MHS
BOILERS

PRESSURISED STEEL BOILER

GAS, LIGHT OIL AND DUAL FUEL

SERIES:

ECOMAX

N/NS

NC/NCS

DUOMAX

N/NS

PN/PNS

INSTRUCTIONS FOR INSTALLATION AND USE

ISO 9001
registered by
GASTEC

LB 1415 • 06/09/2005

INDEX:

ECOMAX N/NS - NC/NCS TECHNICAL DATA

ECOMAX N/NS - NC/NCS	BOILER OUTPUT				BOILER INPUT				WATER CONTENT	LOSS OF LOAD *	BACK PRESSURE IN COMBUSTION CHAMBER	WEIGHT
	MAX		MIN		MAX		MIN					
Mod.	kcal/h	kW	kcal/h	kW	kcal/h	kW	kcal/h	kW	litres	mbar	mbar	kg
70	60.200	70	30100	35	65.580	76,3	32.790	38,1	105	9	0,8	200
80	68.800	80	34400	40	74.950	87,1	37.475	43,6	105	10	1,0	200
90	77.400	90	38700	45	84.310	98,0	42.155	49,0	123	11	0,8	240
100	86.000	100	43000	50	93.680	108,9	46.840	54,5	123	12	1,0	240
120	103.200	120	51600	60	112.420	130,7	56.210	65,4	123	13	1,1	240
150	129.000	150	64500	75	140.520	163,4	70.260	81,7	172	14	1,2	320
200	172.000	200	86000	100	187.360	217,9	93.680	108,9	172	15	1,9	320
250	215.000	250	107500	125	234.200	272,3	117.100	136,2	220	16	2,0	400
300	258.000	300	129000	150	279.520	325,0	139.760	162,5	300	16	2,0	440
350	301.000	350	150500	175	326.110	379,2	163.055	189,6	356	18	2,9	500
420	361.200	420	180600	210	391.330	455,0	195.665	227,5	360	25	4,1	540
510	438.600	510	219300	255	475.190	552,5	237.595	276,3	540	22	4,2	800
630	541.800	630	270900	315	587.000	682,6	293.500	341,3	645	27	6,4	900
750	645.000	750	322500	375	698.810	812,6	349.405	406,3	855	25	5,2	1140
870	748.200	870	374100	435	810.620	942,6	405.310	471,3	855	25	7,2	1140
970	834.200	970	417100	485	903.790	1050,9	451.895	525,5	950	39	5,2	1340
1030	885.800	1030	442900	515	959.700	1115,9	479.850	558,0	1200	26	4,0	1760
1200	1.032.000	1200	516000	600	1.118.090	1300,1	559.045	650,1	1200	30	5,5	1760
1300	1.118.000	1300	559000	650	1.211.270	1408,5	605.635	704,2	1200	30	6,5	1760
1400	1.204.000	1400	602000	700	1.304.440	1516,8	652.220	758,4	1500	28	6,0	2600
1600	1.376.000	1600	688000	800	1.490.790	1733,5	745.395	866,7	1500	32	6,5	2600
1800	1.548.000	1800	774000	900	1.677.140	1950,2	838.570	975,1	1650	37	5,5	2750
2000	1.720.000	2000	860000	1000	1.863.490	2166,8	931.745	1083,4	2000	35	6,0	3650
2400	2.064.000	2400	1032000	1200	2.236.190	2600,2	1.118.095	1300,1	2300	40	7,5	3900
3000	2.580.000	3000	1290000	1500	2.795.230	3250,3	1.397.615	1625,1	3150	49	8,0	5200
3500	3.010.000	3500	1505000	1750	3.261.110	3792,0	1.630.555	1896,0	3650	60	8,5	5700

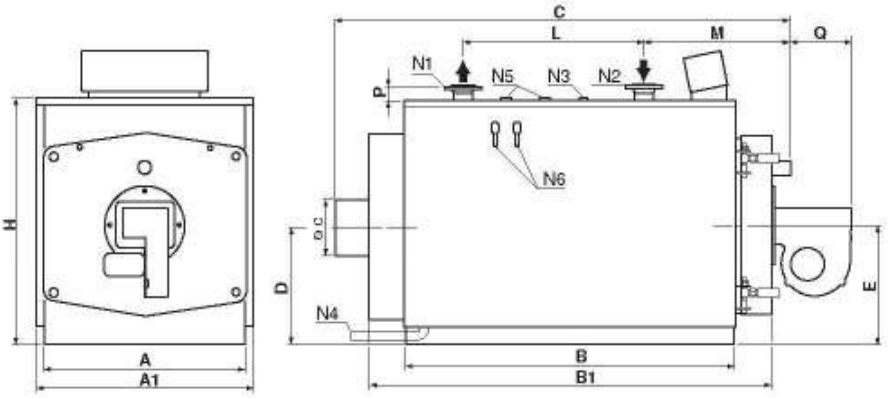
* - With Δt water side 12°C

Max working pressure: 6 bar

ECOMAX N/NS - NC/NCS OVERALL DIMENSIONS AND ATTACHMENT

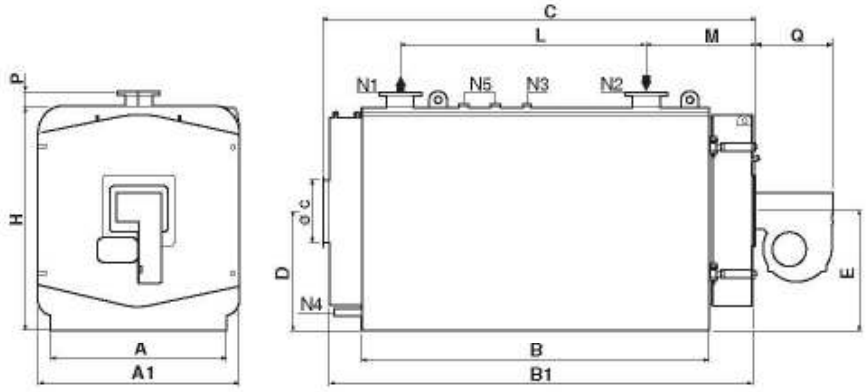
ECOMAX N/NS - NC/NCS
mod. 70 ÷ 1300

N1 - System delivery
N2 - System return
N3 - Poket for instruments
N4 - Boiler outlet attachment
N5 - Safety pipeline attachment
N6 - Poket for bulbs



ECOMAX N/NS - NC/NCS
mod. 1400 ÷ 3500

N1 - System delivery
N2 - System return
N3 - Poket for instruments
N4 - Boiler outlet attachment
N5 - Safety pipeline attachment



ECOMAX N/NS - NC/NCS	DIMENSIONS mm													FITTINGS DN / in				
mod.	**A**	**A1**	**B**	**B1**	**C**	**D**	**E**	**H**	**L**	**M**	**P**	**Q ****	**øc**	**N1/N2**	**N3**	**N4**	**N5**	**N6**
70	700	750	630	895	1000	415	415	855	240	415	56	204	200	50	1"	1"	-	1/2"
80	700	750	630	895	1000	415	415	855	240	415	56	204	200	50	1"	1"	-	1/2"
90	700	750	755	1020	1120	415	415	855	265	484	56	204	200	50	1"	1"	-	1/2"
100	700	750	755	1020	1120	415	415	855	265	484	56	204	200	50	1"	1"	-	1/2"
120	700	750	755	1020	1120	415	415	855	265	484	56	280	200	50	1"	1"	-	1/2"
150	750	800	1000	1267	1365	440	440	905	475	484	56	280	250	50	1"	1"	-	1/2"
200	750	800	1000	1267	1365	440	440	905	475	484	56	280	250	50	1"	1"	-	1/2"
250	750	800	1250	1517	1615	440	440	905	725	484	56	390	250	50	1"	1"	-	1/2"
300	850	900	1250	1517	1615	490	490	1005	700	484	56	555	250	65	1"	1"	-	1/2"
350	850	900	1500	1769	1865	490	490	1005	980	484	56	555	250	65	1"	1"	-	1/2"
420	890	940	1502	1791	1875	500	500	1015	850	600	80	555	250	80	1"	1"	1" 1/4 ●	1/2"
510	1110	1160	1502	1838	1950	610	610	1205	850	660	80	555	300	80	1"	1" 1/4	1" 1/4	1/2"
630	1110	1160	1792	2127	2240	610	610	1205	1150	660	80	555	300	80	1"	1" 1/4	1" 1/4	1/2"
750	1240	1290	1753	2143	2250	675	675	1335	1100	710	82	555	350	100	1"	1" 1/4	1" 1/2	1/2"
870	1240	1290	1753	2143	2250	675	675	1335	1100	710	82	555	350	100	1"	1" 1/4	1" 1/2	1/2"
970	1240	1290	2003	2393	2500	675	675	1335	1200	710	82	555	350	100	1"	1" 1/4	1" 1/2	1/2"
1030	1390	1440	2003	2374	2500	750	750	1485	1200	710	83	555	400	125	1"	1" 1/4	1" 1/2	1/2"
1200	1390	1440	2003	2374	2500	750	750	1485	1200	710	83	660	400	125	1"	1" 1/4	1" 1/2	1/2"
1300	1390	1440	2003	2374	2500	750	750	1485	1200	710	83	660	400	125	1"	1" 1/4	1" 1/2	1/2"
1400	1270	1470	2300	2793	2850	880	880	1630	1300	795	116	660	400	150	1"	1"1/4	1"1/2	-
1600	1270	1470	2300	2793	2850	880	880	1630	1300	795	116	660	400	150	1"	1"1/4	1"1/2	-
1800	1270	1470	2510	3003	3060	880	880	1630	1850	735	116	660	400	150	1"	1"1/4	1"1/2	-
2000	1400	1600	2510	3132	3190	945	945	1760	1550	870	116	810	500	200	1"1/2	1"1/4	2"	-
2400	1400	1600	2770	3392	3450	945	945	1760	1950	870	116	810	500	200	1"1/2	1"1/4	2"	-
3000	1670	1870	2770	3392	3450	1080	1080	2030	2050	870	116	810	550	200	1"1/2	1"1/4	2"	-
3500	1670	1870	3225	3847	3900	1080	1080	2030	2050	870	116	810	550	200	1"1/2	1"1/4	2"	-

● = Only one N5 fitting; - = fitting not included
Q ** = Ecoflam gas burners without gas train

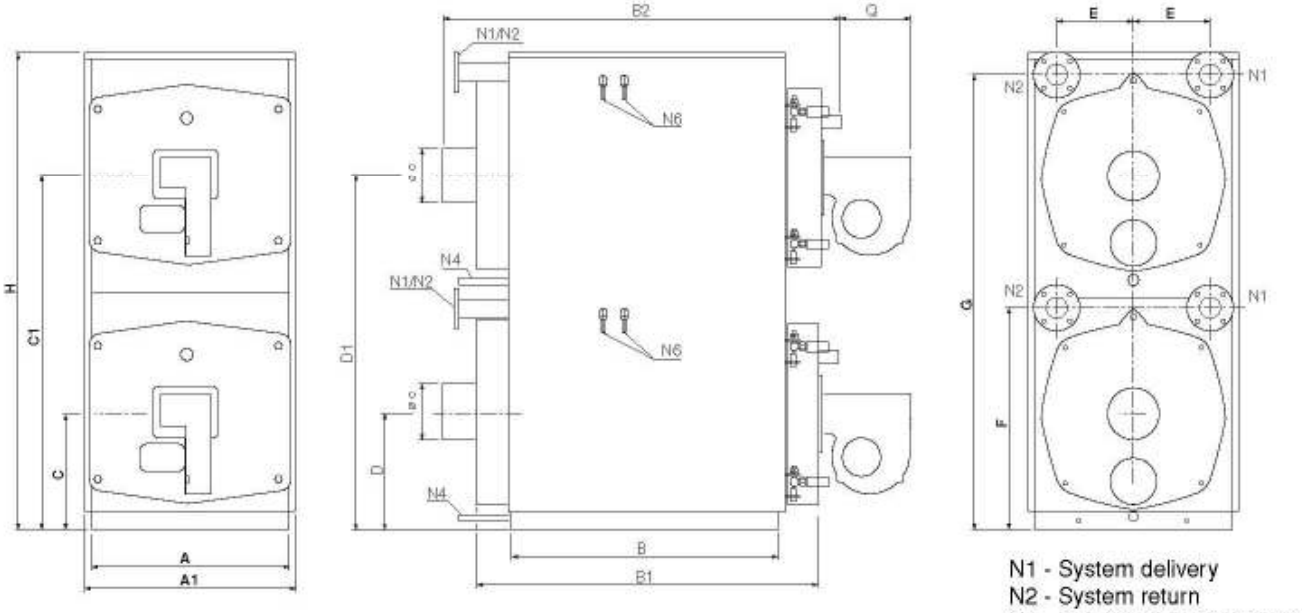
DUOMAX N/NS TECHNICAL DATA

DUOMAX N/NS	BOILER OUTPUT				BOILER INPUT				WATER CONTENT	LOSS OF LOAD *	BACK PRESSURE IN COMBUSTION CHAMBER	WEIGHT
	MAX		MIN		MAX		MIN					
Mod.	kcal/h	kW	kcal/h	kW	kcal/h	kW	kcal/h	kW	litri	mbar	mbar	kg
140	120.400	140	60.200	70	131.160	152,6	65.580	76,3	2x105	9	0,8	410
160	137.600	160	68.800	80	149.900	174,2	74.950	87,1	2x105	10	1,0	410
180	154.800	180	77.400	90	168.620	196,0	84.310	98,0	2x123	10	1,0	490
200	172.000	200	43.000	50	187.360	217,8	46.840	54,5	2x123	12	1,0	490
240	206.400	240	51.600	60	224.840	261,4	56.210	65,4	2x123	13	1,1	490
300	258.000	300	64.500	75	281.040	326,8	70.260	81,7	2x172	14	1,2	660
400	344.000	400	86.000	100	374.720	435,8	93.680	108,9	2x172	15	1,9	660
500	430.000	500	107.500	125	468.400	544,6	117.100	136,2	2x220	15	2,0	820
600	516.000	600	129.000	150	559.040	650,0	139.760	162,5	2x300	16	2,0	900
700	602.000	700	150.500	175	652.220	758,4	163.055	189,6	2x356	18	2,9	1030

* - With Δt water side 12°C

Max working pressure: 6 bar

DUOMAX N/NS OVERALL DIMENSIONS AND ATTACHMENT



N1 - System delivery
N2 - System return
N4 - Boiler outlet attachment
N6 - Poket for bulbs

DUOMAX N/NS	DIMENSIONS mm														FITTINGS DN / in		
mod.	A	A1	B	B1	C	C1	D	D1	E	F	G	H	Q **	øc	N1/N2	N4	N6
140	700	750	630	895	415	1245	415	1245	270	780	1610	1693	204	200	50	1"	1/2"
160	700	750	630	895	415	1245	415	1245	270	780	1610	1693	204	200	50	1"	1/2"
180	700	750	755	1020	415	1245	415	1245	270	780	1610	1693	204	200	50	1"	1/2"
200	700	750	755	1020	415	1245	415	1245	270	780	1610	1693	204	200	50	1"	1/2"
240	700	750	755	1020	415	1245	415	1245	270	780	1610	1693	276	200	50	1"	1/2"
300	750	800	1000	1267	440	1320	440	1320	295	830	1710	1793	276	250	50	1"	1/2"
400	750	800	1000	1267	440	1320	440	1320	295	830	1710	1793	276	250	50	1"	1/2"
500	750	800	1250	1517	440	1320	440	1320	295	830	1710	1793	390	250	50	1"	1/2"
600	850	900	1250	1517	490	1470	490	1470	345	930	1910	1993	555	250	65	1"	1/2"
700	850	900	1500	1769	490	1470	490	1470	345	930	1910	1993	555	250	65	1"	1/2"

Q ** = Ecoflam gas burners without gas train

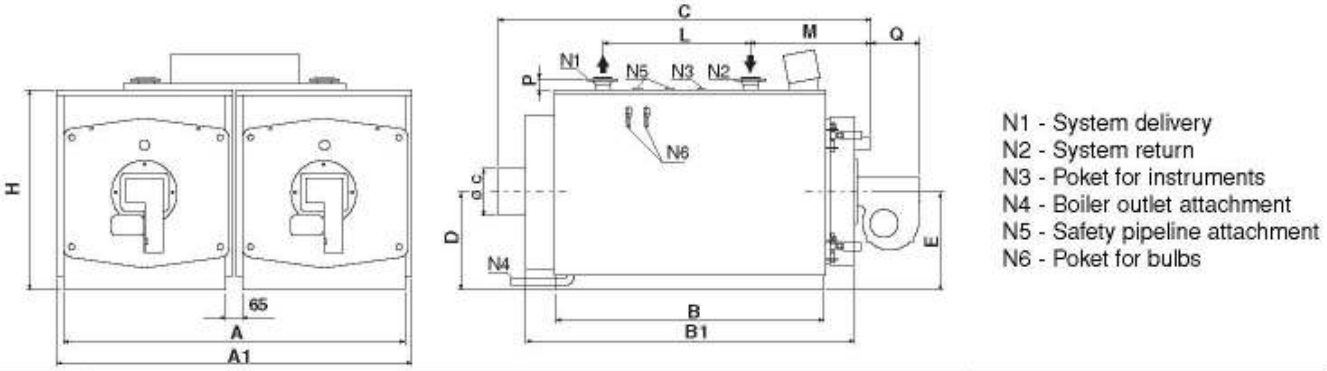
DUOMAX PN/PNS TECHNICAL DATA

DUOMAX PN/PNS	BOILER OUTPUT				BOILER INPUT				WATER CONTENT	LOSS OF LOAD *	BACK PRESSURE IN COMBUSTION CHAMBER	WEIGHT
	MAX		MIN		MAX		MIN					
Mod.	kcal/h	kW	kcal/h	kW	kcal/h	kW	kcal/h	kW	litri	mbar	mbar	kg
140	120.400	140	60.200	70	131.160	152,6	65.580	76,3	105 x 2	9	0,8	200 x 2
160	137.600	160	68.800	80	149.900	174,2	74.950	87,1	105 x 2	10	1,0	200 x 2
180	154.800	180	77.400	90	168.620	196,0	84.310	98,0	123 x 2	11	0,8	240 x 2
200	172.000	200	43.000	50	187.360	217,8	46.840	54,5	123 x 2	12	1,0	240 x 2
240	206.400	240	51.600	60	224.840	261,4	56.210	65,4	123 x 2	13	1,1	240 x 2
300	258.000	300	64.500	75	281.040	326,8	70.260	81,7	172 x 2	14	1,2	320 x 2
400	344.000	400	86.000	100	374.720	435,8	93.680	108,9	172 x 2	15	1,9	320 x 2
500	430.000	500	107.500	125	468.400	544,6	117.100	136,2	300 x 2	16	2,0	400 x 2
600	516.000	600	129.000	150	559.040	650	139.760	162,5	300 x 2	16	2,0	440 x 2
700	602.000	700	150.500	175	652.220	758,4	163.055	189,6	356 x 2	18	2,9	500 x 2
840	722.400	840	180.600	210	782.660	910	195.665	227,5	360 x 2	25	4,1	540 x 2
1020	877.200	1020	219.300	255	950.380	1105	237.595	276,3	540 x 2	22	4,2	800 x 2
1260	1.083.600	1260	270.900	315	1.174.000	1365,2	293.500	341,3	645 x 2	27	6,4	900 x 2
1500	1.290.000	1500	322.500	375	1.397.620	1625,2	349.405	406,3	855 x 2	25	5,2	1140 x 2
1740	1.496.400	1740	374.100	435	1.621.240	1885,2	405.310	471,3	855 x 2	25	7,2	1140 x 2
1940	1.668.400	1940	417.100	485	1.807.580	2101,8	451.895	525,5	950 x 2	39	5,2	1340 x 2
2060	1.771.600	2060	442.900	515	1.919.400	2231,8	479.850	558	1200 x 2	26	4,0	1760 x 2
2400	2.064.000	2400	516.000	600	2.236.180	2600,2	559.045	650,1	1200 x 2	30	5,5	1760 x 2
2600	2.236.000	2600	559.000	650	2.422.540	2817	605.635	704,2	1200 x 2	30	6,5	1760 x 2

* - With Δt water side 12°C

Max working pressure: 6 bar

DUOMAX PN/PNS OVERALL DIMENSIONS AND ATTACHMENT



N1 - System delivery
N2 - System return
N3 - Poket for instruments
N4 - Boiler outlet attachment
N5 - Safety pipeline attachment
N6 - Poket for bulbs

DUOMAX PN/PNS	DIMENSIONS mm													FITTINGS DN / in				
mod.	A	A1	B	B1	C	D	E	H	L	M	P	Q **	øc	N1/N2	N3	N4	N5	N6
140	1465	1515	630	895	1000	415	415	855	240	415	56	204	200	50	1"	1"	-	1/2"
160	1465	1515	630	895	1000	415	415	855	240	415	56	204	200	50	1"	1"	-	1/2"
180	1465	1515	755	1020	1120	415	415	855	265	484	56	204	200	50	1"	1"	-	1/2"
200	1465	1515	755	1020	1120	415	415	855	265	484	56	204	200	50	1"	1"	-	1/2"
240	1465	1515	755	1020	1120	415	415	855	265	484	56	276	200	50	1"	1"	-	1/2"
300	1565	1615	1000	1267	1365	440	440	905	475	484	56	276	250	50	1"	1"	-	1/2"
400	1565	1615	1000	1267	1365	440	440	905	475	484	56	276	250	50	1"	1"	-	1/2"
500	1565	1615	1250	1517	1615	440	440	905	725	484	56	390	250	50	1"	1"	-	1/2"
600	1765	1815	1250	1517	1615	490	490	1005	700	484	56	555	250	65	1"	1"	-	1/2"
700	1765	1815	1500	1769	1865	490	490	1005	980	484	56	555	250	65	1"	1"	-	1/2"
840	1845	1895	1502	1791	1875	500	500	1015	850	600	80	555	250	80	1"	1"	1" 1/4 ●	1/2"
1020	2285	2335	1502	1838	1950	610	610	1205	850	660	80	555	300	80	1"	1" 1/4	1" 1/4	1/2"
1260	2285	2335	1792	2127	2240	610	610	1205	1150	660	80	555	300	80	1"	1" 1/4	1" 1/4	1/2"
1500	2545	2595	1753	2143	2250	675	675	1335	1100	710	82	555	350	100	1"	1" 1/4	1" 1/2	1/2"
1740	2545	2595	1753	2143	2250	675	675	1335	1100	710	82	555	350	100	1"	1" 1/4	1" 1/2	1/2"
1940	2545	2595	2003	2393	2500	675	675	1335	1200	710	82	555	350	100	1"	1" 1/4	1" 1/2	1/2"
2060	2845	2895	2003	2374	2500	750	750	1485	1200	710	83	555	400	125	1"	1" 1/4	1" 1/2	1/2"
2400	2845	2895	2003	2374	2500	750	750	1485	1200	710	83	660	400	125	1"	1" 1/4	1" 1/2	1/2"
2600	2845	2895	2003	2374	2500	750	750	1485	1200	710	83	660	400	125	1"	1" 1/4	1" 1/2	1/2"

● = Only one N5 fitting; - = fitting not included

Q ** = Ecoflam gas burners without gas train

GENERAL SPECIFICATION

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 has been designed in minimum detail, especially those concerning the decrease of polluting gases, silent running and reliability.

Ecomax units 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 anticondensation effect.
The door opening direction can be simply adjusted 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.
In fact, it is equipped with components and instruments geared towards facilitating control and regulation of the boiler. By pressing the special selector switch on a digital econometer (supplied on request) fitted in 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 and 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 correctly connected.
Incorrect installation can cause damage to people and objects for which the manufacturer is not responsible.

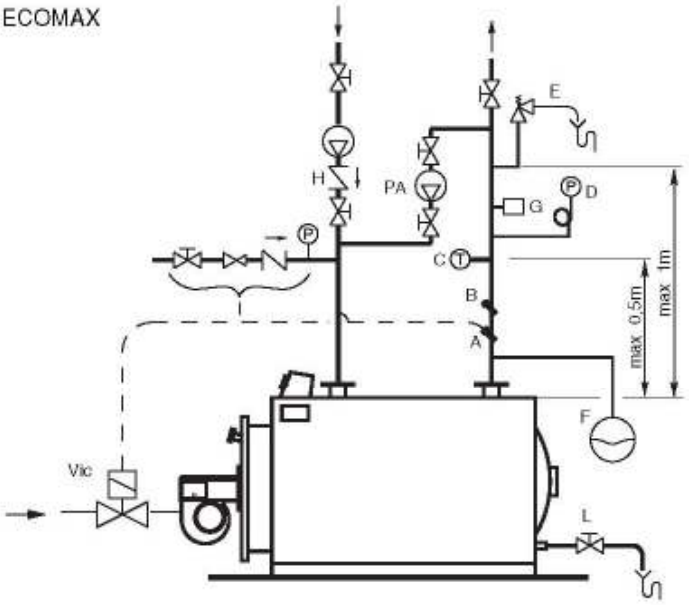
HYDRAULIC CONNECTION

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

WATER CIRCUIT CONNECTIONS

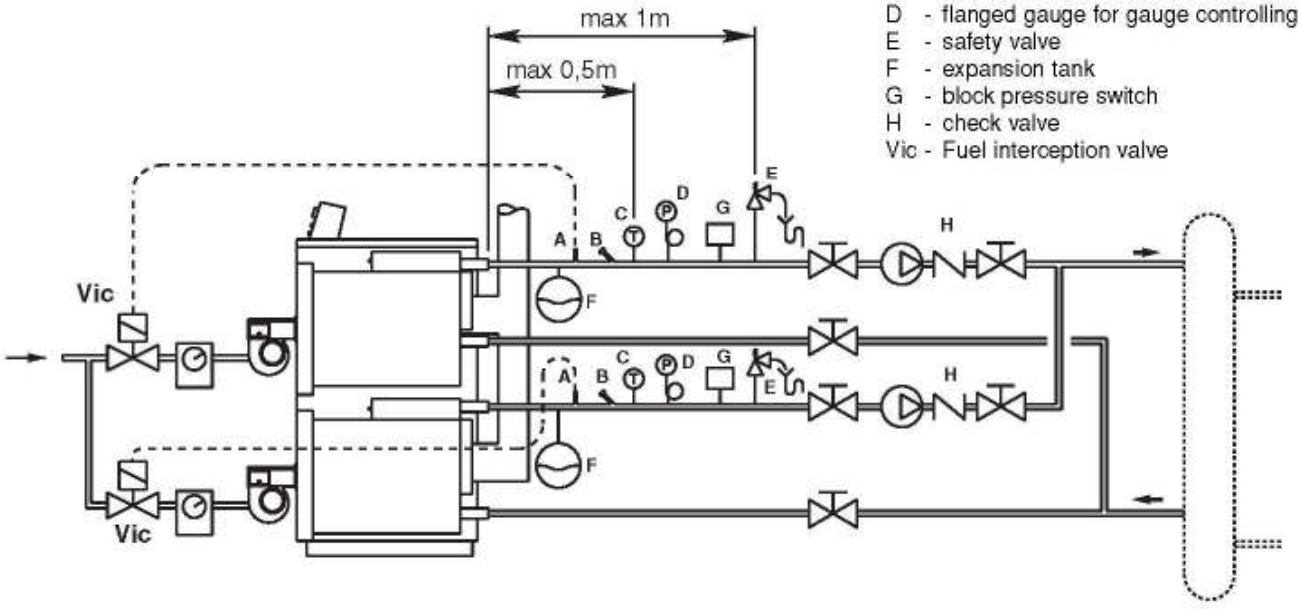
The water connection must comply with the safety standards in force and must be carried out by professionally qualified technicians.
In systems with closed expansion tanks, the pressure reducer of the automatic feed unit (when fitted) must be calibrated to a pressure which does not exceed the initial 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.
Anti-condensate pump should be fitted as shawn in the diagram and to be controlled by an external controller with a pump over-run timer.

ECOMAX



A - fuel interception valve probe
B - thermometer pocket
C - thermometer
D - flanged gauge for gauge controlling
E - safety valve
F - expansion tank
G - block pressure switch
H - check valve
I - loading unit
L - discharge tap
Vic - Fuel interception valve
PA - anti-condensate pump

DUOMAX

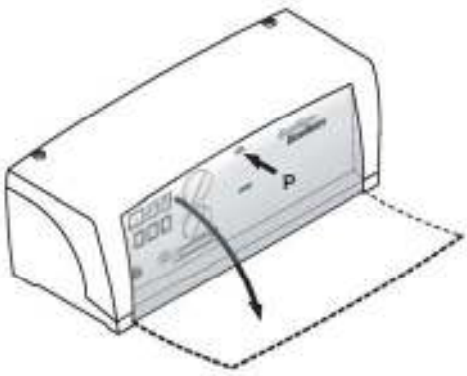


A - fuel interception valve probe
B - thermometer pocket
C - thermometer
D - flanged gauge for gauge controlling
E - safety valve
F - expansion tank
G - block pressure switch
H - check valve
Vic - Fuel interception valve

CONTROL PANELS

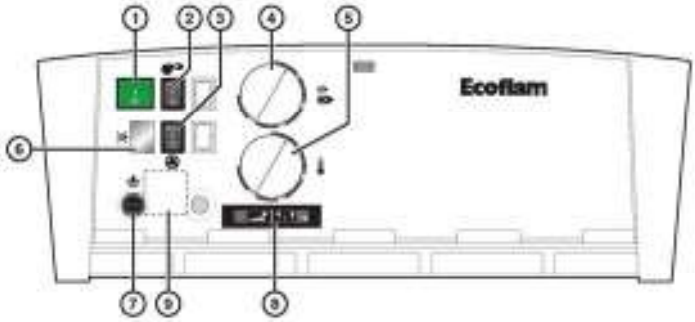
To gain access to the controls, push and release on P and rotate transparency panel towards you.

To close the transparency panel, rotate in vertical position and push and release it on P.



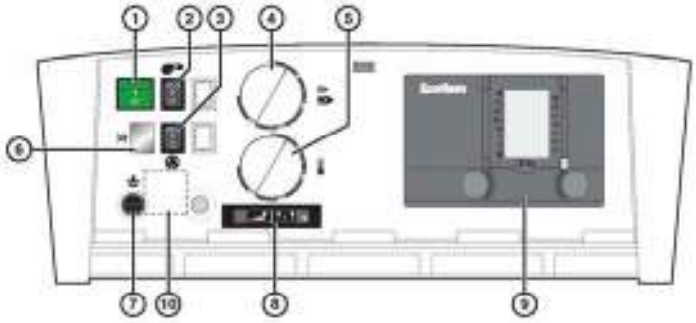
ECOMAX control panels

ELECTRIC PANEL FOR ECOMAX in the version 2 FLAME or MODULATING settings



1 - On/Off switch
2 - Burner switch
3 - Heating pump switch
4 - High and low flame thermostat
5 - Boiler thermostat
6 - Lock out burner lamp
7 - Manual reset safety thermostat
8 - Thermometer
9 - Minimum thermostat (already adjust to 50°C)

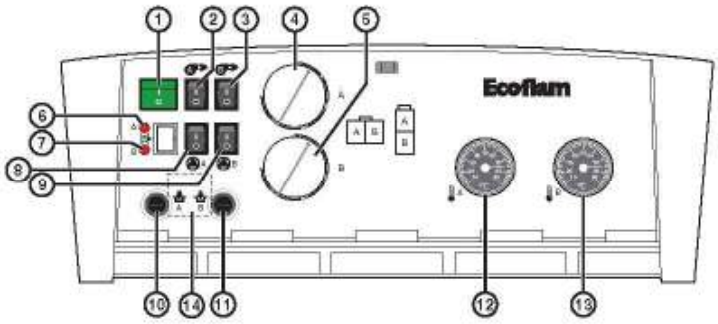
ELECTRIC PANEL FOR ECOMAX in the mudulating version with digital thermoregulation electronic central unit with self-regulating temperature



1 - On/Off switch
2 - Burner switch
3 - Heating pump switch
4 - High and low flame thermostat
5 - Boiler thermostat
6 - Lock out burner lamp
7 - Manual reset safety thermostat
8 - Thermometer
9 - Thermoregulation electronic central unit
10 - Minimum thermostat (already adjust to 50°C)

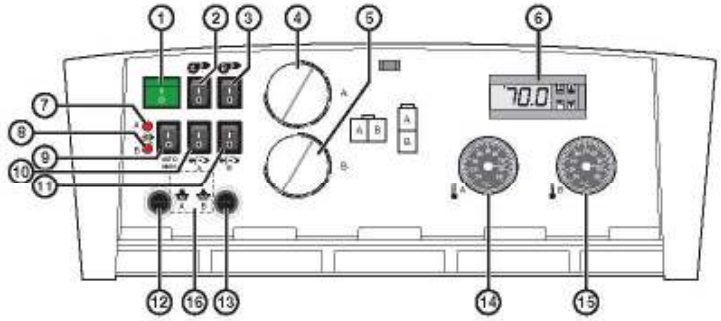
DUOMAX control panels

Duomax 2 or 4 flames



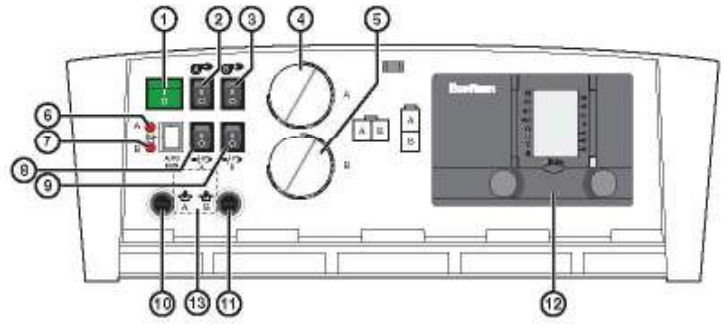
1 - On/Off switch
2 - Burner switch boiler A
3 - Burner switch boiler B
4 - Boiler A thermostat
5 - Boiler B thermostat
6 - Lock out burner A lamp
7 - Lock out burner B lamp
8 - Heating pump switch boiler A
9 - Heating pump switch boiler B
10 - Manual reset safety thermostat boiler A
11 - Manual reset safety thermostat boiler B
12 - Thermometer boiler A
13 - Thermometer boiler B
14 - Minimum thermostat (already adjust to 50°C)

DUOMAX ELECTRONIC CONTROL PANEL WITH 4 FLAME SETTINGS IN AUTOMATIC SEQUENCE



1 - On/Off switch
2 - Burner switch boiler A
3 - Burner switch boiler B
4 - Boiler A thermostat
5 - Boiler B thermostat
6 - CAREL IR32 z 4-step electronic thermostat
7 - Lock out lamp burner A
8 - Lock out lamp burner B
9 - Manual (0)/automatic (I) operations switch
10 - Heating pump switch boiler A
11 - Heating pump switch boiler B
12 - Manual reset safety boiler A thermostat
13 - Manual reset safety boiler B thermostat
14 - Boiler A thermometer
15 - Boiler B thermometer
16 - Minimum thermostat (already adjust to 50°C)

ELECTRIC PANEL FOR DUOMAX in the mudulating version with digital thermoregulation electronic central unit with self-regulating temperature



1 - On/Off switch
2 - Burner switch boiler A
3 - Burner switch boiler B
4 - Boiler A thermostat
5 - Boiler B thermostat
6 - Lock out lamp burner A
7 - Lock out lamp burner B
8 - High/low flame switch burner boiler A
9 - High/low flame switch burner boiler B
10 - Manual reset safety boiler A thermostat
11 - Manual reset safety boiler B thermostat
12 - Thermoregulation electronic central unit
13 - Minimum thermostat (already adjust to 50°C)

CAREL IR 32 Z REGULATOR

OPERATION

The essential operating parameters for this type of control are the SET POINT (St1) and the DIFFERENTIAL (P1). The regulator only activates the burner stages if the delivery temperature decreases below the set point value (St1). Once the required work point has been set (St1, see fig. 2) the stages are activated as the delivery temperature decreases compared with St1. When the delivery temperature is equal to or lower than St1-P1 all the stages are activated; if, on the other hand, the delivery temperature starts up from values below St1 and starts to increase, as it draws nearer to the St1 value the stages are deactivated (see fig.2).
The reverse LED (fig. 1) indicates the number of stages active at that moment with a number of impulses equal to the number of active stages and there is a pause of 2 seconds between one signal and the next.

Other useful parameters for operation are also available, such as:

- **low alarm** (code P25): acoustic alarm that is activated when the delivery temperature decreases below the set limit; the alarm is disconnected by pressing key 3 (mute);
- **high alarm** (code P26): acoustic alarm that is activated when the delivery temperature rises above the set limit; the alarm is disconnected by pressing key 3 (mute);
- **differential alarm** (code P27): this defines the hysteresis set for the alarms, to avoid hunting caused by slight variations in the delivery temperature:
- **alarm delay** (codeP28): delays the alarm signal; the signal is only given if the alarm condition lasts for the entire delay period set. If the condition returns within the set limits during this period, the count is reset.

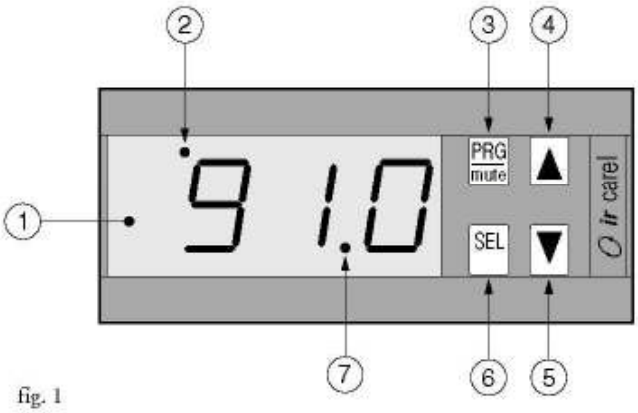


fig. 1

1 - Display
2 - Reverse led
3 - PRG / mute button
4 - Arrow "Up" (value increasing)
5 - Arrow "Down" (value decreasing)
6 - Selection button
7 - Decimal led

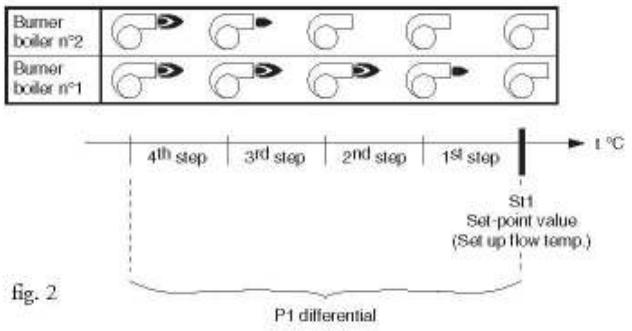


fig. 2

SETTING THE PARAMETERS (ref.fig. 1)

Setting the delivery temperature value (Set point=St1):

- press and hold key 6 (SEL) for a few seconds: "St1" appears on the display;
- release key 6: the value of the parameter to be altered flashes on the display;
- press key 4 (arrow up) or key 5 (arrow down) until the required value is obtained;
- confirm the set value by pressing key 6 (SEL).

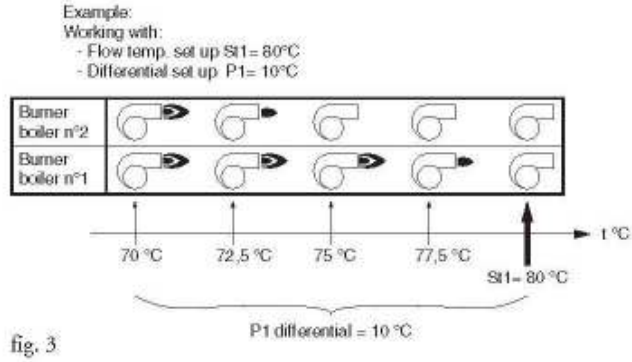


fig. 3

Setting the differential and useful parameter values:

- press and hold key 3 (PRG/mute) for about 5 seconds: "P1" appears on the display;
- release key 3: press key 4 (arrow up) or key 5 (arrow down) to obtain the parameter to be altered (P1 temperature diffe rential, P14, P25, low temperature alarm, P26 high temperature alarm, P 27 alarm differential and P28 alarm delay appear in rotation);
- press key 6 (arrow up) or 5 (arrow down) until the required value is obtained;
- confirm the set value by pressing key 6 (SEL); the code of the altered parameter appears on the display;
- repeat the steps from b to h if other parameters are to be altered;
- at the end of the above operations press key 3 to memorize the altered data and return to normal operation.

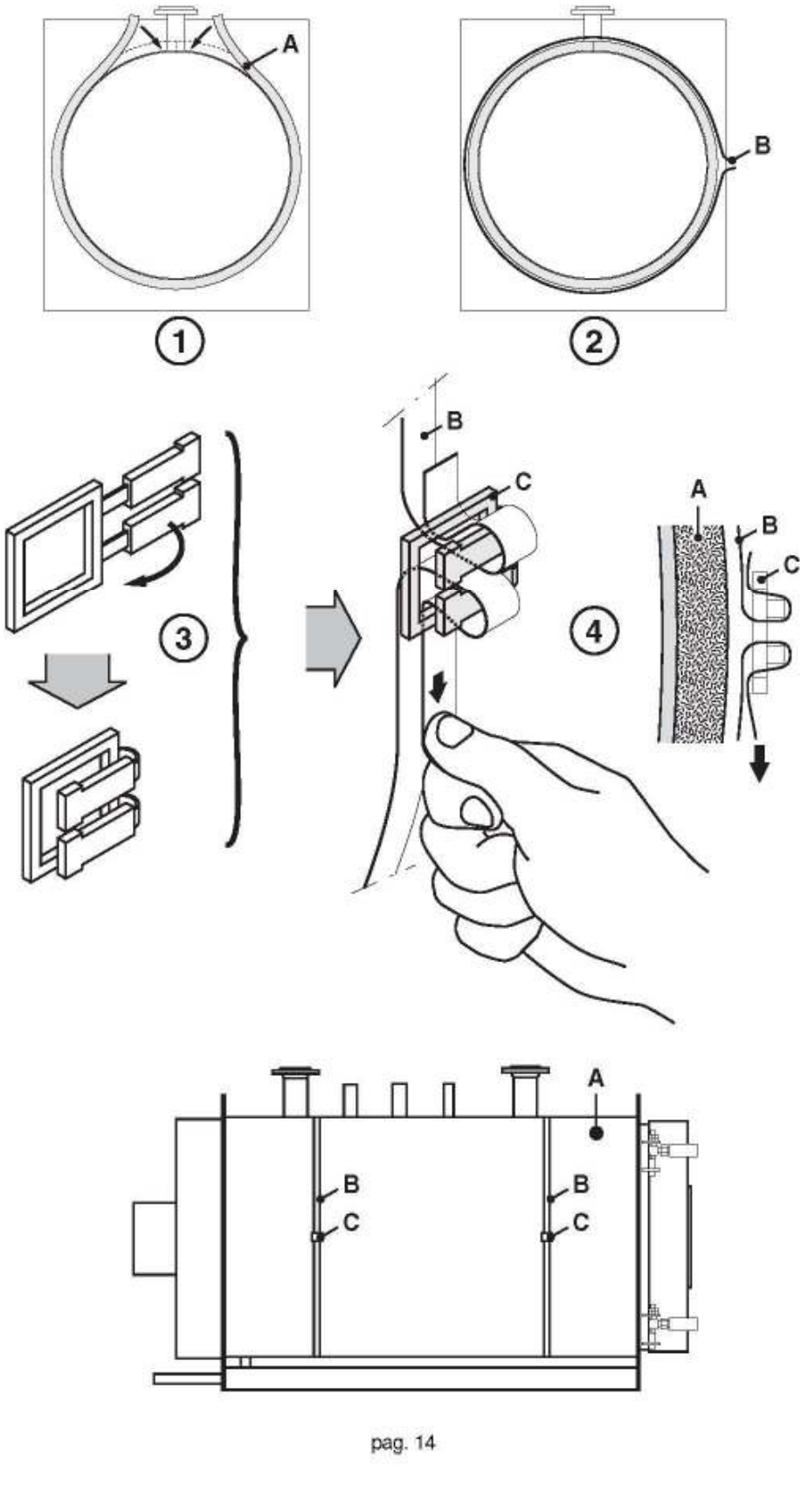
Values of the parameters

Parameter	Code	Range	value set
Set-point	St1	55 ÷ 90 [°C]	80,0°C
Differential	P1	0,1 ÷ 99,9 [°C]	10,0°C
Probe calibration	P14	-99 ÷ 99	0,0 **do not alter**
Low alarm	P25	-99 ÷ value P26 [°C]	5
High alarm	P26	value P25 ÷ 999 [°C]	95
Differential alarm	P27	0,1 ÷ 99,9 [°C]	2,0
Delay alarm	P28	0 ÷ 120 [min.]	60

The boiler rotation of the device is already calibrated (the first are to ignite it is also the first one to shut down), as it is the cut-in delay between power stages (5").

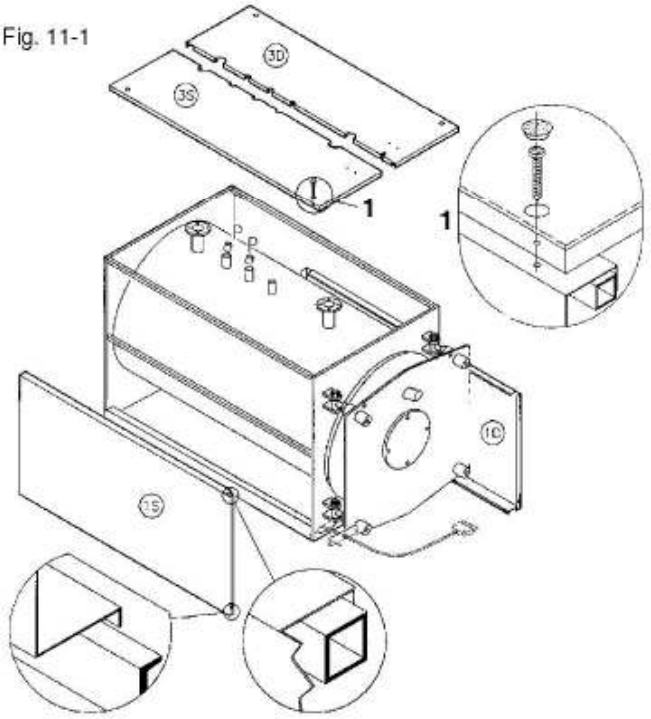
N.B. the probes may be positioned up to a **maximum distance of 100 metres** from the control panel as long as **probes with shielded cables with a minimum section of 1 sq.mm. are used (one end of the cable shield must be connected to the switchboard earth;** the other end must not be connected).
Separate the cables of probes and digital inputs of inductive and power loads as far apart as possible to prevent any electromagnetic disturbance; **never fit the power and probe cables into the same raceways (including those on switchboards).**

FITTING THE BOILER INSULATION



FITTING THE CASING
ECOMAX N - NS - NC - NCS (UP TO 420 MODEL)

Fig. 11-1



P Bulb well for:
Regulation boiler thermostat
Security thermostat
Minimum thermostat (Circulator consent thermostat)
Thermometer

- Wrap the glass wool around the boiler body leaving the bulb well (P) on the top side exposed.
- Loosen screw (V) and rotate towards you the frontal part of the electric control panel (see fig.11-2) and remove the half cut plastic plate K
- Pass the burner connection plug through the slot on the lower side of boiler front plate and insert the thermometer and thermostats bulbs in the slot K and in the wells P.
- Fit the panels (1S) and (1D) inserting the upper fold into the square tube and the lower fold to the boiler side frame.
- Fit the upper panel (3S) on the boiler
- Fit the panel (3D) ensuring that the capillaries are inserted in the slot provided in the panel (3D).
- Fit the electric control panel on panels (3S) and (3D) using screw (V1) (see fig. 11-3).
- Connect electric control panel to mains supply following the wiring diagram included in the control panel.
- Re-place the front part of the control board and tighten the screw V.

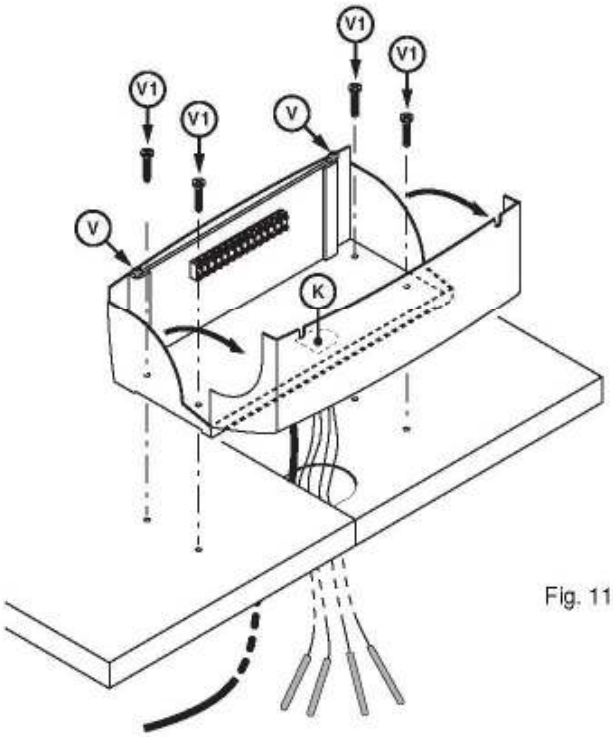


Fig. 11-2

FITTING THE CASING
ECOMAX N - NS - NC - NCS (FROM 510 TO 1300 MODEL)

- Wrap the glass wool around the boiler body leaving the bulb well (P) on the top side exposed.
- Loosen screw (V) and rotate towards you the frontal part of the electric control panel (see fig.11-2) and remove the half cut plastic plate K
- Pass the burner connection plug through the slot on the lower side of boiler front plate and insert the thermometer and thermostats bulbs in the slot K and in the wells P (see fig. 11-4).
- Fit the panels (1S) inserting the upper fold into the square tube and the lower fold to the boiler side frame; repeat this operation to fit the (2S) panel
- Fit the upper panel (3S) on the boiler
- Fit the panel (1D), (2D) and (3D) ensuring that the capillaries are inserted in the slot provided in the panel (3D).
- Fit the electric control panel on panels (3S) and (3D) using screw (V1) (see fig. 11-5).
- Connect electric control panel to mains supply following the wiring diagram included in the control panel.
- Re-place the front part of the control board and tighten the screw V.

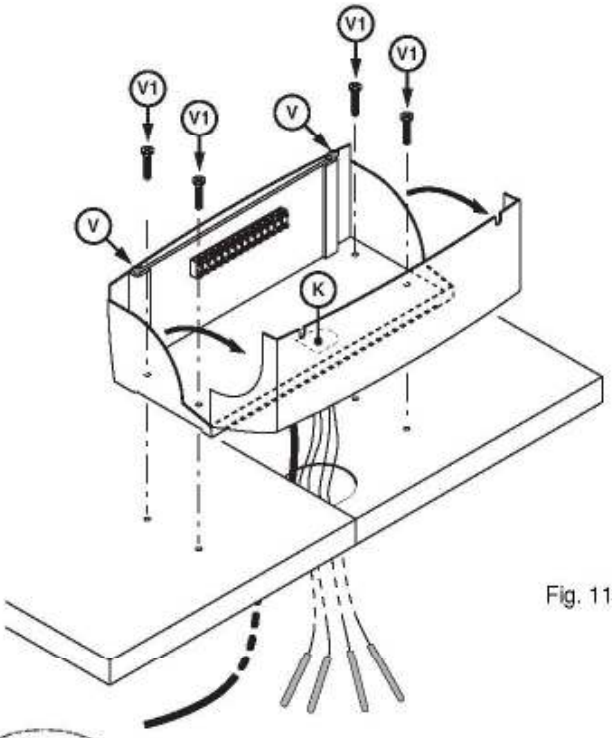


Fig. 11-2

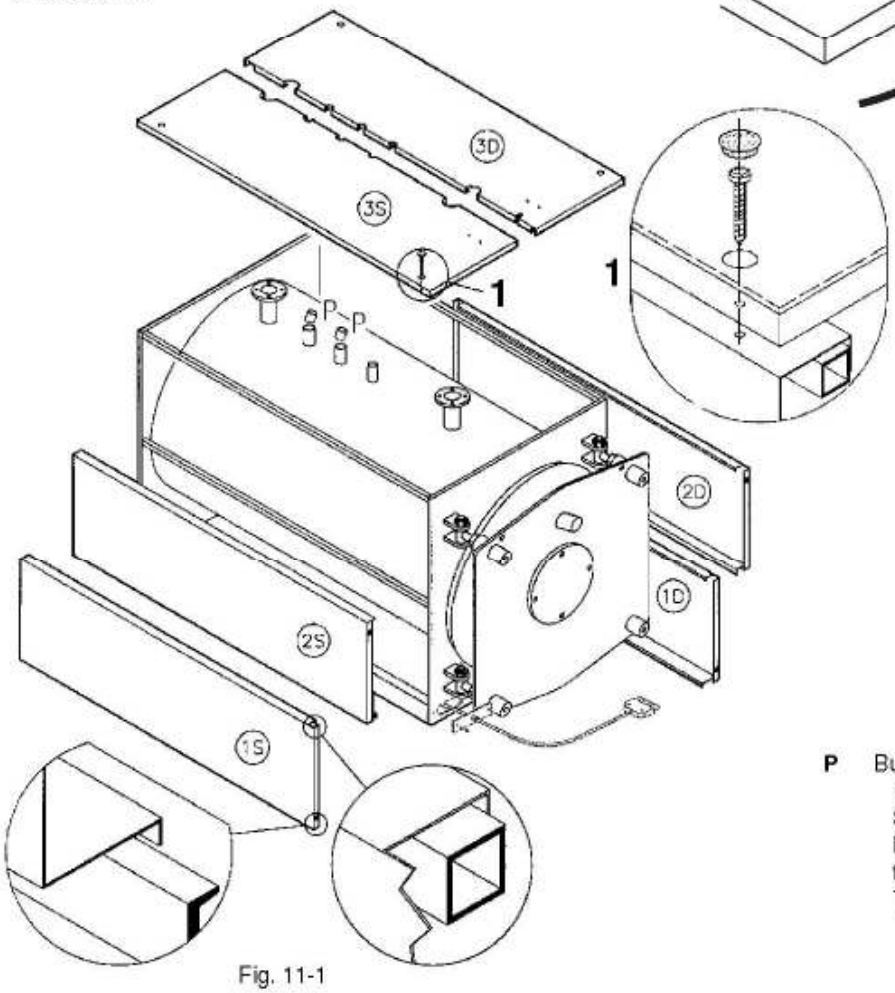


Fig. 11-1

P Bulb well for:
Regulation boiler thermostat
Security thermostat
Minimum thermostat (Circulator consent thermostat)
Thermometer

FITTING ELECTRICAL PANEL ECOMAX N - NS - NC - NCS (FROM 1400 TO 3500 MODELS)

The assembly described hereafter concerns the control panel installation placed on the left side of the boiler.
In case of installation on the right side, follow the indications assembling the parts on the opposite side.

- loosen the screw V and turn forward the control panel front part 3 (fig. 11-3)
- remove the half cut plastic plate K1
- insert the bulbs of the thermometer and of the thermostats inside the half cut plastic plate K1 pocket
- insert all the bulbs of the thermometer and the thermostats inside the rear pocket of the rod and ensure they slide inside the tube of the support 2 until they emerge (fig. 11-3).
- Lift the panel R, fit the control panel on the support 2 using screws V1 supplied and replace panel R.
- Remove the half cut plastic plate K, insert the cable wiring terminal block C inside the hole and secure it to the control panel using the cable holder supplied.
- Remove the plate 4, fit the support 2 to the boiler as indicated in fig. 11-3, paying attention to slide the bulb inside the hole of the boiler towards the plate 5, remove the plate 5 and insert the bulbs inside the pocket P .Once these operations have been carried out re-fit the plates 4 and 5.
- Using the screws supplied, fit the bases of the supports D and E to support cable C approx. in the positions indicated in fig. 11-4 in according to the indicated values (see fig. 11-5), slide the cable and secure it with the upper support.
- place the burner cables around the base of the front plate
- carry out the electrical connections following the wiring diagram enclosed in the control board
- Re-place the front part of the control panel and tighten the screw V.

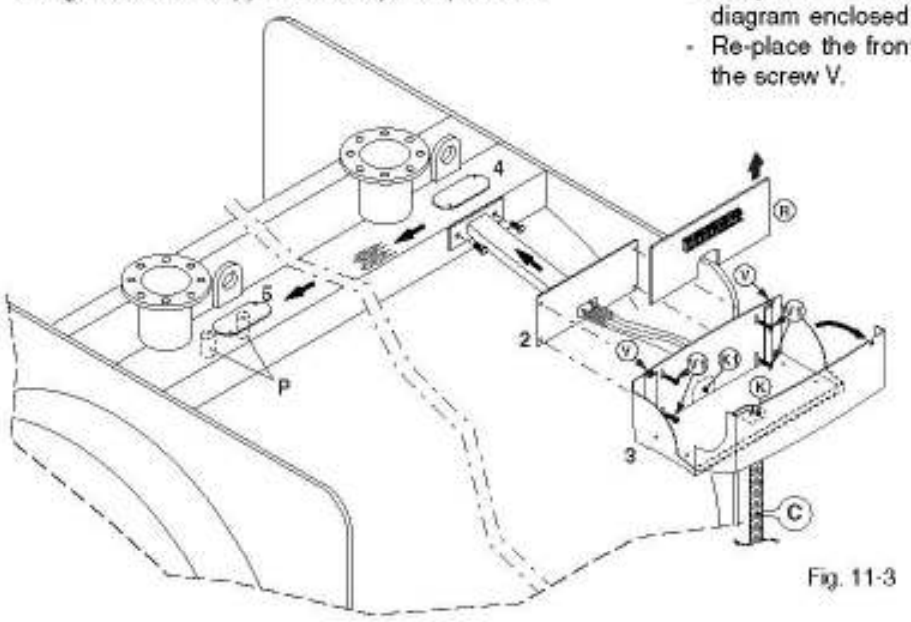


Fig. 11-3

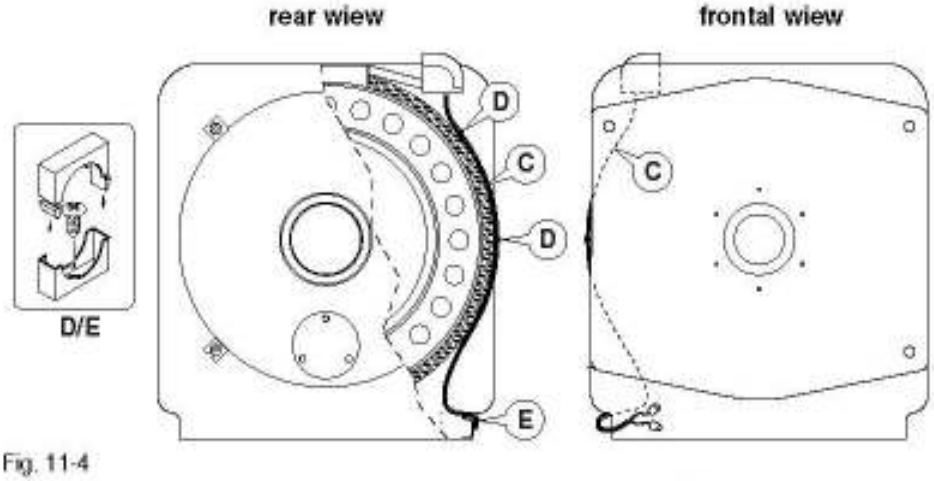
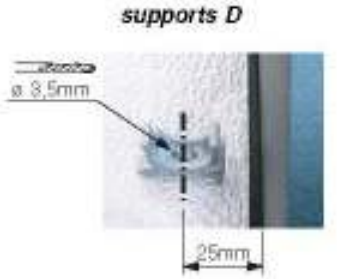


Fig. 11-4



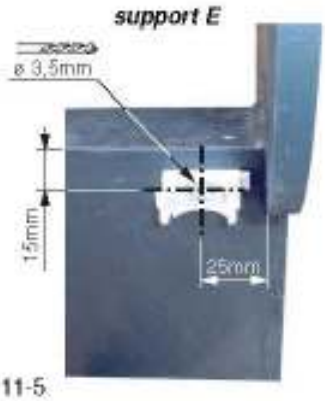


Fig. 11-5

FITTING THE CASING
DUOMAX N - NS

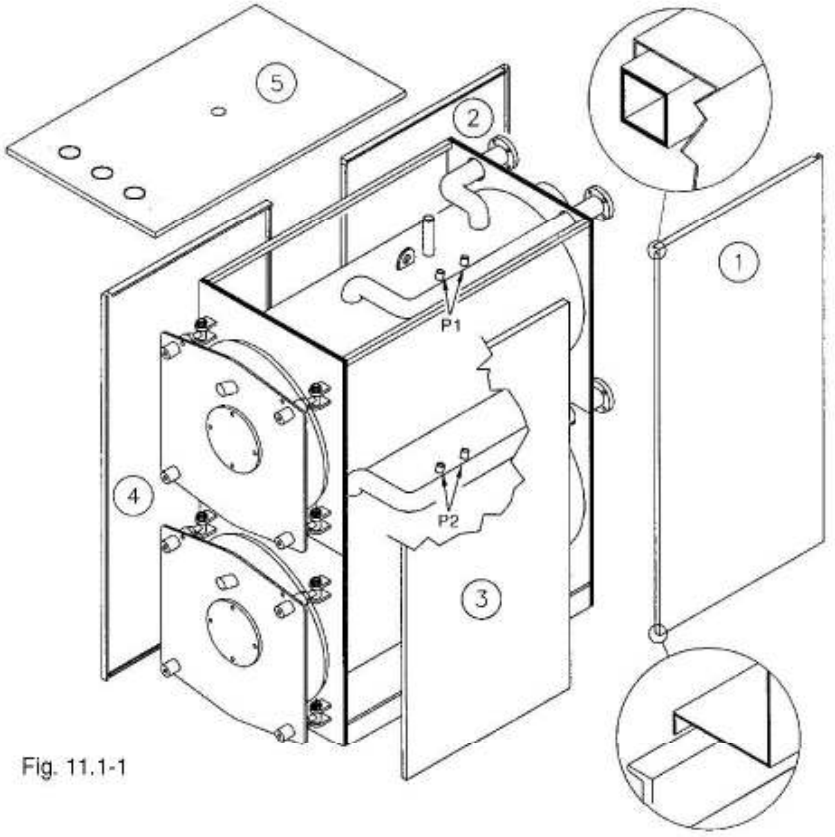


Fig. 11.1-1

P1 - Bulb well for 1st boiler:
Regulation boiler thermostat
Security thermostat
Minimum thermostat (Circulator consent thermostat)
Thermometer

P2 - Bulb well for 2nd boiler:
Regulation boiler thermostat
Security thermostat
Minimum thermostat (Circulator consent thermostat)
Thermometer

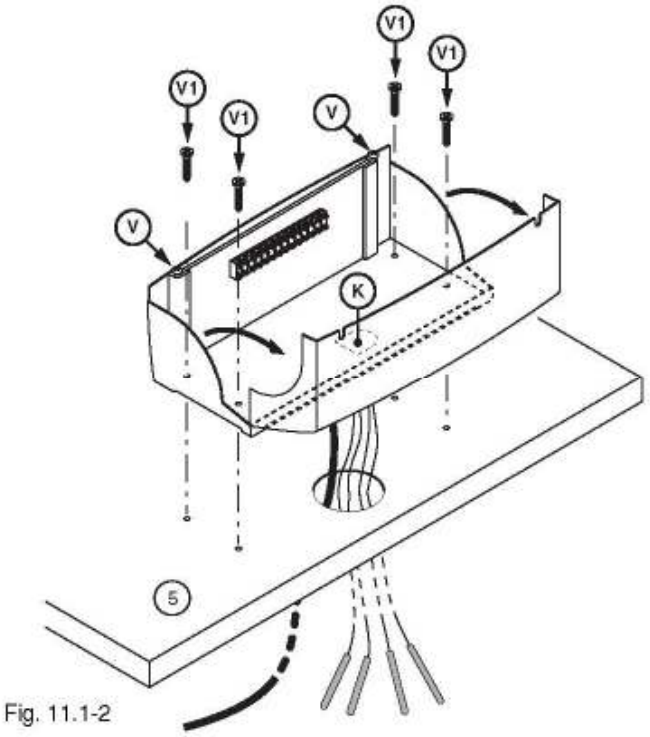
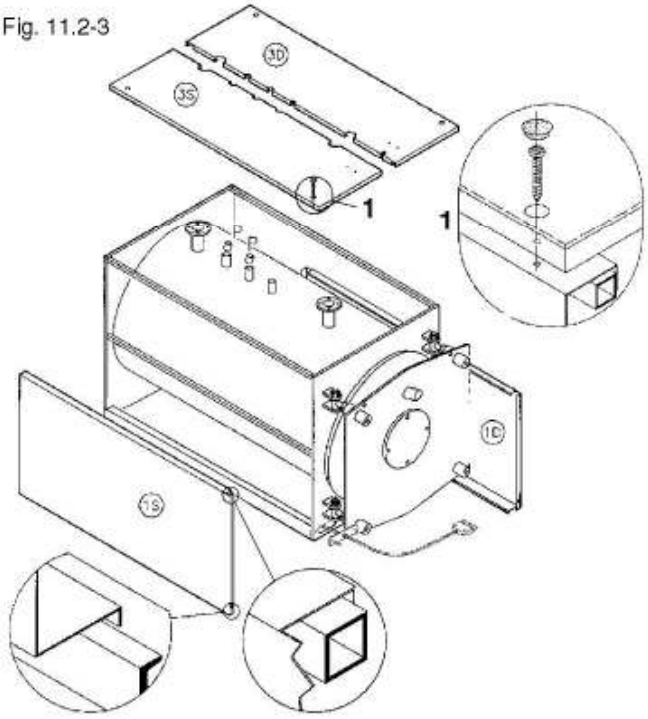


Fig. 11.1-2

- Wrap the glass wool around the boiler body leaving the bulb well (P) on the top side exposed.
- Loosen screw (V) and rotate towards you the frontal part of the electric control panel (see fig.11.1-2) and remove the half cut plastic plate K
- Fit the electric control panel to the top panel using screw (V1).
- Pass the burner connection plug through the slot on the lower side of boiler front plate and insert the thermometer and thermostats bulbs in the slot on panel (5) and in the wells P1 and P2.
- Connect electric control panel to mains supply following the wiring diagram included in the control panel.
- Re-place the front part of the control panel and tighten the screw V.
- Fit the panels (1, 2, 3, 4) inserting the upper fold into the square tube and the lower fold to the boiler side frame;
- Fit the panel (5)

FITTING THE CASING
DUOMAX PN - PNS

Fig. 11.2-3



P Bulb well for:
Regulation boiler thermostat
Security thermostat
Minimum thermostat (Circulator consent thermostat)
Thermometer

- Wrap the glass wool around the boiler body leaving the bulb well (P) on the top side exposed.
- Fixing in the right position the boiler body (65mm between the boilers, see pag. 7)
- Loosen screw (V) and rotate towards you the frontal part of the electric control panel (see fig.11.2-3) and remove the half cut plastic plate K
- Insert all cables in the slot K and in the slot on plate W.
- Fit the electric control panel on panels W using screws (V1).
- Pass the burner connection plug through the slot on the lower side of boiler front plate and insert the thermometer and thermostats bulbs in the slot on panel (5) and in the wells P
- Fit the panels (1S) and (1D) inserting the upper fold into the square tube and the lower fold to the boilers side frame.
- Fit the upper panel (3S) on the boilers
- Fit the panel (3D) ensuring that the capillaries are inserted in the slot provided in the panel.
- Fit the plate W on boilers using screw (V3)
- Connect electric control panel to mains supply following the wiring diagram included in the control panel.
- Re-place the front part of the control board and tighten the screw V.

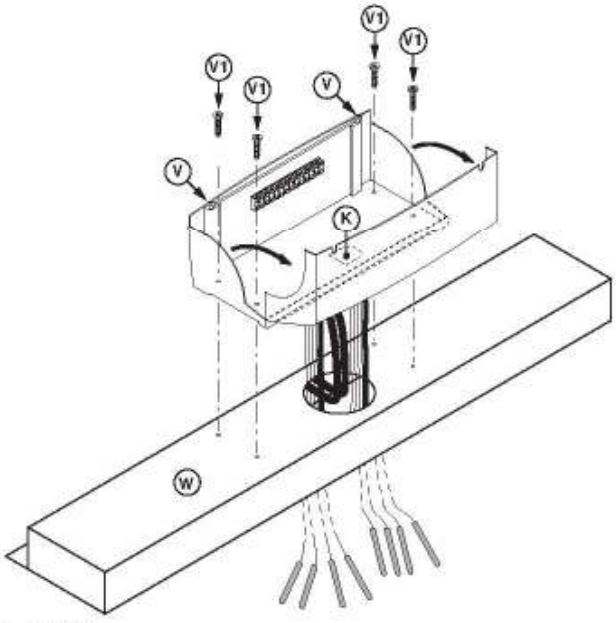


Fig. 11.2-2

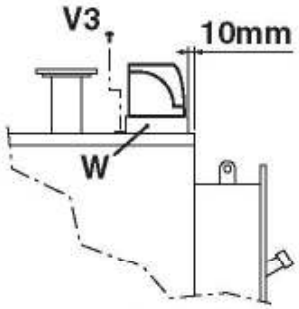


Fig. 11.2-3

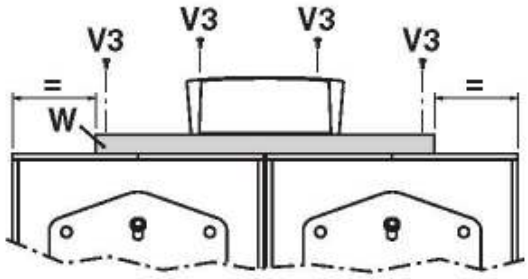


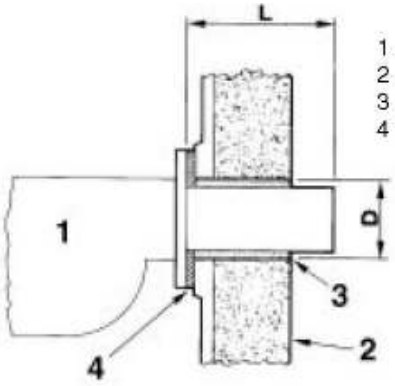
Fig. 11.2-4

FITTING THE BURNER

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

1 - tighten the stud bolts provided with the boiler onto the boiler door;
2 - fit the burner gasket with the burner, and then the burner;
3 - fix the burner with the flanged nuts. 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 into their corresponding sockets.

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.



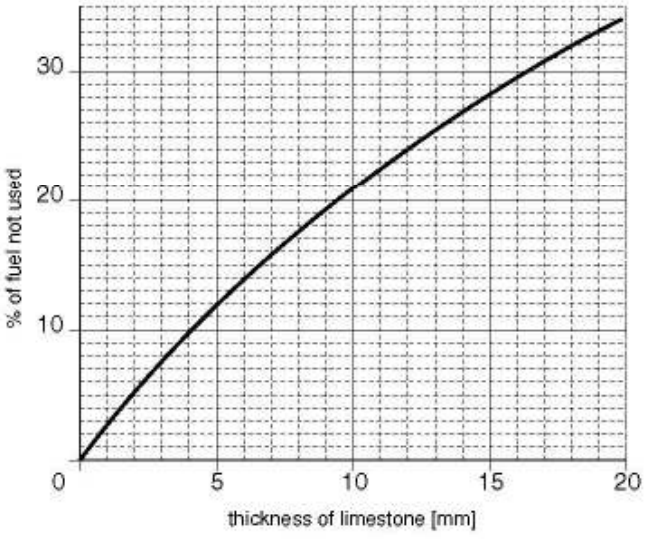
1 - Burner
2 - Door
3 - Insulate material
4 - Gasket

The dimensions below are for burners fitted on Ecomax NC ed NCS models:

Ecomax NC - NCS models	Lenght **L** blast tube (mm)	Diameter **D** hole burner (mm)
100÷1300	270 ÷ 400	280
1400, 1600, 1800, 2000	400 ÷ 550	300
2400, 3000, 3500	530 ÷ 600	330

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).

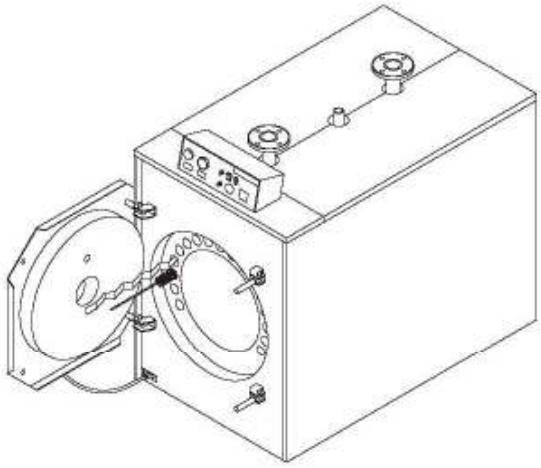


CLEANING THE BOILER

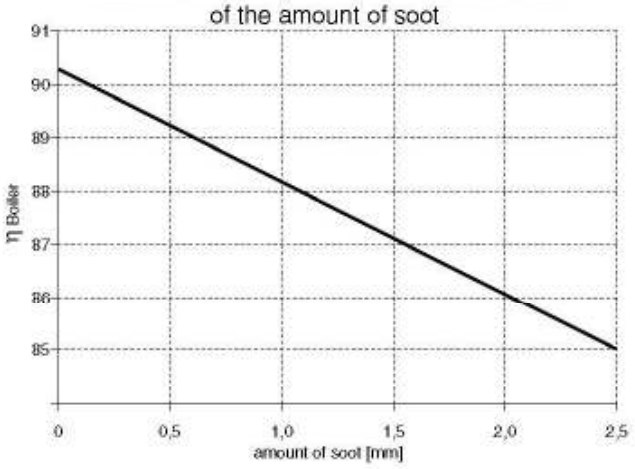
The boiler body must be cleaned regularly in order to guarantee constant efficient operation of the appliance, as soot deposits lower its performance, as can be seen from the graph at the foot of the page; the frequency of this operation depends on the type of fuel and combustion quality. For this purpose, 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 from the flue pipes (see figure);
- clean the flue pipes using a metal brush and remove residue;
- clean the combustion chamber with a metal brush;
- replace the baffles and close the hatch;
- close everything up once more;
- reconnect the power supply.

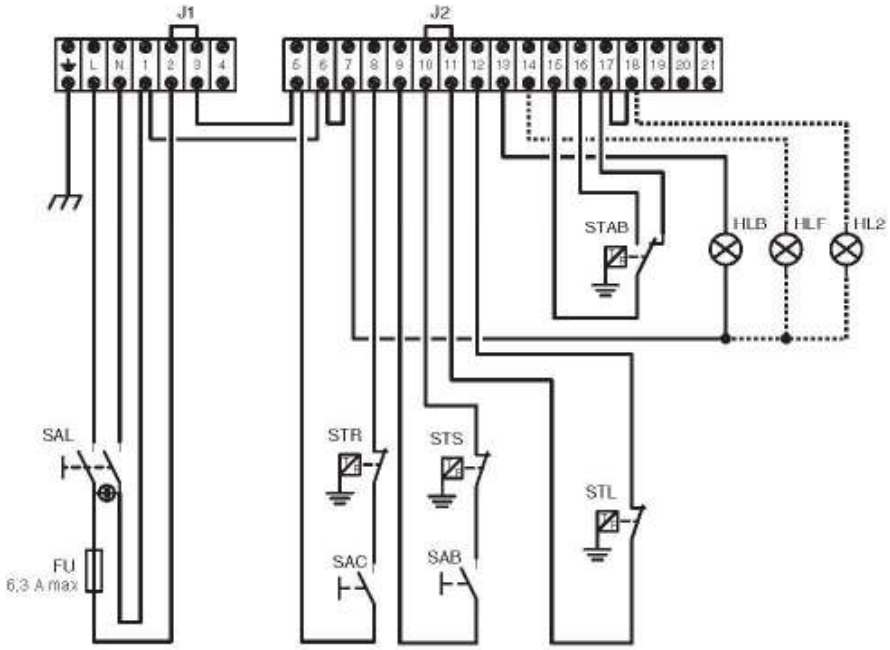


Decrease of boiler performance as a function of the amount of soot



20 ELECTRICAL CONNECTIONS

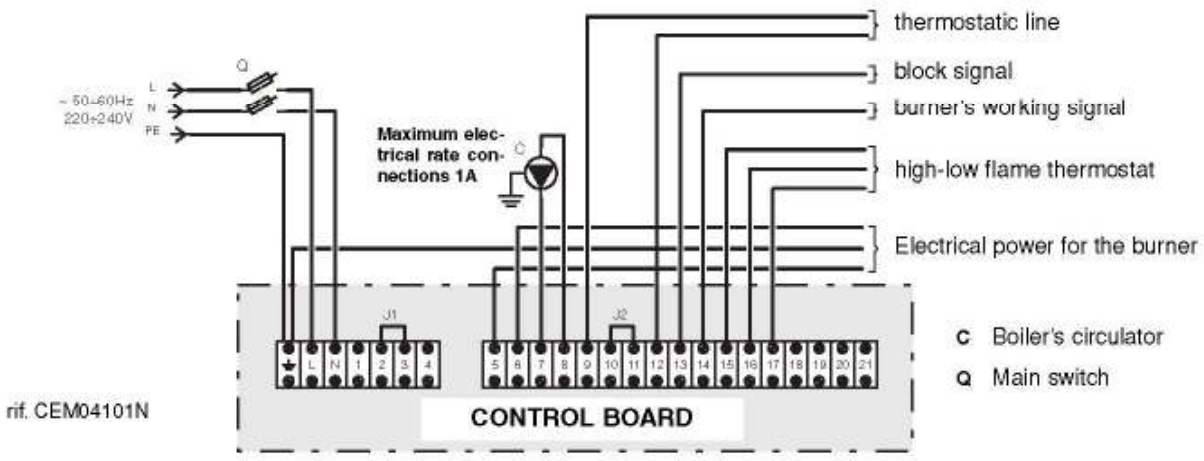
20.1 ELECTRICAL BLUEPRINT BASE CONTROL PANEL FOR ECOMAX N, NS, NC AND NCS



FU	fuse	**SAB**	burner switch
HLB	block bulb	**STR**	recirculation thermostat
HLF	operation bulb	**STS**	security thermostat
HL2	second flame bulb	**STAB**	high-low flame thermostat
SAC	recirculation switch	**J1**	security and eventual external command bridge
SAL	line switch	**J2**	bridge for external commands of ther burner
STL	working thermostat		

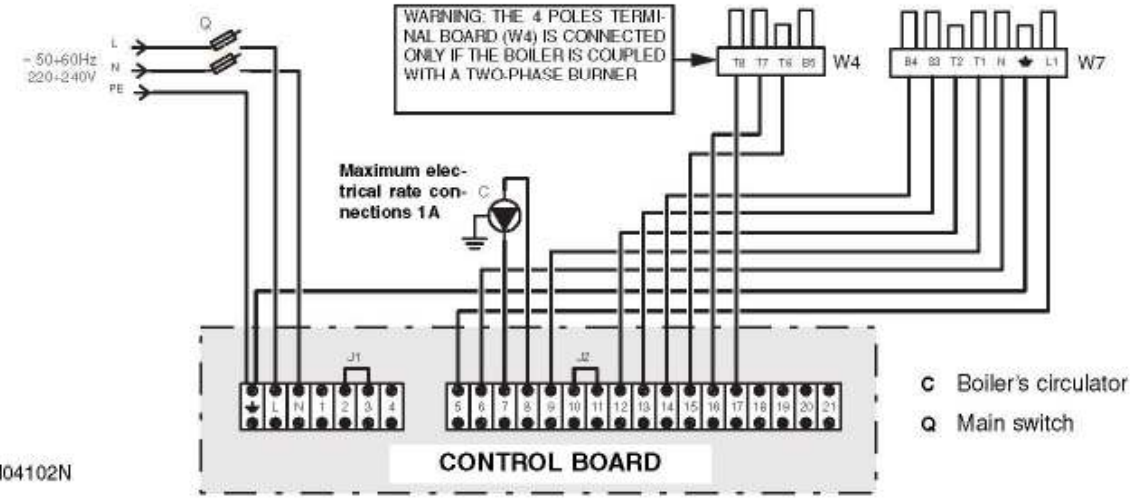
Without burner : rif. CEM04101N
With single-phase burner : rif. CEM04102N
With three-phase burner : rif. CEM04103N

20.1.1 ELECTRICAL CONNECTION BLUEPRINT TO BASE CONTROL PANNEL FOR ECOMAX BOILER NC AND NCS



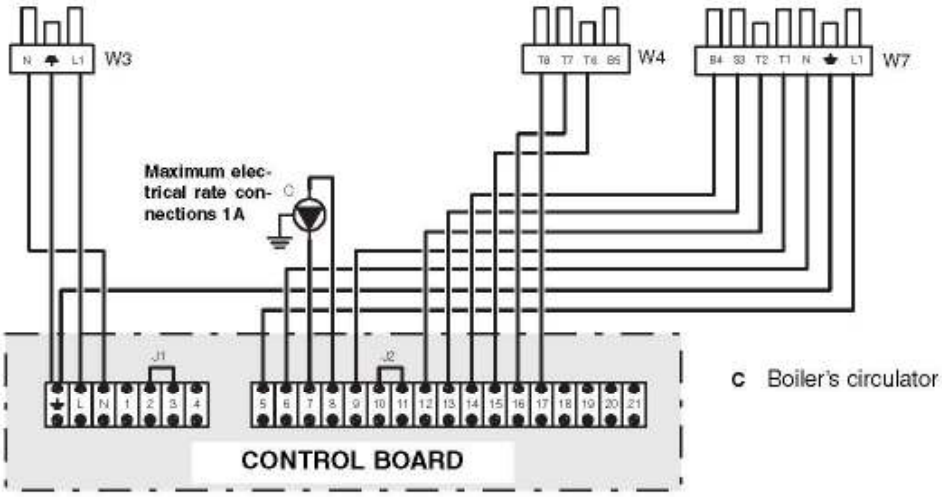
rif. CEM04101N

20.1.2 ELECTRICAL CONNECTION BLUEPRINT TO BASE CONTROL PANEL FOR ECOMAX N AND NS BOILER WITH SINGLE-PHASE BURNER



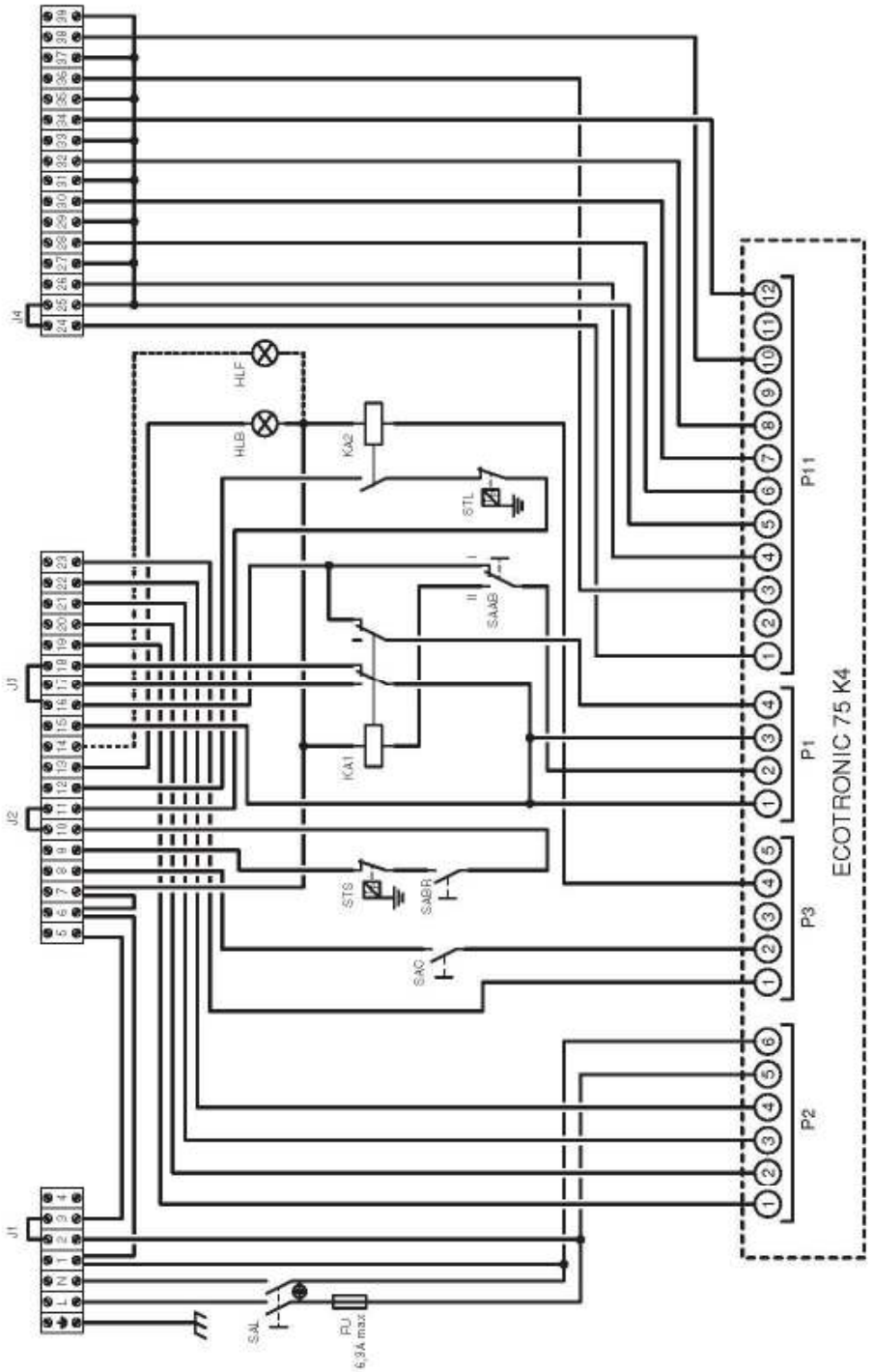
rif. CEM04102N

20.1.3 ELECTRICAL CONNNECTION BLUEPRINT TO BASE CONTROL PANEL FOR ECOMAX N AND NS BOILER WITH THREE-PHASE BURNER



rif. CEM04103N

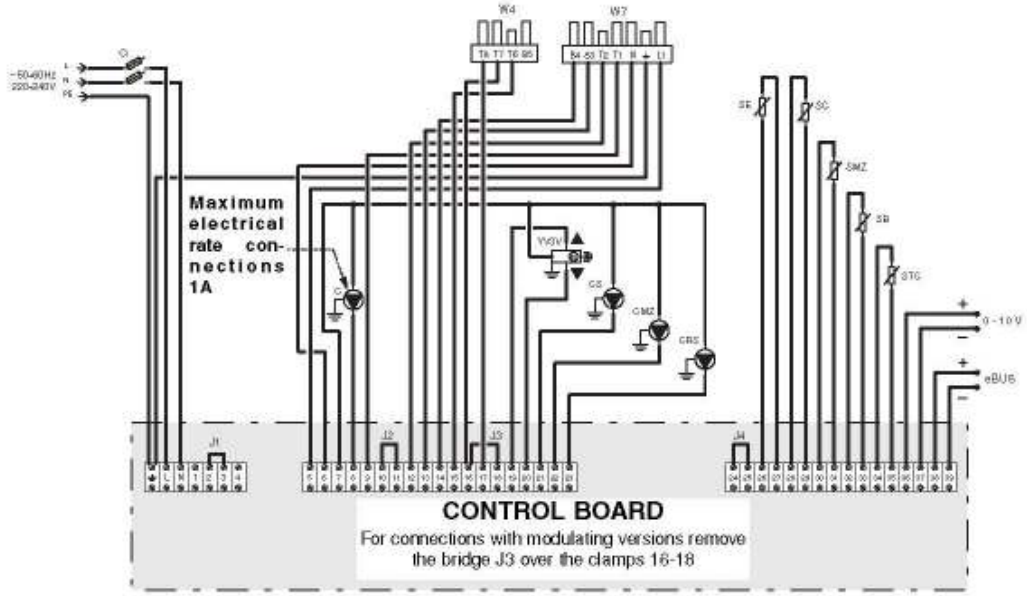
20.2 ELECTRICAL BLUEPRINT CONTROL BOARD FOR ECOMAX N AND NS WITH TEMPERATURE SMOOTHER ELECTRONICS



FU	Fuse	**STL**	working thermostat
KA1	rele	**SABR**	burner switch
KA2	rele	**STS**	security thermostat
HLB	block bulb	**SAAB**	high-low flame switch
HLF	operation bulb	**J1**	security and eventual external command bridge
SAC	recirculation switch	**J2**	bridge for external commands of the burner
SAL	line switch	**J4**	bridge for burner's external thermostat

With single-phase burner : rif. CEM04106N
With three-phase burner : rif. CEM04107N

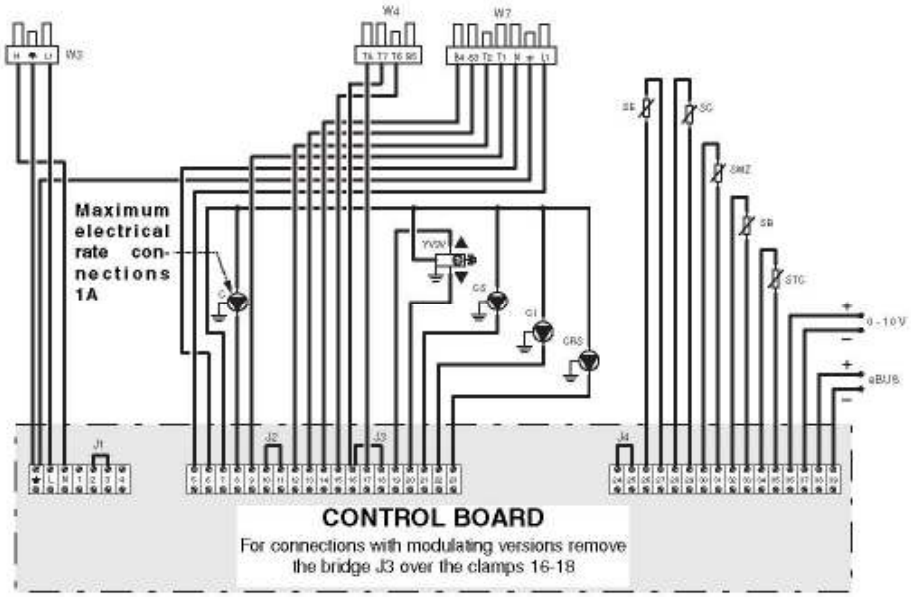
20.2.1 ELECTRONICAL CONNECTION BLUEPRINT TO CONTROL BOARD FOR ECOMAX N AND NS BOILER WITH TEMPERATURE SMOOTHER ELECTRONICS AND SINGLE-PHASE BURNER



C	boiler's ciculator	**SE**	external probe
CS	domestic hot water ciculator	**SC**	boiler's probe
CMZ	zone's circulator	**SMZ**	zone's sender probe
CRS	domestic hot water's resender circulator	**SB**	tank's probe
Q	main switch	**STC**	collector probe
HL2	second flame bulbe	**YV3V**	zone's electrovalve mixer (▼ =close; ▲ =open)

rif. CEM04106N

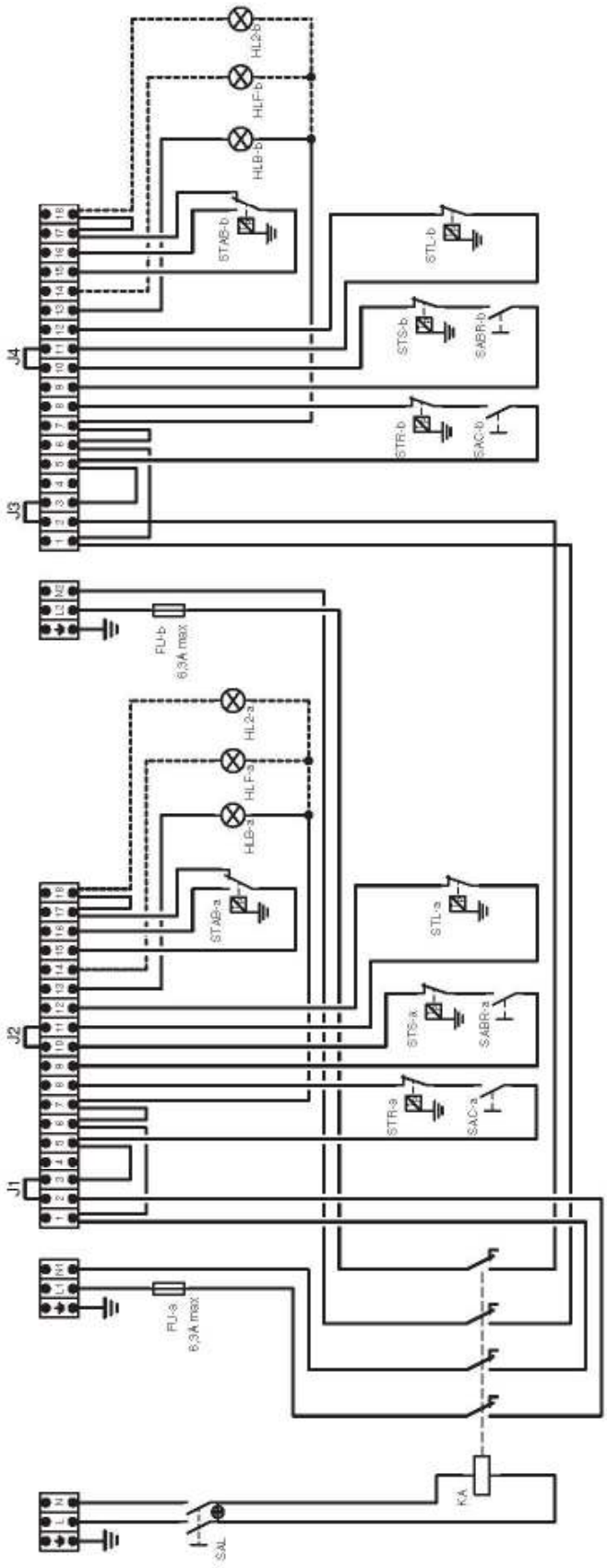
20.2.2 ELECTRONICAL CONNECTION BLUEPRINT TO CONTROL BOARD FOR ECOMAX N AND NS BOILER WITH TEMPERATURE SMOOTHER ELECTRONICS AND THREE-PHASE BURNER



C	boiler's ciculator	**SC**	boiler's probe
CS	domestic hot water ciculator	**SMZ**	zone's sender probe
CMZ	zone's circulator	**SB**	tank's probe
CRS	domestic hot water's resender circulator	**STC**	collector probe
HL2	second flame bulbe	**YV3V**	zone's electrovalve mixer (▼ =close; ▲ =open)
SE	external probe		

rif. CEM04107N

20.3 ELECTRICAL BLUEPRINT BASE CONTROL PANEL FOR DUOMAX N, NS, P AND PNS

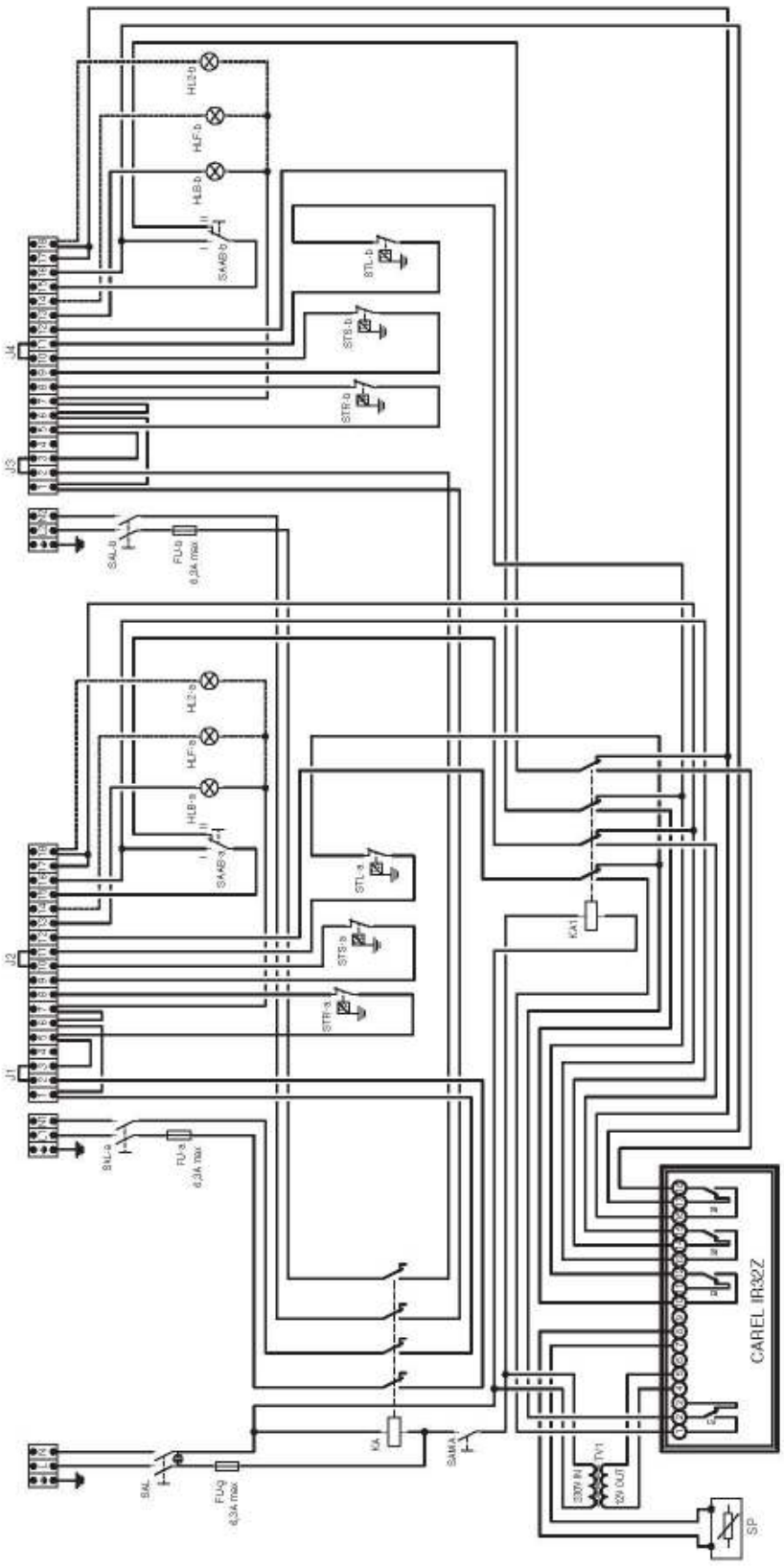


FU	Fuse
KA	rele
HLB	block bulb
HLF	operation bulb
HL2	second flame bulb
SAC	recirculation switch
SAL	line switch

STL	working thermostat
SABR	burner switch
STR	recirculation switch
STS	security thermostat
STAB	high-low flame switch
J1-J3	security and eventual external command bridge
J2-J4	bridge for external commands of the burner

With single-phase burner : rif. CEM04104N
With three-phase burner : rif. CEM04105N

20.4 ELECTRICAL BLUEPRINT CONTROL PANEL FOR DUOMAX N, NS, PN AND PNS WITH ELECTRONIC MANAGEMENT OF THE HI-LOW FLAME

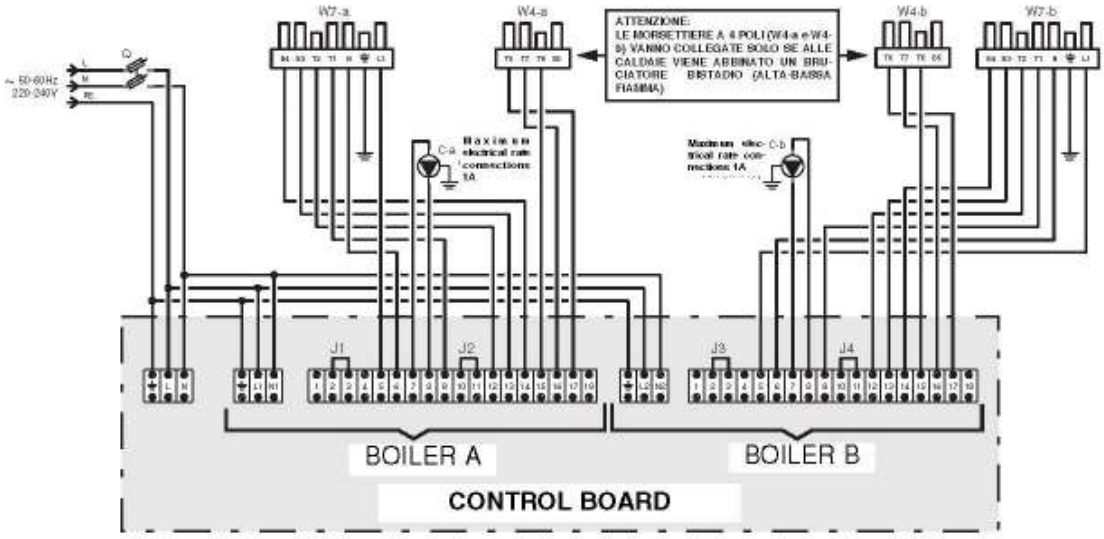


STL	working thermostat
SAAB	high-low flame switch
SP	passive probe
SAMA	manual-automatic switch
TV1	transformer
STR	recirculation switch
STS	security thermostat
J1-J3	security and eventual external command bridge
J2-J4	bridge for external commands of the burner

FU	Fuse
KA	rele
KA1	rele
HLB	block bulb
HLF	operation bulb
HL2	second flame bulb
SAL	line switch

With single-phase burner : rif. CEM04113N
With three-phase burner : rif. CEM04114N

20.4.1 ELECTRICAL CONNECTION BLUEPRINT CONTROL PANEL FOR DUOMAX N, NS, PN AND PNS BOILER, BASE MODEL OR WITH ELECTRONIC MANAGEMENT OF HI-LOW FLAME, WITH SINGLE-PHASE BURNER

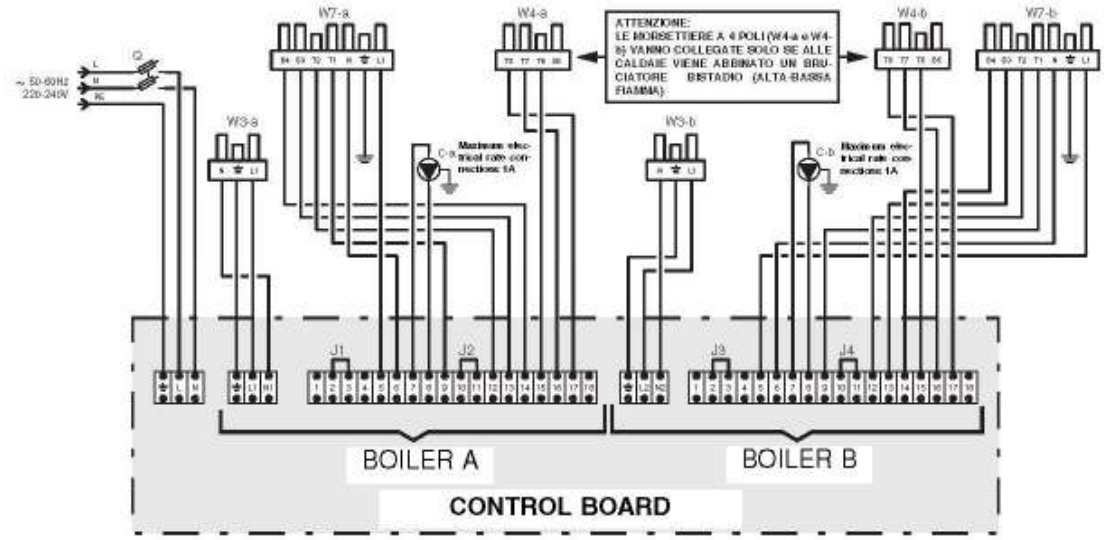


rif. CEM04104N

rif. CEM04113N

Ca A boiler's circulator
Cb B boiler's circulator
Q Main switch

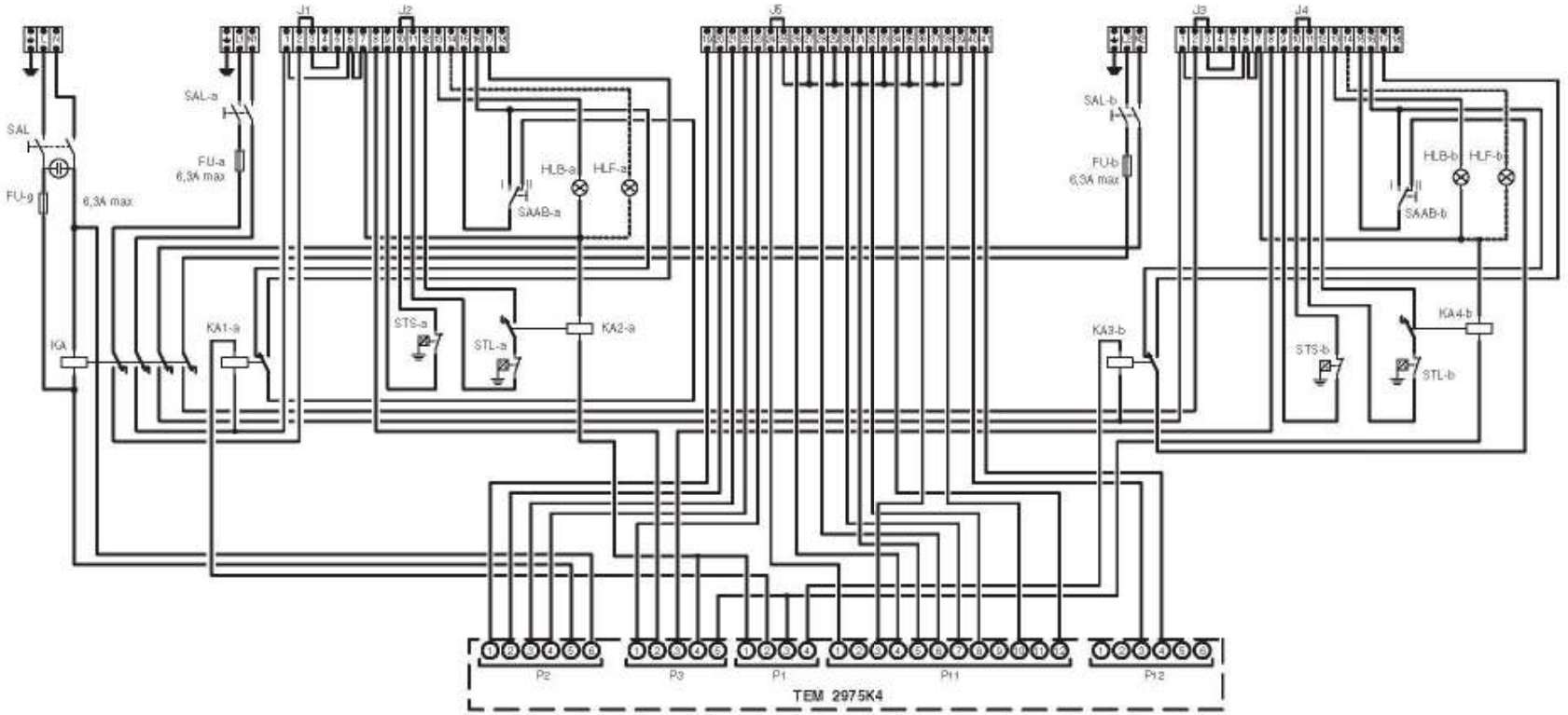
20.4.2 ELECTRICAL CONNECTION BLUEPRINT CONTROL PANEL FOR DUOMAX N, NS, PN AND PNS BOILER, BASE MODEL OR WITH ELECTRONIC MANAGEMENT OF HI-LOW FLAME, WITH THREE-PHASE BURNER



Ca A boiler's circulator
Cb B boiler's circulator
Q Main switch

rif. CEM04105N

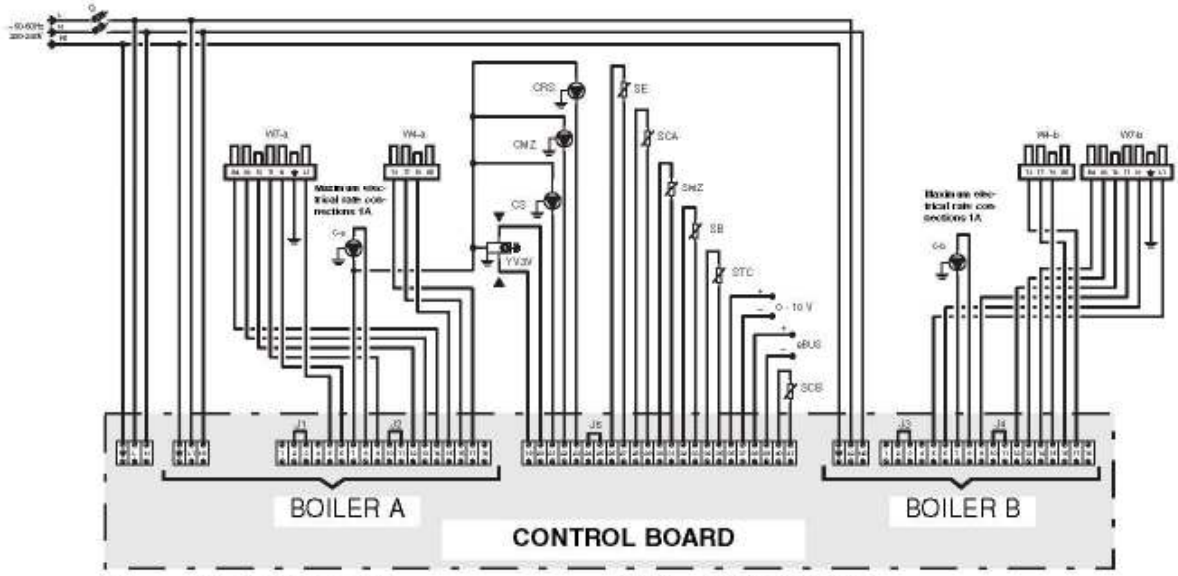
rif. CEM04114N



FU	Fuse
KA	rele
KA1	rele
KA2	rele
KA3	rele
KA4	rele
HLB	block bulb
HLF	operation bulb
SAL	line switch
STL	working thermostat
SAAB	high-low flame switch
STS	security thermostat
J1-J3	security and eventual external command bridge
J2-J4	bridge for external commands of the burner
J5	bridge for remote zone consent

With single-phase burner : rif. CEM04110N
With three-phase burner : rif. CEM04111N

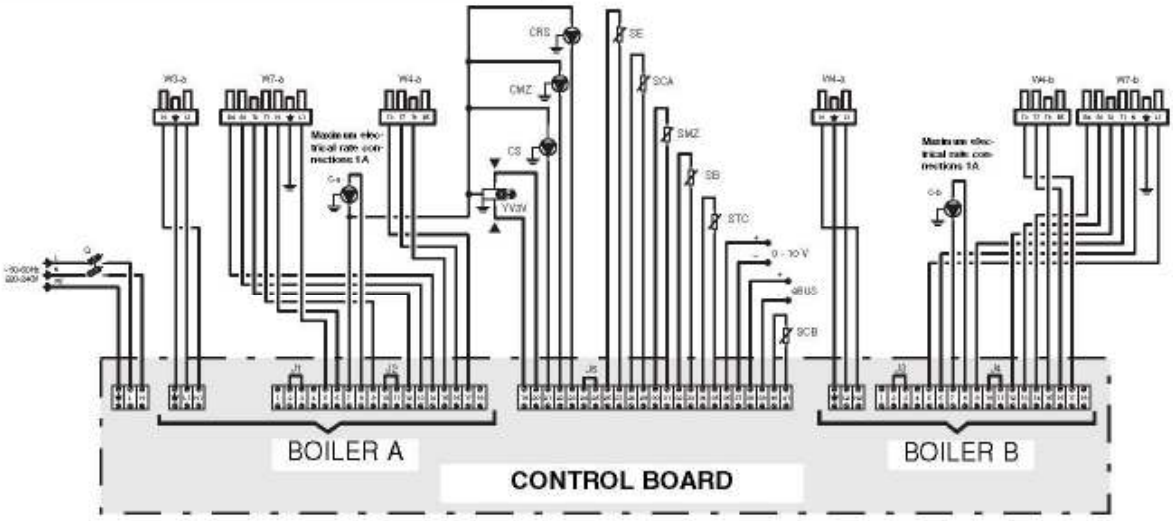
20.5.1 ELECTRICAL CONNECTION BLUEPRINT CONTROL PANEL FOR DUOMAX N, NS, PN AND PNS BOILER WITH TEMPERATURE SMOOTHER ELECTRONICS AND SINGLE-PHASE BURNER



Ca	A boiler's circulator	**SCA**	A boiler's probe
Cb	B boiler's circulator	**SCB**	B boiler's probe
CS	domestic hot water circulator	**SB**	tank's probe
CMZ	zone sender ciculator	**STC**	collector's probe
CRS	domestic hot water's resender circulator	**SMZ**	zone's sender probe
Q	Main switch	**YV3V**	zone's electrovalve mixer (▼ =close; ▲ =open)
SE	external probe		

rif. CEM04110N

20.5.2 ELECTRICAL CONNECTION BLUEPRINT CONTROL BOARD FOR DUOMAX N, NS, PN AND PNS BOILER WITH TEMPERATURE SMOOTHER ELECTRONICS AND THREE-PHASE BURNER



Ca	A boiler's circulator	**SCA**	A boiler's probe
Cb	B boiler's circulator	**SCB**	B boiler's probe
CS	domestic hot water circulator	**SB**	tank's probe
CMZ	zone sender ciculator	**STC**	collector's probe
CRS	domestic hot water's resender circulator	**SMZ**	zone's sender probe
Q	Main switch	**YV3V**	zone's electrovalve mixer (▼ =close; ▲ =open)
SE	external probe		

rif. CEM04111N

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