



Pressurised steel boiler series

ECOMAX
from mod.70 to mod. 120

gas, light oil and dual fuel
from 735 to 1270 kW

INSTRUCTIONS FOR INSTALLATION AND USE



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TECHNICAL DATA

ECOMAX Mod.			70	80	90	100	110	120
Max input	kW		797	918	1034,5	1149,5	1269	1377
	kcal/h		685.420	789.480	889.670	988.570	1.091.340	1.184.220
Max output	kW		735	846	954	1060	1170	1270
	kcal/h		632.100	727.560	820.440	911.600	1.006.200	1.092.200
Min input natural gas/GLP	kW		401	460	520	563	650	704
	kcal/h		344.860	395.600	447.200	484.180	559.000	605.440
Min output natural gas/GLP	kW		370	425	480	520	600	650
	kcal/h		318.200	365.500	412.800	447.200	516.000	559.000
Min input gas oil	kW		524,5	605	670	756	820	897
	kcal/h		451.070	520.300	576.200	650.160	705.200	771.420
Min output gas oil	kW		485	560	620	700	760	830
	kcal/h		417.100	481.600	533.200	602.000	653.600	713.800
Useful performance	%		91,0	91,0	91,2	91,2	91,3	91,3
Burner model installed	gas		Blu 1000 P AB TL	Blu 1400 P AB TL	Blu 1400 P AB TL	Blu 1700 P AB/R TL	Blu 1700 P AB TL	Blu 1700 P AB TL
	Modulating a gas		Modulair P 1000	Modulair P 1400	Modulair P 1400	Modulair P 1700/R	Modulair P 1700	Modulair P 1700
	gas oil		Maioir P120 AB TL	Maioir P120 AB TL	Maioir P120 AB TL	Maioir P150 AB TL	Maioir P150 AB TL	Maioir P150 AB TL
NOx (0% O ₂)	natural gas	ppm	<55	<55	<55	<55	<55	<55
	natural gas	mg/Nm ³	<113	<113	<113	<113	<113	<113
	natural gas	mg/kWh	<97	<97	<97	<97	<97	<97
	light oil	ppm	<100	<100	<100	<100	<100	<100
	light oil	mg/Nm ³	<205	<205	<205	<205	<205	<205
	light oil	mg/kWh	<180	<180	<180	<180	<180	<180
SO ₂ (3% O ₂)	light oil	mg/Nm ³	<450	<450	<450	<450	<450	<450
water content	lt		890	890	1240	1240	1430	1430
Max working pressure	bar		6	6	6	6	6	6
loss of load ⁽¹⁾	kPa		3,6	3,9	4,5	4,7	5,7	6,0
Installed electric power	Light oil	W	4200	4200	4200	5600	5600	5600
	Gas	W	4200	4200	4200	5600	5600	5600
	Gas/light oil mix ⁽²⁾	W	4900	4900	4900	6500	6500	6500
min. gas feed pressure	mbar		20	20	20	20	20	20
boiler weight	kg		1310	1310	1810	1810	2060	2060
Functioning	Light oil		❖	❖	❖	❖	❖	❖
	Gas		❖ □	❖ □	❖ □	❖ □	❖ □	❖ □
Electrical supply	V - Hz		400 - 50	400 - 50	400 - 50	400 - 50	400 - 50	400 - 50
Appliance category			II 2H3+ type B23			I 2H type B23		

- ❖ = 2 flame settings
- = modulation
- (1) = with ΔT water side=15°C

- (2) = gas/gas oil
- = supplied with the system
- = on request

GENERAL SPECIFICATIONS

Ecomax boiler units are formed by matching a gas, gas oil or gas/gas oil mix burner, depending on requirements, with a high quality, high performance steel boiler. To obtain maximum performance from the unit, the burner is specifically designed and calibrated to match the boiler.

The quality of the burner-boiler combination in Ecomax units 70 ÷ 120 has been designed in minimum detail, especially those concerning the decrease of polluting gases, silent running and reliability.

Ecomax units 70 ÷ 120 are available in the following versions:

- 2 stage
- gas modulating
- gas/gas oil mix
- fuel oil

BOILER BODY

The body of the boiler is manufactured in thick, high quality steel, with pressurised combustion chamber and flame reverse, large flue gas flues which guarantee long periods of autonomous operation and are easy to clean, equipped with a highly efficient stainless steel baffles to increase heat exchange; The back base also has an anti-condensation effect.

The door opening direction can be adjusted simply by reversing its clamping elements.

CASING

The casing is packed separately from the boiler body and is constructed of painted panels.

INSULATION

Particular attention has been paid to the insulation of the Ecomax boiler body. It is composed of a thick layer of fibreglass which completely covers the body reducing loss of heat to a minimum and contributing towards a high level of boiler performance.

CONTROL PANEL

The control panel of Ecomax boiler has been designed to solve all the installer's problems relevant to electrical connections and correct unit operation.

It is, in fact, equipped with components and instruments geared towards facilitating control and regulation of the boiler. By pressing the special selector switch on a practical digital econometer (supplied on request) fitted to the board the boiler and flue temperature are displayed.

When the preset flue temperature limit is reached, a warning light indicates that the combustion chamber and flue pipes of the boiler require cleaning.

INSTALLATION

Warning: this boiler is designed to heat water to a temperature below boiling point at atmospheric pressure; it must be connected to a heating system and/or domestic water production and distribution system which is within the limits of its performance and capacity. Any other use of this unit must be considered incorrect and, therefore, dangerous.

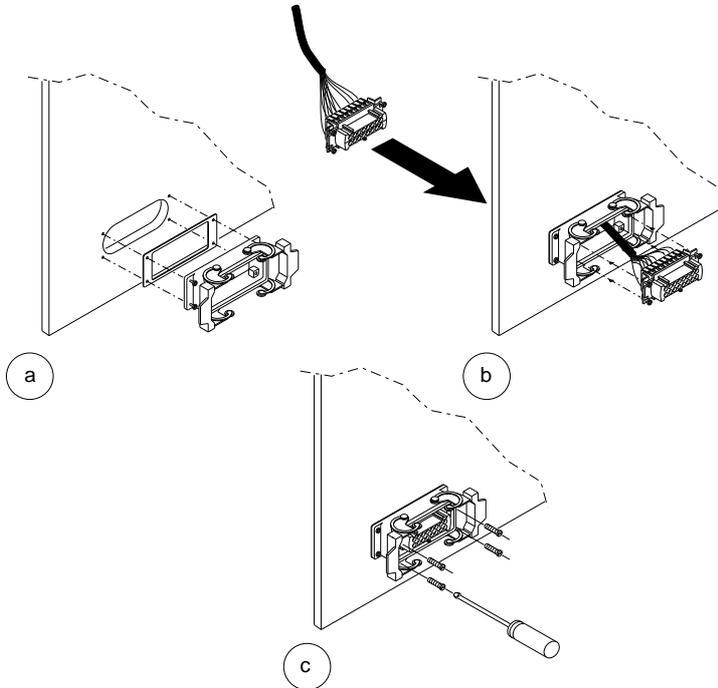
The heating unit must be installed by professionally qualified technicians, in compliance with the safety regulations local building regulations in force at the time.

Warning: when installing and assembling the various parts of the boiler, check that the earth wire is connected correctly.

Incorrect installation can cause damage to persons and objects for which the manufacturer is not responsible.

PRELIMINARY OPERATIONS FOR FITTING THE CASING

FITTING THE PLUG FOR CONNECTION TO THE BURNER

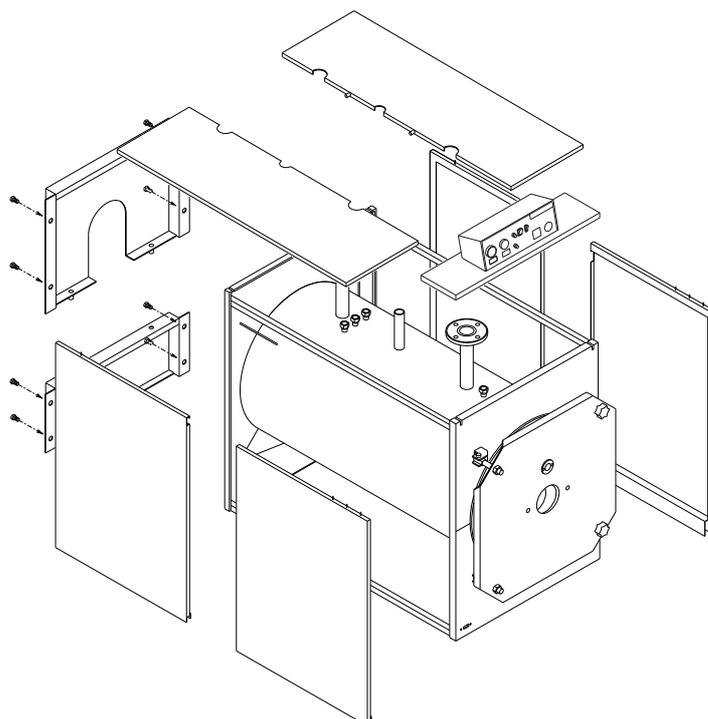


Installation of the socket for connection to the burner:

- fit the support with the lock terminals, positioning the relevant gasket between this and the front of the boiler (fig. a)
- insert the prewired socket from inside the boiler towards outside (fig. b)
- fasten the socket to the support using the screws provided (fig. c).

FITTING THE CASING

The casing must be fitted to the boiler in a specific order, to avoid making mistakes and wasting time; it is therefore advisable to follow the stages listed below.



Before fitting the casing, fit the electric display panel on the upper panel, passing the various cables through the hole provided. Then connect the cables leading from the panel (plug for connection to the burner, thermostat bulbs, etc.) to their corresponding seats (see figure).

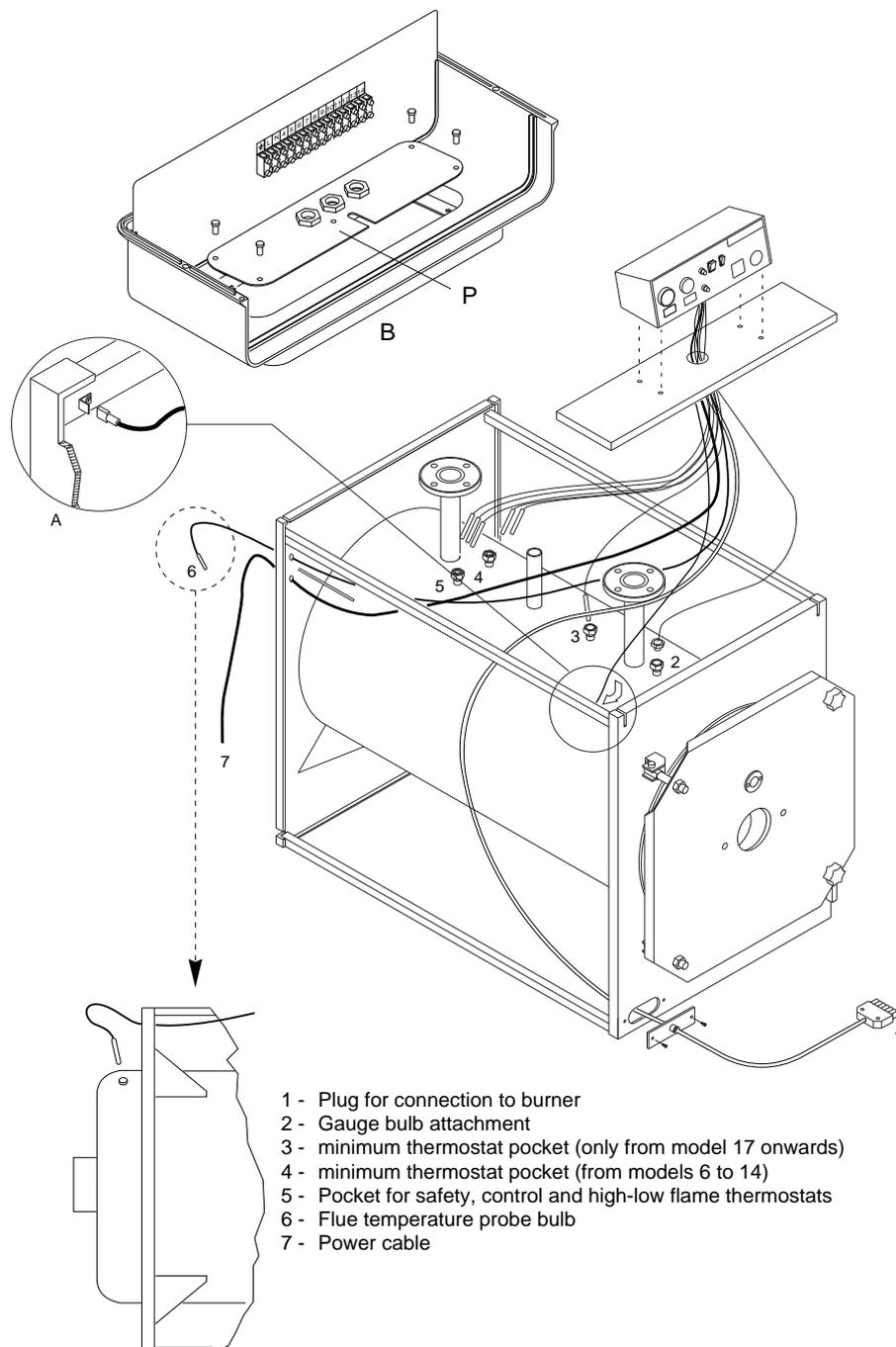
It is essential to connect the earth wire as shown in detail A in the figure below.

When fitting the electric panel, fit the protective plate P using the same screws (see detail B); as this operation is important, it must be carried out carefully, using all the screws provided.

The plug for connection to the burner must be passed through the opening on the front of the boiler after the cover plate has been removed.

The bulb probe to measure flue temperature (in stainless steel) is passed through the hole on the rear wall of the boiler and fitted in the seat provided in the flue box (see figure).

Warning: the gauge bulb must be screwed into pocket no. 2; the bulbs of the control, safety, high/low flame thermostats must be fitted into pocket no. 5, the thermometer bulb into pocket no. 4 and the minimum thermostat, from models 6 to 14, is fitted into pocket no. 3, while from model 17 onwards it is fitted into pocket no. 4.

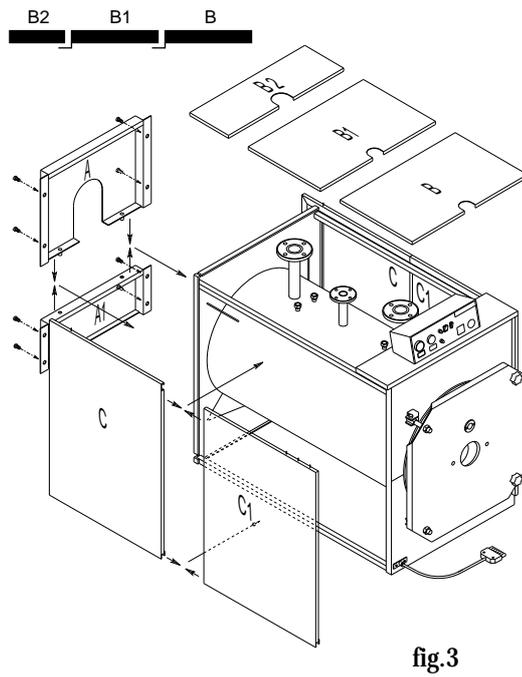
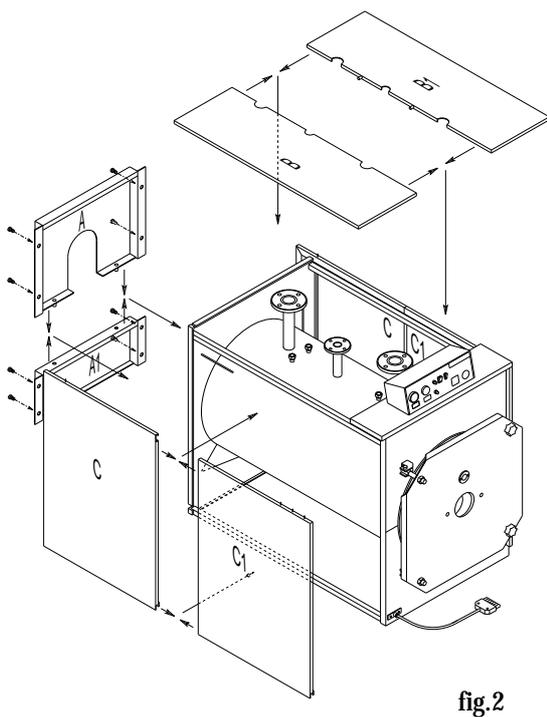
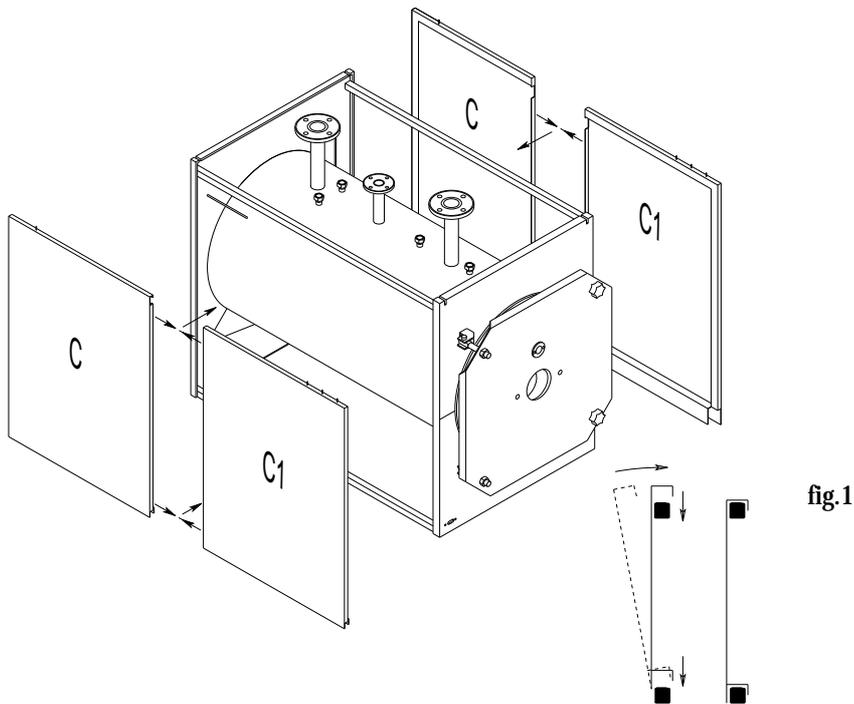


- 1 - Plug for connection to burner
- 2 - Gauge bulb attachment
- 3 - minimum thermostat pocket (only from model 17 onwards)
- 4 - minimum thermostat pocket (from models 6 to 14)
- 5 - Pocket for safety, control and high-low flame thermostats
- 6 - Flue temperature probe bulb
- 7 - Power cable

ECOMAX 70 ÷ 120

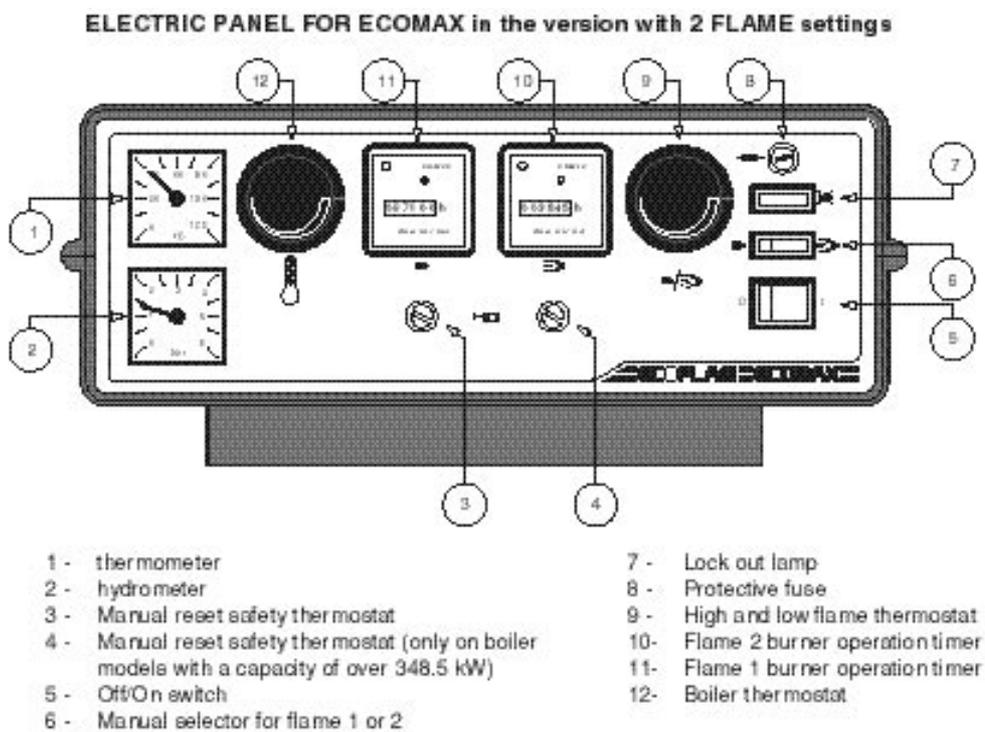
Join the side panels C and C1 using the M4 screws and relevant nuts provided; then fit the panels obtained by resting the lower inside bracket of the panels on the lower side member of the boiler and at the same time hook the upper fold of the casing onto the upper side member of the boiler; push downwards to set the panel in its final position (figure 1).

After fitting the sides, fasten the rear panels A and A1 using the self-threading screws provided; finally, on models 70 and 80, fit the upper panels B and B1 and the panel supporting the electric display panel, pressing down firmly (fig. 2). In models 90,100,110 and 120 fit, in this order, the upper panels B, B1 and B2 and the panel supporting the electric display panel, pressing down firmly (fig. 3).

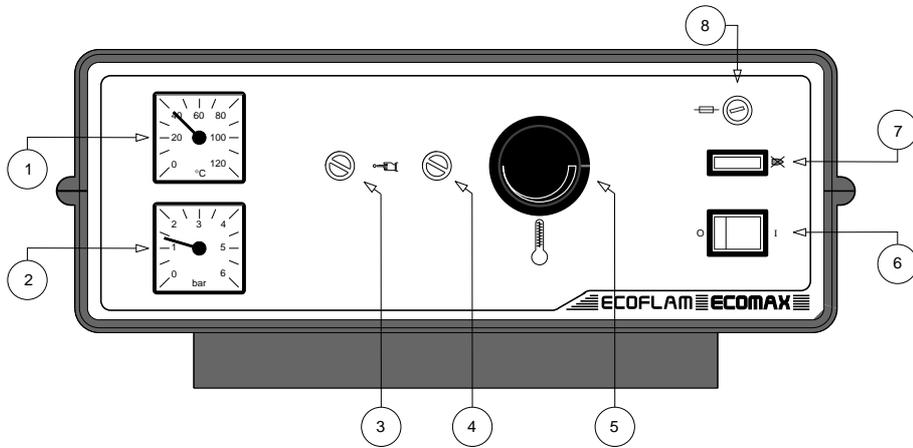


CONTROL PANEL


Almost all panels (except the electronic one with TEM thermoregulation), have an internal minimum thermostat (preset calibration: 50°C). If these require any adjustment, remove the top casing (see figure).

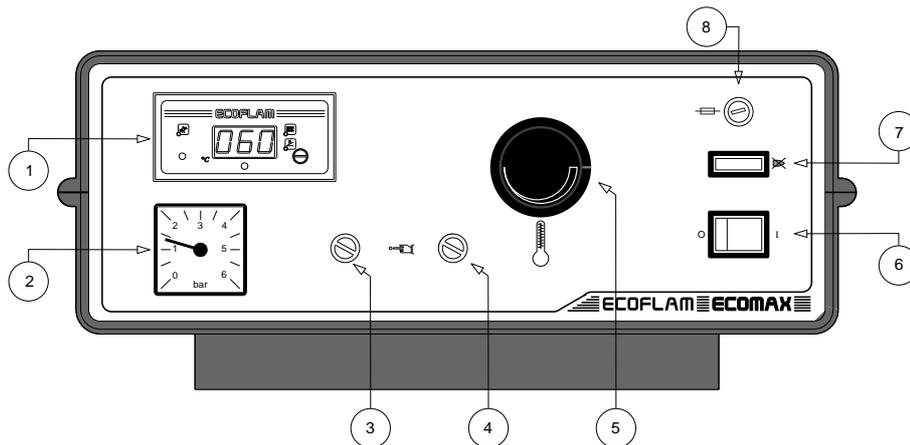


ELECTRIC PANEL FOR ECOMAX in the MODULATING version (both single-phase and three-phase)

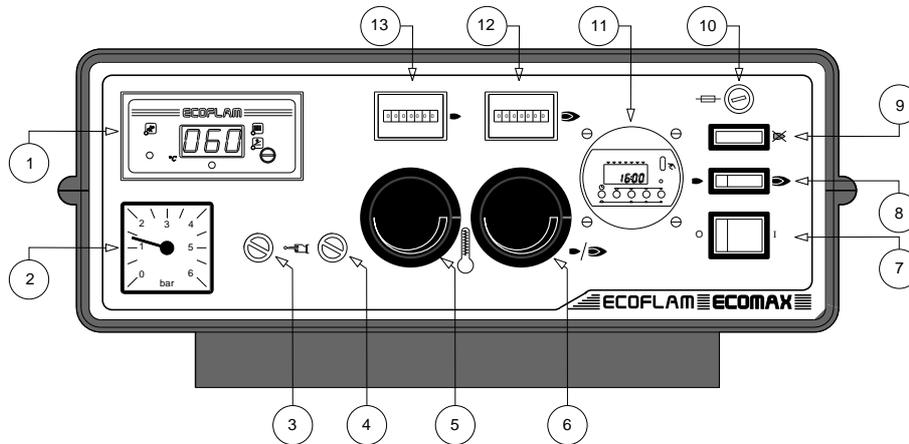


- | | |
|---|-----------------------|
| 1 - thermometer | 5 - Boiler thermostat |
| 2 - hydrometer | 6 - Off/On switch |
| 3 - Manual reset safety thermostat | 7 - Lock out lamp |
| 4 - Manual reset safety thermostat (only on boiler models with a capacity of over 348.5 kW) | 8 - Protective fuse |

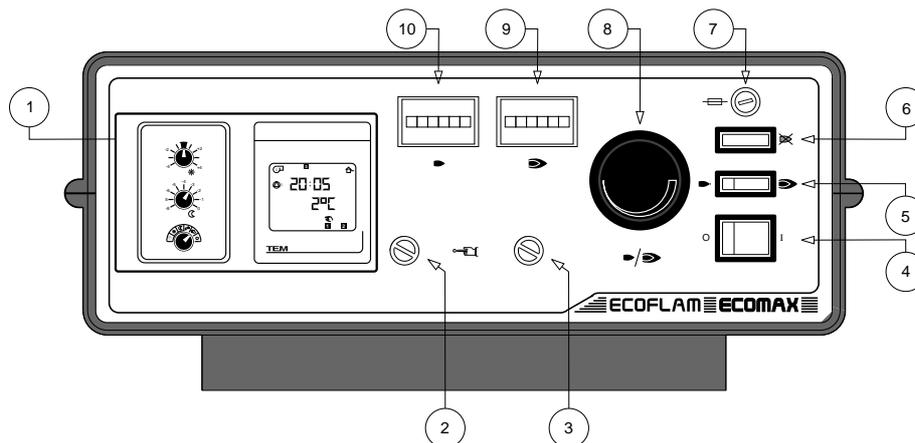
ELECTRIC PANEL FOR ECOMAX in the MODULATING version (both single-phase and three-phase)



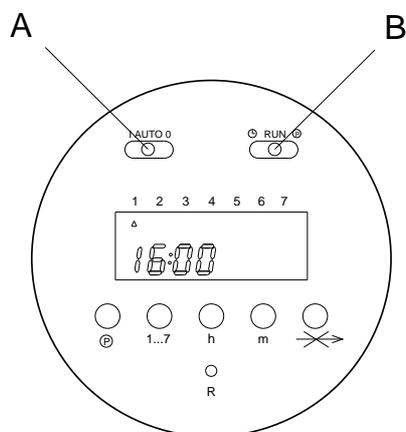
- | | |
|--|-----------------------|
| 1 - Econometer (displays the temperature of boiler and fumes, emits an alarm when reaching the maximum temperature for flue gas) | 5 - Boiler thermostat |
| 2 - Hydrometer | 6 - Off/On switch |
| 3 - Manual reset safety thermostat | 7 - Lock out lamp |
| 4 - Manual reset safety thermostat (only on boiler models with a capacity of over 348.5 kW) | 8 - Protective fuse |

ELECTRIC PANEL FOR ECOMAX in the version with 2 FLAME settings with ECONOMETER


- | | |
|--|---|
| <ul style="list-style-type: none"> 1 - Econometer (displays the temperature of boiler and F.G.T., emits an alarm when reaching the maximum temperature for flue gas) 2 - Hydrometer 3 - Manual reset safety thermostat 4 - Manual reset safety thermostat (only on boiler models with a capacity of over 348.5 kW) 5 - Boiler thermostat 6 - High and low flame thermostat | <ul style="list-style-type: none"> 7 - Off/On switch 8 - Manual selector for flame 1 and 2 9 - Lock out lamp 10 - Protective fuse 11 - Programming clock 12 - Timer for flame 2 operation 13 - Timer for flame 1 operation |
|--|---|

ELECTRIC PANEL FOR ECOMAX in the version with 2 FLAME settings with digital thermoregulation electronic central unit with self-regulating temperature


- | | |
|---|--|
| <ul style="list-style-type: none"> 1 - Thermoregulation electronic central unit 2 - Manual reset safety thermostat 3 - Manual reset safety thermostat (only on boiler models with a capacity of over 348.5 kW) 4 - Off/On switch 5 - Manual selector for flame 1 and 2 | <ul style="list-style-type: none"> 6 - Lock out lamp 7 - Protective fuse 8 - Boiler thermostat 9 - Timer for flame 2 operation 10 - Timer for flame 1 operation |
|---|--|

DIEHL 886 Programming clock


- A - selector for manual/automatic operation
- B - selector for setting program/hour
- P - program selection button
- 1..7 - weekday selection button
- h - hour selection button
- m - minute selection button
- (arrow) - SKIP mode selection button
- R - reset selection button

Manual Operation

With selector "A" in position "I", the system operates continuously, independently of set programs. With selector "A" in position "AUTO", the system is switched off.

Setting the current time

Move selector "B" to the "RUN" position; press the reset button "R": the figures on the display will flash. Position the selector to "P" and set the day with the "1...7" key, the hour with the "h" key and the minutes with the "m" key. After setting return the selector to "RUN".

Setting the program

Position the selector "B" to "P". The display will show "0:00 1": the first three numbers indicate the hour to be set, the other the program number; A light-bulb symbol appears at the side; this means that the system is switched on. Select the day (from 1 to 7) or period (1+5, 6+7, or all days) of the week using the "1...7" key. Set the hour and minutes (with the "h" and "m" keys respectively). Press "P" to memorize the operation and advance to the next program, in which the shut-down time is requested (the light-bulb symbol disappears).

Repeat the same procedure for the subsequent programs.

There is a maximum of 9 start-up and 9 shut-down programs. After setting, position selector "B" to "AUTO".

Cancelling one or more programs

The start-up and shut-down time of each program must be cancelled. Position the selector "B" to "P", choose the required program ("P" key) and remove the day setting with the "1...7" key (the triangular day indicators must disappear). If part of the program is cancelled, when the selector is returned to "RUN", an error message will appear on the display, indicating the program with the error.

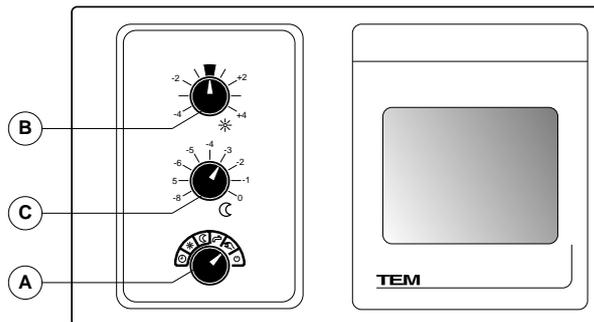
To cancel all programs, position "B" to "P" and press keys "P" and "h" simultaneously.

Setting the SKIP function (skipping programs)

With this function it is possible to skip programs for the next day and start up again with those for the following day by means of the key with the arrow symbol; however, this is only active when "B" is in the "RUN" position. The function can only be cancelled if the "SKIP" key is pressed again before 0.00 of the day to be skipped; if it is pressed after this time the SKIP function will be extended for another day.

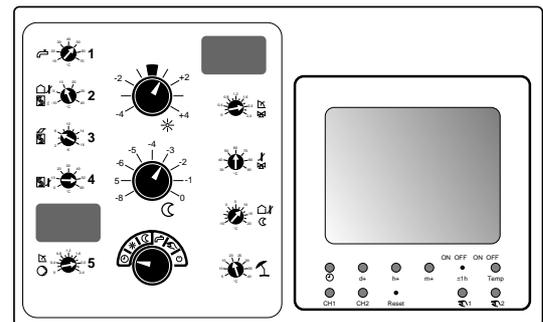
TEM PM 2935 BBUML climatic central unit

The TEM PM 2935 BBUML climatic central unit is among the most up-to-date and sophisticated thermoregulators using microprocessor technology. The regulator controls all heating unit functions, regulating the delivery temperature according to the outdoor temperature read by the dedicated probe (operation at self-regulating temperature).

Control panel


Panel closed

fig. 1



Panel open

fig. 2

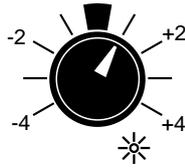
A - Heating program selector

N.B. the antifreeze protection is constantly active

	DESCRIPTION	NOTES
	Automatic running (COMFORT and ECONOMY according to hour program)	The system heating is regulated by the program on channel 1 of the programming clock (CH1). Domestic water production is regulated by the program on channel 2 of the programming clock (CH2).
	COMFORT heating	The heating system remains at the comfort setting notwithstanding the hour program. The domestic water boiler loading is active according to the hour program on channel 2 (CH2).
	reduced temperature	The heating system remains at the economy setting notwithstanding the hour program. The domestic water boiler load remains off.
	only domestic water	The domestic water boiler load is active according to the hour program of channel 2 (CH2).
	manual operation without regulation	In this position the various stages of the heating unit and the circulation pump of the heating circuit are running. The loading pump of the water boiler remains on. The opening and closing commands of the mixer valve are deactivated. This position is used by the technician to check the system or carry out maintenance.
	off	heating and domestic water circuits switched off.

ECOMAX 70 ÷ 120

B - Potentiometer of the COMFORT setting



This potentiometer is used to increase or decrease the calculated delivery temperature value.

The boiler temperature is calculated as a function of the outdoor temperature on the basis of the curve in the diagram in fig. 3, chosen with potentiometer 5 or 6, depending on whether the system is equipped with a pump or a mixer valve (operation with self-regulating temperature).

By moving one line the delivery temperature is varied by 5°C compared to the value calculated in the diagram.

If there is no outdoor probe, the central unit considers the outdoor temperature as 0°C.

If the temperature calculated is lower than the boiler minimum set with the potentiometer no. 4, the value of the latter is kept.

Heating curve:

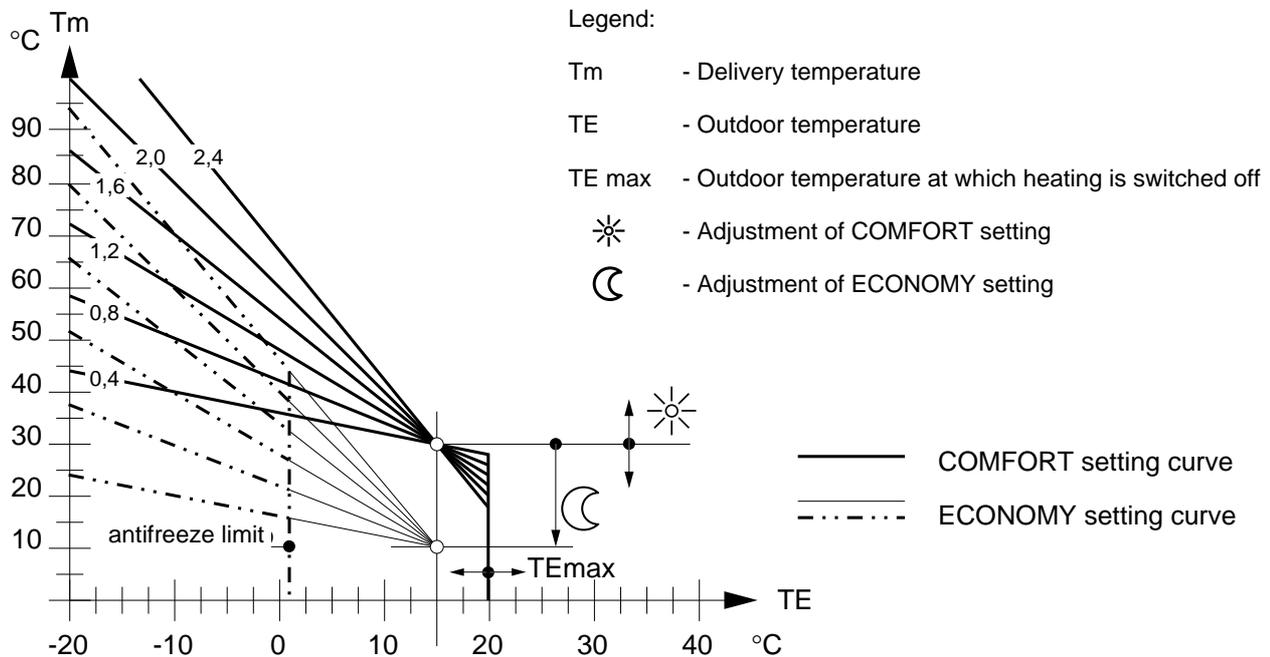
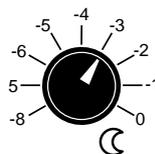


fig. 3

Example:

with: heating curve pos. 2.0
 potentiometer B pos. +1
 outdoor temp. -5°C
 the delivery temperature is 72°C + 5°C = 77°C

C - ECONOMY setting potentiometer



Degree of reduction compared to comfort; each line corresponds to a reduction of 5°C in delivery compared to comfort setting.

Example:

if the Tm calculated is 70°C and the potentiometer C is set at -3, the delivery temperature in economy setting will be 55°C (70°C - 15°C).

3. Calibrating the additional parameters

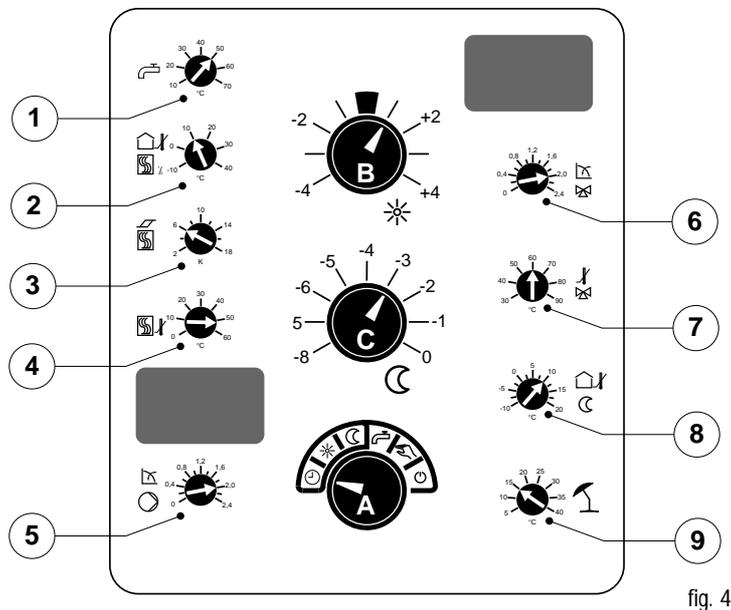


fig. 4

Potentiometer no	Description	value Recommended	value Set value
1	regulation of domestic water temperature	(°C) 45 ÷ 60	
2	outdoor temperature value to switch off stage 2	(°C) 5 ÷ 10	
3	boiler differential	(°C) 6	
4	minimum temperature of heating unit	(°C) 50 ÷ 55 *	
5	slope of the boiler heating curve (see diagram fig.3)	2	
6	slope of the curve of circuit with mixer valve	2	
7	temperature of mixing circuit (only with valve fitted)	(°C) 40 ÷ 80	
8	outdoor temperature to exclude economy setting operation (above this temperature economy setting is excluded)	(°C) 10	
9	outdoor temperature for switching off heating (automatic winter/summer switch-over)	(°C) 15	

* In any case, DO NOT set a value below 50°C unless a return probe is installed.

Adjusting the heating curve (for circuits with boiler pump or with mixer valve, referred respectively to regulators 5 and 6 of fig. 4).

Basic regulation (this must be carried out by a technician):

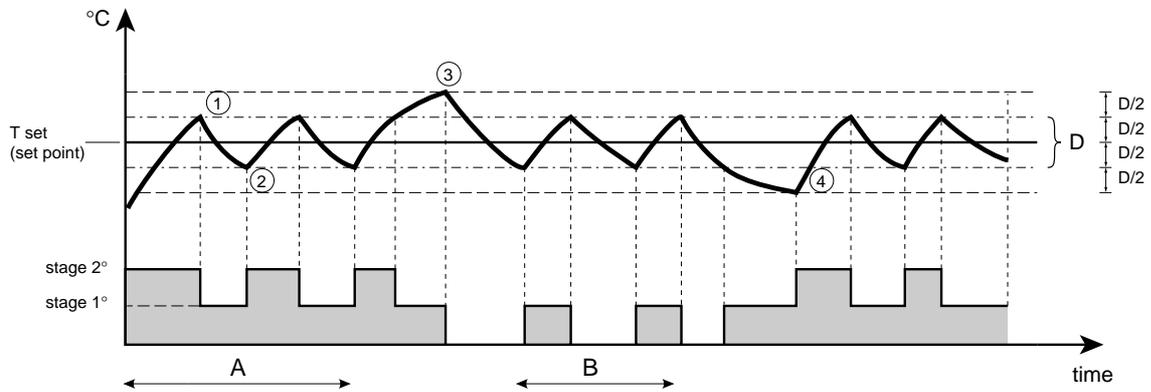
position of heating curve regulator 2,0

position of potentiometer of COMFORT setting ☀ +1

position of potentiometer of ECONOMY setting ☾ -3

4. Differential switching in two-stages:

The diagram gives an example of two-stage operation in different situations of the system. Initially, when the system is "cold", the heating unit operates at full capacity (stage 2). The switch-over to reduced capacity (stage 1) occurs when the temperature reaches the set point value + half of the set boiler differential (point 1 in the diagram). When the temperature subsequently decreases again to the set point value less half the boiler differential (point 2), the system returns to stage 2 operation; in this case regulation occurs by an operating cycle between full capacity and reduced capacity (zone A in the diagram). If, on the other hand, after changing to reduced capacity, the temperature continues to increase, when it reaches the set point + the entire boiler differential (point 3) it will switch off; regulation will subsequently occur by a sequence between reduced capacity operation and switch-off (zone B in the diagram). Lastly, if in condition B, following operation in economy setting (stage 1) the temperature decreases, the change to full capacity (stage 2) will occur when the temperature reaches the set point value + the entire boiler differential (point 4).

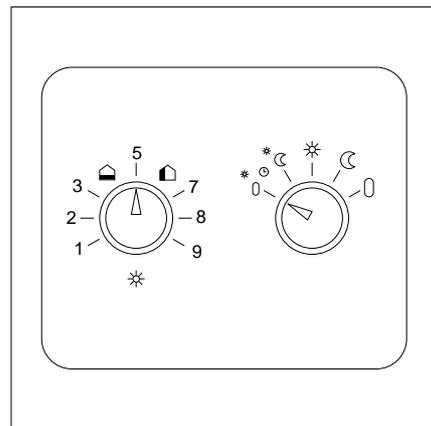


5. Accessories: Remote control FS 3601 / FS 3602

The remote control allows the boiler to be regulated directly from the room in which it is installed; it is available on request and comes in two versions:

- FS 3601 remote control with ambient probe
- FS 3602 remote control without ambient probe

For operation and installation, follow the instructions included in the packaging of the remote control.



PE 107 Programmer

Using small dial, the TEM PE107 programmer enables the functions indicated below to be activated or deactivated:

- Dial **S2**: no function. Leave in the OFF position.
- Dial **S3**: "ON" position: the circulation pump of the heating circuit will not be shut down during boiler loading (boiler loading parallel to heating).
- Dial **S4**: "ON" position: boiler loading is always active, independently of the hour program.

Dial **S5**: "ON" position: boiler loading is carried out with all stages.

Dial **S6**: leave in the OFF position

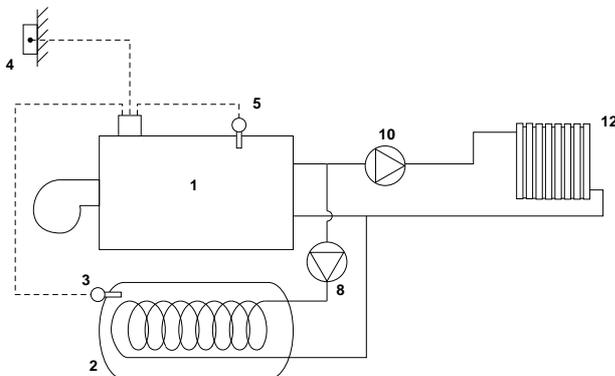
Dial **S7**: inactive position

Dial **S8**: inactive position

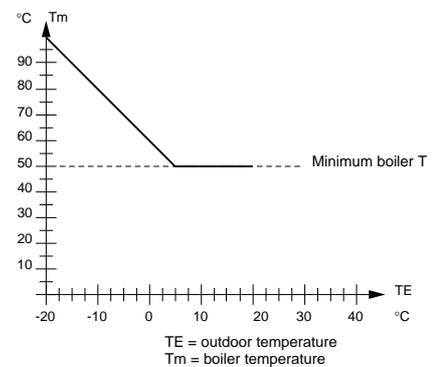
Dial **S9**: "ON" position: mixer valve outlet at two points.
"OFF" position: mixer valve outlet at three points.

6. Hydraulic diagram

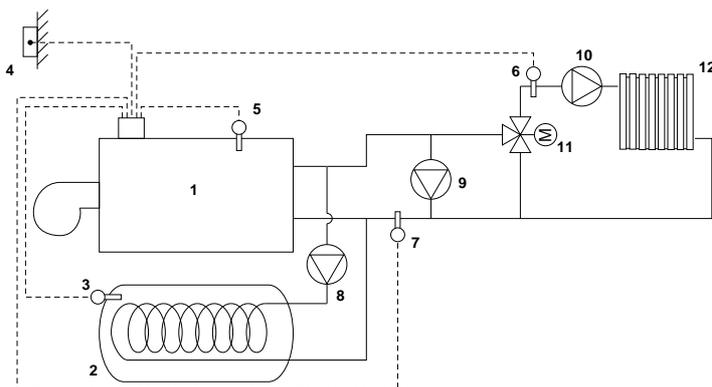
SYSTEM PROVIDED WITH CIRCULATOR



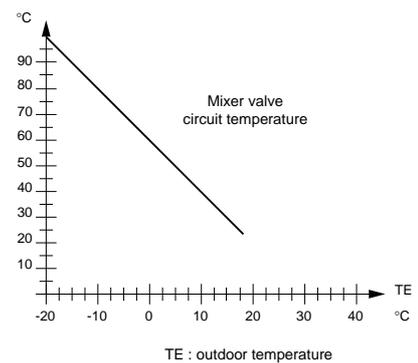
Example of the heating curve tendency



SYSTEM PROVIDED WITH CIRCULATOR AND MIXER VALVE



Example of the heating curve tendency

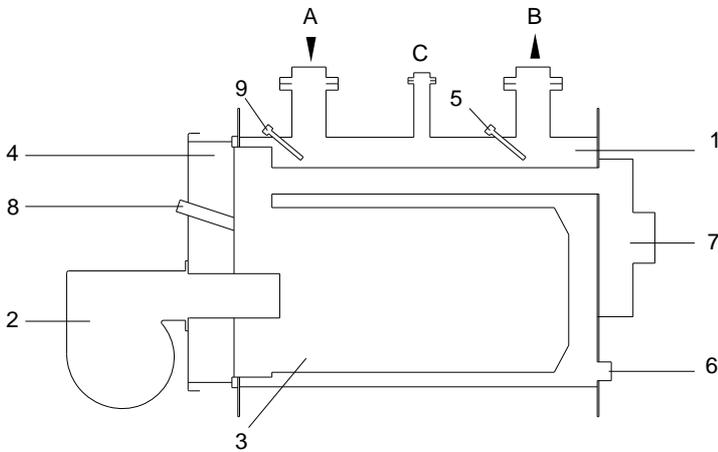


Legend:

- | | |
|--|-------------------------------------|
| 1 - boiler | 7 - return probe ZVF 210 (optional) |
| 2 - water boiler | 8 - water boiler circulator |
| 3 - water boiler probe ZTF222 (standard) | 9 - anti-condensate circulator |
| 4 - outdoor probe ZAF 200 (standard) | 10 - delivery circulator |
| 5 - boiler probe ZTF 222 (standard) | 11 - mixer electrovalve |
| 6 - delivery probe ZVF 210 (optional) | 12 - heating system |

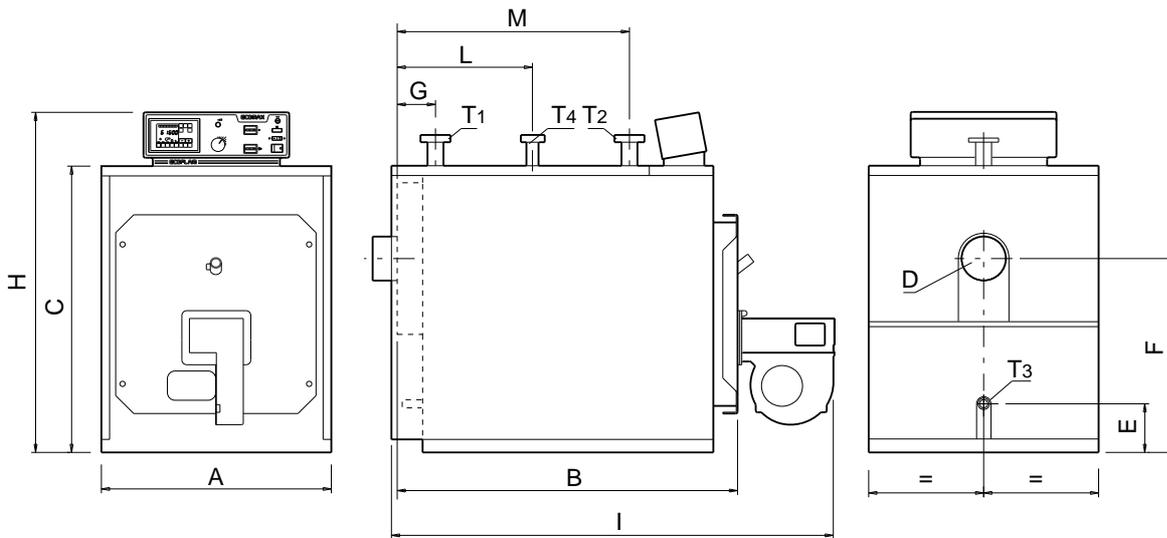
ECOMAX 70 ÷ 120

HYDRAULIC CIRCUIT



- A - System return
- B - System delivery
- C - Safety pipeline attachment
- 1 - Boiler body
- 2 - Blown-air burner
- 3 - Combustion chamber
- 4 - Pre-formed door insulation
- 5 - Pocket for:
boiler thermostat bulb
boiler thermostat bulb
boiler thermostat bulb
thermometer bulb
- 6 - Boiler outlet attachment
- 7 - Flue chamber
- 8 - Sight glass
- 9 - Pocket for minimum thermostat bulb

OVERALL DIMENSIONS AND ATTACHMENTS



- T1 - System flow
- T2 - System return
- T3 - Boiler outlet
- T4 - Safety pipe attachment
- D - Flue attachment
- I1 - Gas burner
- I2 - Gas oil burner
- I3 - Dual fuel burner

HEATING UNIT	DIMENSIONS IN (mm)															
	A	B	C	D	E	F	G	H	I1	I2	I3	L	M	T1/T2	T3	T4
	mm	mm	mm	ø mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN	ø "	DN
ECOMAX 70	1250	2365	1475	350	135	825	290	1640	3255	2985	3455	1000	1800	100	1 1/4"	65
ECOMAX 80	1250	2365	1475	350	135	825	290	1640	3255	2985	3455	1000	1800	100	1 1/4"	65
ECOMAX 90	1350	2640	1530	400	95	830	325	1695	3530	3260	3730	1110	2045	125	1 1/4"	80
ECOMAX 100	1350	2640	1530	400	95	830	325	1695	3530	3260	3730	1110	2045	125	1 1/4"	80
ECOMAX 110	1400	2845	1575	450	95	855	330	1740	4435	3555	4345	1210	2250	125	1 1/4"	80
ECOMAX 120	1400	2845	1575	450	95	855	330	1740	4435	3555	4345	1210	2250	125	1 1/4"	80

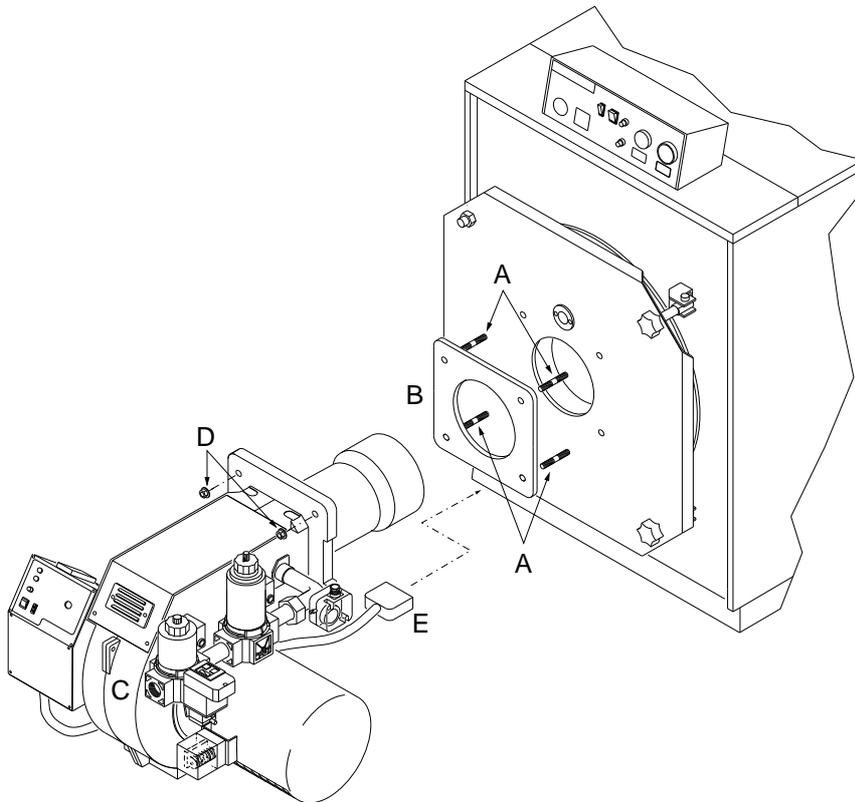
FITTING THE BURNER

In order to fit the burner correctly, follow the instructions below:

- 1 - tighten the stud bolts A (see figure below) provided with the boiler onto the boiler door;
 - 2 - fit the burner gasket B provided with the burner, and then the burner C;
 - 3 - fix the burner with the flanged nuts D provided. The slots in the burner flange allow it to be fitted and removed by simply loosening the nuts, without having to remove them completely;
 - 4 - connect the burner to the power supply, fitting the plugs E and F into their corresponding seats.
- When fitting the burner make sure that there is a perfect seal between the burner attachment flange and the boiler.

The wiring diagram of the heating unit, according to the type of fuel and type of operation of the appliance, is attached.

Fuel must be supplied to the burner in compliance with the instructions contained in the instruction manual provided with the burner.



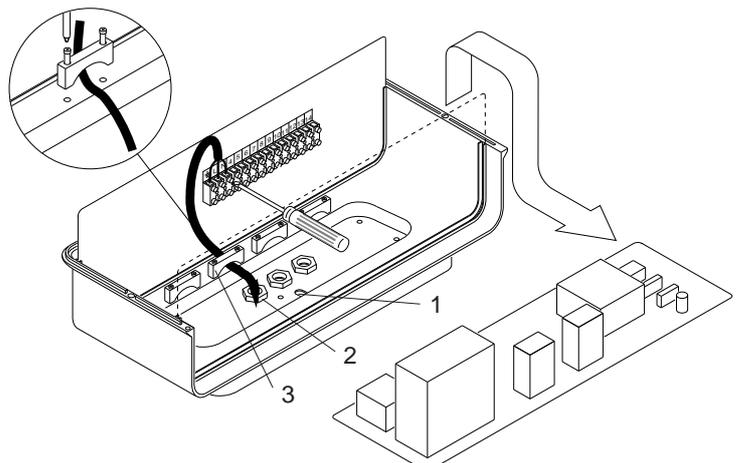
During the first few hours of burner operation, the CO value may be influenced by the evaporation of solvents used in some heating unit components. This value can be read correctly after at least one hour of operation; in any case, the evaporation of solvents should be considered normal and is not dangerous.

ELECTRICAL CONNECTION

To gain access to the connection terminal block, remove the front instrument panel and turn it over as shown in the figure on the right.

Connect the power cable, carefully following the instructions on the adhesive label on the terminal block support plate, and making sure it passes under the cable clamp as shown in the figure to the right.

Make all the remaining connections on the terminal block, passing the thermostat capillary wires through the slot 1; the remaining wires must be passed through the cable grommets 2 and fastened with the dedicated cable clamps 3 (see figure to the right).



N.B. In order to prevent them from being pulled out the cables must not be stretched tight after connection.

The heating unit must be connected in compliance with I.E.E. 16TH Edition wiring regulation and the local building regulation in force at the time.

HYDRAULIC CONNECTION

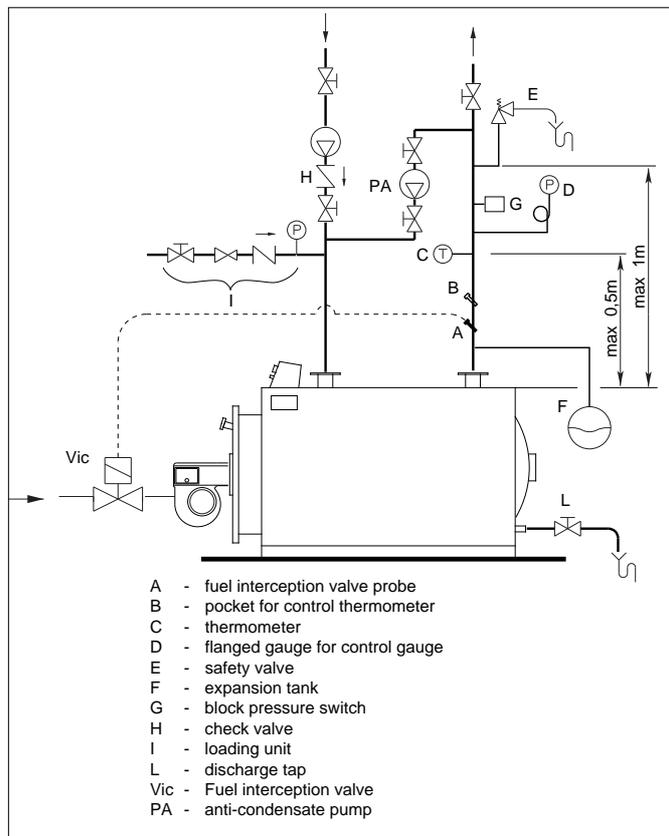
The hydraulic connection must comply with the safety standards in force and must be carried out by professionally qualified technicians.

In systems with closed expansion tanks, the pressure reducer of the automatic feed unit (when fitted) must be calibrated to a pressure which does not exceed the initial project value.

Make sure that the pressure in the system during operation does not exceed the working pressure of each component. Connect the outlets of the safety valves to a discharge funnel, in order to avoid flooding the boiler room should these devices cut in.

If an anti-condensate pump is to be fitted, this must be connected to the terminals provided inside the panel (see wiring diagram).

To the right is a diagram indicating water connection of the heating unit in systems with closed expansion tanks.

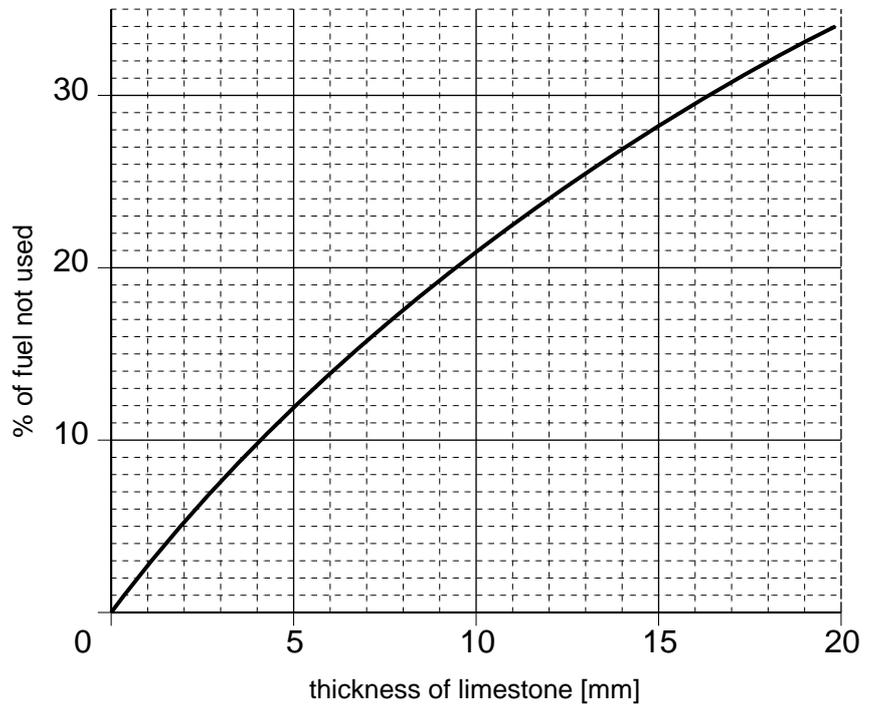


WATER TREATMENT

Limestone deposits strongly impair the efficiency of heat exchange between combustion gases and the system water, causing a decrease in the performance of the appliance (see graph); it also causes an increase in the temperature of the metal walls of the boiler body, thus reducing its life span.

Another phenomenon linked to the quality of the water is the corrosion of metal surfaces due to iron passing into the solution. The presence of dissolved gases such as oxygen and carbon dioxide greatly influences this phenomenon. Softened and demineralised water are more aggressive to iron and therefore these must be conditioned with substances which inhibit corrosive processes.

It is therefore advisable to perform periodic chemical analysis on the degree of hardness of the water, the pH (this must be between 7 and 8) and the iron content (which must be < 1ppm).

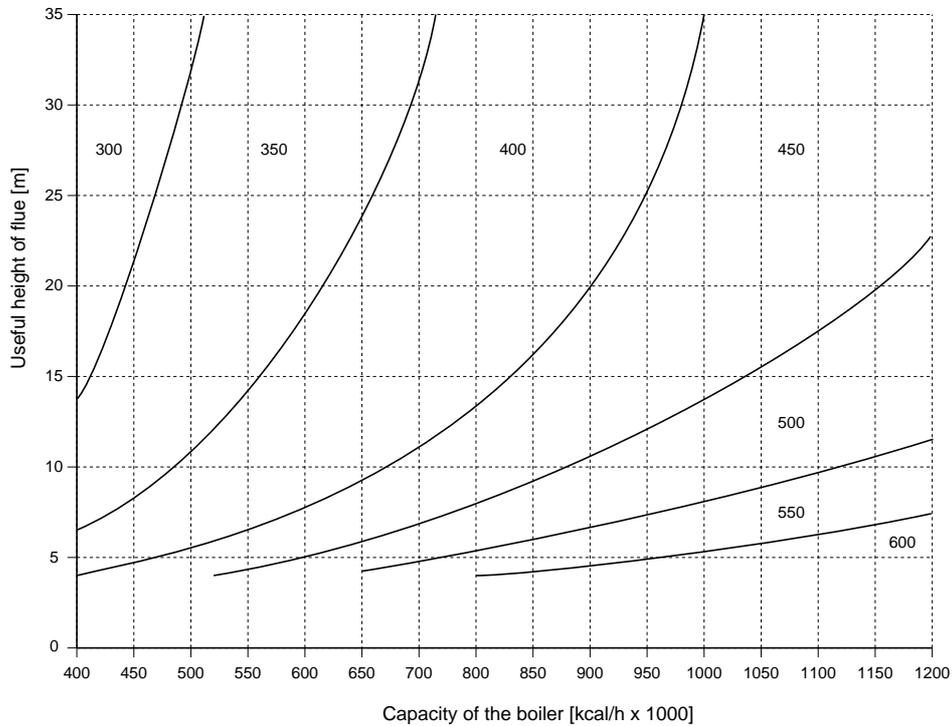


CONNECTION TO THE FLUE

The boiler is connected to the flue by a union with a constant section, with no narrower parts or tight elbows and well-insulated (if possible). In order to calculate the dimension of flue rapidly and simply the following table gives steel flues with circular sections, sized according to the rated power of the heating unit and a diagram.

useful height of flue [m]	5	10	15	20	25	30	35
model	internal flue diameter referred to the capacity at the heating unit furnace [mm]						
ECOMAX 70	400	400	400	400	400	350	350
ECOMAX 80	550	450	450	400	400	400	400
ECOMAX 90	550	550	450	450	400	400	400
ECOMAX 100	600	500	500	450	450	450	450
ECOMAX 110	600	550	500	450	450	450	450
ECOMAX 120	600	550	500	500	450	450	450

Diagram for simplified dimension of the internal flue diameter [mm]
for ECOMAX 70÷120 heating units
Insulated steel flues with circular section



The diagram above takes into account the standards CTI UNI 9615 (Dec. 1990) and refers to the following conditions:

- 1 - Discharge gas temperature at the boiler outlet equivalent to 220°C
- 2 - Outdoor temperature = 15°C
- 3 - The horizontal stretch of flue of a length equal to or less than 1/4 of the useful height (in any case, this must not exceed 7 metres);
- 4 - Total of the single resistances R_s for direction changes, joints, etc. equivalent to 2.2.

The useful height of the flue is equivalent to the difference in height between the fume entry section and exit section.

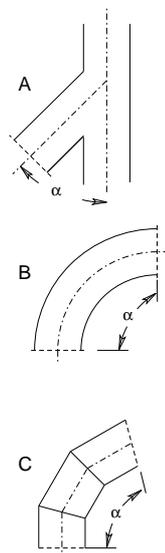
Single resistances, if a union is attached to the flue, take on the following values (see figure A):

- Joint with $\alpha = 90^\circ$ $R_s=1,2$
- Joint with $\alpha = 45^\circ$ $R_s=0,6$

For changes in direction using curves or segments (figs. B, C), the following values are valid:

- Curve with $\alpha = 30^\circ$ $R_s=0,2$
- Curve with $\alpha = 45^\circ$ $R_s=0,3$
- Curve with $\alpha = 90^\circ$ $R_s=0,6$

In order to limit concentrated resistances, it is advisable to limit the maximum number of curves and connect the boiler to the flue with a 45° union.

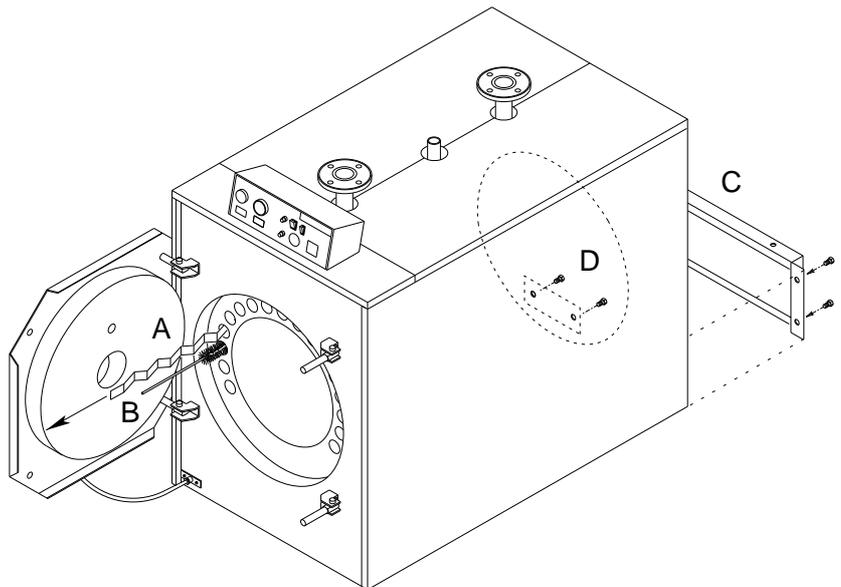


CLEANING THE BOILER

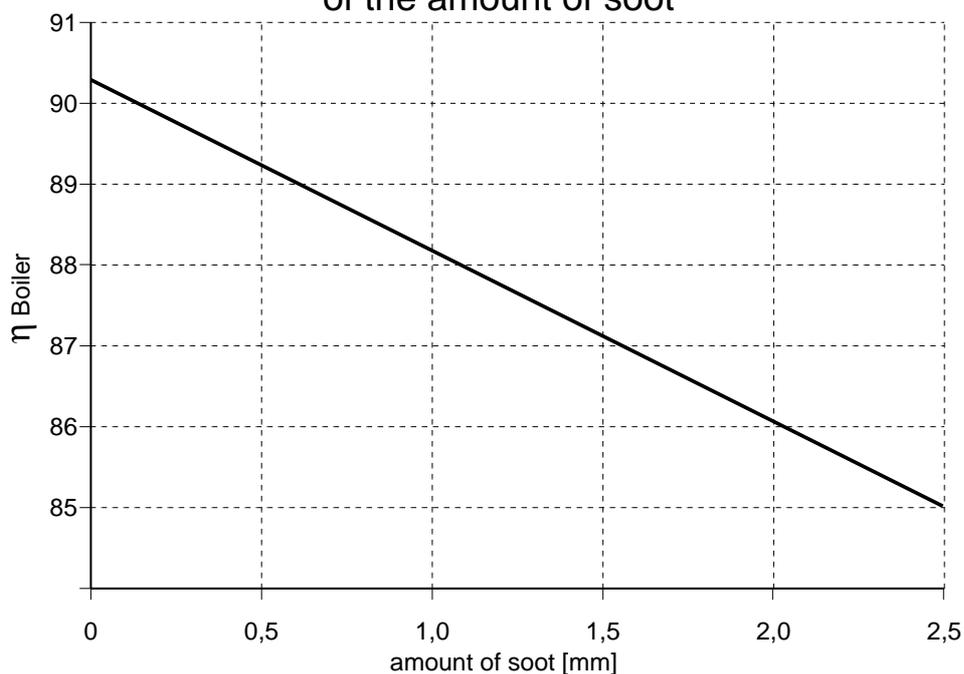
The boiler body must be cleaned regularly in order to guarantee constant efficient operation of the appliance, as soot deposits lower its performance, as can be seen from the graph at the foot of the page; the frequency of this operation depends on the type of fuel and combustion quality. For this purpose, it is extremely useful to check the temperature of flue gas as a progressive increase in this value through time is linked to the amount of soot in the boiler body and flue pipe. It must also be borne in mind that if corrosive residue (which mainly derives from combustion of liquid fuels) is left in the boiler for long periods this can lead to serious damage of the appliance.

Clean as follows:

- switch off the heating unit and disconnect the power supply;
- loosen the fastening handles of the hatch and open it;
- extract the baffles (A) from the flue pipes (see figure);
- clean the flue pipes using a metal brush (B) and remove residue;
- clean the combustion chamber with a metal brush;
- replace the baffles and close the hatch;
- remove the lower part (C) of the rear casing panel;
- open the inspection door on the bottom of the flue box;
- remove residue;
- close everything up once more;
- reconnect the power supply.

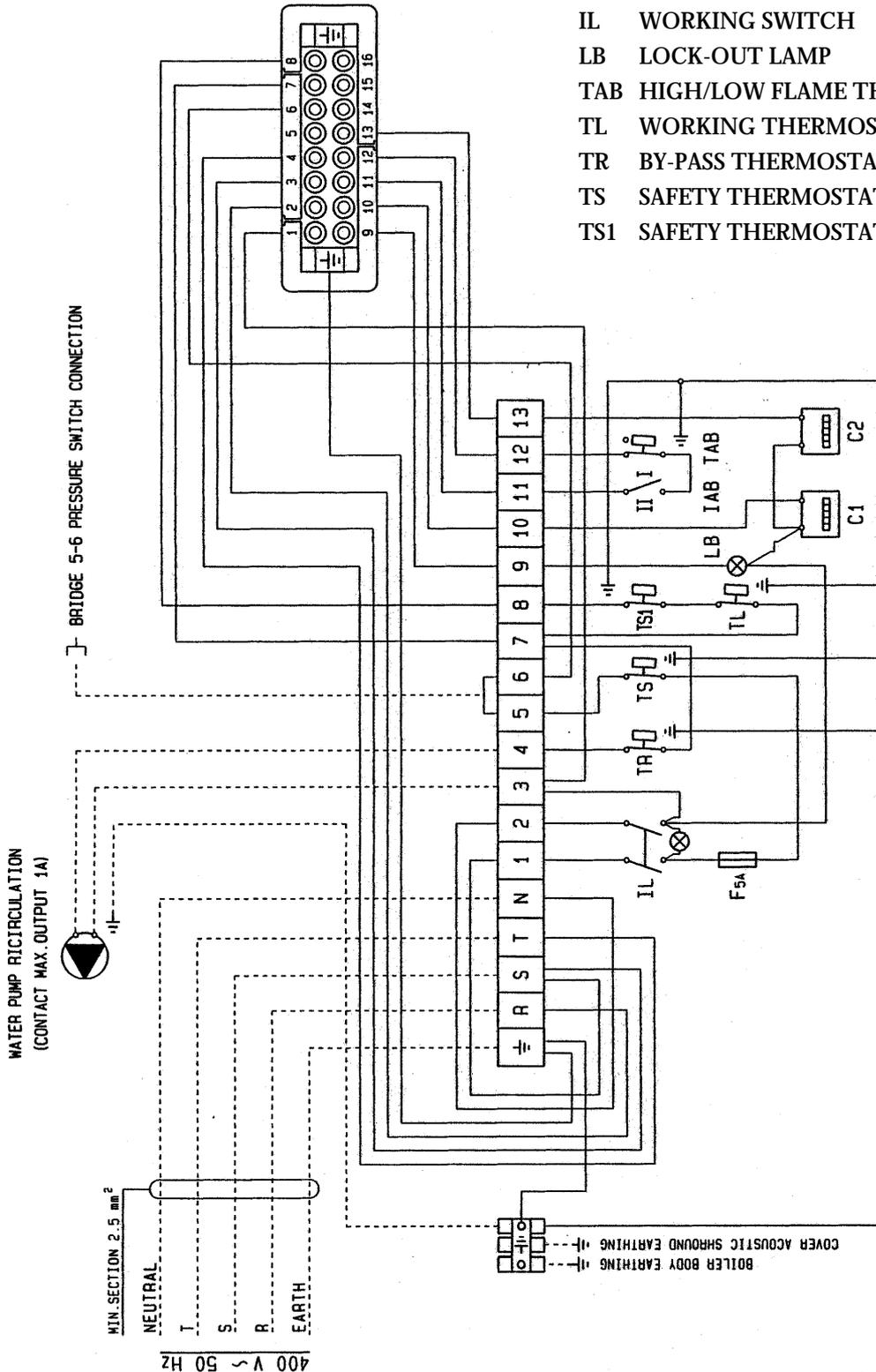


Decrease of boiler performance as a function of the amount of soot



CEA07.012

- C1 FIRST STAGE HOURS COUNTER
- C2 SECOND STAGE HOURS COUNTER
- F FUSE
- IAB HIGH/LOW FLAME SWITCH
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- TAB HIGH/LOW FLAME THERMOSTAT
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 SAFETY THERMOSTAT



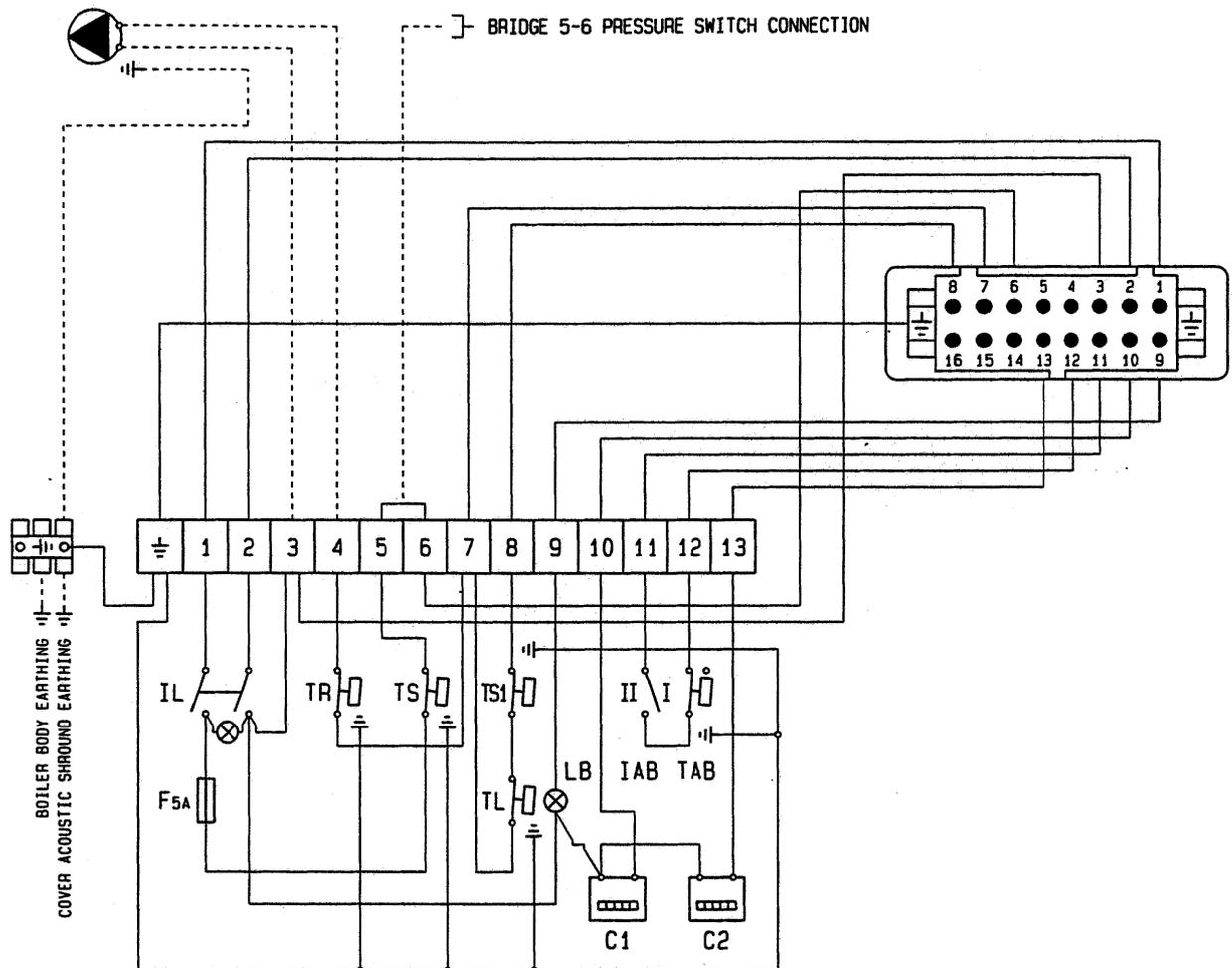
CONNECTIONS TO BE MADE

ATTENTION: FOR 230 VOLT THREE PHASE CONNECTION, MOVE THE EXISTING WIRE FROM TERMINAL N TO TERMINAL R AND CHECK THE ELECTRICAL WIRING DIAGRAM OF THE BURNER.

CEA07.017

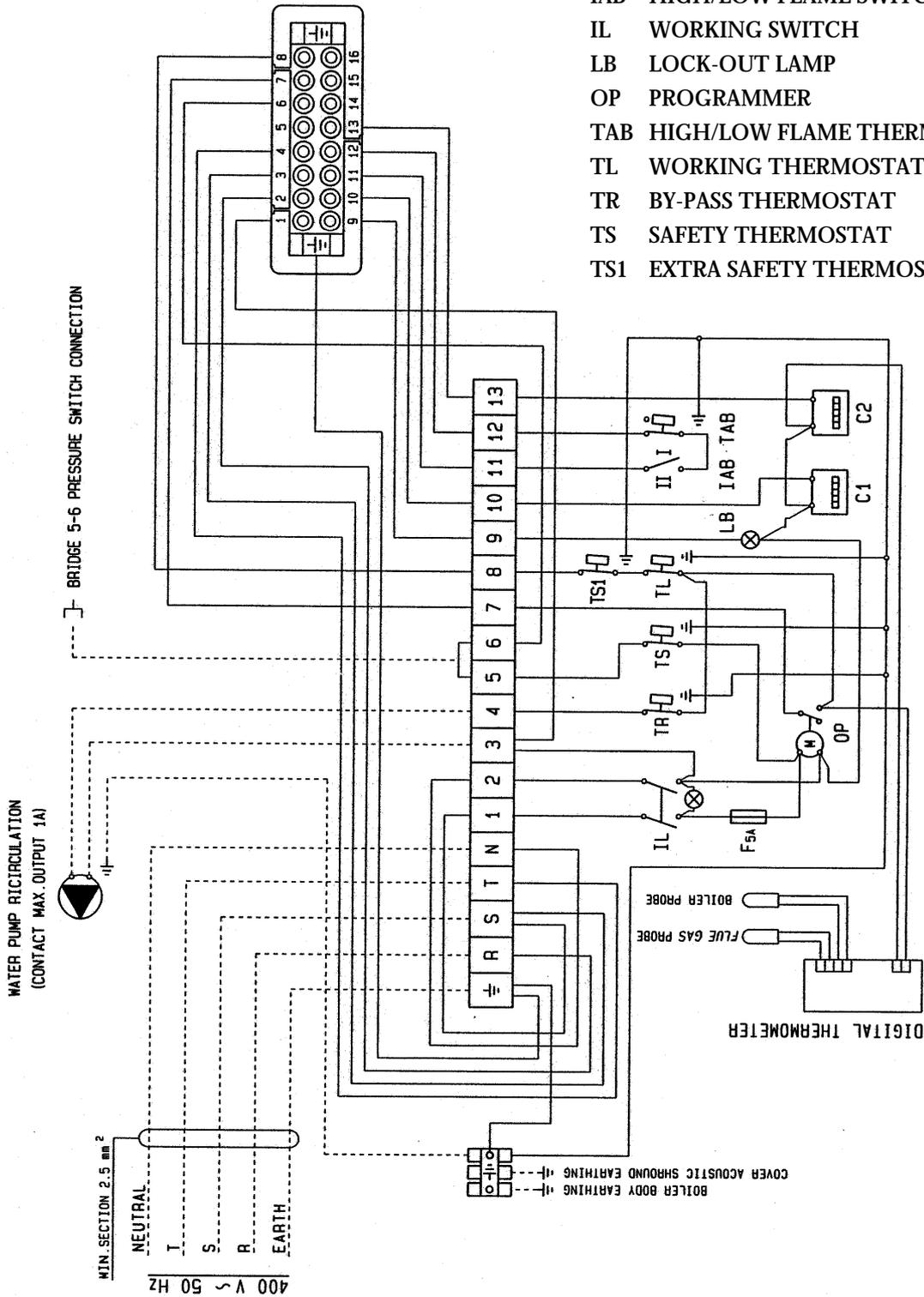
- C1 FIRST STAGE HOURS COUNTER
- C2 SECOND STAGE HOURS COUNTER
- F FUSE
- IAB HIGH/LOW FLAME SWITCH
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- TAB HIGH/LOW FLAME THERMOSTAT
- TL WORKING THERMOSTAT
- TR IGNITION TRANSFORMER
- TS SAFETY THERMOSTAT
- TS1 SAFETY THERMOSTAT

WATER PUMP RICIRCULATION
(CONTACT MAX. OUTPUT 1A)



CEA07.027

- C1 FIRST STAGE HOURS COUNTER
- C2 SECOND STAGE HOURS COUNTER
- F FUSE
- IAB HIGH/LOW FLAME SWITCH
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- OP PROGRAMMER
- TAB HIGH/LOW FLAME THERMOSTAT
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 EXTRA SAFETY THERMOSTAT

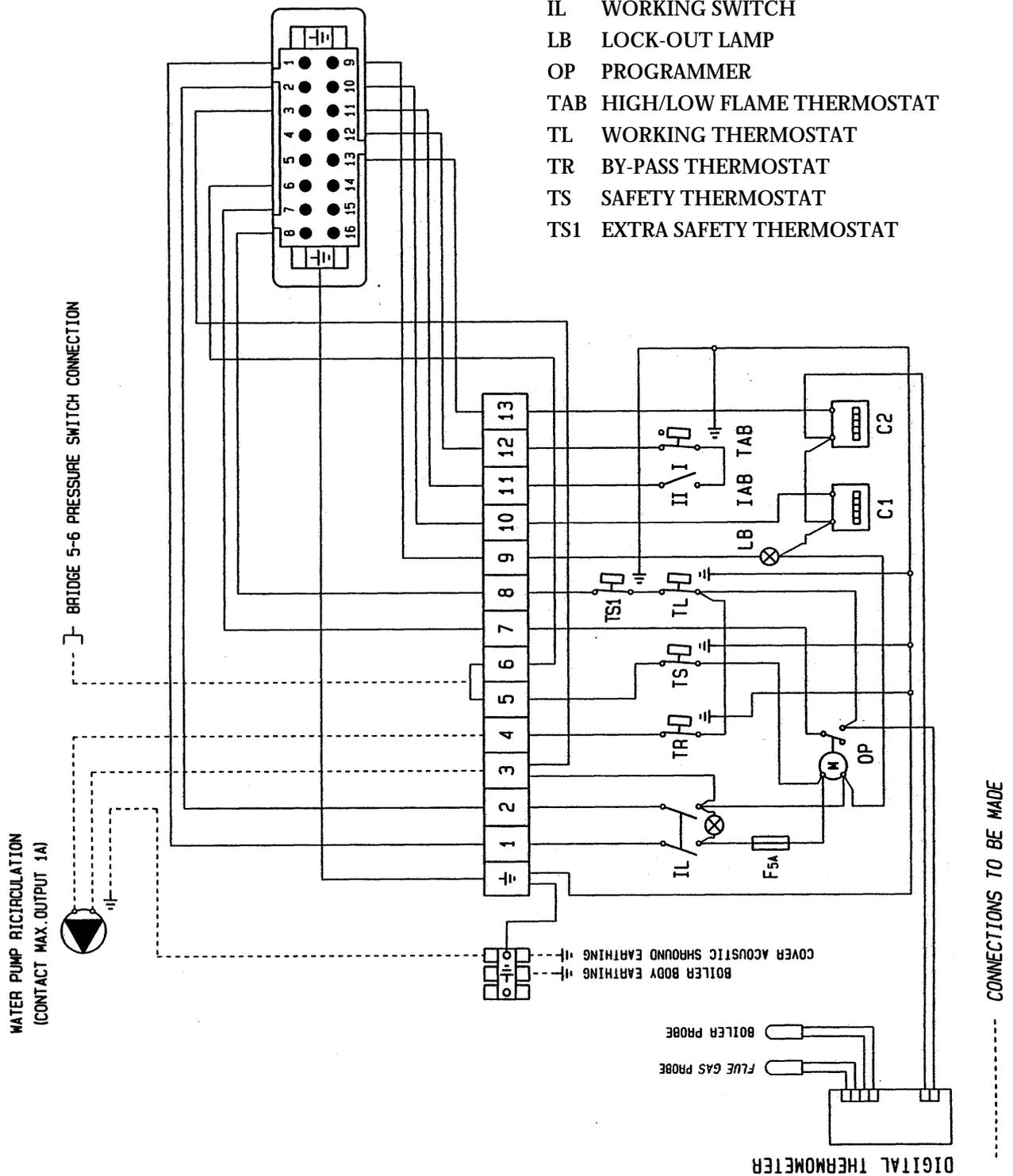


CONNECTIONS TO BE MADE

ATTENTION: FOR 230 VOLT THREE PHASE CONNECTION, MOVE THE EXISTING WIRE FROM TERMINAL N TO TERMINAL R AND CHECK THE ELECTRICAL WIRING DIAGRAM OF THE BURNER.

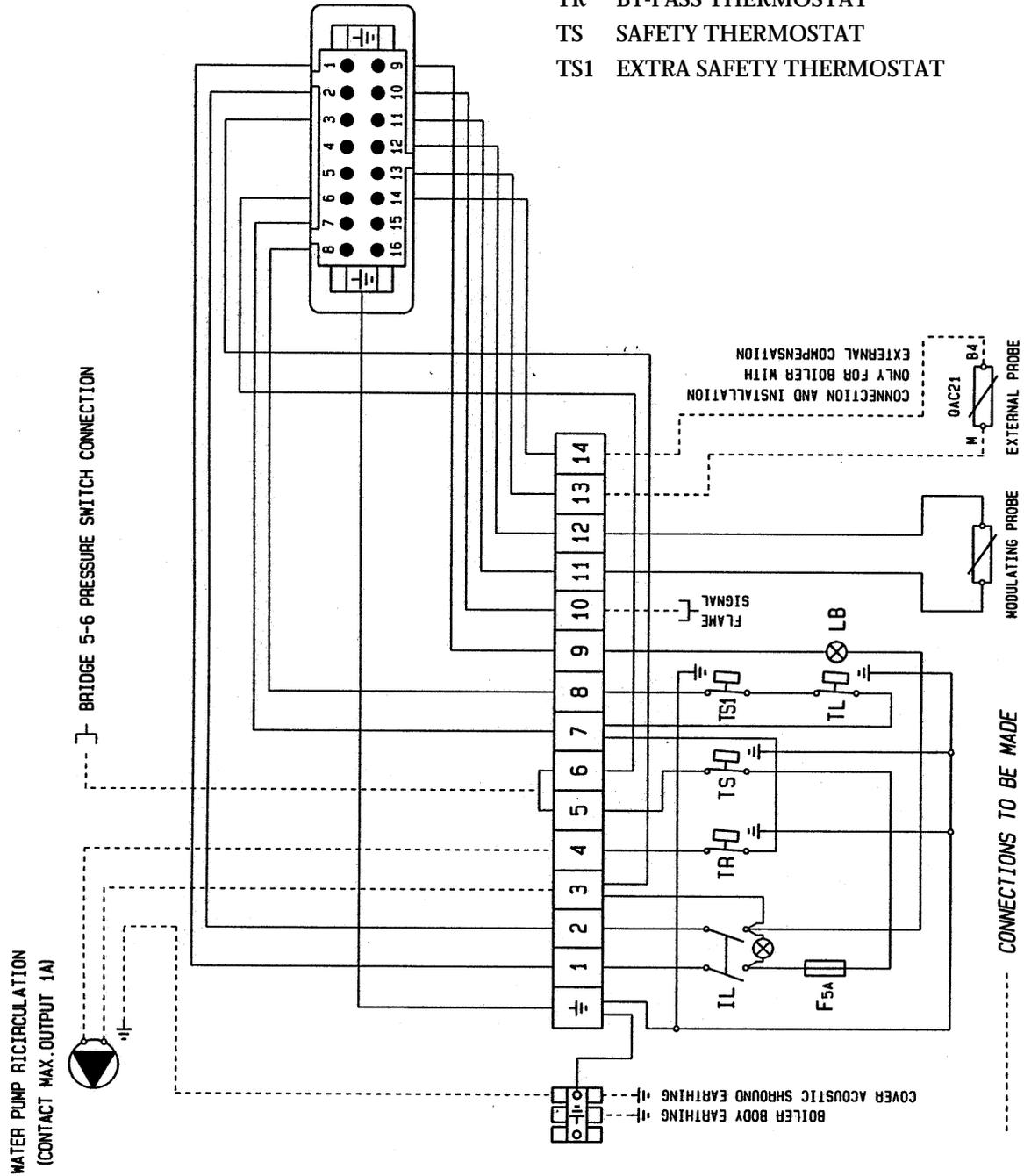
CEA07.032

- C1 FIRST STAGE HOURS COUNTER
- C2 SECOND STAGE HOURS COUNTER
- F FUSE
- IAB HIGH/LOW FLAME SWITCH
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- OP PROGRAMMER
- TAB HIGH/LOW FLAME THERMOSTAT
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 EXTRA SAFETY THERMOSTAT



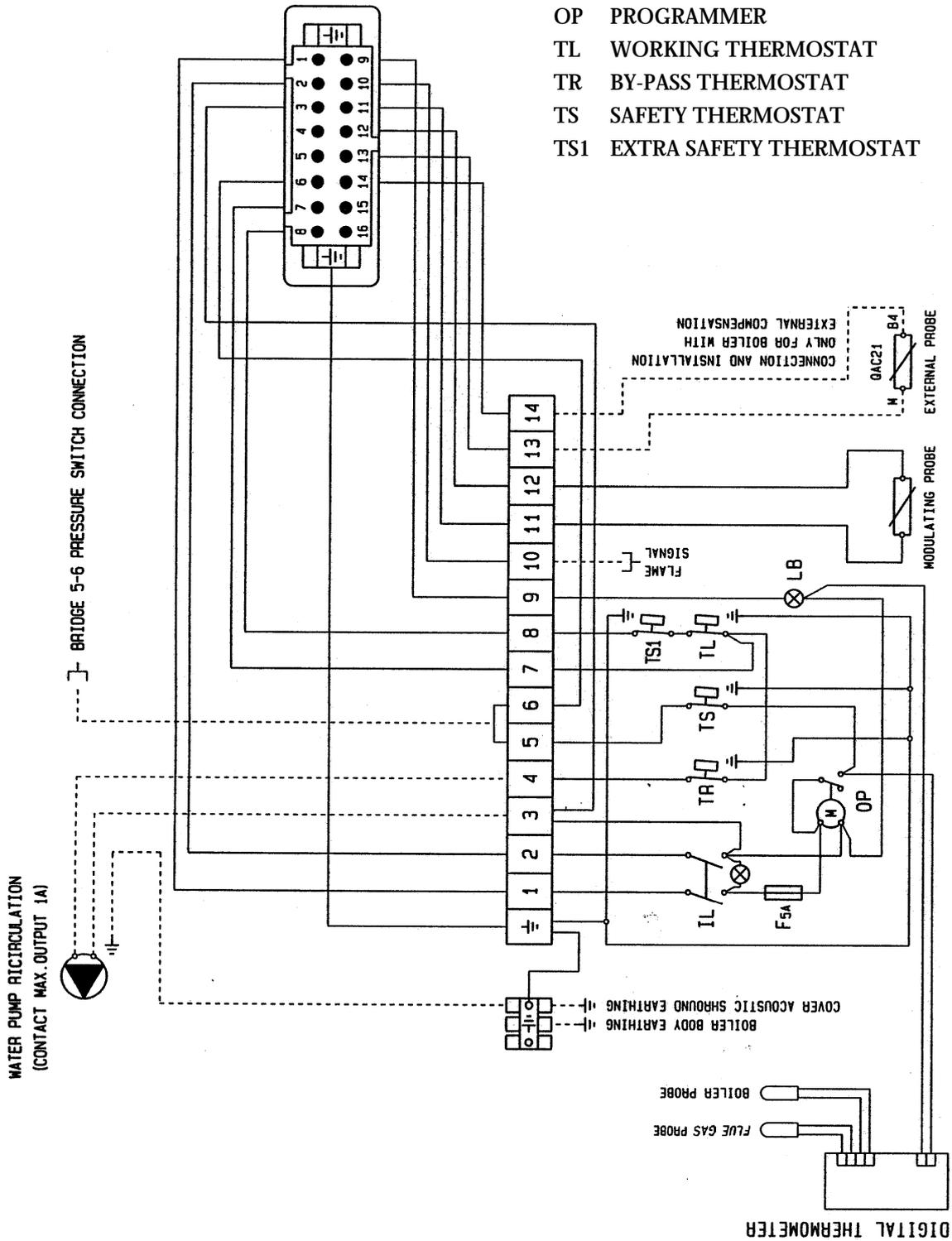
CEA07.033

- F FUSE
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- OP PROGRAMMER
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 EXTRA SAFETY THERMOSTAT



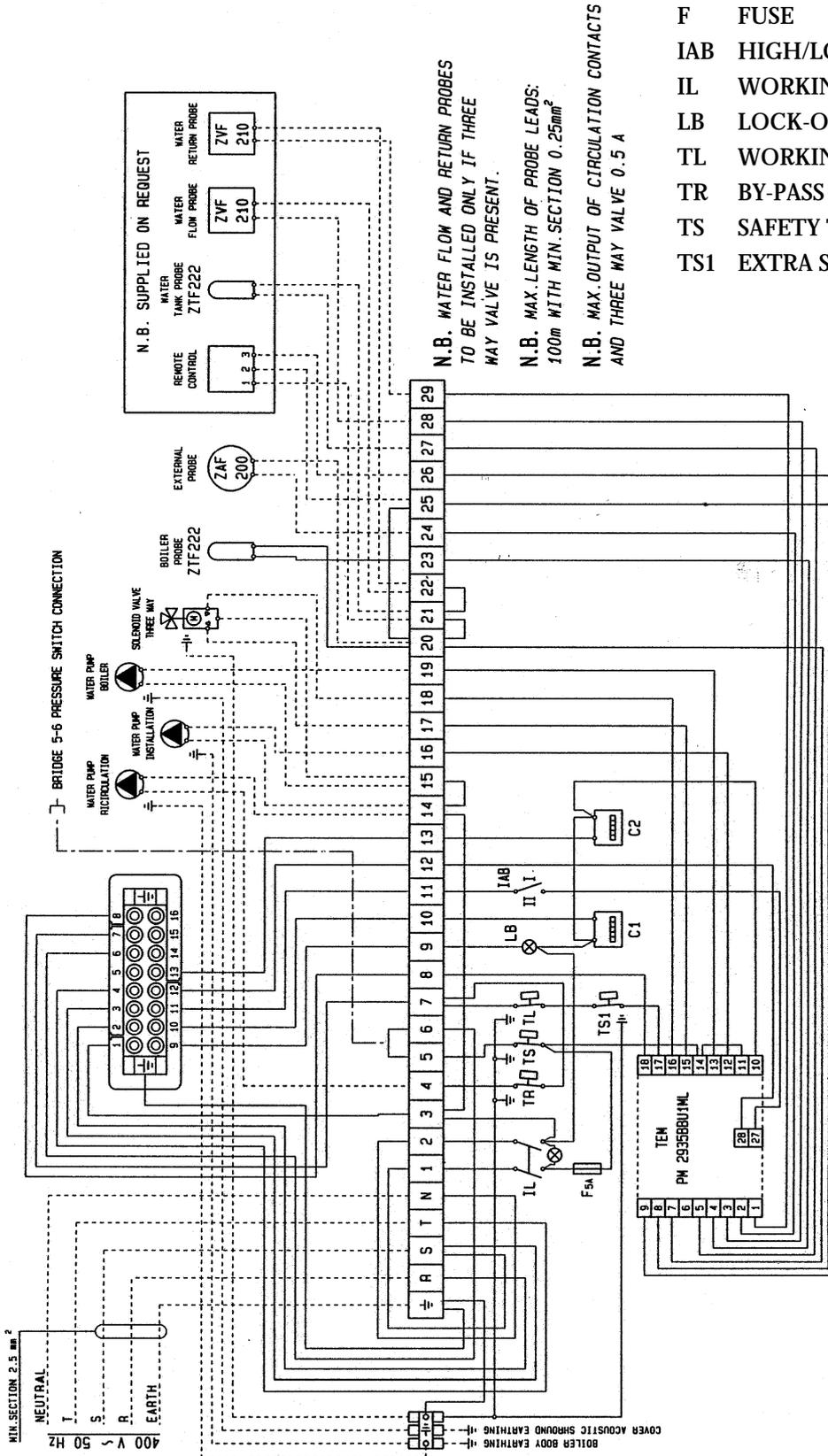
CEA07.035

- F FUSE
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- OP PROGRAMMER
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 EXTRA SAFETY THERMOSTAT

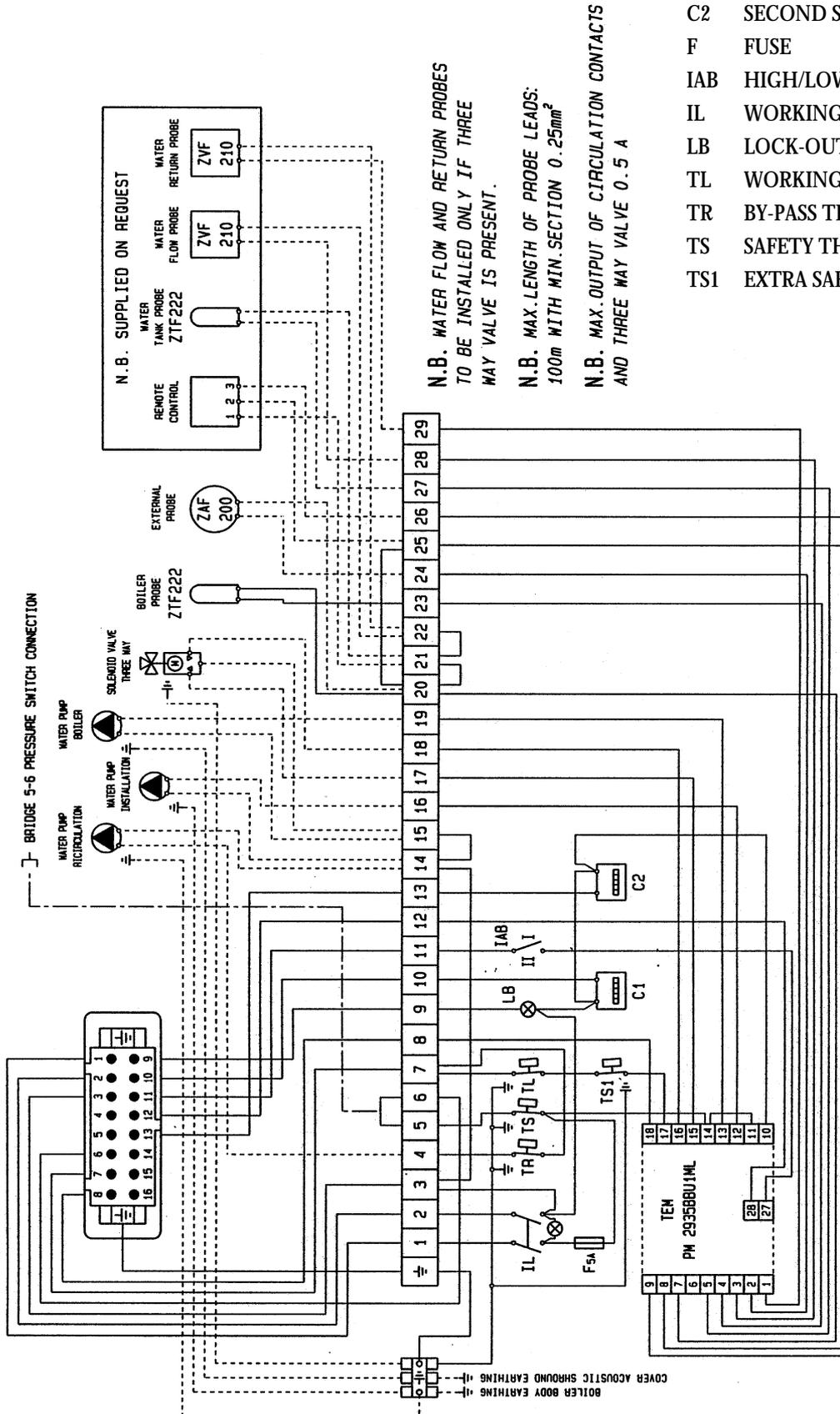


CEA07.036

- C1 FIRST STAGE HOURS COUNTER
- C2 SECOND STAGE HOURS COUNTER
- F FUSE
- IAB HIGH/LOW FLAME SWITCH
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 EXTRA SAFETY THERMOSTAT



CEA07.037



N.B. WATER FLOW AND RETURN PROBES TO BE INSTALLED ONLY IF THREE WAY VALVE IS PRESENT.

N.B. MAX. LENGTH OF PROBE LEADS: 100m WITH MIN. SECTION 0.25mm²

N.B. MAX. OUTPUT OF CIRCULATION CONTACTS AND THREE WAY VALVE 0.5 A

- C1 FIRST STAGE HOURS COUNTER
- C2 SECOND STAGE HOURS COUNTER
- F FUSE
- IAB HIGH/LOW FLAME SWITCH
- IL WORKING SWITCH
- LB LOCK-OUT LAMP
- TL WORKING THERMOSTAT
- TR BY-PASS THERMOSTAT
- TS SAFETY THERMOSTAT
- TS1 EXTRA SAFETY THERMOSTAT

----- CONNECTIONS TO BE MADE

N.B. REMOVE 20-25 CONNECTIONS IF REMOTE CONTROL IS ACTIVATED

- MODEL FS3601 WITH AMBIENT PROBE

- MODEL FS3602 WITHOUT AMBIENT PROBE



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