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# TECHNICAL MANUAL

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GB

## **GREENOX BT**

LOW RETURN TEMPERATURE

## **DUAL BT**

WITH TILED BOILERS

## **GREENOX BT COND**

LOW RETURN TEMPERATURE WITH CONDENSER

## **GREENOX/GREENOX.e/K**

WITH THREE GAS PASSES

## **DUAL GRX/DUAL GRX.e**

THREE GAS PASSES WITH TILED BOILERS

**LOW NO<sub>x</sub> PRESSURISED STEEL BOILERS**

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## GENERAL FEATURES

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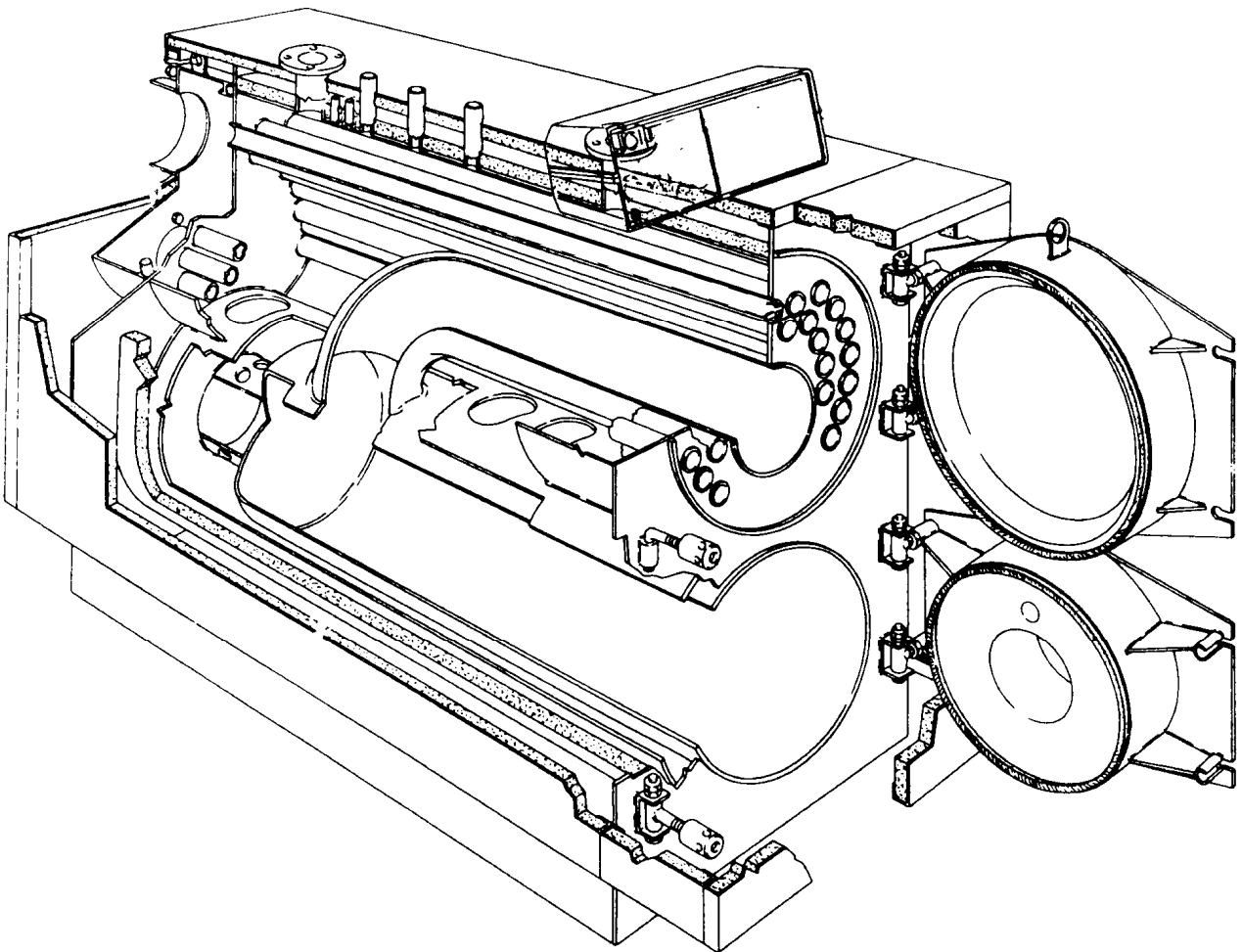
### GENERAL FEATURES

This steel boiler range features 3 gas passes with no flame inversion.

This design minimises the formation of nitrous oxides (NOx) caused by the high temperatures and long flame stay times typical of traditional boiler furnaces.

Furthermore, the BT range boilers have been designed for low temperature operations (return at 35°C). For this reason, a double tube and a special smokebox refractory protection are essential to maintain the high temperature of parts in contact with combustion product, and without condensate production.

The boilers are classified as “high performance” boilers according to the regulations in force due to their extremely high efficiency deriving from optimisation of heat exchange and complete insulation of the exposed surfaces.



### 1 GENERAL WARNINGS

Each generator is provided with a **manufacture plate** that can be found in the envelope with the boiler documents. The plate lists:

- Serial number or identification code;
- Rated thermal output in kcal/h and in kW;
- Furnace thermal output in kcal/h and in kW;
- Types of fuels that can be used;
- Max operating pressure.

A **manufacture certificate** is also provided which certifies the hydraulic test positive performance.

The installation must be performed in compliance with the regulations in force by **professionally qualified personnel**. The term “professionally qualified personnel” means persons with specific technical skills in the sector of heating system components. Incorrect installation may cause damage to persons, animals or objects for which the manufacturer cannot be held responsible.

**At the first start up**, all regulation and control devices positioned on the control panel should be checked for efficiency.

The **guarantee** shall be valid only upon compliance with the instruction given in this manual.

Our boilers have been built and tested in observance of EEC requirements and, as a consequence, CE-marked. EEC directives are as follows:

- **Directive on Gas** 90/396/EEC
- **Directive on Output** 92/42/EEC
- **Directive on Electromagnetic Compatibility** 89/336/EEC
- **Directive on Low Voltage** 73/23/EEC

**IMPORTANT:** This boiler has been designed to heat hot water at a temperature less than the boiling temperature at atmospheric pressure and must be connected to a heating plant and/or a domestic hot water plant within the limits of its performance and output.

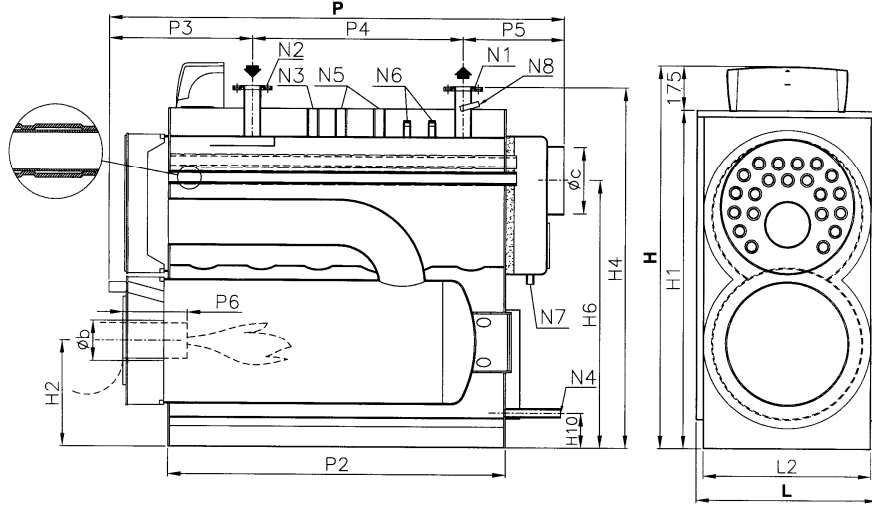
# TECHNICAL SPECIFICATIONS

## 2 TECHNICAL SPECIFICATIONS

### 2.1 GREENOx BT 10 ÷ 60 BOILER

- N1 Flow
- N2 Return
- N3 Fitting for instruments
- N4 System filling/drainage

- N5 Fitting for safety valves
- N6 Bulb wells
- N7 Boiler condensation drain
- N8 Inspection well



Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.)	Effic. 100% (stars)	NG max flow rate G20	NG max flow rate G30	NG max flow rate G31	Max flow rate of flues	Minimum output		Minimum input		Efficiency at 30%	NG min flow rate G20	NG min flow rate G30	NG min flow rate G31	Min flow rate of flues
	kW	kcal/h	kW	kcal/h							kW	kcal/h	kW	kcal/h					
	Medium Temp. 70°C		Medium Temp. 70°C		%	%	m³/h	kg/h	kg/h	kg/h	Medium Temp. 70°C		Medium Temp. 70°C		%	m³/h	kg/h	kg/h	kg/h
GREENOx BT 10	100	86.000	107	92.020	93,46	**	11,32	8,40	8,31	168,67	50	43.000	53,5	46.010	93,45	5,66	4,20	4,16	84,35
GREENOx BT 12	120	103.000	129	110.940	93,02	**	13,65	10,13	10,02	203,39	60	52.000	64,9	55.780	92,50	6,86	5,09	5,04	102,27
GREENOx BT 15	150	129.000	162	139.320	92,59	**	17,14	12,72	12,59	255,39	75	65.000	81,2	69.850	92,34	8,59	6,38	6,31	128,06
GREENOx BT 20	200	172.000	214	184.040	93,46	**	22,65	16,81	16,63	337,49	100	86.000	107,3	92.300	93,17	11,36	8,43	8,34	169,22
GREENOx BT 25	250	215.000	269	231.340	92,94	**	28,47	21,13	20,90	424,20	125	108.000	135,1	116.180	92,53	14,30	10,61	10,50	213,00
GREENOx BT 30	300	258.000	324	278.640	92,59	**	34,29	25,45	25,17	510,92	150	129.000	162,4	139.690	92,35	17,19	12,76	12,62	256,11
GREENOx BT 35	350	301.000	376	323.360	93,09	**	39,79	29,53	29,21	592,87	175	151.000	188,7	162.260	92,75	19,97	14,82	14,66	297,49
GREENOx BT 40	400	344.000	432	371.520	92,59	**	45,71	33,93	33,56	681,08	200	172.000	216,4	186.130	92,41	22,90	17,00	16,81	341,25
GREENOx BT 47	470	404.000	506	435.160	92,89	-	53,54	39,74	39,31	797,75	235	202.000	253,5	218.020	92,70	26,83	19,91	19,69	399,72
GREENOx BT 60	600	516.000	649	558.140	92,45	-	68,68	50,97	50,42	1023,33	300	258.000	325,3	279.770	92,22	34,42	25,55	25,27	512,93

Characteristics	Pressure losses flue gas side	Heat losses through the chimney	Heat losses through the casing	Heat losses with burner off	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side (ΔT=12K)	Design Pressure	Capacity	Total weight	Electric supply	Frequency	Insulation class	Electric power	Fuel			
					GAS	GASOIL	HEAVY OIL	GAS	GASOIL	HEAVY OIL									Nat. gas	LPG	Gasoil	Heavy oil
GREENOx BT 10	1,4	6,04	0,50	0,10	164	167	167	10,5	13,5	14,0	16	5	296	655	230	50	IP X0D	20	X	X	X	X
GREENOx BT 12	2,2	6,48	0,50	0,10	174	177	177	10,5	13,5	14,0	23	5	296	655	230	50	IP X0D	20	X	X	X	X
GREENOx BT 15	2,2	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	35	5	296	655	230	50	IP X0D	20	X	X	X	X
GREENOx BT 20	2,0	6,04	0,50	0,10	164	167	167	10,5	13,5	14,0	22	5	412	790	230	50	IP X0D	20	X	X	X	X
GREENOx BT 25	2,8	6,56	0,50	0,10	176	179	179	10,5	13,5	14,0	34	5	412	790	230	50	IP X0D	20	X	X	X	X
GREENOx BT 30	3,5	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	22	5	505	900	230	50	IP X0D	20	X	X	X	X
GREENOx BT 35	3,6	6,41	0,50	0,10	173	176	175	10,5	13,5	14,0	29	5	738	1160	230	50	IP X0D	20	X	X	X	X
GREENOx BT 40	4,5	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	38	5	738	1160	230	50	IP X0D	20	X	X	X	X
GREENOx BT 47	4,0	6,61	0,50	0,10	177	180	180	10,5	13,5	14,0	22	5	863	1450	230	50	IP X0D	20	X	X	X	X
GREENOx BT 60	5,0	7,05	0,50	0,10	187	190	190	10,5	13,5	14,0	35	5	863	1450	230	50	IP X0D	20	X	X	X	X

Dimensions	H	H1	H2	H4	H6	H10	L	L2	P	P2	P3	P4	P5	P6	Øb	Øc	N1	N2	N3	N4	N5	N6	N7	N8
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in
GREENOx BT 10	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOx BT 12	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOx BT 15	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOx BT 20	1520	1345	410	1397	1082	155	755	700	1895	1412	598	900	397	200-250	170	250	65	65	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOx BT 25	1520	1345	410	1397	1082	155	755	700	1895	1412	598	900	397	200-250	170	250	65	65	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOx BT 30	1675	1500	460	1555	1210	155	800	745	1948	1462	651	900	397	200-250	225	250	80	80	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
GREENOx BT 35	1805	1630	495	1685	1340	155	875	820	2227	1744	698	1075	454	200-250	225	250	80	80	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
GREENOx BT 40	1805	1630	495	1685	1340	155	875	820	2227	1744	698	1075	454	200-250	225	250	80	80	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
GREENOx BT 47	1925	1750	520	1802	1422	155	945	890	2228	1746	699	1100	429	200-250	225	250	100	100	1"1/4	1"	1"1/4	1/2"	1/2"	1/2"
GREENOx BT 60	1925	1750	520	1802	1422	155	945	890	2228	1746	699	1100	429	200-250	225	250	100	100	1"1/4	1"	1"1/4	1/2"	1/2"	1/2"

(1) One fitting only

# TECHNICAL SPECIFICATIONS

## 2.2 GREENOx/GREENOx.e/K 12 ÷ 70 BOILER

Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	Effic. 100% (Stars) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate of flues kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h
	kW	kcal/h	kW	kcal/h							kW	kcal/h	kW	kcal/h					
Modello	Medium Temp. 70°C				Medium Temp. 70°C	(Efficiency Dir. 92/42/CEE)					Medium Temp. 70°C				Medium Temp. 70°C				
GREENOx 10	108	93.000	116	99.760	93,10	**	12,28	9,11	9,01	182,97	54	46.000	57,8	49.700	93,45	6,12	4,54	4,49	91,12
GREENOx 12	120	103.000	129	110.940	93,02	**	13,65	10,13	10,02	203,39	60	52.000	64,2	55.220	93,45	6,79	5,04	4,99	101,24
GREENOx 15	150	129.000	162	139.320	92,59	**	17,14	12,72	12,59	255,39	75	65.000	81,1	69.730	92,50	8,58	6,37	6,30	127,84
GREENOx 20	200	172.000	214	184.040	93,46	**	22,65	16,81	16,63	337,49	100	86.000	108,3	93.130	92,34	11,46	8,51	8,41	170,74
GREENOx 25	250	215.000	269	231.340	92,94	**	28,47	21,13	20,90	424,20	125	108.000	134,2	115.380	93,17	14,20	10,54	10,42	211,54
GREENOx 30	300	258.000	324	278.640	92,59	**	34,29	25,45	25,17	510,92	150	129.000	162,1	139.410	92,53	17,15	12,73	12,59	255,59
GREENOx 35	350	300.000	376	323.360	93,09	**	39,79	29,53	29,21	592,87	175	151.000	189,5	162.970	92,35	20,05	14,88	14,72	298,79
GREENOx 40	400	344.000	432	371.520	92,59	**	45,71	33,93	33,56	681,08	200	172.000	215,6	185.440	92,75	22,82	16,94	16,75	339,98
GREENOx 47	470	404.000	506	435.160	92,89	-	53,54	39,74	39,31	797,75	235	202.000	254,3	218.700	92,41	26,91	19,97	19,76	400,96
GREENOx 60	600	516.000	649	558.140	92,45	-	68,68	50,97	50,42	1023,33	300	258.000	323,6	278.320	92,70	34,25	25,42	25,14	510,27
GREENOx 70	700	602.000	757	651.020	92,47	-	80,11	59,45	58,81	1193,64	350	301.000	379,5	326.390	92,22	40,16	29,81	29,48	598,40

Characteristics	Pressure losses flue gas side mbar	Heat losses through the chimney %	Heat losses through the casing %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt -	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					°C	°C	°C	%	%	%									Gas	Gasoil	Heavy Oil	With electr. contr. (excluded pump and burner)
GREENOx 10	1,0	6,40	0,50	0,10	172	175	175	10,5	13,5	14,0	18	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx 12	1,1	6,48	0,50	0,10	174	177	177	10,5	13,5	14,0	23	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx 15	2,0	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	35	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx 20	2,1	6,04	0,50	0,10	164	167	167	10,5	13,5	14,0	63	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx 25	2,0	6,56	0,50	0,10	176	179	179	10,5	13,5	14,0	34	5	412	735	230	50	IP X0D	20	X	X	X	X
GREENOx 30	3,1	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	50	5	412	735	230	50	IP X0D	20	X	X	X	X
GREENOx 35	3,1	6,41	0,50	0,10	173	176	175	10,5	13,5	14,0	29	5	505	850	230	50	IP X0D	20	X	X	X	X
GREENOx 40	4,1	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	38	5	505	850	230	50	IP X0D	20	X	X	X	X
GREENOx 47	3,7	6,61	0,50	0,10	177	180	180	10,5	13,5	14,0	53	5	738	1110	230	50	IP X0D	20	X	X	X	X
GREENOx 60	3,9	7,05	0,50	0,10	187	190	190	10,5	13,5	14,0	35	5	863	1390	230	50	IP X0D	20	X	X	X	X
GREENOx 70	4,5	7,03	0,50	0,10	187	190	189	10,5	13,5	14,0	48	5	863	1390	230	50	IP X0D	20	X	X	X	X

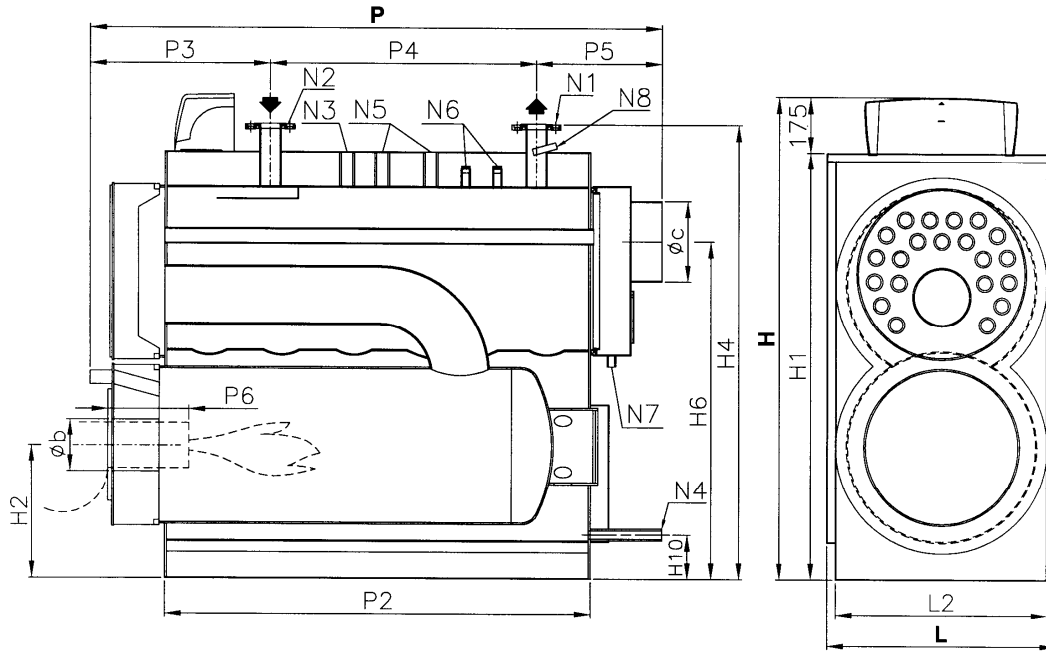
Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	Effic. 100% (Stars) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate of flues kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h
	kW	kcal/h	kW	kcal/h							kW	kcal/h	kW	kcal/h					
Modello	Medium Temp. 70°C				Medium Temp. 70°C	(Efficiency Dir. 92/42/CEE)					Medium Temp. 70°C				Medium Temp. 70°C				
GREENOx.e/K 10	109	94.000	115	98.900	94,78	***	12,17	9,03	8,93	181,33	54,5	47.000	56,9	48.980	95,70	6,03	4,47	4,42	89,80
GREENOx.e/K 12	120	103.000	126	108.360	95,24	***	13,33	9,90	9,79	198,62	60	52.000	62,7	53.920	95,70	6,63	4,92	4,87	98,86
GREENOx.e/K 15	150	129.000	157	135.020	95,54	***	16,61	12,33	12,20	247,49	75	65.000	78,1	67.150	96,05	8,26	6,13	6,07	123,11
GREENOx.e/K 20	200	172.000	210	180.600	95,24	***	22,22	16,49	16,31	331,08	100	86.000	104,4	89.820	95,75	11,05	8,20	8,11	164,68
GREENOx.e/K 25	250	215.000	262	225.320	95,42	***	27,72	20,58	20,35	413,03	125	108.000	130,3	112.040	95,95	13,79	10,23	10,12	205,41
GREENOx.e/K 30	300	258.000	315	270.900	95,24	***	33,33	24,74	24,47	496,62	150	129.000	156,7	134.750	95,73	16,58	12,31	12,17	247,05
GREENOx.e/K 35	350	301.000	367	315.620	95,37	***	38,84	28,82	28,51	578,72	175	151.000	182,5	156.930	95,90	19,31	14,33	14,18	287,82
GREENOx.e/K 40	400	344.000	420	361.200	95,24	***	44,44	32,99	32,63	662,16	200	172.000	208,9	179.620	95,76	22,10	16,40	16,23	329,31
GREENOx.e/K 47	470	404.000	493	423.980	95,33	-	52,17	38,72	38,30	777,33	235	202.000	245,3	210.960	95,80	25,96	19,27	19,06	386,77
GREENOx.e/K 60	600	516.000	630	541.800	95,24	-	66,67	49,48	48,94	993,38	300	258.000	313,3	269.400	95,77	33,15	24,60	24,34	493,92
GREENOx.e/K 70	700	602.000	734	631.240	95,37	-	77,67	57,65	57,02	1157,28	350	301.000	365,2	314.030	95,85	38,64	28,68	28,37	575,74

Characteristics	Pressure losses flue gas side mbar	Heat losses through the chimney %	Heat losses through the casing %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt -	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					°C	°C	°C	%	%	%									Gas	Gasoil	Heavy Oil	With electr. contr. (excluded pump and burner)
GREENOx.e/K 10	1,2	4,72	0,50	0,10	138	137	137	11,0	13,5	14,0	19	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 12	1,4	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	23	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 15	2,5	3,96	0,50	0,10	120	120	120	11,0	13,5	14,0	35	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 20	2,6	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	63	5	296	615	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 25	2,5	4,08	0,50	0,10	122	123	122	11,0	13,5	14,0	34	5	412	735	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 30	3,9	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	50	5	412	735	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 35	3,9	4,13	0,50	0,10	124	124	124	11,0	13,5	14,0	29	5	505	850	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 40	4,7	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	38	5	505	850	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 47	4,6	4,17	0,50	0,10	125	125	124	11,0	13,5	14,0	53	5	738	1110	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 60	4,9	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	35	5	863	1390	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 70	5,6	4,13	0,50	0,10	124	124	124	11,0	13,5	14,0	48	5	863	1390	230	50	IP X0D	20	X	X	X	X

# TECHNICAL SPECIFICATIONS

- N1 Flow
- N2 Return
- N3 Fitting for instruments
- N4 System filling/drainage

- N5 Fitting for safety valves
- N6 Bulb wells
- N7 Boiler condensation drain
- N8 Inspection well



Dimensions		H	H1	H2	H4	H6	H10	L	L2	P	P2	P3	P4	P5	P6	Øb	Øc	N1	N2	N3	N4	N5	N6	N7	N8
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in
GREENOX 10	GREENOX.e/K 10	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOX 12	GREENOX.e/K 12	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOX 15	GREENOX.e/K 15	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOX 20	GREENOX.e/K 20	1400	1225	374	1277	978	155	715	660	1735	1252	598	740	397	200-250	160	200	50	50	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOX 25	GREENOX.e/K 25	1520	1345	410	1397	1082	155	755	700	1895	1412	598	900	397	200-250	170	250	65	65	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOX 30	GREENOX.e/K 30	1520	1345	410	1397	1082	155	755	700	1895	1412	598	900	397	200-250	170	250	65	65	1"	1"	1" (1)	1/2"	1/2"	1/2"
GREENOX 35	GREENOX.e/K 35	1675	1500	460	1555	1210	155	800	745	1948	1462	651	900	397	200-250	225	250	80	80	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
GREENOX 40	GREENOX.e/K 40	1675	1500	460	1555	1210	155	800	745	1948	1462	651	900	397	200-250	225	250	80	80	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
GREENOX 47	GREENOX.e/K 47	1805	1630	495	1685	1340	155	875	820	2227	1744	698	1075	454	200-250	225	250	80	80	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
GREENOX 60	GREENOX.e/K 60	1925	1750	520	1802	1422	155	945	890	2228	1746	699	1100	429	200-250	225	250	100	100	1"1/4	1"	1"1/4	1/2"	1/2"	1/2"
GREENOX 70	GREENOX.e/K 70	1925	1750	520	1802	1422	155	945	890	2228	1746	699	1100	429	200-250	225	250	100	100	1"1/4	1"	1"1/4	1/2"	1/2"	1/2"

(1) One fitting only

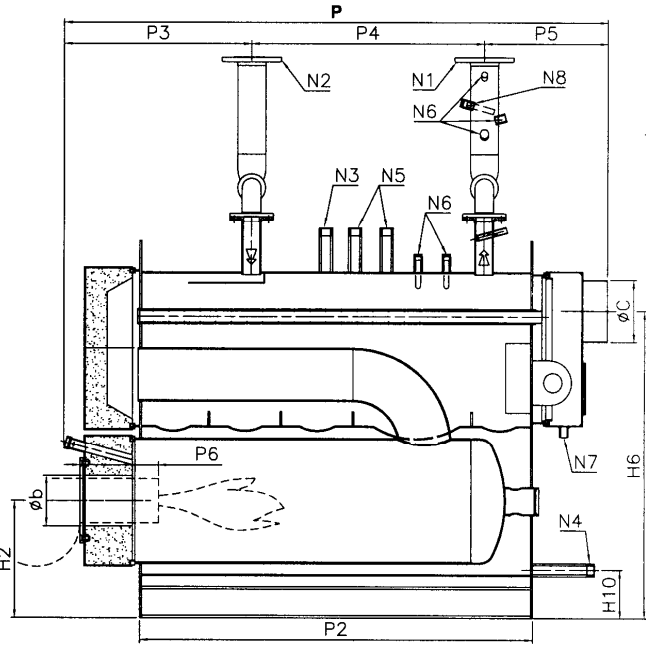
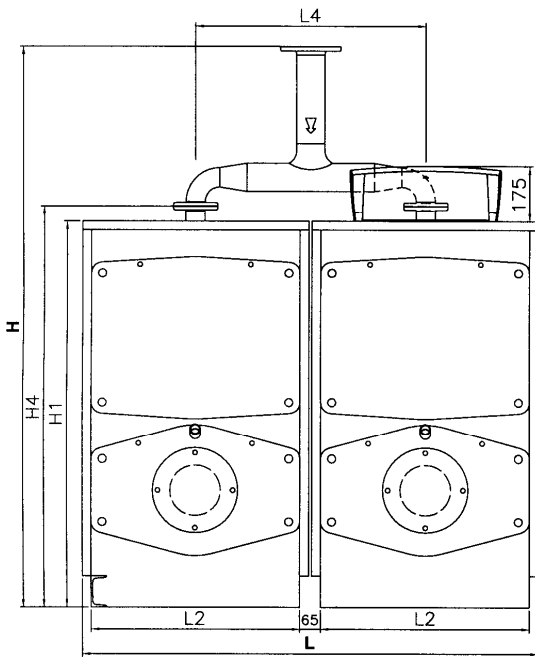


# TECHNICAL SPECIFICATIONS

## 2.3 DUAL BT BOILER

- N1 Flow
- N2 Return
- N3 Fitting for instruments
- N4 System filling/drainage

- N5 Fitting for safety valves
- N6 Bulb wells
- N7 Boiler condensation drain
- N8 Inspection well



Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.)	Effic. 100% (stars)	NG max flow rate G20	NG max flow rate G30	NG max flow rate G31	Max flow rate of flues	Minimum output		Minimum input		Efficiency at 30%	NG min flow rate G20	NG min flow rate G30	NG min flow rate G31	Min flow rate of flues
	kW	kcal/h	kW	kcal/h							Medium Temp. 70°C	Medium Temp. 70°C	kW	kcal/h					
DUAL BT 20	200	172.000	214	184.350	93,30	**	22,68	16,84	16,65	337,93	50	43.000	54,6	46.990	91,50	5,78	4,29	4,24	86,15
DUAL BT 24	240	206.000	258	221.460	93,20	**	27,25	20,22	20,01	406,03	60	52.000	64,7	55.600	92,80	6,84	5,08	5,02	101,94
DUAL BT 30	300	258.000	324	278.500	92,64	**	34,27	25,43	25,16	510,62	75	65.000	81,4	69.990	92,15	8,61	6,39	6,32	128,32
DUAL BT 40	400	344.000	428	368.030	93,47	**	45,28	33,61	33,25	674,67	100	86.000	107,1	92.080	93,40	11,33	8,41	8,32	168,82
DUAL BT 50	500	430.000	540	464.210	92,63	-	57,12	42,39	41,93	851,09	125	108.000	135,1	116.220	92,50	14,30	10,61	10,50	213,08
DUAL BT 58	580	499.000	625	537.440	92,81	-	66,13	49,08	48,55	985,34	145	125.000	156,6	134.670	92,60	16,57	12,30	12,17	246,90
DUAL BT 70	700	602.000	750	645.090	93,32	-	79,38	58,91	58,27	1182,76	175	151.000	188,2	161.830	93,00	19,91	14,78	14,62	296,70
DUAL BT 80	800	688.000	863	742.100	92,71	-	91,31	67,77	67,04	1360,52	200	172.000	215,7	185.540	92,70	22,83	16,94	16,76	340,17
DUAL BT 92	920	791.000	989	850.750	93,00	-	104,68	77,69	76,85	1559,73	230	198.000	247,6	212.920	92,90	26,20	19,44	19,23	390,37
DUAL BT 120	1200	1.032.000	1296	1.114.470	92,60	-	137,13	101,78	100,67	2043,24	300	258.000	324,3	278.920	92,50	34,32	25,47	25,20	511,37

Characteristics	Pressure losses flue gas side	Heat losses through the chimney	Heat losses through the casing	Heat losses with burner off	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side	Design Pressure	Capacity	Total weight	Electric supply	Frequency	Insulation class	Electric power	Fuel			
					°C	°C	°C	%	%	%									(ΔT=12K)	With electr. contr. (excluded pump and burner)	Nat. gas	Lpg
DUAL BT 20	1,4	6,20	0,50	0,10	168	171	170	10,5	13,5	14,0	10	5	592	1310	230	50	IP X0D	20	X	X	X	X
DUAL BT 24	2,2	6,30	0,50	0,10	170	173	173	10,5	13,5	14,0	14	5	592	1310	230	50	IP X0D	20	X	X	X	X
DUAL BT 30	2,2	6,86	0,50	0,10	183	186	185	10,5	13,5	14,0	22	5	592	1310	230	50	IP X0D	20	X	X	X	X
DUAL BT 40	2,0	6,03	0,50	0,10	164	167	167	10,5	13,5	14,0	38	5	824	1580	230	50	IP X0D	20	X	X	X	X
DUAL BT 50	2,8	6,87	0,50	0,10	183	186	186	10,5	13,5	14,0	60	5	824	1580	230	50	IP X0D	20	X	X	X	X
DUAL BT 58	3,5	6,69	0,50	0,10	179	182	182	10,5	13,5	14,0	33	5	1010	1800	230	50	IP X0D	20	X	X	X	X
DUAL BT 70	3,6	6,18	0,50	0,10	167	170	170	10,5	13,5	14,0	48	5	1476	2320	230	50	IP X0D	20	X	X	X	X
DUAL BT 80	4,5	6,79	0,50	0,10	181	184	184	10,5	13,5	14,0	63	5	1476	2320	230	50	IP X0D	20	X	X	X	X
DUAL BT 92	4,0	6,50	0,50	0,10	175	178	177	10,5	13,5	14,0	34	5	1726	2900	230	50	IP X0D	20	X	X	X	X
DUAL BT 120	5,0	6,90	0,50	0,10	184	187	186	10,5	13,5	14,0	58	5	1726	2900	230	50	IP X0D	20	X	X	X	X

Dimensions	H	H1	H2	H4	H6	H10	L	L2	L4	P	P2	P3	P4	P5	P6	Øb	Øc	N1	N2	N3	N4	N5	N6	N7	N8
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in
DUAL BT 20	1780	1225	374	1277	978	155	1441	660	725	1734	1252	598	740	397	200-250	160	200	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL BT 24	1780	1225	374	1277	978	155	1441	660	725	1734	1252	598	740	397	200-250	160	200	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL BT 30	1780	1225	374	1277	978	155	1441	660	725	1734	1252	598	740	397	200-250	160	200	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL BT 40	1925	1345	410	1397	1082	155	1521	700	765	1894	1412	598	900	397	200-250	170	250	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL BT 50	1925	1345	410	1397	1082	155	1521	700	765	1894	1412	598	900	397	200-250	170	250	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL BT 58	2150	1500	460	1555	1210	155	1611	745	810	1948	1462	651	900	397	200-250	225	250	100	100	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
DUAL BT 70	2280	1630	495	1685	1340	155	1761	820	885	2226	1744	698	1075	454	200-250	225	250	100	100	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
DUAL BT 80	2280	1630	495	1685	1340	155	1761	820	885	2226	1744	698	1075	454	200-250	225	250	100	100	1"1/4	1"	1"1/4 (1)	1/2"	1/2"	1/2"
DUAL BT 92	2455	1750	520	1802	1422	155	1901	890	955	2226	1746	699	1100	429	200-250	225	250	125	125	1"1/4	1"	1"1/4	1/2"	1/2"	1/2"
DUAL BT 120	2455	1750	520	1802	1422	155	1901	890	955	2226	1746	699	1100	429	200-250	225	250	125	125	1"1/4	1"	1"1/4	1/2"	1/2"	1/2"

(1) One fitting only

# TECHNICAL SPECIFICATIONS

## 2.4 DUAL GRX/DUAL GRX.e BOILER

Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	Effic. 100% (stars) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate of flues kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h
	kW	kcal/h	kW	kcal/h							kW	kcal/h	kW	kcal/h					
Modello	Medium Temp. 70°C		Medium Temp. 70°C		(Efficiency Dir. 92/42/CEE)	Flue gas temp. at boiler output and air at 20 deg. C		CO2			Press. losses water side	Design Pressure	Capacity	Total weight	Electric supply	Frequency	Insulation class	Electric power	Fuel
									%	%	%	mbar	bar	l	kg	Volt ~	Hz	IP	W
DUAL GRX 24	240	206.000	258	221.880	93,02	**	27,30	20,26	20,04	406,77	60	52.000	64,2	55.220	93,45	6,79	5,04	4,99	101,24
DUAL GRX 30	300	258.000	324	278.640	92,59	**	34,29	25,45	25,17	510,92	75	65.000	81,1	69.730	92,50	8,58	6,37	6,30	127,84
DUAL GRX 40	400	344.000	428	368.080	93,46	**	45,29	33,61	33,25	674,82	100	86.000	108,3	93.130	92,34	11,46	8,51	8,41	170,74
DUAL GRX 50	500	430.000	538	462.680	92,94	-	56,93	42,25	41,80	848,26	125	108.000	134,2	115.380	93,17	14,20	10,54	10,42	211,54
DUAL GRX 60	600	516.000	648	557.280	92,59	-	68,57	50,89	50,34	1021,69	150	129.000	162,0	139.320	92,59	17,14	12,72	12,59	255,43
DUAL GRX 70	700	300.000	752	646.720	93,09	-	79,58	59,06	58,42	1185,74	175	151.000	189,5	162.970	92,35	20,05	14,88	14,72	298,79
DUAL GRX 80	800	688.000	864	743.040	92,59	-	91,43	67,86	67,12	1362,31	200	172.000	215,6	185.440	92,75	22,82	16,94	16,75	339,98
DUAL GRX 94	940	808.000	1012	870.320	92,89	-	107,09	79,48	78,62	1595,64	235	202.000	254,3	218.700	92,41	26,91	19,97	19,76	400,96
DUAL GRX 120	1200	1.032.000	1298	1.116.280	92,45	-	137,35	101,94	100,84	2046,52	300	258.000	323,6	278.320	92,70	34,25	25,42	25,14	510,27
DUAL GRX 140	1400	1.204.000	1514	1.302.040	92,47	-	160,21	118,91	117,62	2387,13	350	301.000	379,5	326.390	92,22	40,16	29,81	29,48	598,40

Characteristics	Pressure losses flue gas side mbar	Heat losses through the chimney %	Heat losses through the casing %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt ~	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					°C	°C	°C	%	%	%									GAS	GASOIL	HEAVY OIL	With electr. contr. (excluded pump and burner)
DUAL GRX 24	1,1	6,48	0,50	0,10	174	177	177	10,5	13,5	14,0	14	5	592	1230	230	50	IP X0D	20	X	X	X	X
DUAL GRX 30	2,0	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	22	5	592	1230	230	50	IP X0D	20	X	X	X	X
DUAL GRX 40	2,1	6,04	0,50	0,10	164	167	167	10,5	13,5	14,0	38	5	592	1230	230	50	IP X0D	20	X	X	X	X
DUAL GRX 50	2,0	6,56	0,50	0,10	176	179	179	10,5	13,5	14,0	60	5	824	1470	230	50	IP X0D	20	X	X	X	X
DUAL GRX 60	3,5	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	86	5	824	1470	230	50	IP X0D	20	X	X	X	X
DUAL GRX 70	3,1	6,41	0,50	0,10	173	176	175	10,5	13,5	14,0	12	5	1010	1700	230	50	IP X0D	20	X	X	X	X
DUAL GRX 80	3,1	6,91	0,50	0,10	184	187	187	10,5	13,5	14,0	63	5	1010	1700	230	50	IP X0D	20	X	X	X	X
DUAL GRX 94	3,7	6,61	0,50	0,10	177	180	180	10,5	13,5	14,0	87	5	1476	2220	230	50	IP X0D	20	X	X	X	X
DUAL GRX 120	3,9	7,05	0,50	0,10	187	190	190	10,5	13,5	14,0	58	5	1726	2780	230	50	IP X0D	20	X	X	X	X
DUAL GRX 140	4,5	7,03	0,50	0,10	187	190	189	10,5	13,5	14,0	79	5	1726	2780	230	50	IP X0D	20	X	X	X	X

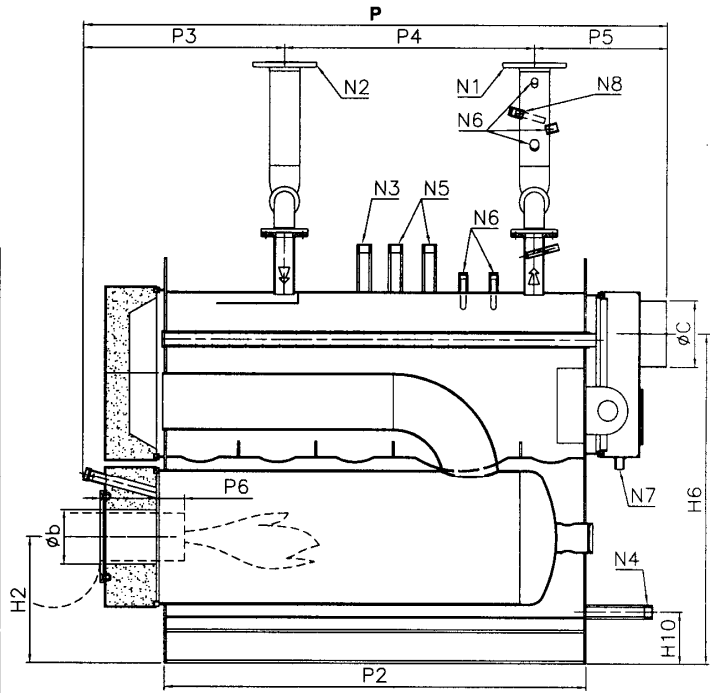
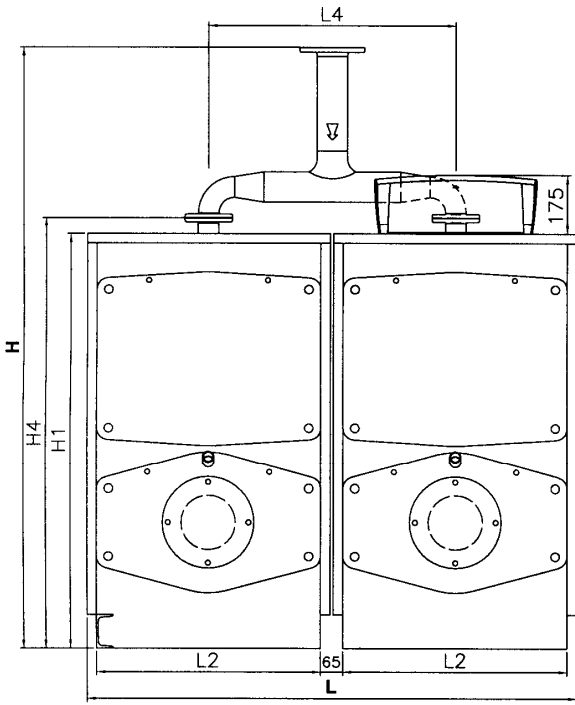
Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	Effic. 100% (stars) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate of flues kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h	
	kW	kcal/h	kW	kcal/h							kW	kcal/h	kW	kcal/h						
Modello	Medium Temp. 70°C		Medium Temp. 70°C		(Efficiency Dir. 92/42/CEE)	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side	Design Pressure	Capacity	Total weight	Electric supply	Frequency	Insulation class	Electric power	Fuel
									%	%	%	mbar	bar	l	kg	Volt ~	Hz	IP	W	
DUAL GRX.e 24	240	206.000	252	216.720	95,24	***	26,67	19,79	19,58	397,38	60	52.000	62,7	53.920	95,70	6,63	4,92	4,87	98,86	
DUAL GRX.e 30	300	258.000	314	270.040	95,54	***	33,23	24,66	24,39	495,13	75	65.000	78,1	67.150	96,05	8,26	6,13	6,07	123,11	
DUAL GRX.e 40	400	344.000	420	361.200	95,24	***	44,44	32,99	32,63	662,16	100	86.000	104,4	89.820	95,75	11,05	8,20	8,11	164,68	
DUAL GRX.e 50	500	430.000	524	450.640	95,42	-	55,45	41,15	40,71	826,21	125	108.000	130,3	112.040	95,95	13,79	10,23	10,12	205,41	
DUAL GRX.e 60	600	516.000	630	541.800	95,24	-	66,67	49,48	48,94	993,38	150	129.000	156,7	134.750	95,73	16,58	12,31	12,17	247,05	
DUAL GRX.e 70	700	300.000	734	631.240	95,37	-	77,67	57,65	57,02	1157,28	175	151.000	182,5	156.930	95,90	19,31	14,33	14,18	287,71	
DUAL GRX.e 80	800	688.000	840	722.400	95,24	-	88,89	65,97	65,26	1324,46	200	172.000	208,9	179.620	95,76	22,10	16,40	16,23	329,31	
DUAL GRX.e 94	940	808.000	986	847.960	95,33	-	104,34	77,44	76,60	1554,67	235	202.000	245,3	210.960	95,80	25,96	19,27	19,06	386,77	
DUAL GRX.e 120	1200	1.032.000	1260	1.083.600	95,24	-	133,33	98,96	97,89	1986,62	300	258.000	313,3	269.400	95,77	33,15	24,60	24,34	493,92	
DUAL GRX.e 140	1400	1.204.000	1468	1.262.480	95,37	-	155,34	115,29	114,05	2314,57	350	301.000	365,2	314.030	95,85	38,64	28,68	28,37	575,74	

Characteristics	Pressure losses mbar	Heat losses through the chimney %	Heat losses through the casing %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt ~	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					°C	°C	°C	%	%	%									GAS	GASOIL	HEAVY OIL	With electr. contr. (excluded pump and burner)
DUAL GRX.e 24	1,4	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	14	5	592	615	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 30	2,5	3,96	0,50	0,10	120	120	120	11,0	13,5	14,0	22	5	592	615	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 40	2,6	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	38	5	592	615	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 50	2,5	4,08	0,50	0,10	122	123	122	11,0	13,5	14,0	60	5	824	735	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 60	4,4	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	86	5	824	735	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 70	3,9	4,13	0,50	0,10	124	124	124	11,0	13,5	14,0	12	5	1010	850	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 80	3,9	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	63	5	1010	850	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 94	4,6	4,17	0,50	0,10	125	125	124	11,0	13,5	14,0	87	5	1476	1110	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 120	4,9	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	58	5	1726	1390	230	50	IP X0D	20	X	X	X	X
DUAL GRX.e 140	5,6	4,13	0,50	0,10	124	124	124	11,0	13,5	14,0	79	5	1726	1390	230	50	IP X0D	20	X	X	X	X

# TECHNICAL SPECIFICATIONS

- N1 Flow
- N2 Return
- N3 Fitting for instruments
- N4 System filling/drainage

- N5 Fitting for safety valves
- N6 Bulb wells
- N7 Boiler condensation drain
- N8 Inspection well



Dimensions		H	H1	H2	H4	H6	H10	L	L2	L4	P	P2	P3	P4	P5	P6	Øb	Øc	N1	N2	N3	N4	N5	N6	N7	N8
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in
DUAL GRX 24	DUAL GRX.e 24	1780	1225	374	1277	978	155	1441	660	725	1734	1252	598	740	397	200-250	160	200	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL GRX 30	DUAL GRX.e 30	1780	1225	374	1277	978	155	1441	660	725	1734	1252	598	740	397	200-250	160	200	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL GRX 40	DUAL GRX.e 40	1780	1225	374	1277	978	155	1441	660	725	1734	1252	598	740	397	200-250	160	200	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL GRX 50	DUAL GRX.e 50	1925	1345	410	1397	1082	155	1521	700	765	1894	1412	598	900	397	200-250	170	250	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL GRX 60	DUAL GRX.e 60	1925	1345	410	1397	1082	155	1521	700	765	1894	1412	598	900	397	200-250	170	250	80	80	1"	1"	1" (1)	1/2"	1/2"	1/2"
DUAL GRX 70	DUAL GRX.e 70	2150	1500	460	1555	1210	155	1611	745	810	1948	1462	651	900	397	200-250	225	250	100	100	1 1/4"	1"	1 1/4" (1)	1/2"	1/2"	1/2"
DUAL GRX 80	DUAL GRX.e 80	2280	1630	495	1685	1340	155	1761	820	885	2226	1744	698	1075	454	200-250	225	250	100	100	1 1/4"	1"	1 1/4" (1)	1/2"	1/2"	1/2"
DUAL GRX 94	DUAL GRX.e 94	2280	1630	495	1685	1340	155	1761	820	885	2226	1744	698	1075	454	200-250	225	250	100	100	1 1/4"	1"	1 1/4" (1)	1/2"	1/2"	1/2"
DUAL GRX 120	DUAL GRX.e 120	2455	1750	520	1802	1422	155	1901	890	955	2226	1746	699	1100	429	200-250	225	250	125	125	1 1/4"	1"	1 1/4"	1/2"	1/2"	1/2"
DUAL GRX 140	DUAL GRX.e 140	2455	1750	520	1802	1422	155	1901	890	955	2226	1746	699	1100	429	200-250	225	250	125	125	1 1/4"	1"	1 1/4"	1/2"	1/2"	1/2"

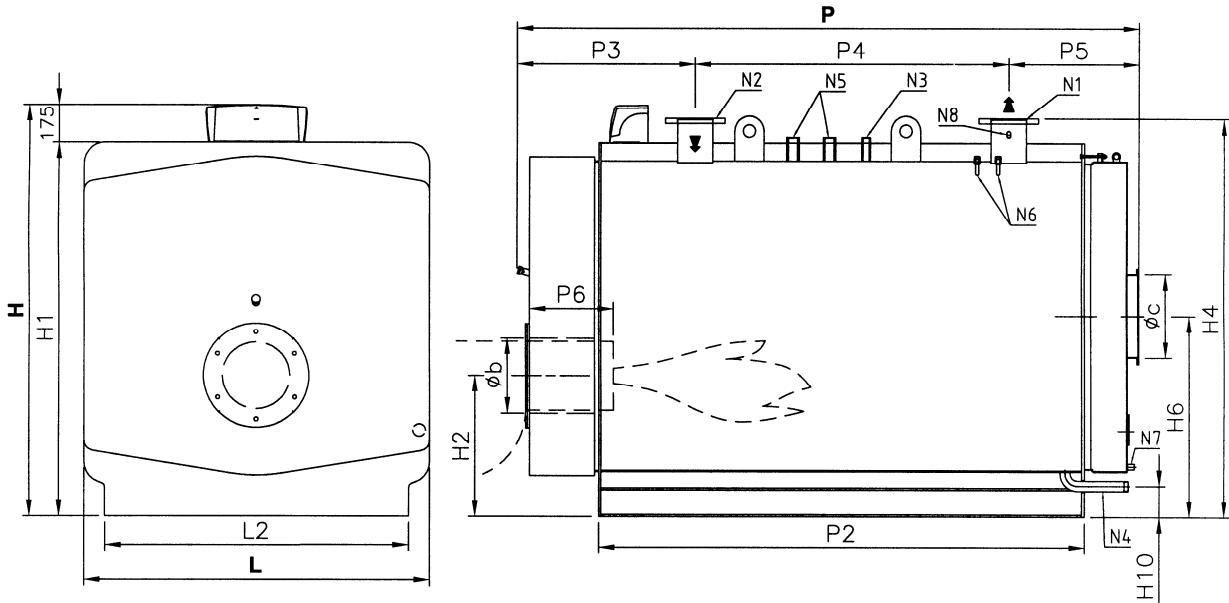
(1) One fitting only

# TECHNICAL SPECIFICATIONS

## 2.5 GREENOx BT 70 ÷ 200 BOILER

- N1 Flow
- N2 Return
- N3 Fitting for instruments
- N4 System filling/drainage

- N5 Fitting for safety valves
- N6 Bulb wells
- N7 Boiler condensation drain
- N8 Inspection well



Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h
	kW	kcal/h	kW	kcal/h						kW	kcal/h	kW	kcal/h					
	Medium Temp. 70°C				Medium Temp. 70°C					Medium Temp. 70°C				Medium Temp. 70°C				
GREENOx BT 70	700	602.000	757	651.020	92,47	80,11	59,45	58,81	1193,64	350	301.000	381,8	328.310	91,68	40,40	29,98	29,66	601,92
GREENOx BT 90	900	774.000	974	837.640	92,40	103,07	76,50	75,67	1535,74	450	387.000	490,6	421.910	91,72	51,91	38,53	38,11	773,53
GREENOx BT 100	1000	860.000	1082	930.520	92,42	114,50	84,98	84,06	1706,05	500	430.000	545,2	468.910	91,70	57,70	42,82	42,36	859,70
GREENOx BT 120	1200	1.032.000	1300	1.118.000	92,31	137,57	102,10	100,99	2049,79	600	516.000	654,2	562.570	91,72	69,22	51,38	50,82	1031,41
GREENOx BT 140	1400	1.204.000	1511	1.299.460	92,65	159,89	118,67	117,39	2382,36	700	602.000	763,5	656.610	91,68	80,79	59,96	59,31	1203,83
GREENOx BT 170	1700	1.462.000	1840	1.582.400	92,39	194,71	144,51	142,94	2901,18	850	731.000	927,0	797.230	91,69	98,10	72,81	72,02	1461,64
GREENOx BT 200	2000	1.720.000	2165	1.861.900	92,38	229,10	170,04	168,19	3413,59	1000	860.000	1090,5	937.810	91,70	115,39	85,64	84,72	1719,38

Characteristics	Pressure losses flue gas side mbar	Heat losses through the chimney %	Heat losses through the casing %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt ~	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					GAS °C	GASOIL °C	HEAVY OIL °C	GAS %	GASOIL %	HEAVY OIL %									(ΔT=12K)	With electr. contr. (excluded pump and burner)	Net. gas	Loc
GREENOx BT 70	2,7	7,03	0,50	0,10	187	190	189	10,5	13,5	14,0	48	5	1200	2220	230	50	IP X0D	20	X	X	X	X
GREENOx BT 90	2,7	7,10	0,50	0,10	188	191	191	10,5	13,5	14,0	33	5	1365	3040	230	50	IP X0D	20	X	X	X	X
GREENOx BT 100	3,5	7,08	0,50	0,10	188	191	190	10,5	13,5	14,0	40	5	1365	3040	230	50	IP X0D	20	X	X	X	X
GREENOx BT 120	5,1	7,19	0,50	0,10	190	193	193	10,5	13,5	14,0	28	5	1570	3360	230	50	IP X0D	20	X	X	X	X
GREENOx BT 140	5,4	6,85	0,50	0,10	183	186	185	10,5	13,5	14,0	38	5	1880	4120	230	50	IP X0D	20	X	X	X	X
GREENOx BT 170	8,0	7,11	0,50	0,10	189	191	191	10,5	13,5	14,0	56	5	2340	4825	230	50	IP X0D	20	X	X	X	X
GREENOx BT 200	8,5	7,12	0,50	0,10	189	192	191	10,5	13,5	14,0	78	5	2340	4825	230	50	IP X0D	20	X	X	X	X

Dimensions	H	H1	H2	H4	H6	H10	L	L2	P	P2	P3	P4	P5	P6	Øb	Øc	N1	N2	N3	N4	N5	N6	N7	N8
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in
GREENOx BT 70	1775	1600	682	1712	895	210	1380	1180	2570	1970	748	1300	522	300-350	280	350	100	100	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx BT 90	1825	1650	671	1764	890	150	1490	1290	2624	1972	800	1300	524	360-410	280	400	125	125	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx BT 100	1825	1650	671	1764	890	150	1490	1290	2624	1972	800	1300	524	360-410	320	400	125	125	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx BT 120	1825	1650	671	1764	890	150	1490	1290	2934	2282	850	1550	534	360-410	320	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx BT 140	1965	1790	722	1904	960	150	1640	1440	2976	2324	850	1500	626	360-410	320	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx BT 170	1965	1790	722	1904	960	150	1640	1440	3476	2824	850	2000	626	360-410	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx BT 200	1965	1790	722	1904	960	150	1640	1440	3476	2824	850	2000	626	360-410	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"

# TECHNICAL SPECIFICATIONS

## 2.6 GREENOx/GREENOx.e/K 80 ÷ 300 BOILER

Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h
	Modello	kW	kcal/h	kW						kcal/h	kW	kcal/h	kW					
	Medium Temp. 70°C				Medium Temp. 70°C					Medium Temp. 70°C				Medium Temp. 70°C				
GREENOx 80	800	688.000	870	748.200	91,95	92,06	68,33	67,59	1371,69	400	344.000	436,3	375.210	91,68	46,17	34,27	33,89	687,91
GREENOx 90	900	774.000	978	841.080	92,02	103,49	76,81	75,98	1542,00	450	387.000	490,7	422.030	91,70	51,93	38,54	38,12	773,75
GREENOx 100	1000	860.000	1087	934.820	92,00	115,03	85,37	84,45	1713,95	500	430.000	545,1	468.790	91,72	57,68	42,81	42,35	859,48
GREENOx 120	1200	1.032.000	1304	1.121.440	92,02	137,99	102,41	101,30	2056,05	600	516.000	654,3	562.690	91,70	69,24	51,39	50,83	1031,63
GREENOx 140	1400	1.204.000	1522	1.308.920	91,98	161,06	119,54	118,24	2399,79	700	602.000	763,2	656.330	91,72	80,76	59,94	59,29	1203,31
GREENOx 170	1700	1.462.000	1848	1.589.280	91,99	195,56	145,14	143,57	2913,84	850	731.000	927,1	797.310	91,68	98,11	72,81	72,02	1461,78
GREENOx 200	2000	1.720.000	2174	1.869.640	92,00	230,05	170,74	168,89	3427,75	1000	860.000	1090,6	937.920	91,69	115,41	85,65	84,73	1719,58
GREENOx 230	2300	1.978.000	2500	2.150.000	92,00	264,55	196,35	194,22	3941,80	1150	989.000	1254,0	1.078.480	91,70	132,70	98,49	97,42	1977,28
GREENOx 260	2600	2.236.000	2826	2.430.360	92,00	299,05	221,95	219,54	4455,85	1300	1.118.000	1402,3	1.206.000	92,70	148,39	110,14	108,94	2211,07

Characteristics	Pressure losses flue gas side mbar	Heat losses through the chimney %	Heat losses through the casing %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt ~	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					GAS	GASOIL	HEAVY OIL	GAS	GASOIL	HEAVY OIL									With electr. contr. (excluded pump and burner)	Nat. gas	Lpg	Gasoil
GREENOx 80	2,2	7,55	0,50	0,10	199	201	201	10,5	13,5	14,0	63	5	1200	1970	230	50	IP X0D	20	X	X	X	X
GREENOx 90	2,8	7,48	0,50	0,10	197	200	199	10,5	13,5	14,0	80	5	1200	1970	230	50	IP X0D	20	X	X	X	X
GREENOx 100	2,1	7,50	0,50	0,10	198	200	200	10,5	13,5	14,0	40	5	1365	2760	230	50	IP X0D	20	X	X	X	X
GREENOx 120	3,2	7,48	0,50	0,10	197	200	199	10,5	13,5	14,0	58	5	1365	2760	230	50	IP X0D	20	X	X	X	X
GREENOx 140	4,4	7,52	0,50	0,10	198	201	200	10,5	13,5	14,0	38	5	1570	2995	230	50	IP X0D	20	X	X	X	X
GREENOx 170	5,0	7,51	0,50	0,10	198	201	200	10,5	13,5	14,0	56	5	1880	3700	230	50	IP X0D	20	X	X	X	X
GREENOx 200	7,0	7,50	0,50	0,10	198	200	200	10,5	13,5	14,0	78	5	2340	4330	230	50	IP X0D	20	X	X	X	X
GREENOx 230	7,5	7,50	0,50	0,10	198	200	200	10,5	13,5	14,0	103	5	2340	4330	230	50	IP X0D	20	X	X	X	X
GREENOx 260	10,0	7,50	0,50	0,10	198	200	200	10,5	13,5	14,0	131	5	2754	5050	230	50	IP X0D	20	X	X	X	X

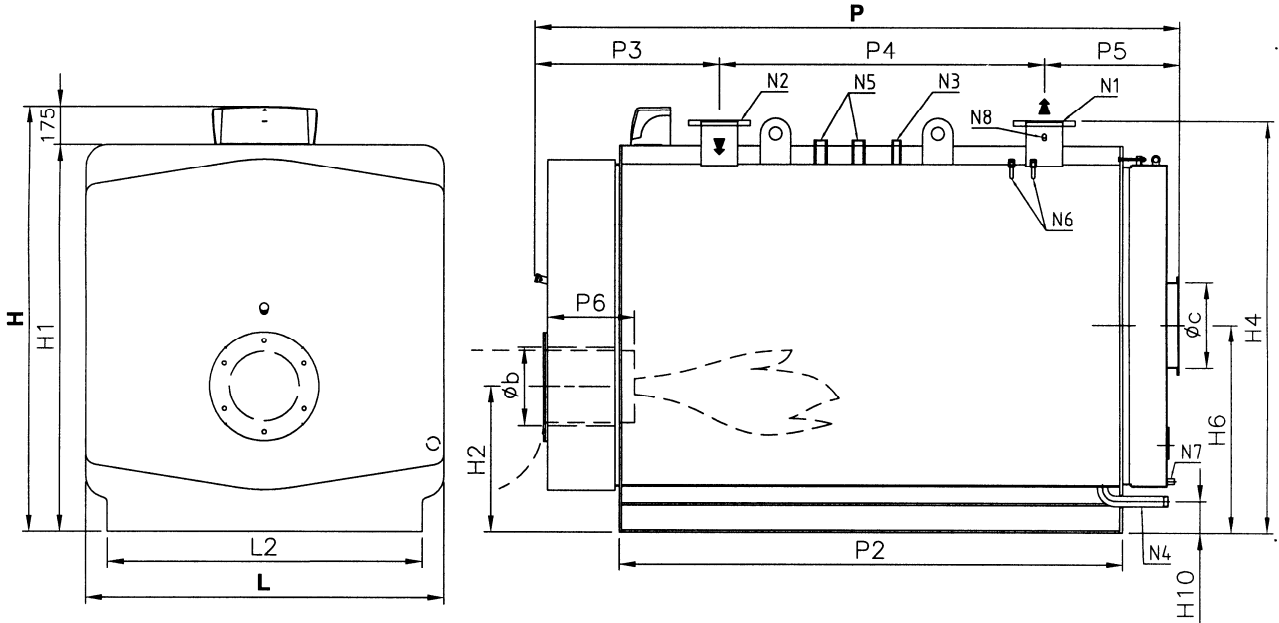
Characteristics	Heat output		Heat input		Efficiency 100% (N.C.V.) %	NG max flow rate G20 m³/h	NG max flow rate G30 kg/h	NG max flow rate G31 kg/h	Max flow rate kg/h	Minimum output		Minimum input		Efficiency at 30% %	NG min flow rate G20 m³/h	NG min flow rate G30 kg/h	NG min flow rate G31 kg/h	Min flow rate of flues kg/h
	Modello	kW	kcal/h	kW						kcal/h	kW	kcal/h	kW					
	Medium Temp. 70°C				Medium Temp. 70°C					Medium Temp. 70°C				Medium Temp. 70°C				
GREENOx.e/K 80	800	688.000	839	721.540	95,35	88,78	65,89	65,18	1322,82	400	344.000	417,2	358.780	95,88	44,15	32,77	32,41	657,79
GREENOx.e/K 90	900	774.000	944	811.840	95,34	99,89	74,14	73,34	1488,36	450	387.000	469,1	403.460	95,92	49,64	36,85	36,45	739,70
GREENOx.e/K 100	1000	860.000	1050	903.000	95,24	111,11	82,47	81,57	1655,54	500	430.000	522,1	449.040	95,76	55,25	41,01	40,56	823,27
GREENOx.e/K 120	1200	1.032.000	1259	1.082.740	95,31	133,23	98,88	97,81	1985,13	600	516.000	626,1	538.450	95,83	66,25	49,17	48,64	987,19
GREENOx.e/K 140	1400	1.204.000	1469	1.263.340	95,30	155,45	115,37	114,12	2316,21	700	602.000	730,4	628.130	95,84	77,29	57,36	56,74	1151,61
GREENOx.e/K 170	1700	1.462.000	1784	1.534.240	95,29	188,78	140,11	138,59	2812,82	850	731.000	887,4	763.130	95,79	93,90	69,69	68,94	1399,12
GREENOx.e/K 200	2000	1.720.000	2099	1.805.140	95,28	222,12	164,85	163,07	3309,59	1000	860.000	1044,0	897.800	95,79	110,47	81,99	81,10	1646,02
GREENOx.e/K 230	2300	1.978.000	2415	2.076.900	95,24	255,56	189,67	187,62	3807,84	1150	989.000	1200,8	1.032.680	95,77	127,07	94,31	93,29	1893,31
GREENOx.e/K 260	2600	2.236.000	2731	2.348.660	95,20	288,99	214,49	212,16	4305,95	1300	1.118.000	1357,0	1.167.010	95,80	143,60	106,58	105,42	2139,59
GREENOx.e/K 300	3000	2.580.000	3150	2.709.000	95,24	333,33	247,40	244,72	4966,62	1500	1.290.000	1565,8	1.346.560	95,80	165,69	122,97	121,64	2468,78

Characteristics	Pressure losses flue gas side mbar	Heat losses through the chimney %	Heat losses through %	Heat losses with burner off %	Flue gas temp. at boiler output and air at 20 deg. C			CO2			Press. losses water side mbar	Design Pressure bar	Capacity l	Total weight kg	Electric supply Volt ~	Frequency Hz	Insulation class IP	Electric power W	Fuel			
					GAS	GASOIL	HEAVY OIL	GAS	GASOIL	HEAVY OIL									With electr. contr. (excluded pump and burner)	Nat. gas	Lpg	Gasoil
GREENOx.e/K 80	2,8	4,15	0,50	0,10	124	124	124	11,0	13,5	14,0	63	5	1200	1970	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 90	3,5	4,16	0,50	0,10	124	124	124	11,0	13,5	14,0	80	5	1200	1970	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 100	2,6	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	40	5	1365	2760	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 120	4,0	4,19	0,50	0,10	125	125	125	11,0	13,5	14,0	58	5	1365	2760	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 140	5,5	4,20	0,50	0,10	125	125	125	11,0	13,5	14,0	38	5	1570	2995	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 170	6,3	4,21	0,50	0,10	126	126	125	11,0	13,5	14,0	56	5	1880	3700	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 200	8,8	4,22	0,50	0,10	126	126	126	11,0	13,5	14,0	78	5	2340	4330	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 230	9,4	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	103	5	2340	4330	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 260	12,0	4,30	0,50	0,10	128	128	127	11,0	13,5	14,0	131	5	2754	5050	230	50	IP X0D	20	X	X	X	X
GREENOx.e/K 300	15,0	4,26	0,50	0,10	127	127	127	11,0	13,5	14,0	175	5	2754	5050	230	50	IP X0D	20	X	X	X	X

# TECHNICAL SPECIFICATIONS

- N1 Flow
- N2 Return
- N3 Fitting for instruments
- N4 System filling/drainage

- N5 Fitting for safety valves
- N6 Bulb wells
- N7 Boiler condensation drain
- N8 Inspection well



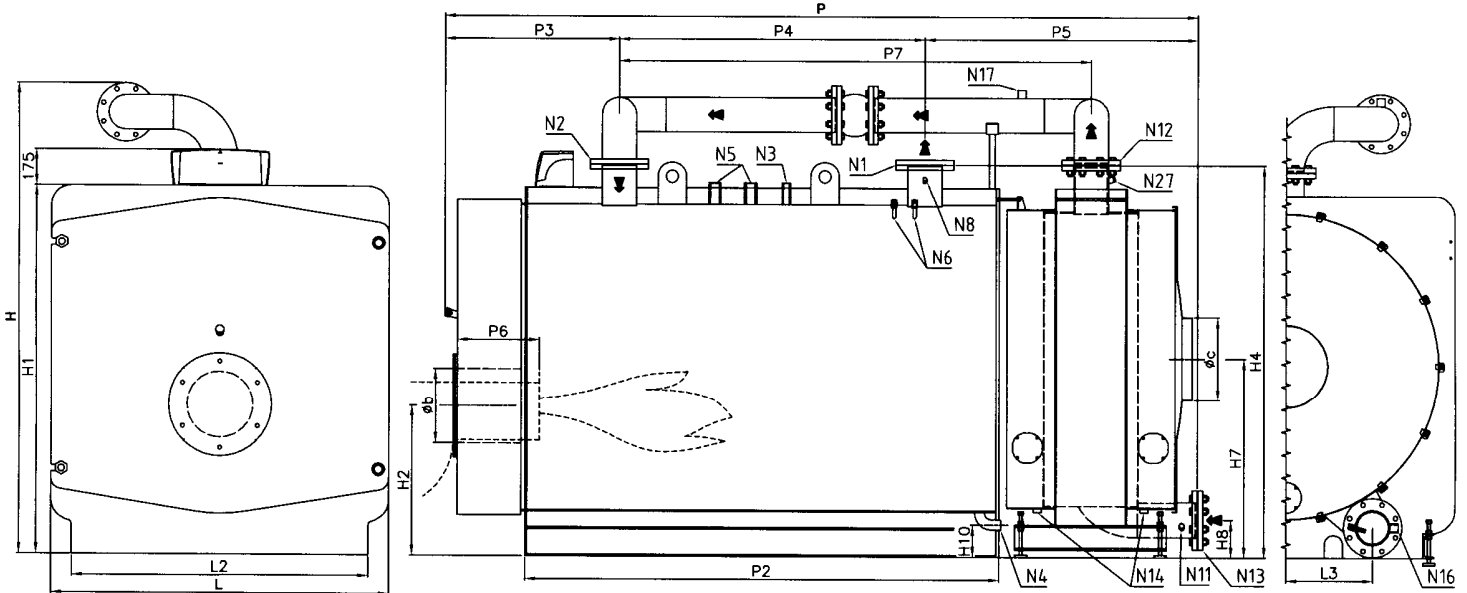
Dimensions		H	H1	H2	H4	H6	H10	L	L2	P	P2	P3	P4	P5	P6	Øb	Øc	N1	N2	N3	N4	N5	N6	N7	N8
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in
GREENOx 80	GREENOx.e/K 80	1775	1600	682	1712	895	210	1380	1180	2535	1970	748	1300	487	300-350	280	350	100	100	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 90	GREENOx.e/K 90	1775	1600	682	1712	895	210	1380	1180	2535	1970	748	1300	487	300-350	280	350	100	100	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 100	GREENOx.e/K 100	1825	1650	671	1764	890	150	1490	1290	2589	1972	800	1300	489	360-410	280	400	125	125	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 120	GREENOx.e/K 120	1825	1650	671	1764	890	150	1490	1290	2589	1972	800	1300	489	360-410	320	400	125	125	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 140	GREENOx.e/K 140	1825	1650	671	1764	890	150	1490	1290	2899	2282	850	1550	499	360-410	320	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 170	GREENOx.e/K 170	1965	1790	722	1904	960	150	1640	1440	2941	2324	850	1500	591	360-410	320	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 200	GREENOx.e/K 200	1965	1790	722	1904	960	150	1640	1440	3441	2824	850	2000	591	360-410	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 230	GREENOx.e/K 230	1965	1790	722	1904	960	150	1640	1440	3441	2824	850	2000	591	360-410	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"
GREENOx 260	GREENOx.e/K 260	1965	1790	722	1904	960	150	1640	1440	3941	3324	850	2500	591	360-410	360	400	150	150	1"1/2	1"1/4	2"	1/2"	1/2"	1/2"
-	GREENOx.e/K 300	1965	1790	722	1904	960	150	1640	1440	3941	3824	850	2500	591	360-410	360	400	150	150	1"1/2	1"1/4	2"	1/2"	1/2"	1/2"

# TECHNICAL SPECIFICATIONS

## 2.7 GREENOx BT COND BOILER

- N1 Boiler flow
- N2 Boiler return
- N3 Fitting for instruments
- N4 Boiler drain
- N5 Fitting for safety valves
- N6 Bulbs wells
- N8 Inspection well

- N11 Condenser return temperature control
- N12 Condenser flow
- N13 Condenser return
- N14 Condenser condensation drain
- N16 Condenser drain
- N17 Air vent fitting
- N27 Condenser flow temperature control



Characteristics	Heat output				Heat input		Efficiency 100% (N.C.V.)		NG max flow rate G20	NG max flow rate G30	NG max flow rate G31	Max flow rate	Minimum output		Minimum input		Efficiency at 30%	NG min flow rate G20	NG min flow rate G30	NG min flow rate G31	Min flow rate of flues
	kW		kcal/h		kW		%		m³/h	kg/h	kg/h	kg/h	kW		kcal/h		%	m³/h	kg/h	kg/h	kg/h
Modello	Medium Temp. 70°C		Temp. flow/return 50/30°C				Medium Temp. 70°C	Temp. flow/return 50/30°C					Medium Temp. 70°C		Medium Temp. 70°C						
GREENOx BT COND 180	1646	1.415.520	1800	1.548.000	1674	1.440.000	98,30	107,50	177,19	131,51	130,08	2640,13	542	466.290	550,5	473.390	98,50	58,25	43,23	42,76	867,91
GREENOx BT COND 200	1829	1.572.800	2000	1.720.000	1860	1.600.000	98,30	107,50	196,87	146,12	144,53	2933,36	602	518.100	611,6	525.990	98,50	64,72	48,04	47,51	964,35
GREENOx BT COND 230	2103	1.808.720	2300	1.978.000	2140	1.840.000	98,30	107,50	226,41	168,04	166,21	3373,51	693	595.820	703,4	604.890	98,50	74,43	55,24	54,64	1109,00
GREENOx BT COND 260	2377	2.044.640	2600	2.236.000	2419	2.080.000	98,30	107,50	255,94	189,95	187,90	3813,51	783	673.540	795,1	683.790	98,50	84,14	62,45	61,77	1253,66
GREENOx BT COND 300	2743	2.359.200	3000	2.580.000	2791	2.400.000	98,30	107,50	295,31	219,18	216,80	4400,12	904	777.160	917,4	788.990	98,50	97,08	72,05	71,27	1446,53

Characteristics	Pressure losses flue gas side	Heat losses through the chimney	Heat losses through the casing	Heat losses with burner off	Flue gas temp. at boiler output and air at 20 deg.	CO2	Condense production	Press. losses water side	Design Pressure	Capacity	Cond. capacity	Total capacity	Total weight	Electric supply	Frequency	Insulation class	Electric power	Fuel		
Modello	mbar	%	%	%	°C	%	kg/h	mbar	bar	l	l	l	kg	Volt ~	Hz	IP	W	Gas	Oil	Coal
		For condensing Temp. flow/return 50/30°C	For condensing Temp. flow/return 50/30°C	For condensing Temp. flow/return 50/30°C	GAS For condensing Temp. flow/return 50/30°C	GAS For condensing Temp. flow/return 50/30°C	Temp. flow/return 50/30°C	(ΔT=12K)									With electr. contr. (excluded pump and burner)	Gas	Oil	Coal
GREENOx BT COND 180	8,0	1,50	0,50	0,10	50	10,5	419,9	53	5	2340	444	2784	5560	230	50	IP X0D	20	X	X	-
GREENOx BT COND 200	9,5	1,50	0,50	0,10	50	10,5	466,6	65	5	2340	444	2784	5560	230	50	IP X0D	20	X	X	-
GREENOx BT COND 230	10,0	1,50	0,50	0,10	50	10,5	536,6	86	5	2340	444	2784	5560	230	50	IP X0D	20	X	X	-
GREENOx BT COND 260	14,0	1,50	0,50	0,10	50	10,5	606,6	35	5	2754	444	3198	5835	230	50	IP X0D	20	X	X	-
GREENOx BT COND 300	15,0	1,50	0,50	0,10	50	10,5	699,9	46	5	2754	444	3198	5835	230	50	IP X0D	20	X	X	-

Dimensions	H	H1	H2	H4	H7	H8	H10	L	L2	P	P2	P3	P4	P5	P6	P7	Øb	Øc	N1	N2	N3	N4	N5	N6	N8	N11	N12	N13	N14	N16	N17	N27	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	DN/in	in	in	DN/in	in
GREENOx BT COND 180	2288	1790	722	1904	960	180	155	1640	1440	4180	2824	850	2000	1330	360-410	2813	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"	1/2"	150	150	1"	1"	1"	1/2"
GREENOx BT COND 200	2288	1790	722	1904	960	180	155	1640	1440	4180	2824	850	2000	1330	360-410	2813	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"	1/2"	150	150	1"	1"	1"	1/2"
GREENOx BT COND 230	2288	1790	722	1904	960	180	155	1640	1440	4180	2824	850	2000	1330	360-410	2813	360	400	150	150	1"	1"1/4	1"1/2	1/2"	1/2"	1/2"	1/2"	150	150	1"	1"	1"	1/2"
GREENOx BT COND 260	2394	1790	722	1904	960	206	155	1640	1440	4680	3324	880	2500	1300	360-410	3282	360	400	200	200	1"1/2	1"1/4	2"	1/2"	1/2"	1/2"	200	200	1"	1"	1"	1/2"	
GREENOx BT COND 300	2394	1790	722	1904	960	206	155	1640	1440	4680	3324	880	2500	1300	360-410	3282	360	400	200	200	1"1/2	1"1/4	2"	1/2"	1/2"	1/2"	200	200	1"	1"	1"	1/2"	

### 3 INSTALLATION

Before **connecting** the boiler, perform the following operations:

- Thoroughly clean all the **system pipes** in order to remove any foreign matter that could affect correct operation of the boiler;
- Check that the flue has an adequate draught, that there is no narrowing of passages and that it is free from debris; also check that other appliances do not discharge into the flue (unless designed to serve several utilities). See the regulations in force.

#### 3.1 THERMAL PLANT

##### 3.1.1 ROOM BOILER

Current regulations must always be observed. premises in which boilers will be installed should be sufficiently ventilated and permit access for ordinary and extraordinary maintenance operations.

##### 3.1.2 FLUE

The pressurised boiler that now equips your heating system is so-called because it uses a burner provided with a fan which introduces into the combustion chamber the exact amount of air necessary in relation to the fuel and maintains an overpressure in the furnace equivalent to all the internal resistances of the flue gas path as far as the boiler exhaust. At this point the fan pressure should have dropped to zero to prevent the flue connection pipe and the lower area of the flue itself from being under pressure and combustion gas leaks occurring in the boiler room.

The **connection pipe** from the boiler to the base of the flue must slope upwards in the direction of the flue gas flow with recommended gradient of no less than 10%. Its path must be as short and straight as possible with the bends and fittings rationally designed in accordance with air duct criteria.

The paragraph Technical Specifications specifies the flue connection diameters of the boilers for lengths of up to 1 metre. For more winding paths, the diameter must be suitably enlarged.



# INSTALLATION

## 3.2 HYDRAULIC CONNECTION

### 3.2.1 SEALED HOT WATER HEATING SYSTEM WITH EXPANSION VESSEL - pressure 5 bar (Fig. 1)

The generator must be provided with:

- a - 1 safety valve
- 2 safety valves if output is ( $\geq 500.000$  kcal/h)
- b - Expansion vessel
- c - Regulation thermostats
- d - 1st safety thermostat
- e - 2nd safety thermostat
- f - Cut-off pressure switch
- g - Well for control thermometer
- h - Pressure gauge with flange for control pressure gauge
- i - Heat discharge valve or fuel on-off valve

- N1 - Flow
- N2 - Return
- N3 - Instrument fitting
- N4 - Lower fitting:
  - N4b expansion vessel fitting
  - N4c Filling/drain
- N5 - Safety valve fitting ( $\geq 500.000$  kcal/h: n. 2 valves)
- N6 - Bulb wells (thermometer, pump consent thermostat, regulation thermostat, safety thermostat)
- N7 - Condensation recollection fitting

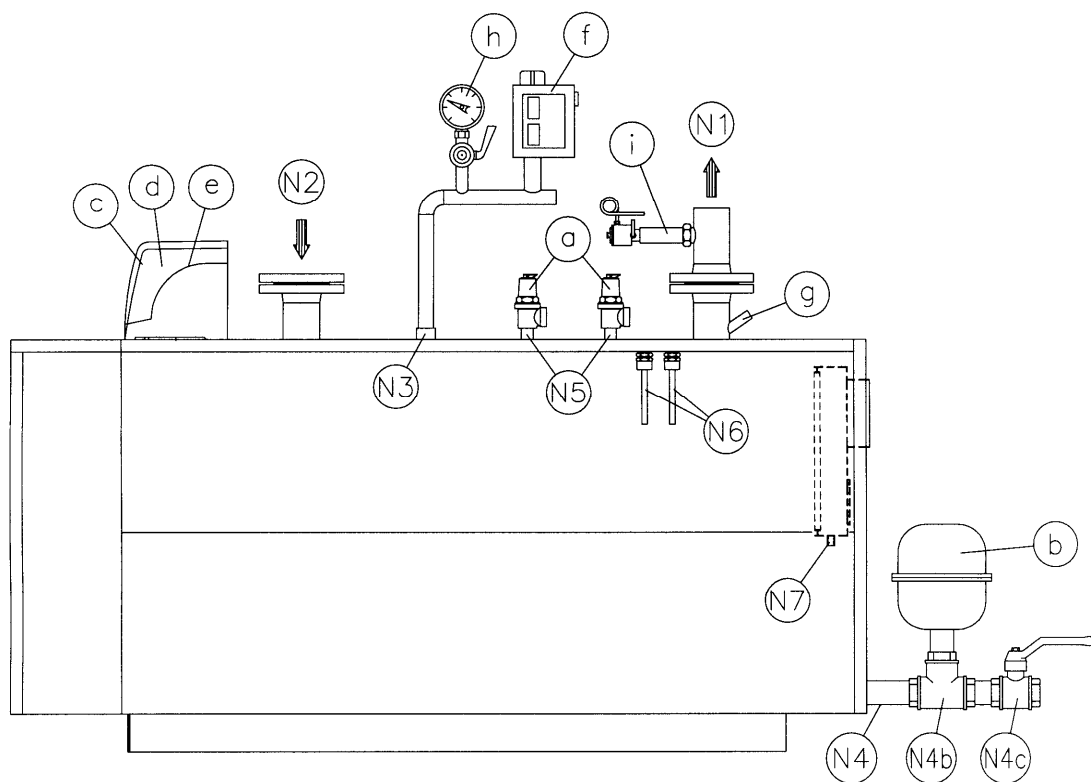


Fig. 1

Ensure that the hydraulic pressure measured after the reduction valve on the supply pipe does not exceed the operating **pressure specified on the rating plate of the component** (boiler, heater etc.).

- As the water contained in the heating system increases in pressure during operation, ensure that its maximum value does not exceed the maximum hydraulic pressure specified on the component rating plate (5 bar).
- Ensure that the safety valve outlets of the boiler and hot water tank, if any, have been connected to an exhaust funnel in order to prevent the valves from **flooding the room** if they open.
- Ensure that the pipes of the water and heating system **are not used as an earth connection** for the electrical system as this can seriously and very rapidly damage the pipes, boiler, heater and radiators.
- Once the heating system has been filled, you are advised to close the supply cock and keep it closed so that **any leaks from the system** will be identified by a drop in hydraulic pressure indicated on the system pressure gauge.

# INSTALLATION

## 3.2.2 DUAL BT/DUAL GRX/DUAL GRX.e INSTRUMENTS POSITIONING (Fig. 2)

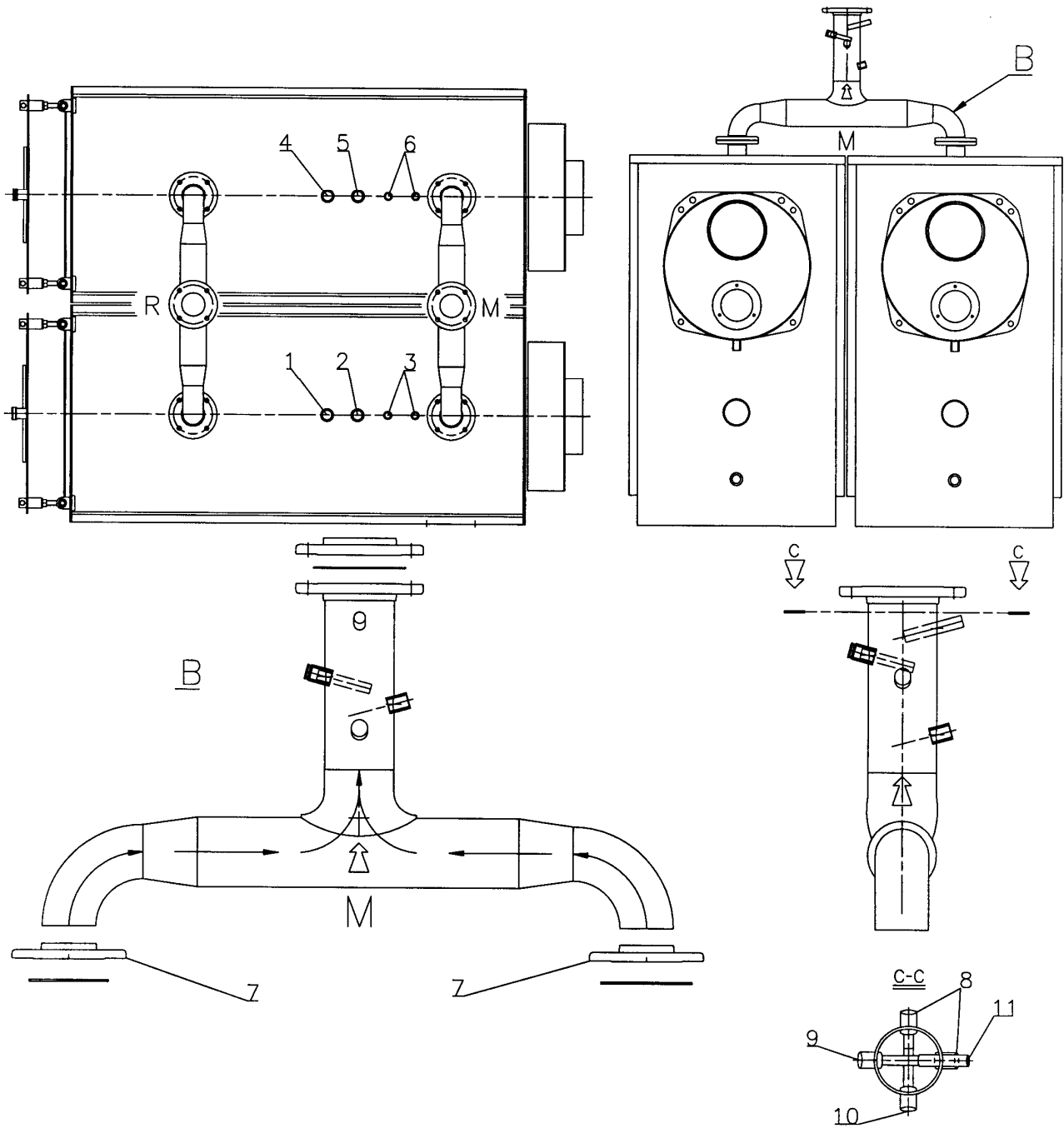


Fig. 2

**Key**

- 1. Pressure switch fitting
  - 2. 1<sup>st</sup> safety valve fitting or thermal drainage 1<sup>st</sup> safety
  - 3. 1<sup>st</sup> boiler circulator consent thermostat bulb wells and 1<sup>st</sup> boiler thermometer
  - 4. Manometer fitting with control manometer flange
  - 5. 2<sup>nd</sup> safety valve fitting or thermal drainage 1<sup>st</sup> safety
  - 6. 2<sup>nd</sup> boiler circulator consent thermostat bulb wells and 2<sup>nd</sup> boiler thermometer
  - 7. Flanges to weld after the definitive and correct positioning of the boilers
  - 8. 1<sup>st</sup> and 2<sup>nd</sup> boiler fuel valve bulbs well
  - 9. 1<sup>st</sup> and 2<sup>nd</sup> boiler safety thermostats bulb wells
  - 10. 1<sup>st</sup> and 2<sup>nd</sup> boiler bi-thermostats bulbs well, digital regulator thermal-resistance (optional)
  - 11. Temperature test bulb wells
- M. Flow  
R. Return

### 3.3 ELECTRICAL CONNECTION

Electrical systems of thermal plants designed only for heating purposes **must comply with numerous legal regulations which apply in general as well as specifically to each application or fuel type.**

### 3.4 OPTIONAL CONTROL PANEL (Fig. 3)

The control panel (optional) with the boilers is made of IP40 protection plastic material, and houses the regulation and safety instruments:

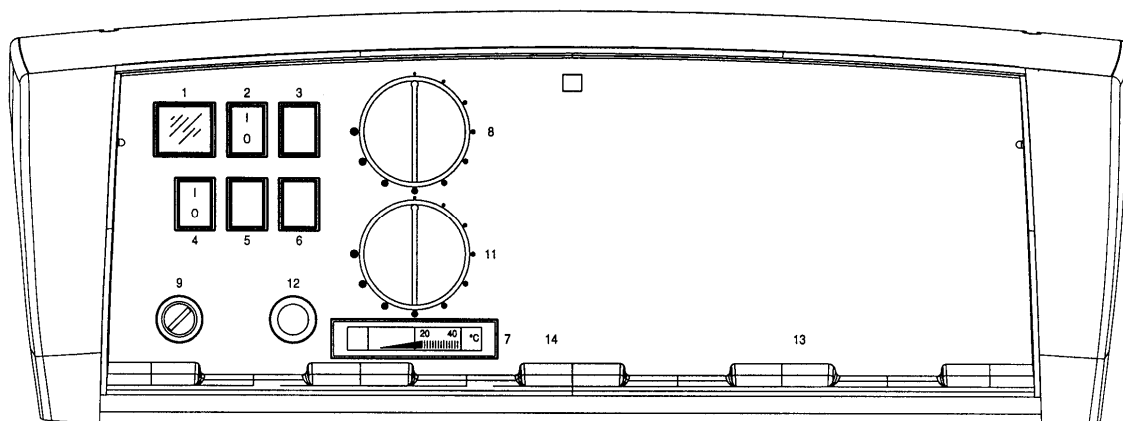


Fig. 3

#### KEY

- 1 NET WARNING LIGHT
- 2 1<sup>st</sup> BURNER SWITCH
- 4 CIRCULATOR SWITCH
- 7 BOILER THERMOMETER
- 8 1<sup>st</sup> ADJUSTMENT THERMOMETER
- 9 1<sup>st</sup> SAFETY THERMOSTAT
- 11 2<sup>nd</sup> ADJUSTMENT THERMOSTAT

The upper part of the control panel can be rotated to gain access to the terminal board and uncoil the thermostat and thermometer capillaries. A copy of the wiring diagram is contained inside the control panel cover. The **regulation thermostats (TR1-TR2)** have an operating range from 60°C (40°C for the BT versions BT) to 90° and can be set by the user by means of the front knob.

**Safety thermostat TS** has a fixed setting of 100 (+0/-6)°C and can be manually reset in accordance with Ministerial Decree 1/12/75 «R».

**Circulator consent thermostat (TM)** has a fixed setting of 50°C (40°C for the BT versions) with a working range of 6°C: at start-up, with the heating system cold, this permits higher boiler temperatures to be maintained thus reducing the risk of flue gas condensation.

For correct installation, refer to the boiler casing assembly instructions.

#### WIRING DIAGRAM

Refer to the diagram supplied with the specific switchboard.

## 3.5 DUAL BT/DUAL GRX/DUAL GRX.e OPERATING PRINCIPLES

The boiler consists of 2 tiled units of the same capacity and one only control panel for both units. Each unit can work independently and the boiler can be operated partially. This means that there are two sets of panel controls (burner switches, thermostats and thermometers) . See paragraph 3.2.2. on connection. As an example, bi-thermostats TR1 and TR2 can be adjusted so that there is a 10°C intervention difference between them (note that the controls have a 43 to 85 °C regulation range with a half turn rotation). Flow water temperature after 2 equal flows have been mixed, corresponds to the mean temperature set by the flow of the 2 units.

### 3.5.1 OPTIONAL DUAL BT CONTROL PANEL (Fig. 4)

The optional control panel is made of plastic with IP40 protection degree and houses the regulation and safety instruments:

The upper part of the control panel can be rotated to gain access to the terminal board and uncoil the thermostat and thermometer capillaries. A copy of the wiring diagram is contained inside the control panel

**The regulation bi-thermostats (TR1 and TR2)** have an operating range from 43° to 85° and can be set by the user by means of the front knob. The temperature differential of each bi-thermostat is fixed and approx. 7°C.

**Safety thermostats (TS1 and TS2)** have a fixed setting of 100 (+0/-6)°C and can be manually reset in accordance with Ministerial Decree 1/12/75 «R».

**Circulator consent thermostats (TM1 and TM2)** have a fixed setting of 45°C (50° for not BT version) with a working range of 6°C: at start-up, with the heating system cold, this permits higher boiler temperatures to be maintained thus reducing the risk of flue gas condensation.

For correct installation, refer to the boiler casing assembly instructions.

**Note:** both hour meters start each time their own burner starts. It is recommended that the numbers displayed by each hour meter is monitored . The boilers should be operated so that both the upper and lower burners have approximately the same number of working hours.

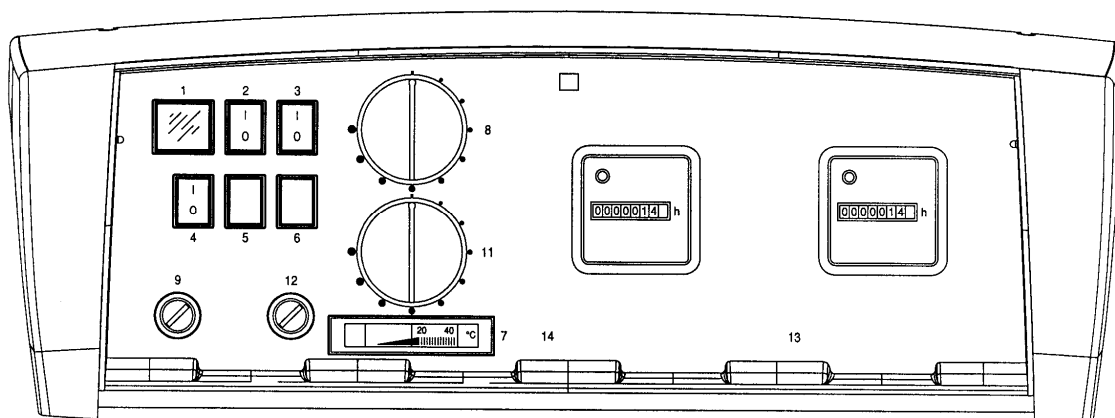


Fig. 4

#### KEY

- 1 NET WARNING LIGHT
- 2 1st BURNER SWITCH
- 3 2nd BURNER SWITCH
- 4 SYSTEM CIRCULATOR SWITCH
- 7 BOILER THERMOMETER
- 8 1st ADJUSTMENT THERMOSTAT
- 9 1st SAFETY THERMOSTAT
- 11 2nd ADJUSTMENT THERMOSTAT
- 12 2nd SAFETY THERMOSTAT
- 13 1st BOILER HOUR METER
- 14 2nd BOILER HOUR METER

#### WIRING DIAGRAM

Refer to the diagram supplied with the specific switchboard.

## 3.6 INVERTING THE MANHOLE OPENING

Should you need to invert the opening of the manhole, instructions are as follows:

1. Exchange the hinge outer bolt (or bush) with the opposite closing bush; with the inner bolt fix the cone to the manhole on the hinge side.
2. Follow the above operation for the other hinge.
3. Adjust the bolts on the hinges as needed.

## 3.7 BURNER CONNECTION

Before installation you are advised to thoroughly clean the inside of all the fuel supply system pipes in order to remove any foreign matter that could affect correct operation of the boiler. See technical specification tables and check the max pressure value inside the furnace. The value found on the table may also increase by 20% if heavy oil is used instead of gas or light oil; furthermore the following checks should also be carried out:

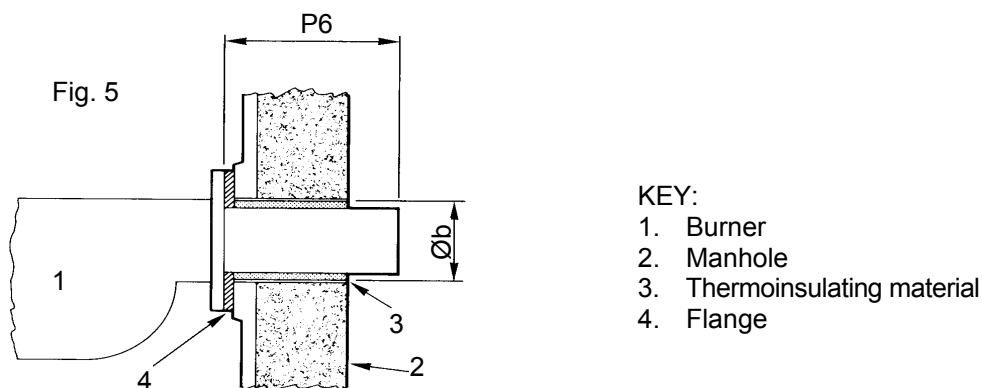
- a) Check the internal and external seal of the fuel supply system;
- b) Regulate the fuel flow according to the power required by the boiler;
- c) Check that the boiler is fired by the correct type of fuel;
- d) Check that the fuel supply pressure is within the values specified on the burner rating plate;
- e) Check that the fuel supply system is sized for the maximum flow rate necessary for the boiler and that it is provided with all control and safety devices provided for by the regulations referred to above;

In particular, when using gas:

- f) Check that the supply pipe and the gas ramp comply with the regulations in force;
- g) Check that all the gas connections are sealed;
- h) Check that the boiler room vents are of sufficient size to ensure the air flow dictated by the regulations referred to above and that they are in any case sufficient to obtain perfect combustion.
- i) Check that the gas pipes are not used as earth connections for electrical appliances.

If the boiler is not going to be used for some time, close the fuel supply cock or cocks.

**IMPORTANT: check that the gap between the burner draught tube and the mounting plate are properly filled with thermoinsulating material (Fig. 5).** The boiler is supplied with a piece of ceramic rope. if this does not suit the burner used, use a braid of different diameter but same material.



All details on the draught tube length (**P6**), the diameter of the burner hole (**Øb**) and the pressurization are included in the par. Technical Specifications.

## 4 ASSEMBLY

### 4.1 CASING BOILER (Fig. 6)

- a) Wrap the rock wool around the boiler body leaving the thermostat bulb well (p) near the flanged flow connector exposed.
- b) Insert the wire guide in the lower slits of panel (1S) and (2D); then, allowing for the opening direction of the manhole, insert the wires connecting the burner to the control panel
- c) Fit the panel (1S), inserting the upper fold into the square tube and the lower fold to the boiler side frame Repeat the same procedure for panel (2S).
- d) Fit the upper panel (3S) on the boiler and fit on this panel the control panel. uncoil the thermometer and thermostat capillaries and insert the bulbs in the well; connect the control panel to the cables from the burner
- e) Fit panel (1D) and (2D) as indicated under point b); fit panel (3D) ensuring that the capillaries are inserted in the slot provided in the panel itself. Secure the control panel.
- f) Fit the panels (4S) and (4D), connecting them to the side panels by means of the brackets; fit the front panels (5) connecting them to panels (4S) and (4D) by means of the brackets. Complete the front manhole casing by fitting panel (6) .
- g) Fit rear panels (7) connecting them to the boiler side panels by means of the brackets.
- h) Fit the upper panels secured by screws; close the holes with special caps (see figure).

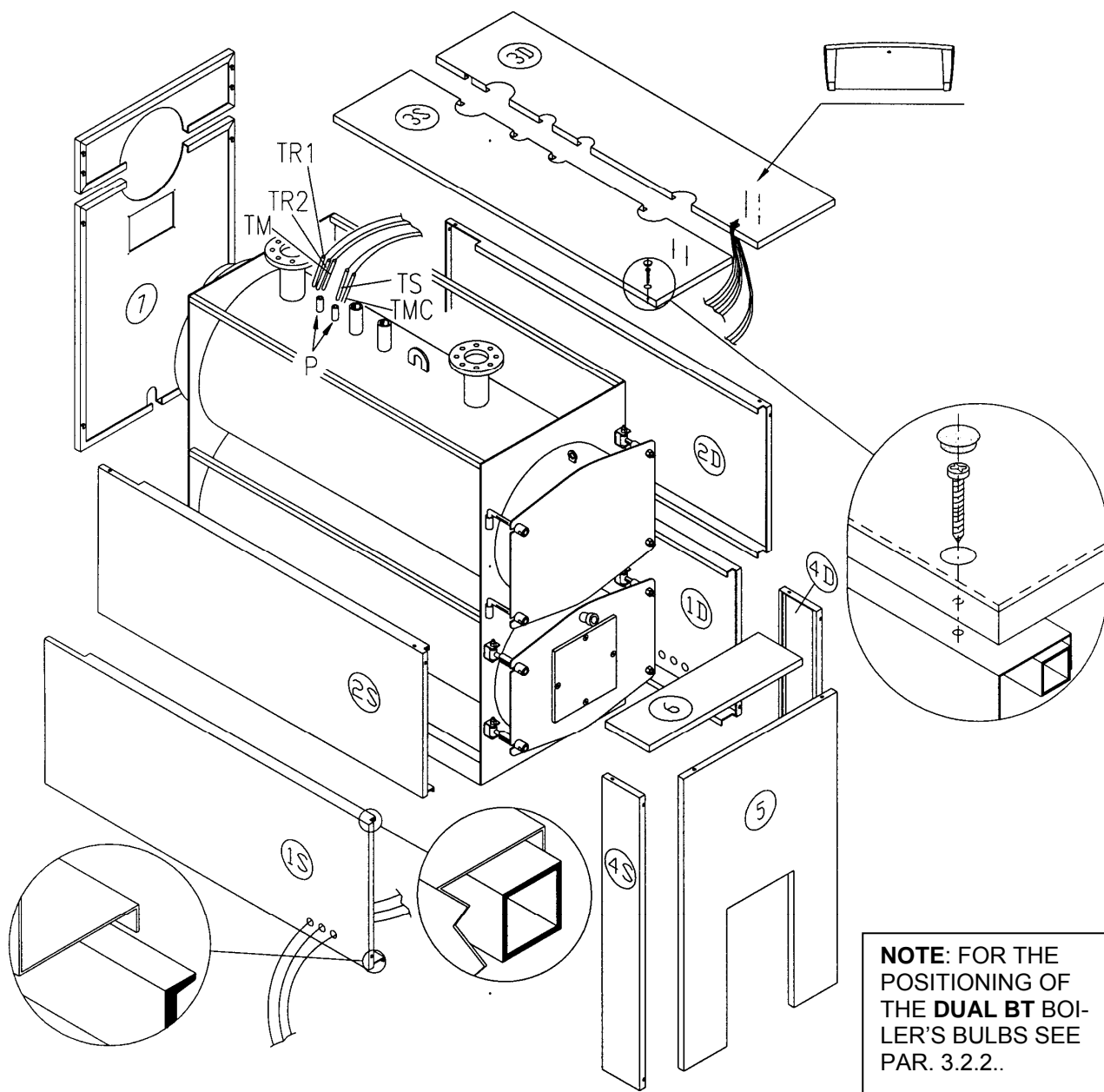


Fig. 6

**Key:** P Bulb wells - TR1-TR2 Boiler regulation thermostats – TS Safety thermostat - TM Circulator consent thermostat - TMC Boiler thermometer

## 5 START UP

**WARNING:** Before start up insert all the turbolators into the smoke tubes ensuring that there is a space of at least 100 mm at the front after they have been pushed fully inside.

### 5.1 PRELIMINARY CHECKS

Before starting the boiler, check that:

- The **rating plate** specifications and power supply network (electricity, water, gas or fuel oil) specifications correspond;
- The burner **power range** is compatible with the power of the boiler;
- There is a copy of the burner instructions in the boiler room;
- The **flue gas exhaust pipe** is correctly fitted;
- The **air inlet supply** is the correct size and free from any obstacle;
- The **manhole**, the **smokebox** and the **burner plate** are closed in order to provide a complete flue gas seal;
- The system is **full of water** and that any **air pockets** have been eliminated;
- The **anti-freeze** protections are operative;
- The water **circulation pumps** are operating correctly.
- The expansion vessel and the safety valve(s) have been connected correctly (with no interception) and are properly operating.
- Check the electrical parts and thermostat operation.

### 5.2 WATER TREATMENT

The most common phenomena that occur in heating systems are:

#### - Scaling

Scale reduces heat transfer between the combustion gases and the water, causing an abnormal increase in the temperature of the metal and therefore reducing the life of the boiler.

Scale is found mostly at the points where the wall temperature is highest and the best remedy, at construction level, is to eliminate areas that overheat.

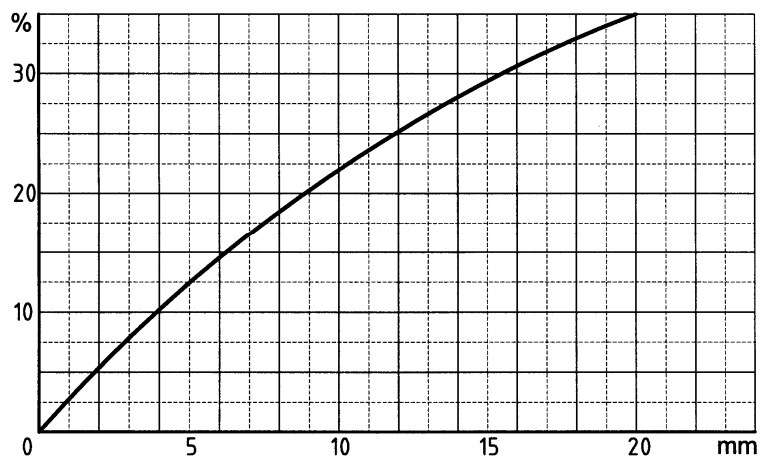
Scale creates an insulating layer which reduces the thermal transfer of the generator, affecting system efficiency. This means that the heat produced by burning the fuel is not fully exploited and is lost to the flue

**Scale diagram**

**Key**

% % fuel not used

mm mm scale



#### - Corrosion on the water side

Corrosion of the metal surfaces of the boiler on the water side is due to the passage of dissolved iron through its ions ( $Fe^{+}$ ). In this process the presence of dissolved gases and in particular of oxygen and carbon dioxide is very important. Corrosion often occurs with softened or demineralised water which has a more aggressive effect on iron (acid water with  $Ph < 7$ ): in these cases, although the system is protected from scaling, it is not protected against corrosion and the water must be treated with corrosion inhibitors.

### 5.3 FILLING THE SYSTEM

The water must enter the system as slowly as possible and in a quantity proportional to the air bleeding capacity of the components involved. Filling times vary depending on the capacity and characteristics of the system but should never be less than 2 or 3 hours.

In the case of a sealed system with an **expansion vessel**, water is let in until the pressure gauge indicator reaches the static pressure value pre-set in the vessel.

Heat the water to maximum temperature but never over  $90^{\circ}C$ . During this operation the air contained in the water is released through the automatic air separators or through manual bleed valves. Once the air has been entirely released, reset the pressure to the pre-established value and close the manual and/or automatic filling valve.

## 6 OPERATION

### 6.1 OPERATING CHECKS

The heating system must be correctly operated to ensure perfect combustion as far as possible with lowest possible emissions of carbon monoxide, unburnt hydrocarbons and soot into the atmosphere, and to avoid hazards and damage to people and goods.

Guide to combustion values:

FUELS	%CO <sub>2</sub>	Flue gases temperature	% CO
Gas	10	190°C	0 – 20 ppm
Gas oli	13	195°C	10 – 80 ppm
Heavy oil	13.5	200°C	50 – 150 ppm

A diagram is provided in which the system efficiency is obtained by considering the flue gas temperature, the ambient temperature and the percentage of carbon dioxide (CO<sub>2</sub>). Dispersions through the boiler casings are not considered.

Example:

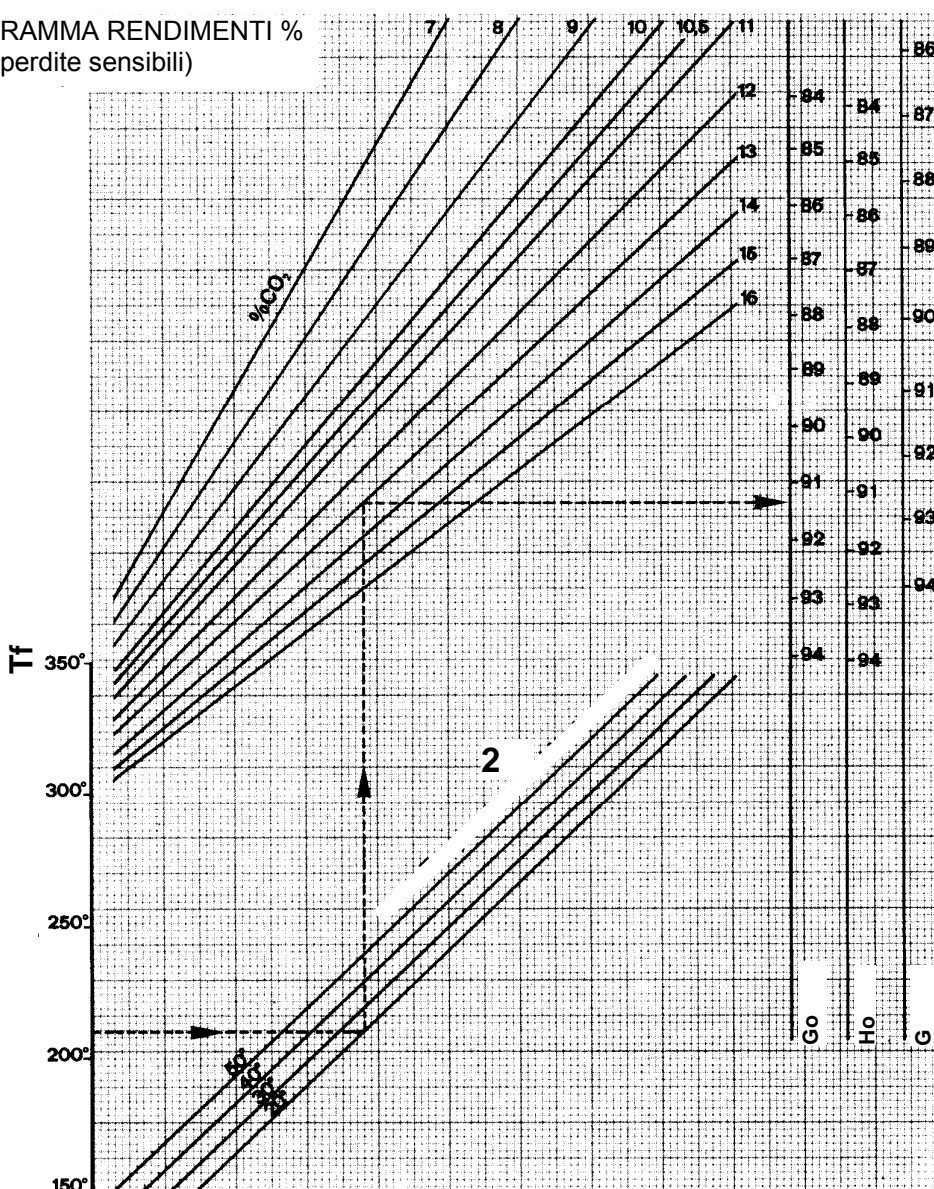
Fuel used .....GAS OIL

%CO<sub>2</sub>.....13 %

Ambient temperature.....20 °C

Efficiency.....91.4 %

DIAGRAMMA RENDIMENTI %  
(solo perdite sensibili)



Key:

Tf Flue gas temperature °C – Ta Ambient temperature °C – Go Gas oil – Ho Heavy oil – G Gas



## OPERATION

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Pressurisation values should be included in the range given in the table of technical specifications.

### IMPORTANTE

The differential temperature between boiler flow and return must not exceed 15°C in order to prevent thermal shock to the boiler structures. The temperature of the return water must be above 55°C (35°C for the BT versions) in order to protect the boiler from corrosion due to condensation of the flue gases on cold surfaces; for this reason it is useful to install a 3 or 4-way mixing valve. The guarantee does not cover damages caused by condensate.

A recirculation pump (anticondensate pump) must be installed to mix the cold returns. This pump should have a minimum flow rate equal to approximately 5 m<sup>3</sup>/h or equal to 1/3 or 1/4 of the heating system pump flow rate.

It is recommended that the burner switch is always switched on in order to maintain water temperature approximately equal to the value the thermostat is set to.

If the flue gas seal is poor in the front part of the boiler (manhole and burner plate) or the back part (smokebox), the closing tie rods of the individual parts must be adjusted; if this is not sufficient, the seals must be replaced.

### CAUTION

Do not open the manhole and do not remove the smokebox while the burner is working. Always wait a few minutes after the burner has been switched off until the insulating parts are cooler.

## 6.2 CLEANING AND SERVICING

Shut off the fuel supply and disconnect the electrical mains before starting any cleaning and servicing operations.

As economic running depends on the exchange surfaces being clean and regulation of the burner, the following operations should be performed:

- Clean the tube bundle and turbolators with the appropriate tube-brush every month for heavy oil-fired boilers, every three months for gas oil-fired boilers and once a year for gas-fired boilers. Cleaning schedule depends on plant features.

Quick cleaning can be performed by opening the front manhole only, taking the turbolators out and cleaning the tubes with a tube-brush. For more thorough cleaning, the smokebox must be removed to eliminate carbon deposits from the rear side.

- Have the burner calibration checked by professionally qualified personnel;
- Have the water circulating in the system analysed and provide for adequate treatment to avoid the formation of scale which initially reduces the efficiency of the boiler and in the long term will permanently damage it, making it unserviceable;
- Check that the refractory castings in contact with the flue gases are in perfect condition and if not, replace them;
- Periodically check the efficiency of the system regulation and safety instruments.



*alta tecnologia del calore*

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Iscritto R.I. VR 02245640236

## **DECLARATION OF CONFORMITY WITH THE EUROPEAN COMMUNITY REGULATIONS**

I undersigned Emanuela Lucchini, Managing Director of ICI CALDAIE S.p.A.,  
headquartered in via G. Pascoli 38 – 37059 Campagnola di Zevio (VR) Italy

**DECLARE THAT STEEL BOILERS**

**GREENO<sub>x</sub> BT-DUAL BT  
GREENO<sub>x</sub> BT COND  
GREENO<sub>x</sub>/ GREENO<sub>x.e</sub>  
DUAL GRX/DUAL GRX.e**

comply with the CE certificate and with the following regulations (or harmonised regulations):

EN 60335-1, EN 303-1, pr EN 303-3

In accordance with the boards regulations:

- Gas Directive 90/396/CEE
- Low Voltage Directive 73/23/CEE (modified by 93/68)
- Efficiency Directive 92/42/CEE
- EMC Directive 89/336/CEE

S. Maria di Zevio, li 14/03/2005

ICI CALDAIE S.p.A.  
Direttore Generale  
Emanuela Lucchini

A handwritten signature in black ink, appearing to read 'Emanuela Lucchini', is written over the printed name and title.





Appartenente al Gruppo Finluc, iscritto R.I. VR n. 02245640236

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