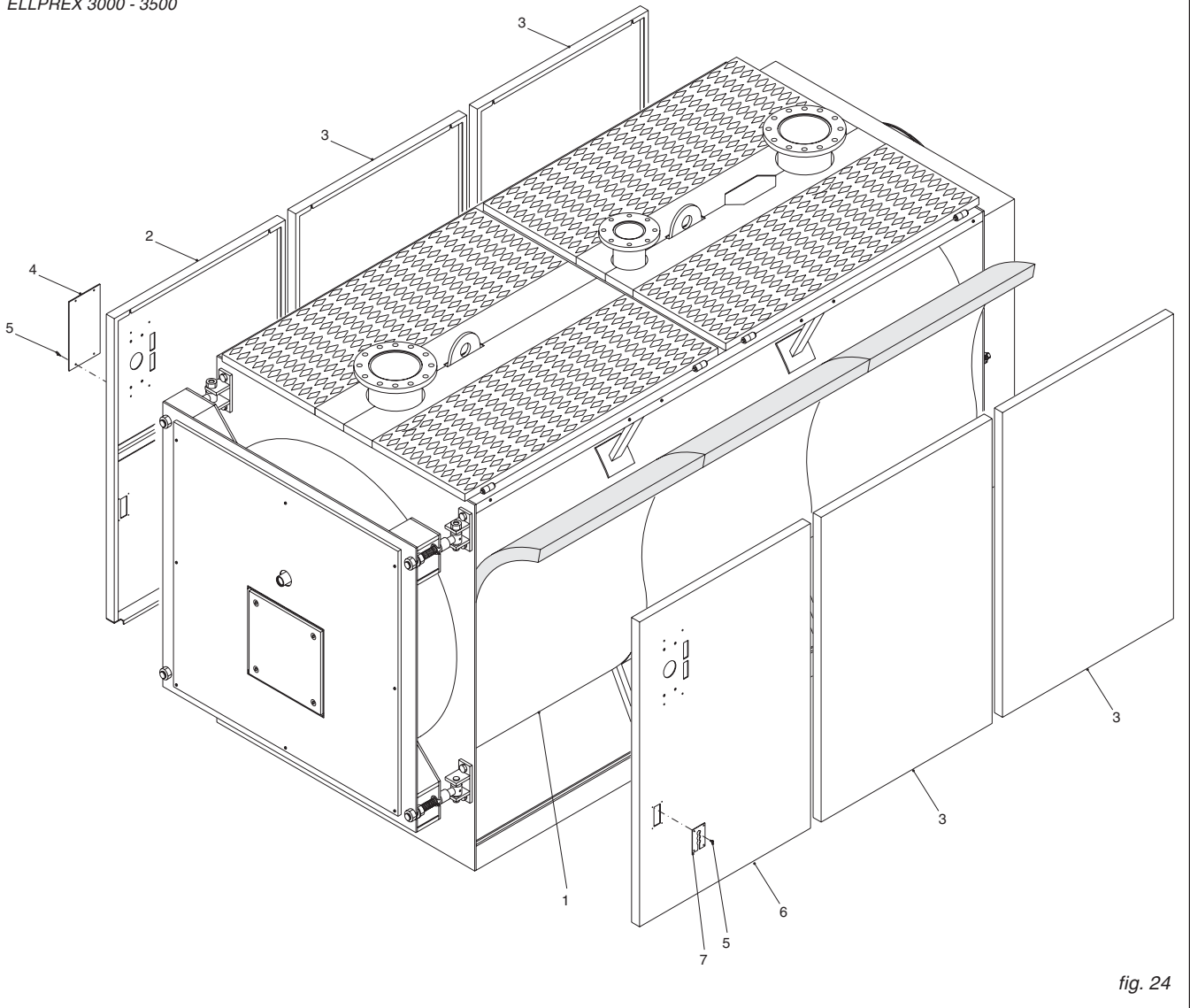


fig. 24

Mounting sequence (Ref. fig. 24)

- A) Fit the insulation blanket (1) onto the boiler shell and secure it in to place using the elasticated straps (2) provided, ensuring that the metal clips grip in to the external surface of the insulation.
Make a convenient cut in the upper part of the insulation blanket to get easy access to the bulb holders.
- B) Position the L.H. side panels (2 & 3) with the lower bend inside the bottom L profiles and hook them to the screws fitted to the upper square tube.
To determine which one of the front side panels is the left or the right ensure that the cable clamp plates (5) are positioned facing toward the front edge.
- C) Position the R.H. side panels (6 & 3) with

- the lower bend inside the bottom L profiles and hook them to the screws fitted to the upper square tube.
To determine which one of the front side panels is the left or the right ensure that the cable clamp plates (5) are positioned facing toward the front edge.
- D) Fit the panel board to the left or right front side panel.
After removal of the two side screws from the panel board rotate its cover towards the front and insert the cables and the capillaries of thermometer and thermostats through the slots on its base.
- E) Insert the thermometer and thermostat bulbs in the bulb holders as shown in fig. 25 and connect the mains, the burner, the pump(s) and any ancillary equipment to the panel board.

- Close the panel board.
Guide the burner plug through the side cable clamp plate (5) on the preferred side and clamp the cable using the cable clamp supplied.
Fix the side cable clamp plates (5) to the casing side panels (2 & 6).
- F) Remove the protective paper film from data plate and ventilation requirement label (14) and fit them at the top front corner of the most accessible side panel after removal of dust from the surface.
The data plate and label are in the documents envelope.

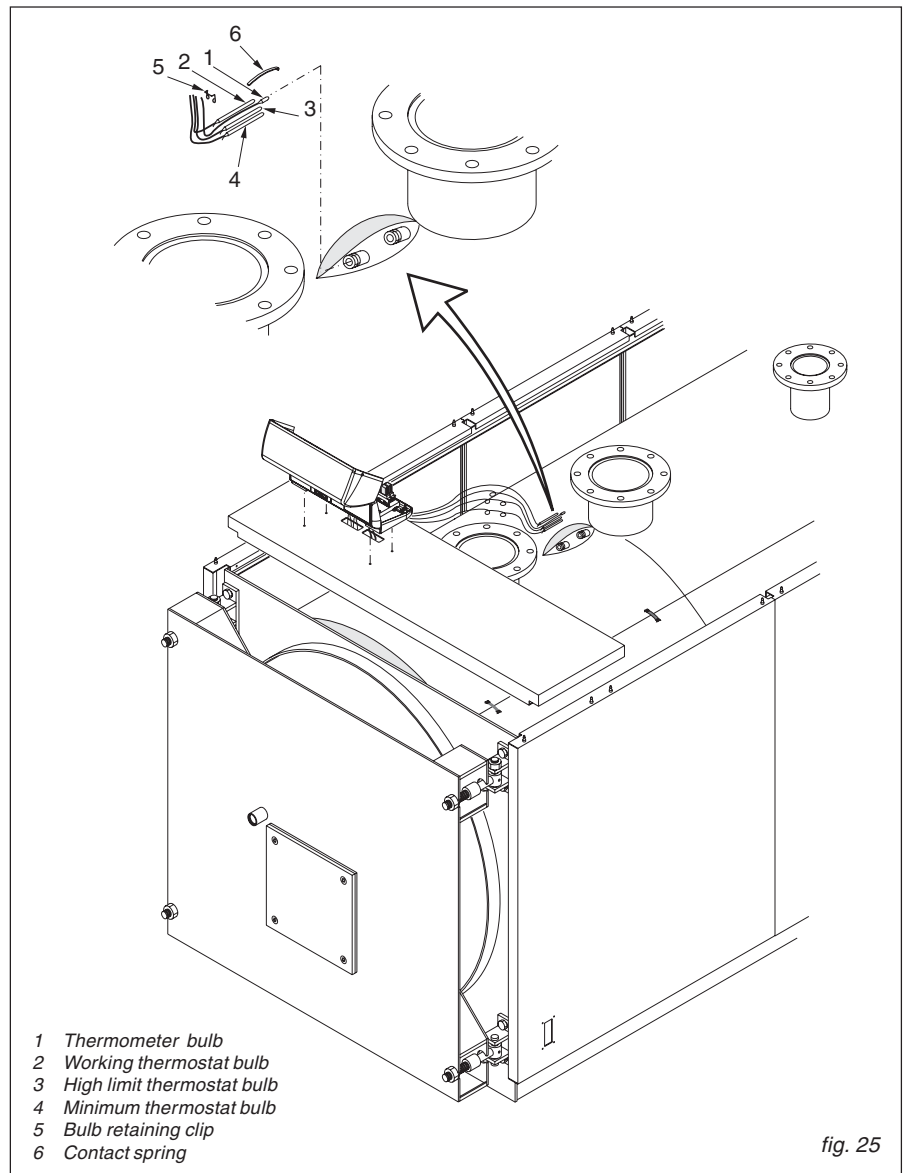
Sequence of bulbs introduction

Introduce the sensors in the upper bulb holder(s) in the following sequence (Ref. to fig. 25):

- thermometer (1)
- working thermostat (2)
- high limit thermostat (3)
- minimum thermostat (4).

We recommend that the introduction of the sensors is made up to bottom of the bulb holder(s).

To get a better contact introduce also the arcuated spring (6) and secure the capillaries with the special clip (5).



3

STANDARD PANEL BOARD

3.1 - PANEL BOARD TYPE 21057 - FUNCTIONS DESCRIPTION

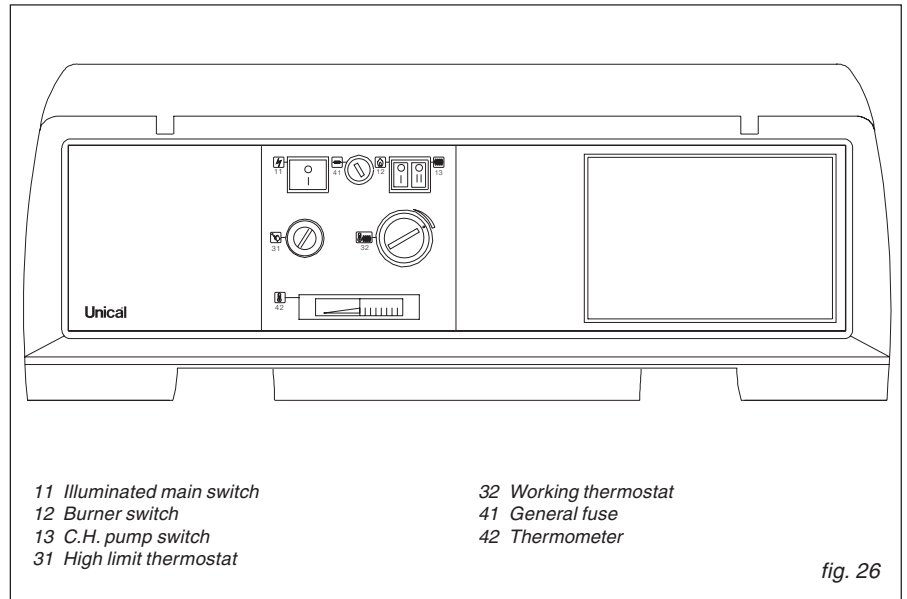
Through the main switch [11] the panel board and all the equipments connected to it will be under power.

The switches [12] & [13] switch On and OFF the power to the burner and the Heating pump (via a relay, if necessary).

With the thermostat [32] the working temperature of the boiler can be adjusted. This thermostat is provided with a DPDT contact, for the control of a two stage burner.

The differential between the switching points of the two double pole is 6°C (not adjustable). The minimum thermostat, accessible through the opening of the panel board cover, switches OFF the C.H. pump during the reaching of the steady state and up to the obtention of 50 °C within the boiler.

On the electrical supply line to the boiler a switch with fuses is to be foreseen.



11 Illuminated main switch
12 Burner switch
13 C.H. pump switch
31 High limit thermostat

32 Working thermostat
41 General fuse
42 Thermometer

fig. 26

3.2 - ELECTRICAL WIRING DIAGRAM FOR SINGLE PHASE BURNER AND PUMP

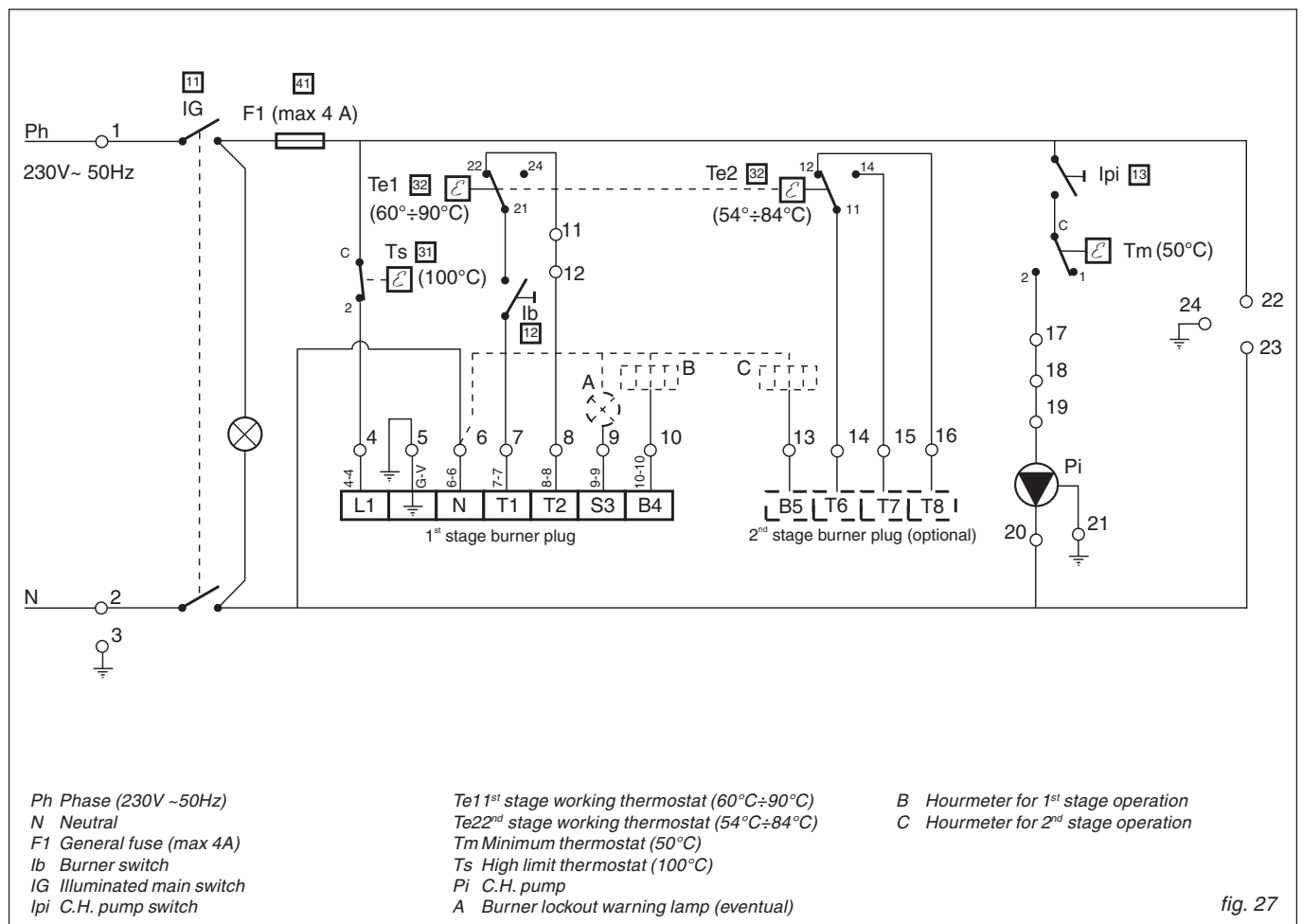


fig. 27

3.3 - INTRODUCTION OF THE ELECTRONIC PANEL BOARD TYPE 28735

The ELLPREX boilers can be supplied with an electronic panel board complete with a digital outer compensator with built-in microcomputer and permanent memory.

The management of the boiler is made through the outer compensator which, in addition to the burner and pump control, can control also two different heating zones.

The automatic operation is made on the base of the data detected by the boiler, D.H.W. storage tank, outer, room and flow temperature sensors. This last sensor will be fitted only when a mixing valve is fitted.

The outer compensator is capable to control several heating system configurations:

- one direct zone C.H. system without mixing valve: the flow sensor has not to be fitted; the outer compensator controls only the pump of the C.H. system No. 1.
- one zone C.H. system with mixing valve: the flow sensor has to be fitted downstream the mixing valve; the outer compensator controls the pump of the C.H. system No. 2.
- two zone C.H. system: one direct and one with mixing valve; the outer compensator controls the direct pump of the C.H. system No. 1, the mixing valve and the pump of the mixed C.H. system No. 2.

The outer compensator sensors (boiler, storage tank, outer and flow) are included in the supply; the room sensors for the C.H. systems No.1 and No. 2 are optionals.

The mixing valve and the relevant motor are not supplied by Unical.

When the room sensor is not fitted (it is optional), the room temperature is determined and controlled only by the heating curve of the outer compensator program.

The electronic panel board type 28735 is supplied as standard with the outer compensator, type 28733, already fitted. If two boilers in cascade are fitted, please get in touch with our after sale service.

3.4 - PANEL BOARD TYPE 28735 - FUNCTIONS DESCRIPTION

Through the main switch [11] the panel board and the ancillary equipments connected to it are powered.

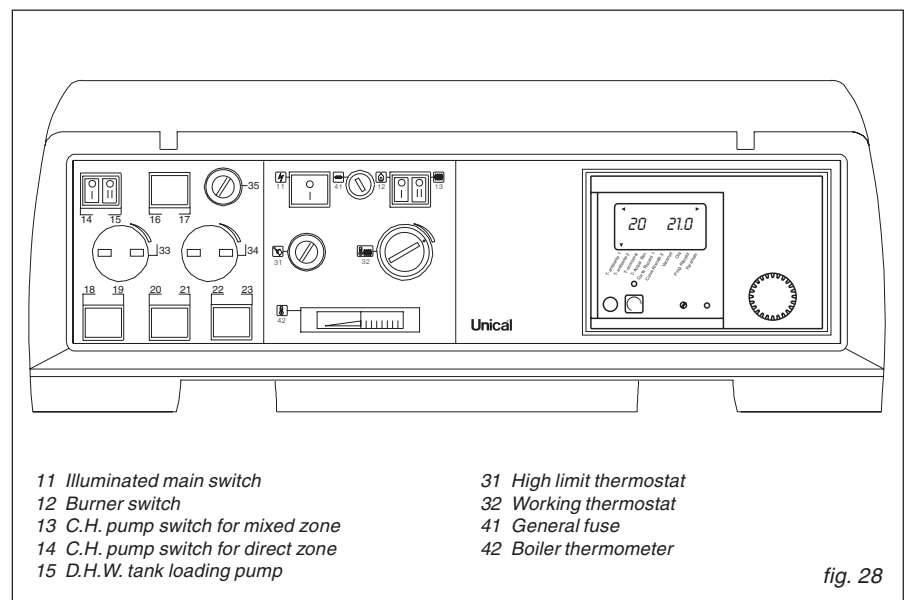
The switches [12] and [13] control the respectively the burner and the heating pump of the mixed zone.

The switches [14] and [15] control the heating pump of the direct zone and the storage tank pump.

Through the thermostat [32] the boiler working temperature is adjusted.

The minimum temperature thermostat, placed under the plug [34] keeps OFF the heating pump during the starting of the boiler till the boiler temperature reaches 30°C.

On the supply line to the boiler panel board a double pole fused switch has to be fitted.



- 11 Illuminated main switch
- 12 Burner switch
- 13 C.H. pump switch for mixed zone
- 14 C.H. pump switch for direct zone
- 15 D.H.W. tank loading pump

- 31 High limit thermostat
- 32 Working thermostat
- 41 General fuse
- 42 Boiler thermometer

fig. 28

3.5 - ELECTRICAL WIRING DIAGRAM FOR SINGLE PHASE BURNER AND PUMPS

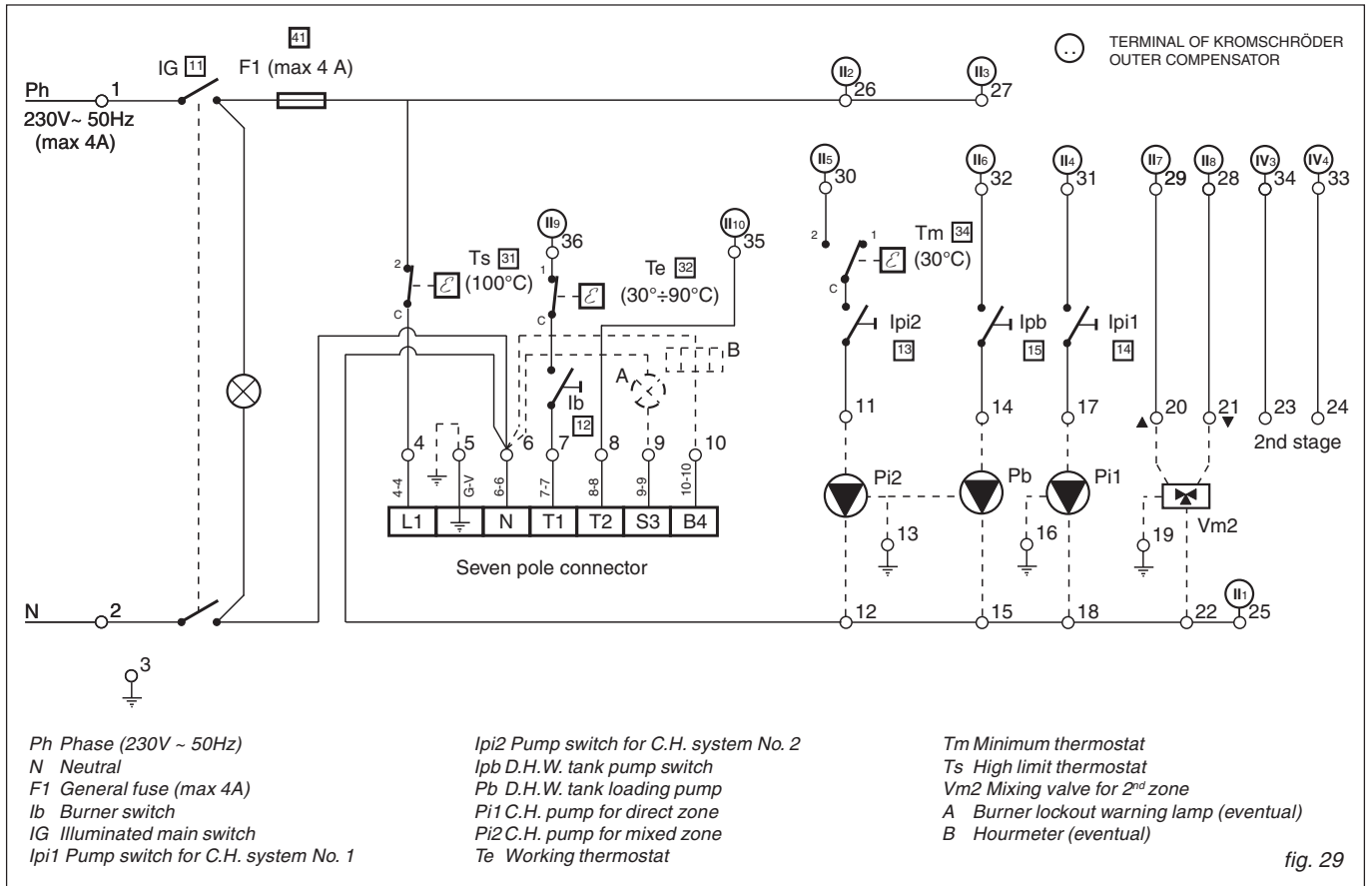


fig. 29

SENSOR CONNECTION ONTO THE OUTER COMPENSATOR TERMINAL STRIP

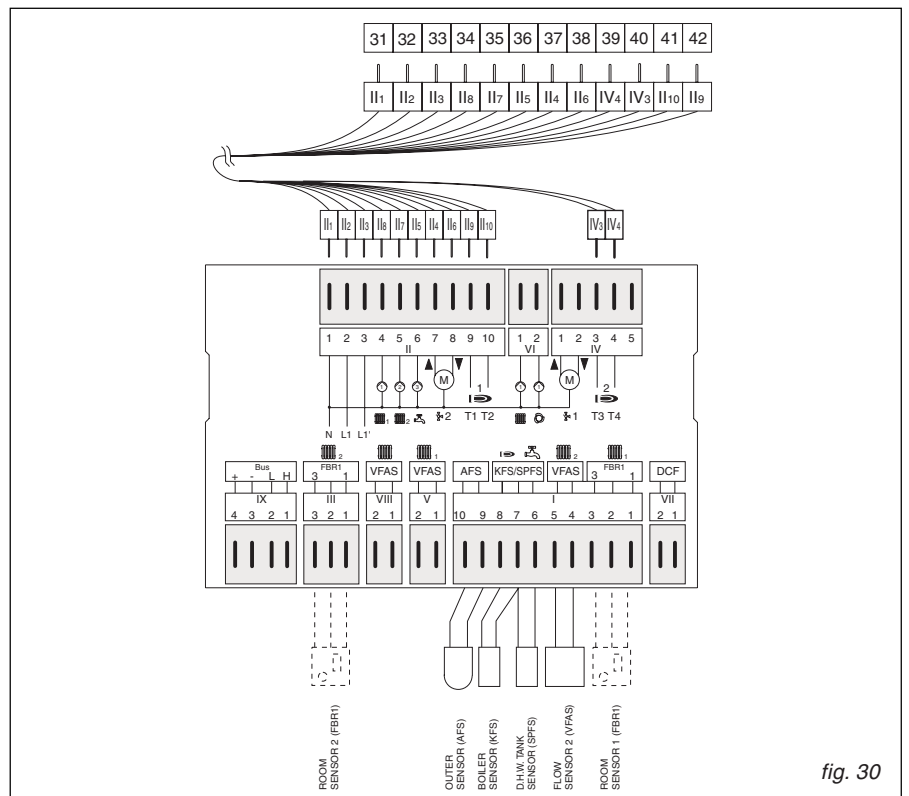


fig. 30

3.6 - OUTER COMPENSATOR

On how to adjust or to program the outer compensator, please refer to the instruction manual supplied with the outer compensator. In the following table we list the factory set

parameters, which are "not changeable" and the parameters which are adjustable by the user according to his needs.

PARAMETERS ADJUSTABLE BY THE USER				
Parameter	Description	Adjustment range	Standard	System values
01	Outer temperature	-----		Visualization only
02	Temporary operation	0/1 (Off/On)		0
03	Nominal flow temperature circuit 1	-----		Visualization only
04	Actual flow temperature circuit 1	-----		Visualization only
05	Nominal flow temperature circuit 2	-----		Visualization only
06	Actual flow temperature circuit 2	-----		Visualization only
07	Nominal boiler temperature	-----		Visualization only
08	Actual boiler temperature	-----		Visualization only
09	Influence of room sensor above outer sensor in circuit 1	0-20	10	
10	Influence of room sensor above outer sensor in circuit 2	0-20	10	
11	Heating optimisation according to the room temperature in circuit 1	0/1 (Off/On)	1	
12	Heating optimisation according to the room temperature in circuit 2	0/1 (Off/On)	1	
13	Maximum anticipation	0-3 hours	2	
14	Time relay with D.H.W. consensus	0/1 (Off/On)	0	
15	Delay outer temperature	0-3 hours	1	

FACTORY SET PARAMETERS (protected by a secret code)				
N°	Parameter	Adjustment range	Standard	System values
20	Introduction of the numeric code	0000-9999	-----	
21	Numeric code	0000-9999	-----	
22	Bus code for heating circuit 1 (HK1)	0-15	-----	
23	Bus code for heating circuit 2 (HK2)	0-15	1	
24	Anti frost temperature	(-5)°C - (+5)°C	-3	
25	Max. flow temperature for heating circuit 1	50°C - 110°C	80	
26	Max. flow temperature for heating circuit 2	50°C - 110°C	45	
27	Heating curves distance	5 - 50 °C	5	
28	Time relay function (if in the 0, 1 or 3 setting position no sensor is connected, the relay is activated with the temporised program for the circulating pump)	0-3 0: Increase of the return water temperature 1: Solid fuel fired boiler 2: Manifold pump 3: Solar panel	0	
29	Relay activation temperature (see 28)	10°C - 90°C	10	
30	Hysteresis for supplementary relay (see 28)	2 °C - 20 °C*	5	
31	Loading pump stop	0/1 Off/On	1	
32	Pumps in parallel operation	0/1 (Off/On)	0	
33	Anti legionella program	0/1 (Off/On)	1	
34	Zone outer compensators communication address	0/1 (Off/On)	1	
Boiler parameters				
51	Boiler maximum temperature	50°C - 110°C	80	
52	Boiler minimum temperature	10°C - 60°C	60	
53	Temperature increase for D.H.W.	0°C - 50°C	20	
54	Simplified start	10°C - 50°C	50	
55	Activation of minimum temperature limit	0/1 (Off/On)	1	
56	Boiler temperature hysteresis (dynamic)	5 - 20 °C	5	
57	Boiler time hysteresis (dynamic)	1 - 30 min	10	
58	Stop time for 2 nd burner	0 - 30 min	10	
59	Fixed hysteresis for 2 nd boiler	2 - 20 °C	2	
60	Hours to the next boiler sequence change	0 - 250 hours	0	
61	Number of starts burner 1			Visualization only
62	Operation time burner 1			Visualization only
63	Number of starts burner 2			Visualization only
64	Operation time burner 2			Visualization only
Mixing valve parameters				
71	Operation time of mixing valve 1 (see motor data plate 1)	30 - 240 s	120	
72	Operation time of mixing valve 2 (see motor data plate 2)	30 - 240 s	120	
Service				
81	Burner relay control	According to configuration		Start with burner relay
82	Outer sensor control	According to configuration		Start with outer temperature sensor
85	Software version E6			Visualization only

* To adjust the pump of the solar energy panels: Set the parameter 29 at the switching off temperature (e.g. 90°C). The hysteresis (parameter 30) can be set, in this case, between 7 and 25°C; the standard value is 7 °C.

3.7 - ELECTRICAL AND HYDRAULIC CONNECTIONS OF C.H.

In the fig. 31 the typical connection of the boiler to C.H. system with two heating zones, of which one is with motorized mixing valve. Both, the heating zones are controlled by an outer compensator.

The electrical connections of the heating pumps and the mixing valve motor must be connected strictly according to the schema shown in fig. 29.

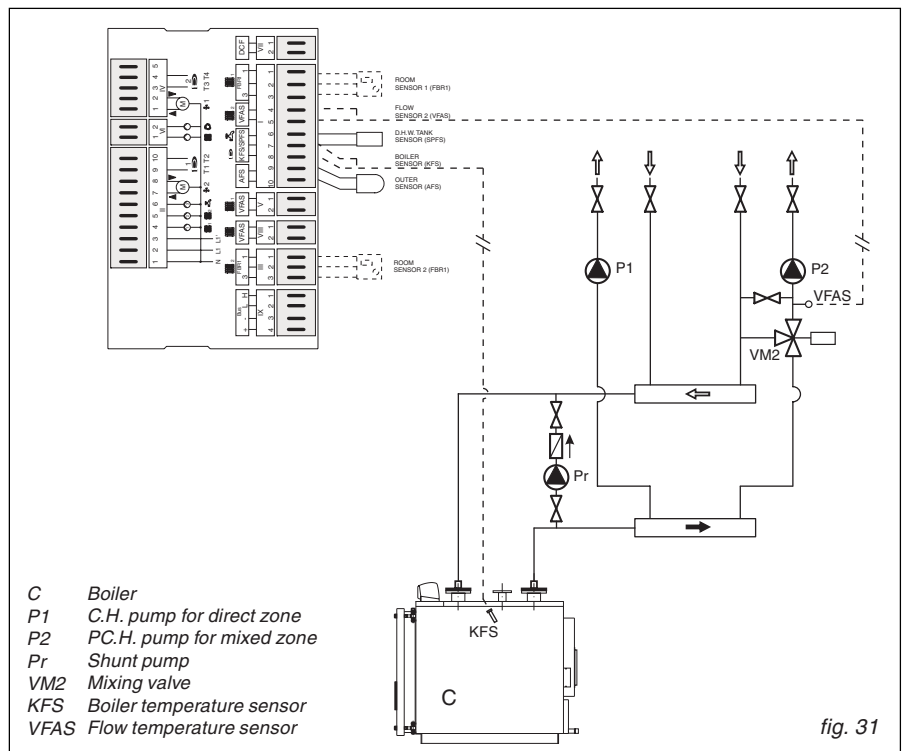
The temperature sensors will be connected according to the schema shown in fig. 30.

Remember that all the ELLPREX boilers are for forced circulation.

It is suggested to adopt a shunt pump "Pr" to guarantee the circulation through the boiler in any possible open condition of the mixing valve (see fig. 30).

The shunt pump "Pr", which will have a throughput equal, at least, at 50% of the C.H. pump and a manometric of 1 m W.G., will perform also an anticondensation function, limiting the too cold returns into the boiler.

The hydraulic schemas shown in the figs. 31 & 32 are principle schemas; in case of different system circuits, contact, please, our after sale service dept., which will supply you with all the necessary informations.

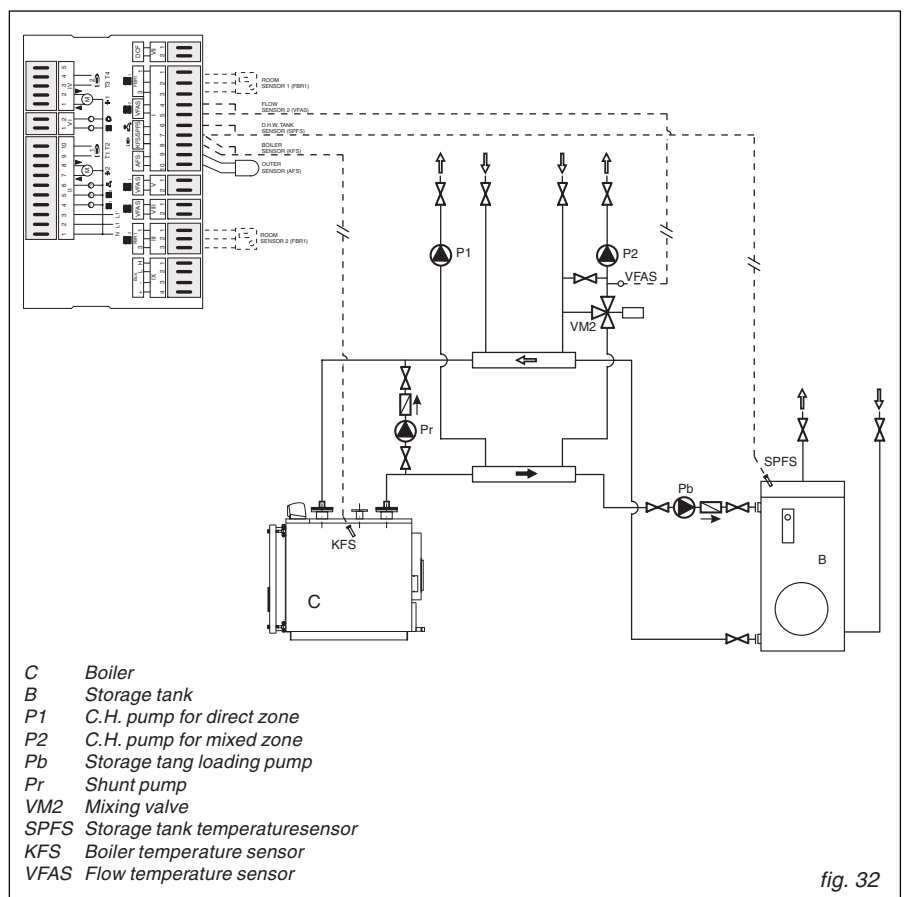


3.8 - ELECTRICAL AND HYDRAULIC CONNECTIONS OF C.H. AND D.H.W. PRODUCTION CIRCUITS

In a C.H. installation equipped with a D.H.W. storage tank, the hydraulic schema, shown in fig. 32, can be used.

Note: Also in this case the remarks made in the previous paragraph are applicable, i.e.: the adoption of a shunt pump (Pr).

The electrical connections of the storage tank loading pump will follow the schema shown in fig. 29.



4

COMMISSIONING AND OPERATION

4.1 - POSITIONING OF THE TURBULATORS

The ELLPREX boilers are designed to be used in an output range to improve the seasonal efficiency and the possibility to be adopted in all the heating installations.

The output must be adjusted at the commissioning stage, according to the system designer indications and, in any case, within the operation range for each boiler model shown on page 6 to 9, by the burner technician, which will determine the fuel throughput.

In any case **the turbulators will be placed, inside the relevant smoke pipes, at a distance, from the front tube plate, as shown in fig. 33.**

When using the boiler at minimum output the smoke temperature will not be lower than 160 °C.

In contrary case, before get in touch with our After Sale Service Dept, ascertain that the turbulators are in all the smoke pipes.

The commissioning of the burner must be performed under the responsibility of a specialized and well trained burner technician, authorised by the burner manufacturer.

In that occasion a commissioning report has to be filled out.

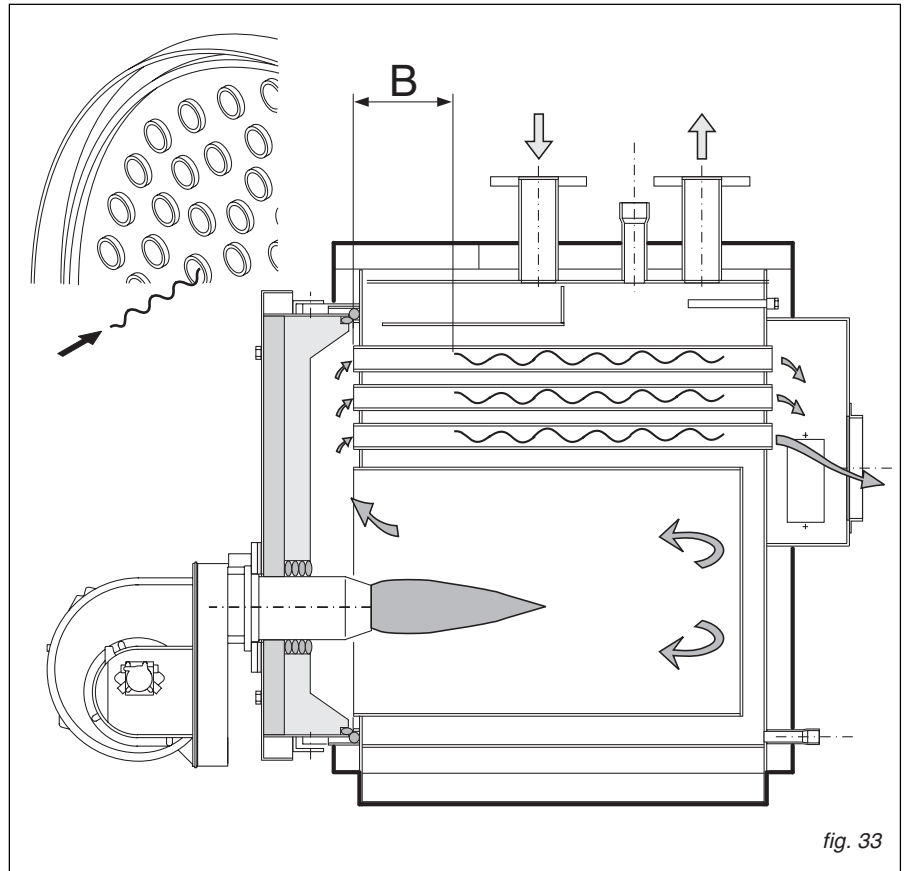
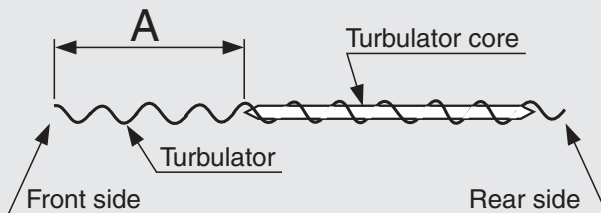


fig. 33

POSITION OF THE CORE INSIDE THE TURBULATOR (ONLY FOR MODELS ELL 170÷870)



ELL 170	A =	50
ELL 240	A =	260
ELL 290	A =	200
ELL 340	A =	320
ELL 420	A =	390
ELL 510	A =	560
ELL 630	A =	700
ELL 760	A =	590
ELL 870	A =	810

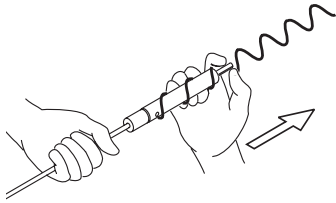
Note: In case of boiler use at minimum output, do not place the core inside the turbulator.

POSITION OF THE TURBULATORS INTO THE BOILER SMOKE PIPES (see fig. 33)

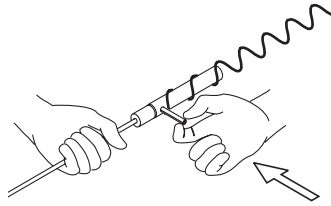
		AT MIN. OUTPUT	AT MAX. OUTPUT
ELL 170	B =	100	100
ELL 240	B =	100	100
ELL 290	B =	250	250
ELL 340	B =	200	200
ELL 420	B =	250	250
ELL 510	B =	200	200
ELL 630	B =	300	300
ELL 760	B =	330	330
ELL 870	B =	340	340
ELL 970	B =	370	370
ELL 1100	B =	200	200
ELL 1320	B =	410	310
ELL 1570	B =	910	750
ELL 1850	B =	1100	900
ELL 2200	B =	1290	1130
ELL 2650	B =	1470	1260
ELL 3000	B =	1540	1380
ELL 3500	B =	100	100

Turbulators removal

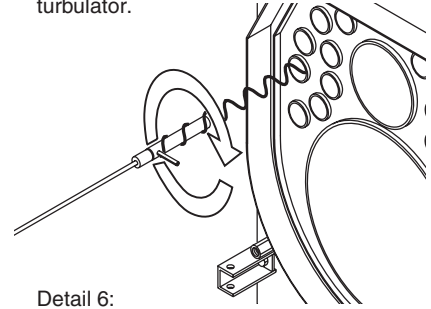
Detail 1:
Fit the brush handle extension onto the turbulator remover
Withdraw the pin from turbulator.



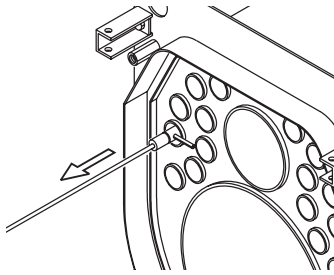
Detail 2:
Fit the pin in the radial hole with a hammer.



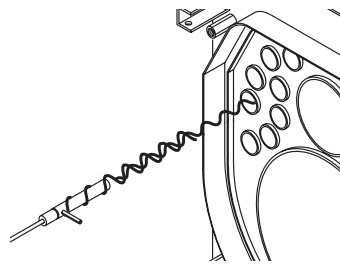
Detail 3:
Screw the turbulator remover onto the turbulator.



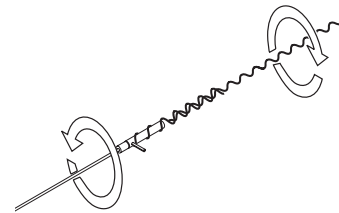
Detail 4:
Turn up to unblock the turbulator.



Detail 5:
Withdraw the turbulator



Detail 6:
Turn the remover counterclockwise to release the turbulator



The procedure from detail 3 to 6 has to be repeated for all the turbulators.

fig. 34

4.2 - PRELIMINARY CHECK

Once all the hydraulic, electrical and fuel connections have been made, before starting the boiler we suggest to ascertain that:

- The expansion vessel and the pressure relief valve are correctly connected and are in no way interceptable.
- The bulb of thermometer, working, high limit and minimum thermostats are well secured into their proper bulb holder.
- The turbulators are correctly fitted in all the smoke pipes.
- The C.H. circuit has been washed and rinsed and is free from solid impurities.
- The C.H. circuit is filled with water and has been completely purged.
- The pumps operate properly.
- The flow switch, the pressure relief valve, and the overheating discharge valve, if any, are adjusted at the right value.
- The fuel, hydraulic, electrical and safety connections are executed in conformity with national and local requirements in force.
- There are no water leaks.
- The burner has been fitted according to the instructions of the burner manufacturer.
- The mains voltage and frequency are compatible with the burner and the electrical equipment of the boiler.
- The burner is adjusted for the fuel type, among those listed in the burner data plate, available on the installation site, and the burner output range is compatible with the boiler output.
- In the boiler house there are also the burner instructions.
- The C.H. pipes are properly insulated.
- The C.H. system is capable to absorb the heat quantity produced at the first start of the burner, during the test period.
- **The shunt pump is installed as prescribed in the paragraph 2.5.6.**

4.3 - FIRST COMMISSIONING

At the commissioning stage of the boiler a qualified technician has to perform the following checks:

- Internal and external sound test of burner and fuel feeding pipe;
- Adjustment of the fuel throughput according to the nominal input of the boiler (it is convenient to remember that the nominal input can be adjusted between the minimum and the maximum shown in the table of pages 5 to 8), by sharing the output between the 1st and the 2nd stage, knowing that the 1st stage flame can go down to the 60% of the nominal output (which at its turn can vary between the minimum and the maximum depending on the output requested by the C.H. system).

Proceed, then, in the following way:

- Open the fuel feeding cock and check that there are no leaks in the feeding line.

- Ascertain that all the switches of the panel board are in OFF position and adjust the working thermostat to the minimum position.
- Switch ON the panel board through the main switch.
- Switch ON the C.H. pump: it will start to rotate as soon as the minimum water temperature thermostat detects 50°C.
- Switch the burner ON.
- Position the working thermostats of 1st and 2nd stages to the maximum setting to create a heat request.

During this phase check that:

- There are no smoke leaks from the front door, the burner plate and the chimney connection.
- There is a draught at the chimney base between 2 and 4 mm w.g.
- There are no water leaks.
- The different thermostats and the other installation safety devices work properly.
- The shunt pump operates correctly.

- The burner ignition is good.
- The burner characteristics (main adjustments and nozzle type) correspond to the boiler data plate.

With a burner properly adjusted it must be possible to reach easily, from a smoke sample taken at the chimney base, the values given below:

- 1) With light oil having a maximum viscosity of 1.5 °E at 20 °C:
 - CO₂ = 12 to 13 %
 - Smoke index < 1
 - Smoke temperature = 190 to 210 °C
- 2) With Natural Gas:
 - CO₂ = 9 to 10 %
 - Smoke temperature = 180 to 200 °C (values related to a clean boiler, with water at 70 °C).

It is suggested to adjust the fuel throughput to the actual needs of the C.H. installation (avoid to overcharge the boiler), without exceeding the a.m. smoke temperatures (never go below 160 °C).

4.4 - OPERATION OF THE BOILER

To ascertain that the form and the dimension of the burner flame, which we estimate very important, are the correct ones for the good operation of the boiler, it is suggested to make a visual inspection of the furnace at least one month after the first lighting.

The furnace cylinder shall show a homogeneous coloration for all of its length to demonstrate that the flame reverses in proximity of the blind bottom.

Contrarily, a furnace that underlines a clean distinction of colour among two zones (the anterior part clearer than the rear part), it would be the typical example of a flame of inadequate length, for which the adjustment of the burner, to avoid located overheatings, with consequent probable serious damages, needs to be immediately revised.

Similarly, the state of the exchange surfaces on the water side, where possible, i.e. on the boilers beginning from the model ELL 1100,

standard equipped with inspection hand holes, and in the case the presence of limestone, sludges or deposits is found, the opportune provisions to seek of it and to eliminate its causes must be taken.

Such control must be effected within the first months of exercise of the boiler, in any case compulsorily to the first stop of the heating system, at the end of the heating season or on the occasion of standstills for other extraordinary interventions, particularly in the case of heating systems with large water content.

The HIGH EFFICIENCY ELLPREX boilers are foreseen to operate with a return water temperature never below 54 °C when operated on light oil, and never below 59 °C when operated on gas, to avoid (or, at least, to reduce) the smoke acid condensation phenomenon, which can be the reason of a premature deterioration of the steel boiler body. The working thermostat, pos. 32 of the panel board, must be set at a temperature of

approximately 80 to 85 °C.

The room temperature will be compulsorily adjusted through a mixing valve and, eventually, an outer compensator.

To homogenise the water temperature, or avoid as maximum as possible, returns into the boiler at a temperature below 54 °C when operated on oil, or 59°C when operated on gas, a properly dimensioned shunt pump must be fitted between flow and return pipes of the boiler.

N.B. The metal sheet corrosion due to the acid condensate is not covered by the guarantee because it depends only from the operation of the C.H. system.

The ELLPREX panel board is equipped with a low temperature thermostat not allowing the operation of the pump when the boiler temperature is below 50 °C (protection against cold starts).

4.5 - SWITCH OFF OF THE BOILER

- Switch OFF the burner (switch No.12 to 0 position).

- Leave the pumps working up to when they are not stopped by the minimum thermostat.
- Switch Off the power to the boiler panel board.

- If it is decided not to use the boiler for a long period close also the gate valves of the fuel.

5

MAINTENANCE

5.1 - GENERAL RULES

Before effecting any operation of cleaning or maintenance, disconnect the boiler from the electrical supply acting on the main switch onto the panel board.

In case of failure or bad operation of the boiler, switch it off, abstaining your self from any attempt of repair or direct intervention.

Exclusively address to professionally qualified personnel.

The possible repair of the boiler must be effected by an authorized service center using only original spare parts.

The non respect of the above can jeopardize

the safety of the boiler.

To guarantee the efficiency of the boiler and for its correct operation it is essential to submit the boiler to an annual maintenance, through a professionally qualified technician, according to the indications of the manufacturer.

When it is decided not to use the boiler anymore, the parts which can be potential sources of danger shall be made harmless. After a month of boiler operation, open the front door and ascertain the smoke pipes are clean.

In case of a heavy dirtiness:

- Remove the turbulators from smoke pipes.
- Clean all the smoke pipes using the brush delivered with the boiler.
- Open the two cleaning doors on the sides of the smoke chamber and remove, with a vacuum cleaner all the soot.
- Relocate the two cleaning doors and the turbulators; then close the boiler front door and check for soundness all around the sealing rope.
- Then adjust the burner.

Note: With a burner properly adjusted only a cleanup at the season end is necessary.

5.2 - ORDINARY MAINTENANCE

The boiler operating condition are very different from one case to the other and depend on the fuel used, on the adjustment of the burner, on the number of starting, on the C.H. system characteristics, etc. and for that reason it is not possible to establish, in advance, the frequency of the maintenances.

It is, then, necessary that the technician, who

performs the first cleaning, establish the cleaning frequency on the base of the boiler status.

Generally, we suggest the following frequency, according to the fuel used:

- Gas fired boilers: once a year.
- Oil fired boilers: twice a year or more often if there is reason to doubt of their adjustment.

In any case the local rules in force have to

complied with.

We suggest to shake the turbulators, without removing them from the smoke tubes, at least once an month of operation, not to allow the soot blocking them and making them extremely difficult to be removed.

During the operations of ordinary maintenance it will be necessary to brush the tube bundle - after the removal of the turbulators - and the furnace and collect the soots through the

cleaning doors on the smoke chamber. Besides it will be necessary to verify the good operation of the protection and control devices (thermostats, thermometers) of the boiler and of the plant (manometers, flow and pressure switches, expansion vessels) and all the safety devices.

In this occasion it will be necessary to notice the quantity of reinstatement water used and decide, also in base to its hardness, an intervention of preventive descaling.

It must be considered that the calcium and magnesium salts dissolved in the raw water, with repeated reinstatements, can cause deposits in the boiler that hinder the inner circulation and subsequent overheating of the wall plates with possible serious damages

that cannot be attributed to the constructive geometry and/or to the materials used and/ to the constructive technique and, therefore, they are not covered by guarantee.

On the occasion of the ordinary maintenance it is useful to perform a small discharge from the boiler to verify if sludges escape.

In affirmative case, it will be necessary to prolong the discharge up to get clear water.

At the end of the drainage it will be necessary to reestablish the level of the water in the system.

At the end of the smoke circuit cleaning, to the next restart check around the burner plate and the smoke chamber for smoke leaks. In the case some smoke leaks were noticed, first of all tighten the screws fitting the smoke

and, not getting result, it will be necessary to replace the sealing gasket.

Similarly it will be necessary to act on the front door, increasing at first the tightening of the nuts (after having loosened the inner counternuts) and then, if necessary, by replacing the whole gasket.

If it was necessary to center the sealing gaskets on the sealing ring of the door it is possible to adjust the door position by acting as suggested on the paragraph 2.6.

At the end check and, if necessary, restore the sealing of the connection of the chimney and of the burner with the door.

The performed operations must be recorded on the log book of C.H. system.

5.3 - EXTRAORDINARY MAINTENANCE

Extraordinary maintenance of end season or for long periods of inactivity.

It will be necessary to perform all the operations described in the preceding chapter and besides:

- Check the state of consumption of the turbulators to replace them in time.
- To facilitate the extraction of the turbulators, with the ELLPREX boilers a special extractor

is supplied.

- After the cleaning of the smoke circuit it is convenient to pass in the smoke pipes and in the furnace with a rag soaked of diluted solution of caustic soda.

After having let to dry cross again all the surfaces with a rag soaked of oil.

Perfectly close the the burner air intake to avoid a continuous passage of damp air through the boiler recalled by the chimney it self.

It is advisable to put inside the furnace

some alive mortar that has an hygroscopic action.

- Do not empty the C.H. system and the boiler.
- Protect the screws with graphitized fat, nuts and pivots of the door.
- Show all the operations that must be perform to the following put into operation particularly the operation of the shunt pump must be checked.

5.4 - CLEANING OF THE BOILER

Follow the next sequence:

- Close the feeding of the oil.
- Cooldown the boiler to the ambient temperature.
- Switch Off the electrical supply to the boiler

and the burner.

- Open the front door.
- Shake and remove the turbulators every 15-20 days of activity of the boiler to avoid that the residues of combustion can stop them so much to make difficult their removal.
- Clean the turbulators and the smoke pipes by brushing them with the brush supplied.
- Reposition the turbulators.

- Remove the cleaning door and all the soot from the smoke chamber.
- Re-fit the cleaning doors.
- Verify the state of the refractory insulation of the combustion chamber door.
- Verify the state of the door sealing rope.
- Close the door of the furnace.

5.5 - CHECK OF THE BOILER OPERATION

For a safe operation of the boiler it is necessary to check:

- The good operation of the working thermostat.

- The good operation of the high limit thermostat.
- The adjustment and the good operation of the minimum thermostat.
- The good operation of the shunt system.
- The good operation of the outer

compensator (if fitted).

- The good operation of all the other safety and control devices imposed by local requirements.

5.6 - CHECK OF THE BURNER OPERATION

- See the burner instruction manual.
- Follow all the local requirement in terms of burner maintenance .

5.7 - BOILER HOUSE

For the combustion of oil or gas the burner needs air.

Accordingly wide openings are foreseen for the entry of the air in the boiler house.

These openings never have to be obstructed.

Maintain the boiler house clean and dust free. The boiler is not a closet: avoid to store any kind of materials.

Maintain the entry of the boiler free and easy to reach in any moment.

Ascertain that the boiler house is endowed with efficient emergency lamp.

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