Melbury HE
& Melbury C Boilers

Gas/Oil Fired Low Temperature Steel Boilers
530kW to 10000kW

INSTALLATION, COMMISSIONING AND SERVICING INSTRUCTIONS

IMPORTANT NOTE

THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT

Hamworthy

Heating *at work.*

Customer After Sales Services

Telephone: **01202 662555** E-mail: **service@hamworthy-heating.com** Fax: **01202 662522**

Technical Enquiries

To supplement the detailed technical brochures, technical advice on the application and use of products in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly

Hamworthy offer a service of site assembly for many of our products where plant room access is restricted. Using our trained staff we offer a higher quality of build and assurance of a boiler built and tested by the manufacturer.

Commissioning

Commissioning of equipment by our own engineers, accredited agents or specialist sub-contractors will ensure the equipment is operating safely and efficiently.

Service Contracts

Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing the risk of failure and improving performance and efficiency. Service contracts enable you to plan and budget more efficiently.

Breakdown service, repair, replacement

Hamworthy provide a rapid response breakdown, repair or replacement service through head office at Poole and accredited agents throughout the UK.

Spare Parts

We offer a comprehensive range of spare parts, providing replacement parts for both current and discontinued products. Delivery options are available to suit you. Please refer to our website for more details.

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Gas/Oil Fired Low Temperature Steel Boilers
530kW to 10000kW

Installation, Commissioning and Servicing Instructions

NATURAL GAS I_{2H}
CLASS D (35 sec fuel oil)
Dual Fuel

THE MELBURY BOILER IS INTENDED FOR USE AS A COMMERCIAL APPLIANCE.

THE GAS FIRED VARIANTS ARE FOR USE ON GROUP H NATURAL GAS (2ND FAMILY) I_{2H}

THE OIL FIRED VARIANTS ARE FOR USE ON CLASS D (35 sec FUEL OIL) or CLAS C2 - KEROSENE (28 sec OIL) OR BLENDED BIO- FUEL (RME or FAME).

PLEASE ENSURE THE RELEVANT INFORMATION REQUIRED WITHIN DOCUMENT IS FOUND RELATING TO THE SPECIFIC FUEL TO BE FIRED, BEFORE OPERATING THE BOILER.

THIS BOILER COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.
EC TYPE CERTIFICATE No. EC-0461

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1.0 INTRODUCTION

1.1 The Melbury boiler range consists of 19 HE models, gas, oil or dual fuel fired, welded carbon steel boilers with outputs ranging from 530kW to 10,000kW and 12 C models gas, oil or dual fuel fired, welded carbon steel boilers with outputs ranging from 530kW to 3,000kW . Refer to Technical Data in Appendix A for details on Natural gas, and Oil firing.
For applications firing blended Bio Fuel (RME or FAME), please refer to Hamworthy Heating Ltd for confirmation and guidance on the fuel specification.

Melbury HE boilers are three pass, smoke tube boilers with combustion chamber and flue way using Low-Nox technology. The geometry of the combustion chamber and it's relatively low volume, coupled with a patented flame escape system, allows for lower emission values and safe operation. The third pass is equipped with turbulators. Their turbulent action further increases the heat exchange and allows the system to work at low combustion gas temperatures, optimising efficiencies.

The Melbury C is equipped with an integrated second heat exchanger made of special stainless steel that is also designed for operation with oil and/ or gas burners. In this combination, the Melbury C becomes a condensing unit by using the latent heat present in the flue gases. As a result, the efficiency can increase to over 107% (net) at a correspondingly low return temperature.
IMPORTANT
The Melbury C boiler range requires specific attention to the system design so as to achieve the increased efficiency performance and to maintain the minimum flow requirements through the second heat exchanger - **refer to Appendix E for specific information.**
A differential pressure switch is supplied loose to ensure minimum flow is achieved. This must be fitted across the pump.
A limit thermostat and sensor pocket is supplied loose to protect from excessive water temperatures - refer to Appendix E for additional information
A dedicated circulating pump (not HHL supply) is required to deliver the minimum flow requirements for the economiser circuit.

Melbury HE boilers are suitable for minimum return temperatures down to 50°C for oil firing and 60°C for gas firing. Melbury C boilers have no minimum return temperature limitations and as a result, are suitable for direct connection to mixed temperature heating systems. The minimum flow temperature for all models is 70°C for gas firing, 60°C for oil firing, all with no minimum flow rate requirements.

Melbury boilers can be used individually, or in a multi-boiler configuration, and are suitable for use on either open-vented or sealed low temperature hot water heating systems. For hot water production they can be used in conjunction with calorifiers or indirect hot water cylinders.

Chesil pressurisation units are available from Hamworthy Heating Ltd for sealed systems.

1.2 Melbury boilers are supplied unassembled ready for on-site assembly.

1.3 Melbury HE boilers have an operating efficiency of over 86% part load based on gross CV.
Melbury C boilers can have an operating efficiency of over 96% part load based on gross CV.

The heat exchanger is mounted within a steel frame, to which the casing and controls assemblies are fitted, leaving access for cleaning the appliance from the front. The heat exchanger assembly is provided with 100mm of glass fibre insulation
The flow / return and water drain connections are located on top of the boiler. Refer to Section 8 for details.

1.4 The Melbury boiler range can be fitted with either a high/low or modulating burner for operation on Natural Gas I_{2H} (Second Family) or a high/low or modulating burner for operation on fuel oil (Class D 35 sec or C2 28sec.), or liquid bio fuel . In addition dual fuel option burners are available - see figures 11.1.....11.6
Low NOx variants of burners are available on specific models of Melbury boilers. Please refer to Hamworthy Heating Ltd for further information.

1.5 The boiler is supplied with a pre-wired control panel which contains:

- Control fuse 6.3 AT
- Limit thermostat 110°C manual reset
- Control thermostat 35°C to 90°C
- High fire control thermostat 35°C to 90°C
- Burner on off switch
- Limit thermostat test button
- Overheat indicator lamp
- Safety interlock indicator lamp
- Burner lock out lamp
- Water temperature thermometer
- High and low fire hours run meters
- 5 Volt free contacts for remote signalling

The boiler is housed in a powder coated sheet steel casing which is supplied flat-packed for on-site assembly. Refer to Section 10 for casing assembly procedure.

1.6 All Melbury boilers are factory hydraulically tested ensuring suitability for use on systems with maximum working pressures of up to 6 bar (80 psi)

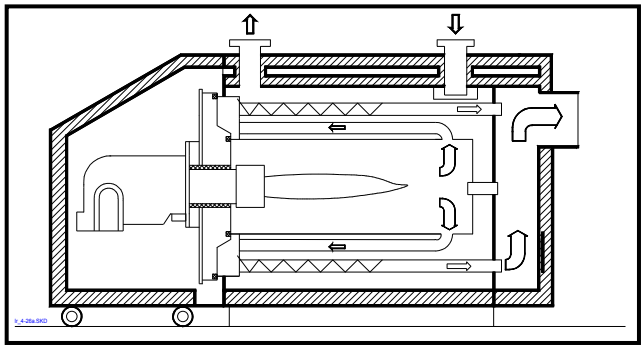


Figure 1.1 - Melbury HE 3 pass boiler

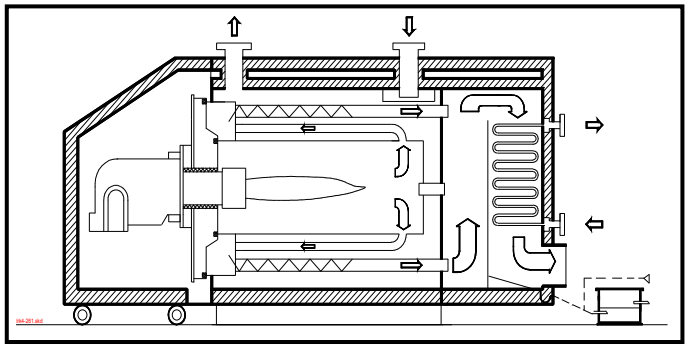


Figure 1.2 - Melbury C boiler

2.0 SUPPLY AND DELIVERY

2.1 The boiler is normally supplied as a set of equipment comprising the following:

a. Boiler body

plus pallet containing;

b. Casing panels

c. Control panel

d. Turbulators

plus

e Burner assembly—incl nozzles for oil firing, supplied separately

Important - All Melbury boilers are supplied as standard with the burner door hinged on the rhs. It is possible to reverse the hinge arrangement to provide alternative opening – **refer to section 5 Boiler Assembly.**

Remove all packing material and inspect the equipment to ensure that all parts are present and undamaged.

.If in any doubt, DO NOT USE THE EQUIPMENT, contact the Hamworthy Heating Ltd.

All packaging materials are to be disposed of appropriately.

2.2 Warranty

Full warranty assistance will be covered when the appliance is commissioned by Hamworthy Heating Ltd, see Terms & Conditions for full details.

Hamworthy Heating Ltd will not accept any liability resulting from damage due to tampering, improper use, handling, installation errors, operation and maintenance. It is important to check for damage upon receipt of product, which if found must be notified to Hamworthy Heating Ltd immediately.

Tel - 0845 450 2866

Model HE	W mm Boiler	W mm Pallet	H mm Boiler	H mm Pallet	L mm Boiler	L mm Pallet	Weight (kg) Excl. Burner
530	1000	330	1370	980	2150	1300	1130
580	1060	330	1450	980	2300	1300	1490
630	1060	330	1450	980	2300	1300	1490
700	1130	350	1535	1150	2500	1470	1810
800	1130	350	1535	1150	2500	1470	1810
895	1210	350	1630	1150	2600	1470	2000
1150	1300	450	1730	920	3000	1580	2460
1300	1300	450	1730	920	3000	1580	2460
1650	1375	450	1805	1020	3400	1650	2948
1900	1445	630	1870	1090	3600	1720	3393
2500	1570	650	1990	1190	3900	1840	4248
3000	1645	650	2080	990	4200	1925	4822
3800	1970	n/a	2235	n/a	4670	n/a	7025
4500	2170	n/a	2450	n/a	4910	n/a	8425
5400	2280	n/a	2565	n/a	5310	n/a	10095
6300	2560	n/a	2870	n/a	5771	n/a	13545
7400	2710	n/a	3025	n/a	6221	n/a	16040
8600	2810	n/a	3135	n/a	6763	n/a	18620
10000	2900	n/a	3230	n/a	7364	n/a	21900

Figure 2.1 - Melbury HE Boiler Shipping details

2.3 Delivery Verification

When taking delivery please ensure that you have received the correct number of boilers and ancillary parts to fulfil your order. The boiler and ancillary items are shipped on one pallet. The burner is shipped separately.
The control panel and fasteners are located in the combustion chamber.
The casing panels are secured to the top of the boiler body.

If any item is missing please contact our after sales service team. Please provide details of your order such as order number and contract number as well as a detailed description of the missing item.

Figure 2.2 - Melbury C Shipping details

Model C	W mm		H mm		L mm		Weight (kg) Excl. Burner
	Boiler	Pallet	Boiler	Pallet	Boiler	Pallet	
530	1150	480	1370	1090	2600	1370	1450
580	1210	480	1450	1090	2700	1370	1800
630	1210	480	1450	1090	2700	1370	1800
700	1280	480	1535	1090	2960	1370	2160
800	1280	480	1535	1090	2960	1370	2160
895	1355	480	1630	1150	3130	1470	2420
1150	1445	570	1730	910	3630	1580	2950
1300	1445	570	1730	910	3630	1580	2950
1650	1520	630	1805	1090	4200	1720	3508
1900	1590	630	1870	1090	4580	1720	4133
2500	1715	650	1990	1190	4820	1840	5169
3000	1790	650	2080	980	5080	1925	5892

2.4 Burner Selection

Hamworthy recommend the use of Riello burners for use with the Melbury boiler range. For a comprehensive list of matched burners please refer to figures 11.1 .... 11.6.
In addition to standard burners, Hamworthy also offer a choice of Low NOx gas burners on specific models of gas and dual fuel boilers. Refer to Hamwoprthy Heating Ltd for information and advice.

3.0 SIZE AND SPACE REQUIREMENTS

3.1 The Melbury boiler range has been designed to utilise available space, therefore it is important that the plantroom has sufficient ceiling height to allow for installation and connection to the flue system allowing for sufficient access at the rear of the boiler for pipework connections and at the front of the boiler for access to the burner and combustion chamber. See Figure 3.3

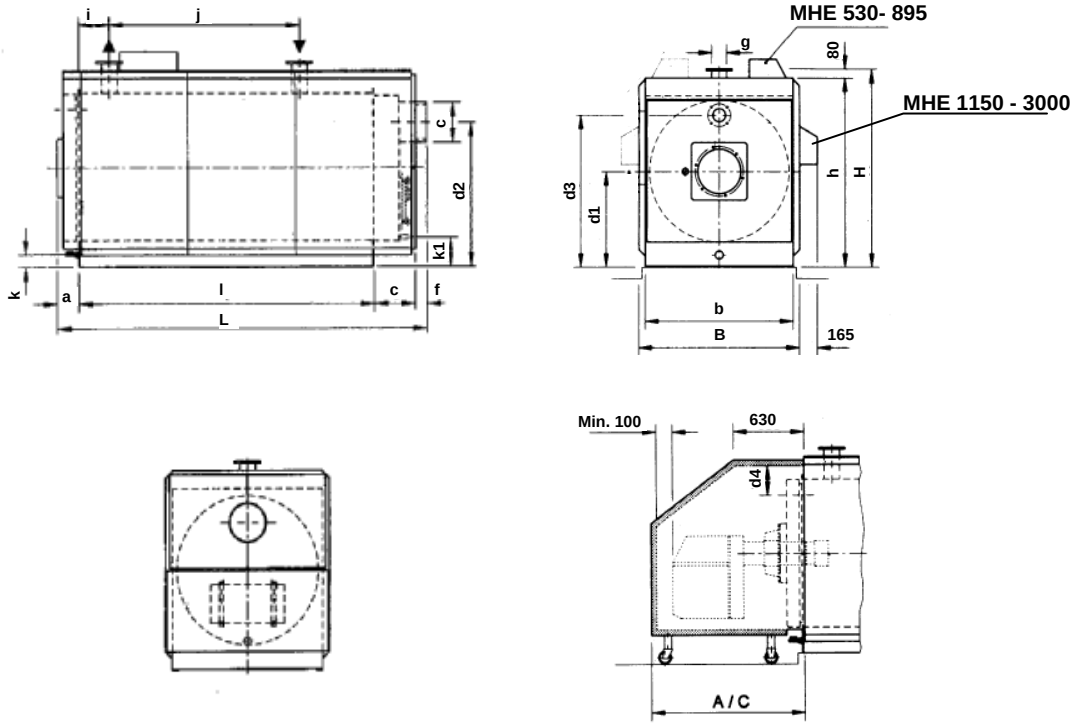


Figure 3.1 - Connections Melbury HE 530 - 3000

MELBURY HE			530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
Boiler feet length	l	mm	1580	1695	1695	1880	1880	1975	2314	2314	2674	2854	3096	3356
Boiler feet insert width *	b	mm	1000	1060	1060	1130	1130	1210	1300	1300	1375	1445	1570	1645
Boiler height	h	mm	1 290	1 370	1 370	1 455	1 455	1 545	1650	1650	1725	1790	1910	2000
Door thickness	a	mm	145	145	145	145	145	145	145	145	200	200	200	200
Flue gas collector	c	mm	300	300	300	335	335	345	400	400	400	430	470	495
Burner flange centre	d_1	mm	640	690	690	740	740	790	840	840	875	905	965	1015
Height flue	d_2	mm	950	1000	1000	1055	1055	1115	1200	1200	1275	1315	1410	1470
EGR (ARF) flange centre	d_3	mm	1015	1087	1087	1 150	1 150	1233	1320	1320	1385	1465	1585	1630
Distance EGR (ARF) flange centre - sound-proof hood	d_4	mm	215	223	223	245	245	252	270	270	280	265	265	310
Flue outside diameter	e	mm	200	250	250	250	250	300	350	350	350	400	450	500
Flue lenght	f	mm	100	100	100	100	100	100	80	80	80	80	80	80
ø supply - return PN6	g	DN	100	100	100	100	100	100	125	125	125	150	150	200
Distance front - supply	i	mm	150	150	150	200	200	200	238	238	274	292	318	344
Distance supply - return	j	mm	950	950	950	1150	1150	1150	1493	1493	1727	1844	2000	2168
Discharge height	k	mm DN	80 1 ¼“	100 1 ¼“	100 1 ¼“	115 1 ¼“	115 1 ¼“	125 1 ¼“	110 1 ¼“	110 1 ¼“	107 1 ¼“	103 1 ¼“	100 1 ¼“	110 1 ¼“
Height flue collector discharge	k_1	mm DN	206.5 3/4“	256.5 3/4“	256.5 3/4“	256.5 3/4“	256.5 3/4“	271.5 3/4“	251 1¼“	251 1¼“	246 1¼“	241 1¼“	241 1¼“	253.5 1¼“
Overall length	L	mm	2125	2240	2240	2460	2460	2565	2939	2939	3354	3564	3846	4131
Boiler width	B	mm	1120	1180	1180	1250	1250	1330	1420	1420	1495	1565	1690	1765
Height supply - return flange	H	mm	1370	1450	1450	1535	1535	1625	1730	1730	1805	1870	1990	2080
Short sound-proof. hood	A	mm	1080	1180	1180	1180	1180	1280	1380	1380	1380	1430	1430	1430
Long sound-proof. hood	C	mm	1330	1530	1530	1530	1530	1730	1630	1630	1630	1780	1880	1880
Weight empty	G	kg	**1130**	**1490**	**1490**	**1810**	**1810**	**2000**	**2460**	**2460**	**2948**	**3393**	**4248**	**4822**
Boiler water content	V	L	530	650	650	790	790	960	1360	1360	1760	2060	2610	3070
Boiler gas content	VG	L	590	690	690	910	910	1100	1460	1460	1880	2280	3030	3720
Furnace diameter	DF	mm	516	549	549	614	614	640	675	675	712	750	811	870
Furnace length	LF	mm	1517	1623	1623	1794	1794	1889	2225	2225	2559	2745	2985	3265
Furnace volume	VF	m^3	0.32	0.38	0.38	0.53	0.53	0.61	0.80	0.80	1.02	1.21	1.54	1.90

* without insulation material

8.1.08/TN

Figure 3.2 - Boiler Dimensions Melbury HE 530 - 3000

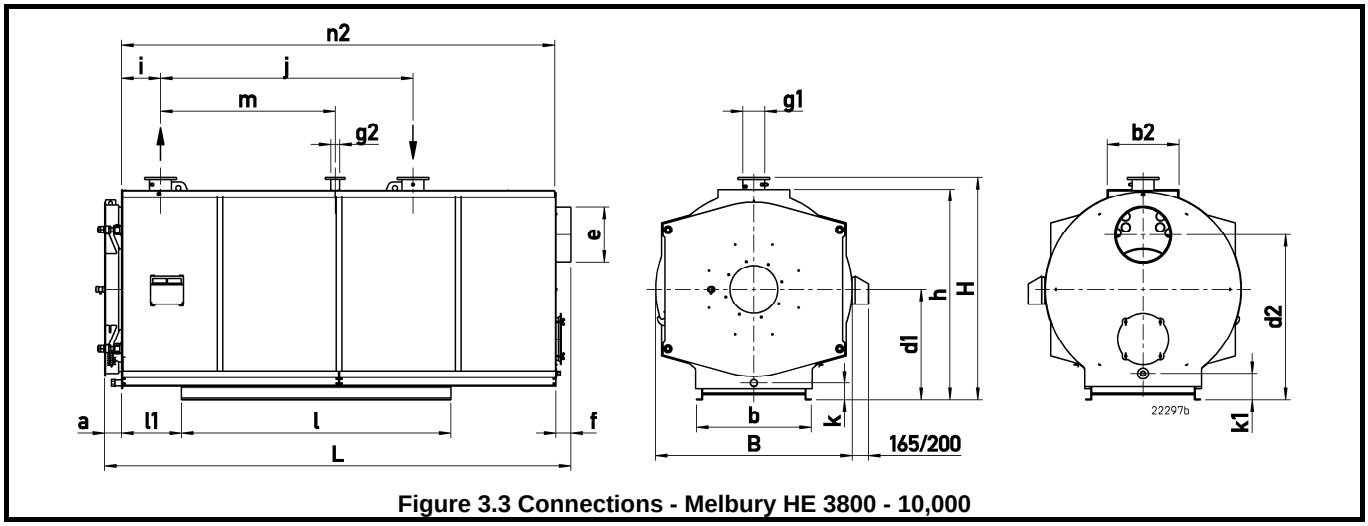


Figure 3.3 Connections - Melbury HE 3800 - 10,000

Figure 3.3 - Connections Melbury HE 3800 - 10,000

Melbury HE	Dim.	unit	3800	4500	5400	6300	7400	8600	10,000
Boiler feet length	l	mm	2700	2850	3200	4110	4510	4912	5412
Boiler feet width	b	mm	1150	1290	1350	1520	1610	1670	1730
Boiler height	h	mm	2105	2320	2435	2740	2895	3005	3100
Door thickness	a	mm	170	170	170	212	212	212	212
Burner flange centre	D1	mm	1110	1225	1285	1450	1530	1590	1640
Height flue	d2	mm	1660	1850	1940	2120	2280	2390	2460
Flue outside diameter	e	mm	550	600	650	700	750	850	900
Flue length	f	mm	150	150	150	150	150	150	150
Diameter supply - return PN6	g1	DN	200	200	200	250	250	300	300
Distance front supply	l	mm	390	410	450	495	540	590	645
Distance supply - return	J	mm	2530	2677	2920	3160	3430	3740	4120
Dia. of safety valve connection PN16	g2	DN	80	80	100	100	100	125	125
Distance supply - safety valve	m	mm	1751	1855	2024	2190	2370	2590	2850
Discharge position	k1	mm DN	167 2”	182 2”	187 2”	135 65	140 65	150 65	127 80
Height of flue collector discharge	K1	mm DN	264 1 1/4”	279 1 1/4”	284 1 1/4”	335 2”	340 2”	350 2”	360 2”
Distance front feet	l1	mm	600	640	650				
Catwalk width	b2	mm	700	700	700	750	800	850	850
Catwalk length	n2	mm	4340	4577	4977	5395	5845	6387	6987
Overall length	L	mm	4670	4910	5310	5771	6221	6763	7364
Boiler width	B	mm	1970	2170	2280	2560	2710	2810	2900
Height supply - return flange	H	mm	2235	2450	2565	2870	3025	3135	3230
Weight empty	G	Kg	7025	8425	10095	13545	16040	18620	21900
Boiler water content	V	Litres	3805	5385	6060	9300	11400	13300	51520
Boiler gas content	VG	Litres	5870	7380	9450	11640	14250	17240	20720
Furnace diameter	DF	mm	1020	1110	1220	1270	1350	1430	1500
Furnace length	LF	mm	3765	3980	4360	4690	5090	5550	6120
Furnace volume	VF	m^3	2.96	3.72	4.95	5.78	7.12	8.73	10.58

Figure 3.4 - Dimensions Melbury HE 3800 - 10,000

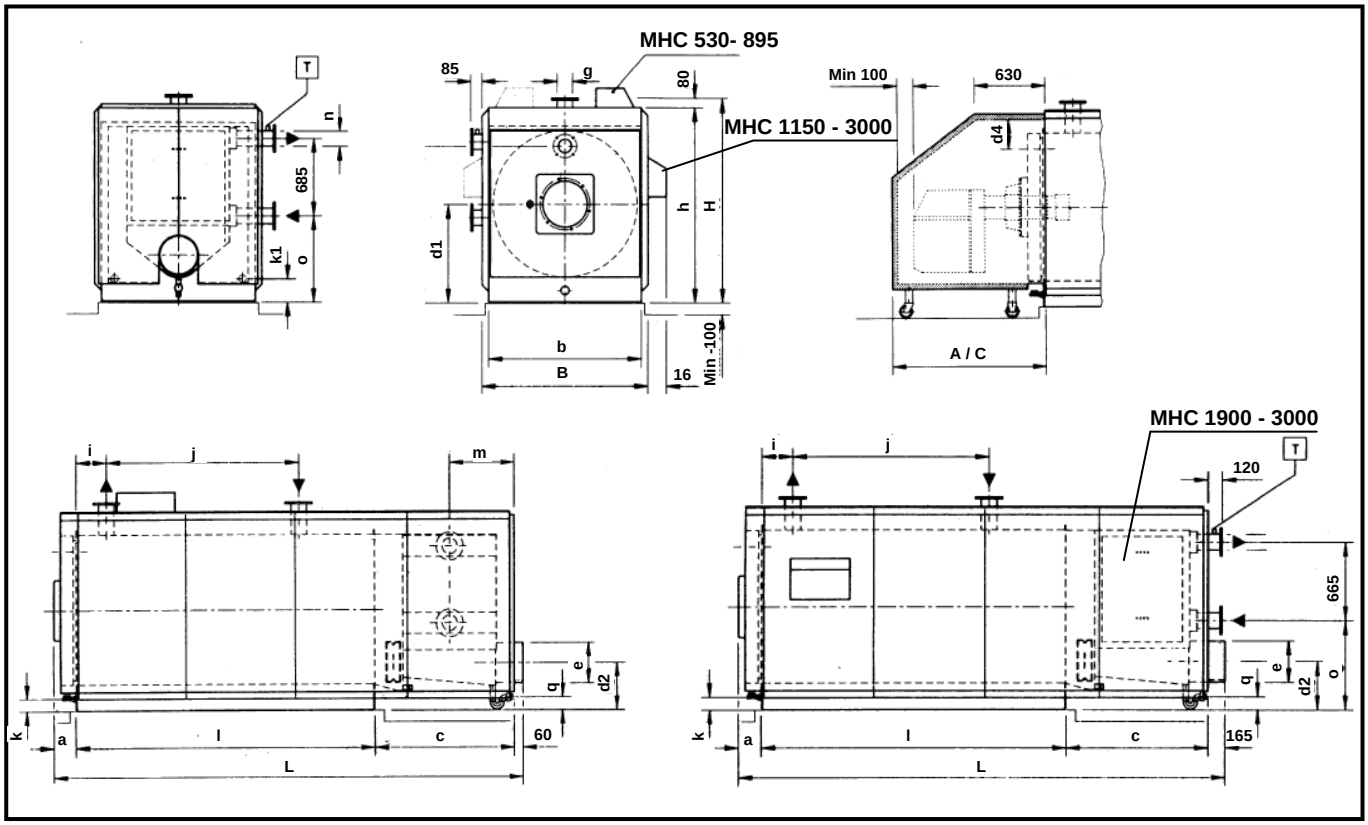
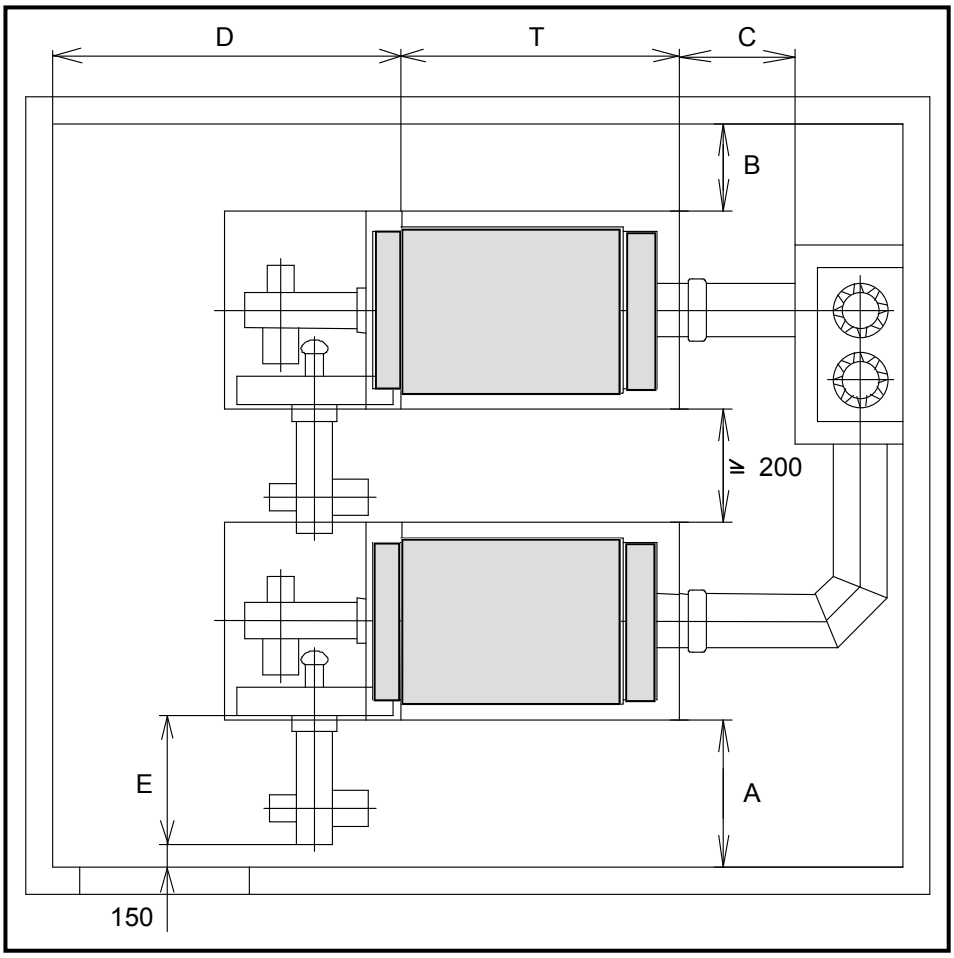


Figure 3.5 - Connections Melbury C 530 - 3000

Melbury C	Dim.	unit	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
Boiler feet length	l	mm	1580	1695	1695	1880	1880	1975	2314	2314	2674	2854	3096	3356
Boiler feet insert width	b	mm	1000	1060	1060	1130	1130	1210	1300	1300	1375	1445	1570	1645
Boiler height	h	mm	1290	1370	1370	1455	1455	1545	1650	1650	1725	1790	1910	2000
Door thickness	a	mm	145	145	145	145	145	145	145	145	200	200	200	200
Secondary heat exchanger	c	mm	800	800	800	875	875	950	1105	1105	1260	1360	1360	1360
Burner flange centre	d1	mm	640	690	690	740	740	790	840	840	875	905	965	1015
Height flue	d2	mm	240	270	270	305	305	355	400	400	448	400	435	490
Flue outside diameter	e	mm	200	250	250	250	250	300	350	350	350	400	450	500
Flue length	f	mm	60	60	60	60	60	60	60	60	60	165	165	165
Diameter supply - return PN6	g	DN	100	100	100	100	100	100	100	125	125	150	150	200
Distance front supply	i	mm	150	150	150	200	200	200	238	238	274	292	318	344
Distance supply - return	J	mm	950	950	950	1150	1150	1150	1493	1493	1727	1844	2000	2168
Discharge height	k	mm DN	80 1 1/4"	100 1 1/4"	100 1 1/4"	115 1 1/4"	115 1 1/4"	125 1 1/4"	110 1 1/4"	110 1 1/4"	107 1 1/4"	103 1 1/4"	100 1 1/4"	110 1 1/4"
Distance over secondary ht ex	m	mm	285	285	285	305	305	335	385	385	455	see figure 3.5		
Diameter flow/return secondary ht ex	n	DN DN	65 1 1/2"	80 1 1/2"	80 1 1/2"	80 1 1/2"	80 2"	100 2"	100 2"	100 2"	125 2 1/2"	125 -	150 -	150 -
Height to secondary ht ex return flange centre	o	mm	405	475	475	560	560	650	720	720	795	780	860	940
Height of condensate outlet	q	mm DN	130 11/2"	85 11/2"	85 11/2"	125 11/2"	125 11/2"	165 11/2"	185 11/2"	185 11/2"	235 11/2"	160 11/2"	170 11/2"	200 11/2"
Height of flue collector discharge	k1	mm DN	168 1"	183 1"	183 1"	207 1"	207 1"	203 1"	205 11/4"	205 11/4"	208 11/4"	168 11/4"	166 11/4"	189 11/4"
Overall length	L	mm	2585	2700	2700	2960	2960	3130	3624	3624	4194	4579	4821	5081
Boiler width	B	mm	1120	1180	1180	1250	1250	1330	1420	1420	1495	1565	1690	1765
Height supply - return flange	H	mm	1370	1450	1450	1535	1535	1625	1730	1730	1805	1870	1990	2080
Weight empty	G	Kg	1486	1833	1833	2204	2204	2440	2889	2889	3510	4144	5086	5831
Boiler water content	V	Litres	565	690	690	840	840	1020	1430	1430	1855	2170	2755	3240
Boiler gas content	VG	m^3	0.94	1.18	1.18	1.51	1.51	1.88	2.46	2.46	3.18	3.98	5.23	6.32
Furnace diameter	DF	mm	516	549	549	614	614	640	675	675	712	750	811	870
Furnace length	LF	mm	1517	1623	1623	1794	1794	1889	2225	2225	2559	2745	2985	3265

Figure 3.6 - Dimensions Melbury C 530 - 3000

Figure 3.7 - Clearances



A It should be possible to open the furnace door, including burner, by 90° (door opening can be either to the left or to the right; right opening can be changed to left opening at the time of installing the boiler).
At least 200 mm of free space should be provided to the right and to the left of the boiler to install boiler casing.

B After installing the casing, the boiler can be moved closer to the wall, but at least 60 mm away from it.

C The boiler cleaning hole behind the boiler must be easily accessible and should be 600 mm away from the wall.

E = Burner length
A = E + d + 150 mm
When a sound proofing hood is used, dimension D must be checked against the dimensions of the hood

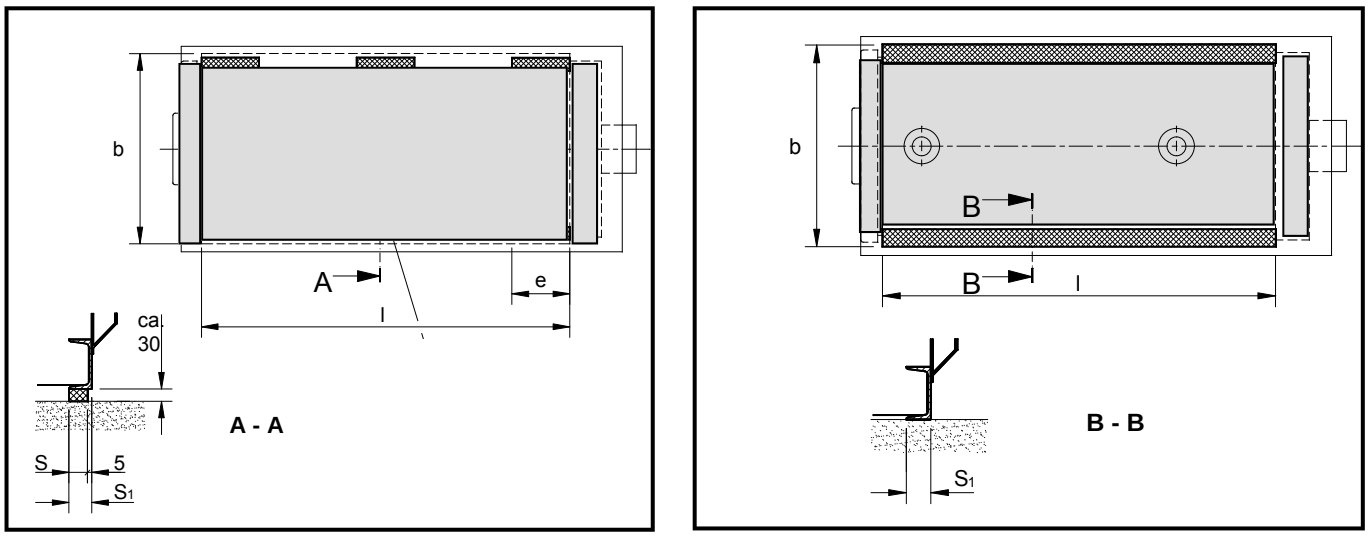


Figure 3.8 - with vibration dampers **without vibration dampers**

Note: -It is possible to mount the boiler on vibration dampers (available as option) to reduce noise transmission caused by vibrations. The dampers must be fitted prior to connecting the boiler to the system pipe work. To fit the dampers, some form of lifting device is required to locate the damper pads under the steel frame. Once the boiler is filled with water, it will sink 3– 5mm into the damper pads.

Melbury HE	**Model**	**530**	**580**	**630**	**700**	**800**	**895**	**1150**	**1300**	**1650**	**1900**	**2500**	**3000**
Front of boiler to wall	**D** mm	1600	1700	1700	1900	1900	2000	2300	2300	2700	2800	3100	3300
Boiler block length	**T** mm	1880	1995	1995	2215	2215	2320	2714	2714	3074	3284	3566	3851
Rear of boiler to wall	**U** mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1150
Side of boiler to wall	**V** mm	600	600	600	600	600	600	600	600	600	1000	1000	1000
Boiler feet length	**l** mm	1580	1695	1695	1880	1880	1975	2314	2314	2674	2854	3096	3356
Boiler feet width	**b** mm	1000	1060	1060	1130	1130	1210	1300	1300	1375	1445	1570	1645
Vibration damper length	**e** mm	130	130	130	130	130	130	130	274	274	274	274	274
No. of damper pads		4	4	4	4	4	4	4	4	4	6	6	6
U channel width	**S1** mm	50	50	50	55	55	55	55	55	55	55	55	55

Melbury HE	**Model**	**3800**	**4500**	**5400**	**6300**	**7400**	**8600**	**10,000**
Front of boiler to wall	**D** mm	3800	4000	4400	4800	5200	5700	6200
Boiler block length	**T** mm	4350	4590	4990	5409	5859	6401	7002
Rear of boiler to wall	**U** mm	1150	1150	1150	1150	1150	1150	1150
Side of boiler to wall	**V** mm	1000	1000	1000	1000	1000	1000	1000
Boiler feet length	**l** mm	2700	2850	3200	4110	4510	4912	5412
Boiler feet width	**b** mm	1150	1290	1350	1520	1610	1670	1730
Vibration damper length	**e** mm	706	706	634	634	634	670	670
No. of damper pads		6	8	10	12	14	14	16
U channel width	**S1** mm	60	60	65	55	55	55	55

Melbury C	**Model**	**530**	**580**	**630**	**700**	**800**	**895**	**1150**	**1300**	**1650**	**1900**	**2500**	**3000**
Front of boiler to wall	**D** mm	1600	1700	1700	1900	1900	2000	2300	2300	2700	2800	3100	3300
Boiler block length	**T** mm	2380	2495	2495	2755	2755	2925	3419	3419	3934	4214	4456	4716
Rear of boiler to wall	**U** mm	1000	1000	1000	1000	1000	1000	1000	1000	1000	1150	1150	1150
Side of boiler to wall	**V** mm	600	600	600	600	600	600	600	600	600	1000	1000	1000
Boiler feet length	**l** mm	1580	1695	1695	1880	1880	1975	2314	2314	2674	2854	3096	3356
Boiler feet width	**b** mm	1000	1060	1060	1130	1130	1210	1300	1300	1375	1445	1570	1645
Vibration damper length	**e** mm	274	346	346	346	346	418	562	562	562	562	562	706
No. of damper pads		4	4	4	4	4	4	4	4	4	6	6	6
U channel width	**S1** mm	50	50	50	55	55	55	55	55	55	55	55	55

Figure 3.9 - Clearance dimensions

4.0 SITE LOCATION AND PREPARATION

4.1 Site Location.

- **The floor or plinth for the boiler(s), must be both flat and level to ensure correct alignment of fittings and connections.**
- **The floor or plinth must be sufficiently strong to support the weight of the boiler(s) (when full of water) and pipework.**
- **The floor or plinth must be fireproof in accordance with BS 6644.**
- **The plantroom must have sufficient space for installation of boilers, pipework, pumps controls, flues, ventilation, access and servicing and other items of plant.**
- **Sufficient space must be provided around the boiler to allow the removal of the burner assembly and opening of the burner door for servicing/replacement, and at the rear for installation of pipes, valves and flue.**

4.2 Fuel Supply.

- **Gas supply pipes must be in accordance with BS 6891 or IGE/UP/2**
- **Gas supply connections to the boiler must not be smaller than the connection on the burner**
- **Gas installation must be soundness tested to BS 6891 or IGE/UP/1 & IGE/UP/1A.**
- **Gas installation must be purged to BS 6891 or IGE/UP/1 & IGE/UP/1A.**
- **Inlet gas pressure to boiler measured at the gas valve, nominal 20mbar (minimum 17.5mbar) dynamic - refer to Appendix A**
- **Where it is necessary to employ a gas pressure booster, the controls must include a low pressure cut-off switch at the booster inlet. It may be necessary to install a governor between the booster and gas train should the inlet pressure to the gas train exceed 50mbar - consult HHL for advice. The local gas region must be consulted before a gas pressure booster is fitted.**
- **Boiler house gas isolation valve must be clearly identified and installed close to the entrance / exit.**
- **The oil storage and supply system should be designed and installed in accordance with BS.5410 Part 2, as appropriate.**
- **Oil Supply Lines - The oil supply line(s) between storage tank and burner should be run in copper, steel or aluminium pipe. Galvanised pipes and fittings should not be used.**
- **The supply line should terminate adjacent to the burner with an isolating valve and metal bowl filter (with replaceable filter element). All burners are supplied with flexible oil pipes to make the final connection between the oil supply pipe and the burner.**
- **Liquid Bio Fuel quality MUST be in accordance with EN 1423 - consult Hamworthy Heating Ltd prior to installation and operation and seek assurances from the fuel supplier.**

4.3 Flueing

- **Flue termination, routing and construction must comply with the requirements of the Clean Air Act 1956, BS 6644, BS 5440 and IGE/UP/10 where applicable.**
- **Melbury boilers are suitable for open flue (type B_{23}) installation, drawing combustion air from the plant room - see section 5.2**
- **Melbury C models are capable of operating with extremely low flue gas temperatures (<60°C) due to the secondary heat exchanger and low return temperatures. Accordingly, flue system design and materials must be used which are suitable for condensing boilers and incorporating condense drainage from the flue system. The secondary heat exchanger is supplied with an integral siphon for discharging the condensate to a suitable drain.**
- **Condensing flue system design must not allow condense drainage from the flue system through the boiler. Horizontal flue runs must be kept to a minimum and designed with a minimum 2° slope towards a suitable drain point.**
- **Due to the low flue gas temperature of HE models, (~180/200°C), upon start-up, condensation will occur in the flue, flue materials must be non-corrosive and utilise fully sealing joints.**
- **it is recommended that the flue system shall be adapted to its design diameter as soon as possible, after leaving the boiler.**
- **Flue systems must be self supporting, contain access for cleaning and contain a maintenance joint near the boiler outlet to allow for removal of the flue box during servicing.**
- **Melbury boilers are suitable for installation in a balanced compartment in accordance with the requirements of BS 6644. Consult Hamworthy Heating Technical Department for help or assistance if in doubt.**
- **Existing chimneys should be thoroughly swept before use and any register plates, dampers, or restrictions removed.**
- **Chimneys should be lined with a non-porous acid-resistant material in accordance with BS.5854, e.g. a flexible flue liner or similar British Gas Approved material. The internal diameter of the liner must not be less than the recommended flue size and the number of joints should be kept to a minimum.**
- **It is recommended that a draught stabiliser is fitted to the flue system where the suction is likely to exceed 0.3mbar. The flue system should be designed to maintain atmospheric pressure or a slight suction at the boiler flue connection at all times (0.1 - 0.3mbar).**
- **Combustible materials in the vicinity of the boiler and flue shall not exceed 65 °C during boiler operation. The flue shall not be closer than 50mm to any combustible material, except where it passes through such material with a non-combustible sleeve when the air gap may not be less than 25mm.**
- **When designing the flue system, care must be taken to ensure that any condensate which may form within the system, can be safely drained to a suitable waste point and, that the flue material used is resistant to the corrosive effects of that condensate.**

4.4 Water Supply

- **The Melbury boiler is suitable for operating on open vented or sealed (pressurised) heating systems.**
- **Pressurised system to comply with BS 7074.**
- **Feed Water Quality - The condition of the feed water quality must be controlled:**

  Hardness ..... - <100mg $CaCO_3$/l.
  pH ..... 8.3 - 9.5
  Phosphates (PO4) .....- <30 mg/l
  Chlorides (Cl) .....- <50 mg/l
  Oxygen (O2) ..... - <0.1 mg/l

- **It is strongly recommended that the system pipework is flushed at least twice before adding water treatment and before installing the boiler.**
- **In hard water areas (>100mg $CaCO_3$/litre) precautions such as water treatment are strongly recommended to prevent the build up of sludge and scale.**
- **Leaks in the system pipework must be repaired to prevent dilution of water treatment.**
- **A coarse filter and dirt separator in the return to the boiler(s) MUST be fitted.**
- **Maximum working water pressure is 6bar. Minimum water pressure - see figure 4.4**
- **If operational return temperatures are below the limits detailed below, the boiler should be provided with an automatic return temperature control regulation (back end protection).**
  Melbury HE boilers and the primary heat exchanger element of Melbury C boilers are suitable for minimum return temperatures down to 50°C for oil firing and 60°C for gas firing.
  Melbury C boilers have no minimum return temperature limitations to the second heat exchanger. However the Melbury C boiler requires specific attention to the system design so as to achieve the increased efficiency performance and to maintain the minimum flow requirements through the secondary heat exchanger. The differential flow switch provided must be fitted across the circulating pump- refer to Appendix E for specific information.
- **Care must be taken to ensure that oxygen does not enter the system via the open feed tank, or system materials which allow the transmission of oxygen into the system.**
  If this cannot be prevented, additional measures are necessary in the form of correctly used oxygen binding agents or chemicals.
  If it is not possible, consideration must be given for separation of the boiler from the system using for example plate heat exchangers.

Melbury HE & C	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
bar g	0.55	0.55	0.65	0.50	0.70	0.75	0.85	1.10	1.25	1.30	1.60	1.70

Melbury HE	3800	4500	5400	6300	7400	8600	10,000
bar g	1.8			2.2			

Figure 4.4 - Minimum operating pressures

4.4 General Requirements

- **<u>Related Documents</u> - Gas Safety (Installation and Use) Regulations 1994 – (As amended). It is the law that all gas appliances are installed by competent persons, in accordance with the above regulations. Failure to do so, could lead to prosecution. It is in your own interest, and that of safety, to comply with the law.**
  The installation of the boiler MUST be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the bylaws of the local water undertaking.
  The installation should also be in accordance with any relevant requirements of the local gas region and local authority and the relevant recommendations of the following documents :-
- **BS5410 - Code of practice for oil firing. Part 2: Installations of 44 kW and above capacity for space heating, hot water and steam supply purposes.**
- **BS.6644 - Specification for installation of gas fired hot water boilers of rated inputs 60kW - 2MW.**
- **BS 6700 Design, installation, testing and maintenance of services supplying water for domestic use.**
- **BS 6891 Installation of low pressure gas pipe work of up to 35mm (R 1 ¼) in domestic premises.**
- **BS 6880 Part 1, 2 & 3 Code of practice for low temperature hot water heating systems of output greater than 45kW.**
- **BS 7074 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems. Part 2 Code of practice for low and medium temperature hot water systems.**
- **BS 7671 Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition.**
- **BSEN 806-2 Specification for installations inside buildings conveying water for human consumption. Design.**
- **BSEN 12828 Heating systems in buildings, Design for water-based heating systems.**
- **<u>I. Gas E. Publications</u>**
  IGE/UP/1 Soundness testing and purging of industrial and commercial gas installations.
  IGE/UP/1A Soundness testing and direct purging of small low pressure industrial and commercial natural gas installations.
  IGE/UP/2 Gas installation pipe work, boosters and compressors in industrial and commercial premises.
  IGE/UP/10 Installation of gas appliances in industrial and commercial premises, Part 1 flued appliances.
- **<u>Health and Safety Executive</u>**
  Guidance note PM5 - Automatically controlled steam and hot water boilers.
- **<u>CIBSE Publications</u>**
  CIBSE Guide B Heating, ventilating, air conditioning and refrigeration.
  CIBSE Guide H Building Control Systems
  CIBSE Guide Energy Efficiency in Buildings
  CIBSE Commissioning Code B: 2002

- **Dept Environment, Scottish Development Dept & Welsh Office**
  Third edition of the 1956 Clean Air Act Memorandum

4.6 Electrical Supply

WARNING! THIS APPLIANCE MUST BE EARTHED IN ACCORDANCE WITH IEE REGULATIONS

- **Boiler electrical supplies must not be switched by a time clock.**
- **Boilers are suitable for 230Volt, 50Hz supply. Burners are suitable for either 415Volt, 50Hz– 3 phase or 230Volt, 50Hz single phase supplies**
- **External fuses should be rated for 6.3 amps**
- **Wiring must be completed in heat resistant cable size 1.0mm^2 csa.**
- **Each boiler MUST have individual means of isolation.**
- **Electrical isolators must facilitate complete electrical isolation.**
- **Electrical isolators must have contact separation of minimum 3mm in all poles.**
- **Electrical isolators must be installed in readily accessible locations.**
- **Electrical supplies to boiler modules should only serve the boiler.**
- **Wiring of ancillary circuits must be connected to the control panel via the knock-outs in the rear of the panel, using suitable cable glands.**
- **Any pump controlled by the boiler must be installed using an adequate contactor.**
- **Where twin head pumps are installed a changeover control (not HHL supplied) external to the boiler is required.**
- **Where an external alarm is required, the control panel has 5 volt free contacts for remote signalling.**
- **Time clock control should be via the remote enable circuit (volt free).**
- **Any interlock circuit must be in series with the time control for each circuit. The interlock circuit must never be used to isolate the boiler electrical supply.**

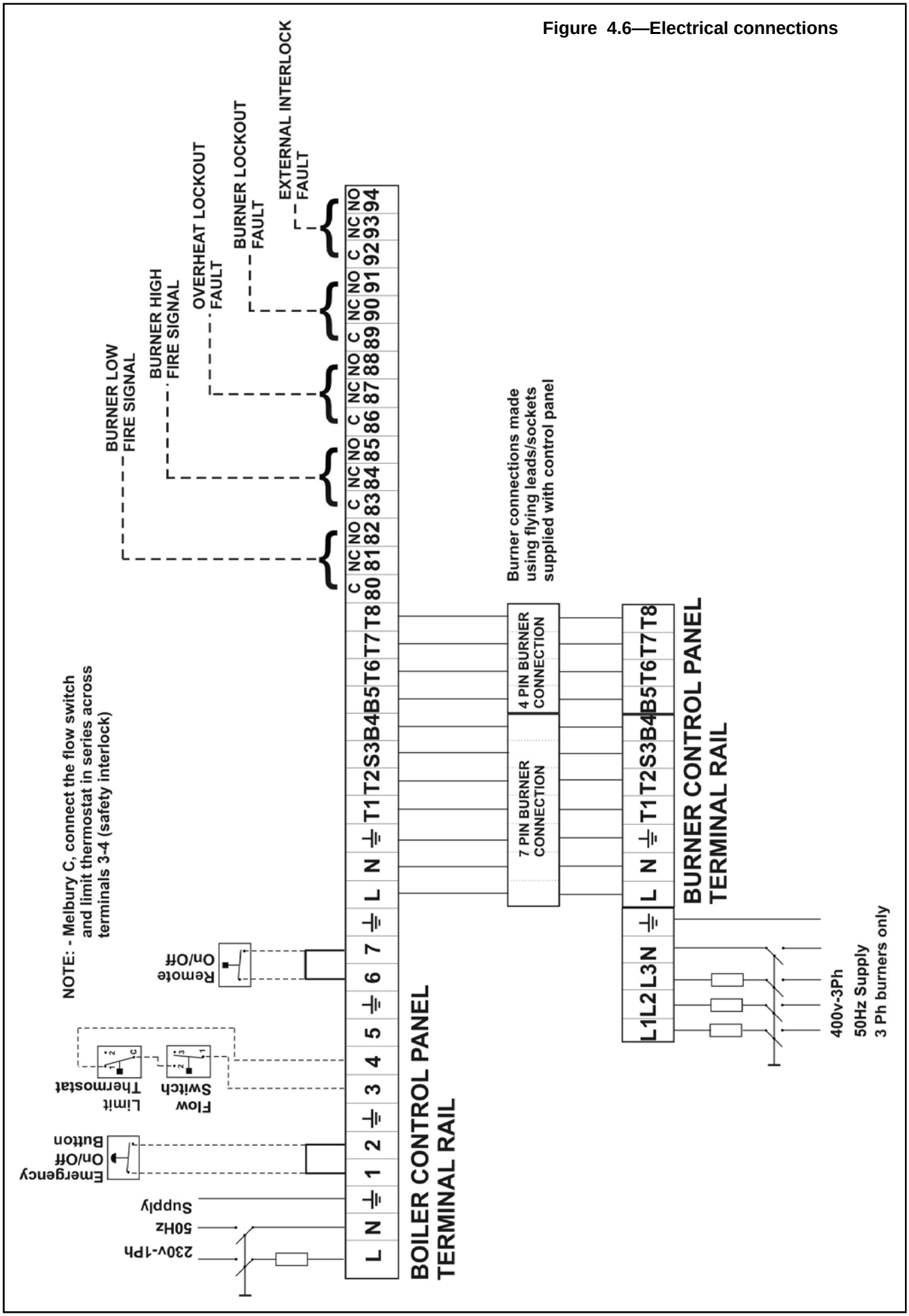
ADDITIONAL INFORMATION REGARDING ELECTRICAL SUPPLIES IS GIVEN IN BS EN60335, Part 1.

NOTE: The appliance must be isolated from the electrical supply if electric arc welding is carried out on connecting pipework.

FOR TYPICAL ELECTRICAL CONNECTIONS - SEE FIGURE 4.6

FOR DETAILED WIRING SCHEMATIC - SEE FIGURE 5.7

Figure 4.6—Electrical connections



5.0 BOILER ASSEMBLY

Important; - fit the casing to the boiler body, **before** connecting the flue system and **after** connecting to the heating system and carrying out a water soundness test

Site equipment and accessories MUST NOT be secured to the casing panels.

Ancillary equipment wiring MUST be connected to the control panel using suitable cable glands at the rear of the panel.

It is strongly recommended to support the burner when fitted to the door, so as to avoid undue strain on the door created by the weight of the burner.

5.1 Assembly

Referring to the separate assembly instructions covering the fitting of the casing to the boiler body.

a) Carefully remove the knock-out on the selected panel using a suitable tool, to provide a route for the burner cables and capillaries to pass through the lid - see arrow figure 5.1..

b) Secure the boiler control panel (**D)** either on the lid or the selected side panel using the self tapping

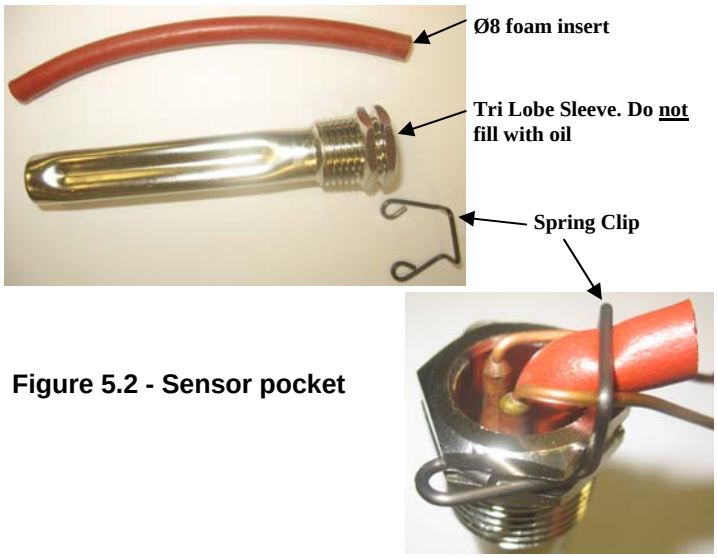


Figure 5.2 - Sensor pocket

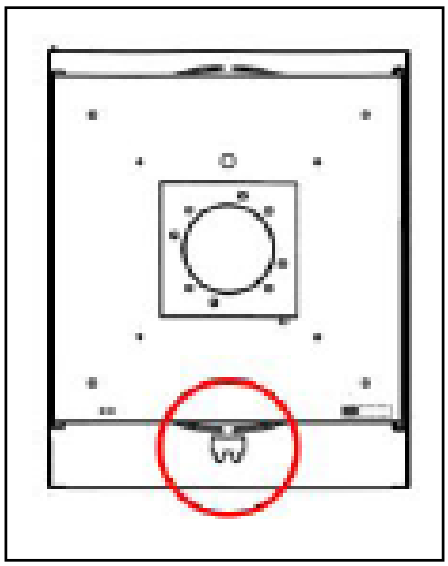


Figure 5.3—opening for burner cables

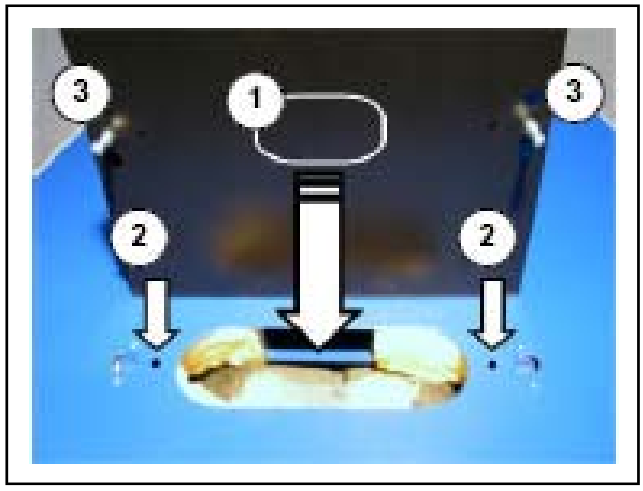


Figure 5.1 - Cable route

screws provided and carefully introduce the thermostat sensors through the opening and into the pockets - refer to figures 5.4, 5.5 & 5.6. Fit a foam insert into the empty pockets when 1 or 2 sensors are fitted and secure using the spring clip see figure 5.2. Ensure that the capillaries are not damaged during installation.

c) Route the burner cable(s) through the knock-out hole, running between the side panels and the boiler body insulation.

Important: Do not allow the burner cables to contact the boiler body.

Feed and secure the cable(s) through the lower front opening ready for connection to the burner wiring.

5.2 Turbulators

The function of the turbulators is to control the flue gas temperature through the boiler.

All smoke tubes in the third pass must be fitted with turbulators. These smoke tubes are those located on the outer diameter, which are open at the rear, discharging into the flue gas collector.

Read and follow the instructions on the boiler door labels and the markings on the tube plate.

Important: - the turbulators must be introduced and fed through the tube up to the stop created by the bent tail. Failure to do so may result in damage to the door insulation.

5.3 Mounting the Burner

Before attempting to mount the burner, firstly ensure that the hole in the mounting plate is a clearance size for the burner blast tube diameter, and that the mounting stud pattern is correct for the burner flange. The hole in the mounting plate acts as a template for the boiler door insulation.

It is advisable to establish which direction the hinge will operate before fitting the burner. Adjust the hinge locknuts and handles to provide the necessary opening and check that the door seals correctly on the combustion chamber front before fitting the burner.

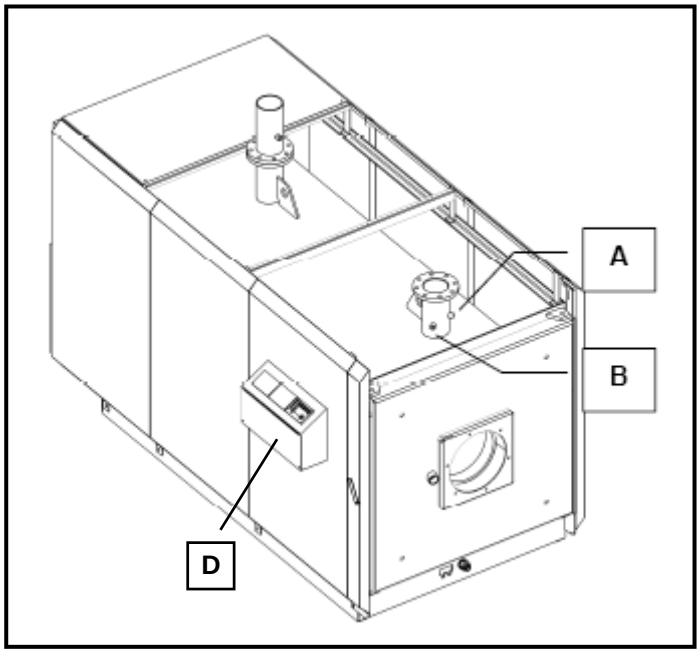


Figure 5.4 - Sensor location
Melbury HE 530 - 3000

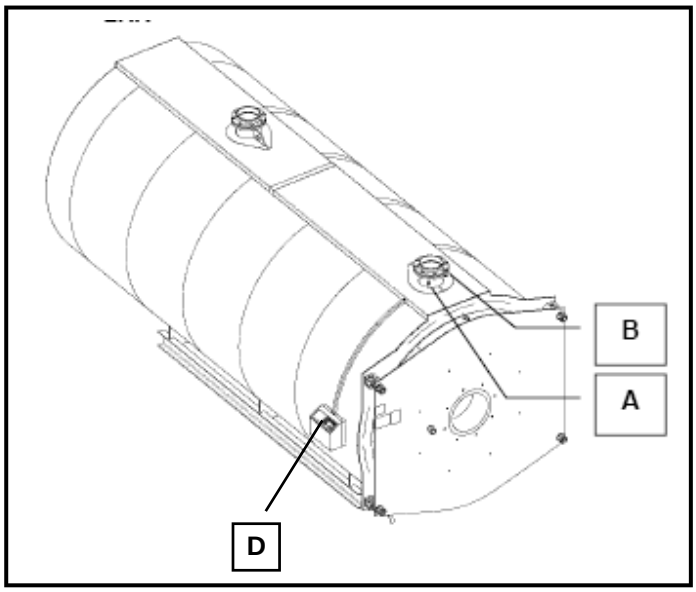
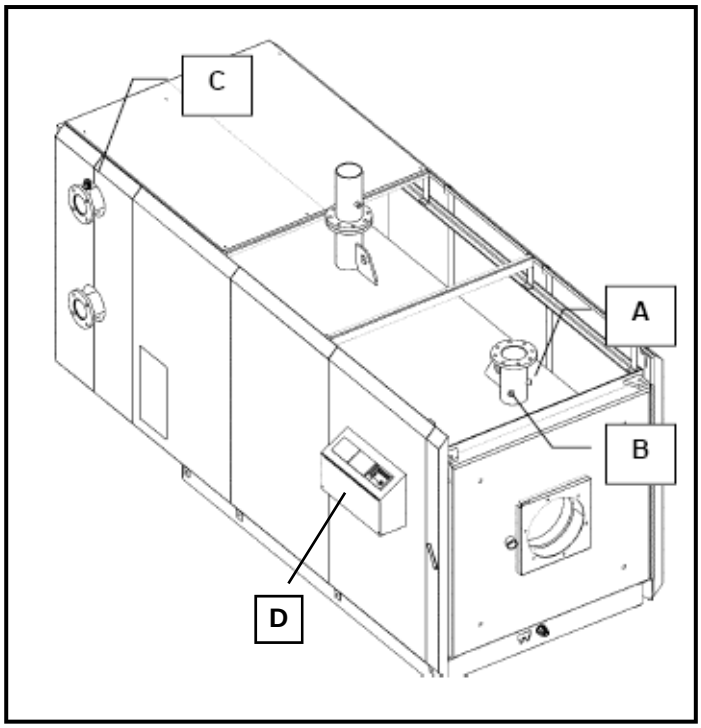


Figure 5.5 - Sensor location
Melbury HE 3800 - 10,000



A - Limit Thermostat

B - Control Thermostat

C - Limit thermostat secondary heat exchanger

D - ControlPanel

Figure 5.6 - Sensor location
Melbury C 530 - 3000

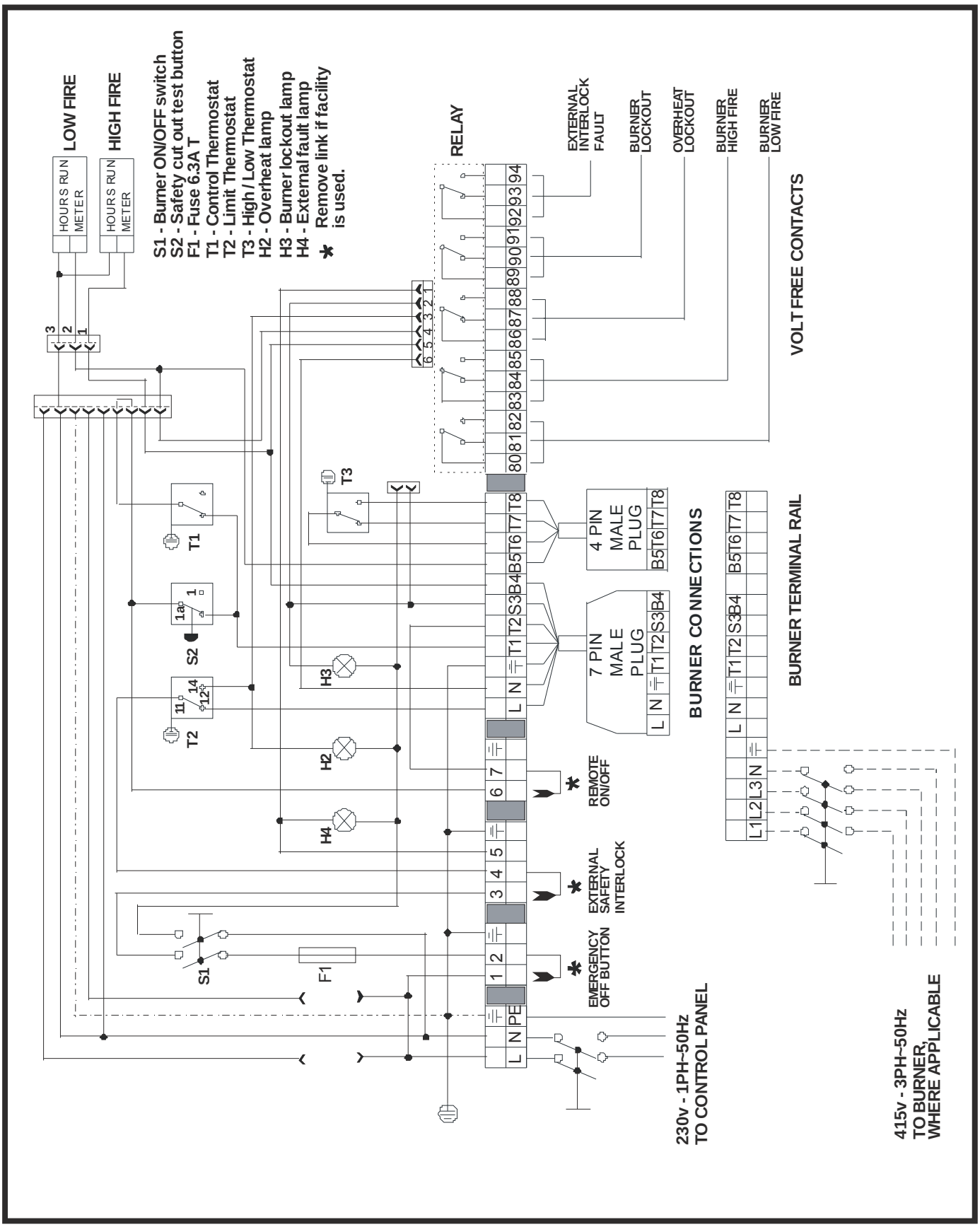


Figure 5.7– Boiler Control Panel Wiring Diagram – Hi/Lo and Modulating Burner Control

IMPORTANT Note: -for modulating burners, it is necessary to disconnect, remove and discard the 4 pin plug connecting the burner to the control panel

Melbury HE & C	Model	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
Number of turbulators		24	30	30	33	33	31	36	36	41	48	43	48
Outer diameter	mm	36											
Wire diameter	mm	6											
Pitch	mm	55											
Length	mm	800					1600	1200				2200	3000

Melbury HE	Model	3800	4500	5400	6300	7400	8600	10,000
Number of turbulators		54	63	72	80	84	91	99
Outer diameter	mm	72						
Wire diameter	mm	10						
Pitch	mm	80						
Length	mm	3100						

Figure 5.8 - Turbulators

5.3.1 Important - All Melbury models are supplied as standard with the burner door hinged on the rhs.
The hinge arrangement can be changed to the opposite side as follows;

1. Remove the (thin) locknuts on both the hinge assemblies (rhs) and loosen the door securing nut by 2-3mm.
2. On the latch side of the door (lhs) tighten the inner conical nut on both latches by 2-3mm towards the hinge. Tighten the door securing nuts to lock the door against the conical nuts.
3. Remove the door securing nuts from the rhs and open the door on the lhs hinge. Check for smooth operation, alignment and easy closure. When satisfactory, refit the (thin) locknuts to the lhs hinge and tighten.
4. Recheck the operation and sealing of the door and when satisfactory, refit the door securing nuts to the rhs.

5.3.1 Fit the burner gasket over the studs and carefully mount the burner **taking care not to damage the door insulation with the burner blast tube.** Secure with the washers and nuts provided and tighten to form an effective seal on the gasket.

Open the boiler door and check that the burner blast tube is sitting correctly through the insulation, it is clean internally and the insulation is undamaged. There should be a small gap between the blast tube and the insulation on the door, this gap **must** be sealed with the insulation provided in the accessory pack, prior to firing the burner, in order to prevent hot gases from travelling backwards behind the insulation of the boiler door.

5.4.1 Melbury C boilers - the separately supplied Limit Thermostat and differential pressure switch providing over temperature and water flow protection **MUST** be fitted into the hydraulic circuit as shown in Appendix E and connected to the electrical controls as shown in figure 4.6.

A suitably sized safety valve **MUST** be fitted to the flow connection of the secondary heat exchanger.
A suitably sized circulating pump must be fitted - refer to Appendix E for schematic and sizing.

b) Connect the system pipe wok - refer to Appendix E for installation schematics. Fit a suitable drain to the return connection and an appropriately sized safety valve to the flow connection using the tappings provided.—see figure 3.5.

Note: ensure that the discharge from the safety valve is taken to a safe place.

Fit the differential pressure switch across the circulating pump. For setting of the switch to ensure that minimum flow rates are achieved refer to Appendix E.

The design of the logic is so that should a failure to detect flow occur, the burner will be held off.

c) Fit a suitable 32mm condense drainage system to the secondary heat exchanger and the flue system ensuring that the discharge is taken to a suitable drain using appropriate materials. Should a siphon be used, access must be provided for inspection and cleaning.

d) A manually resettable thermostat limiting the temperature to 95°C is supplied. This thermostat must be connected across terminals 3 & 4 of the boiler control panel and in series with any other controls in that circuit - refer to figure 4.6.

6.0 PRE-COMMISSIONING

The following pre-commissioning check must be carried out before the boiler is commissioned.

6.1 Gas Supply - Ensure that gas installation pipework and meter has been soundness tested and purged to IGE/ UP/1 or IGE/UP/1A as appropriate. Test and purge certificates should be available for viewing.

6.2 Ventilation - Ensure that ventilation and air supply to plantroom is correct.

6.3 Pipework, Valves and Pump - Ensure that;

- Pipework and valve arrangement is installed to Hamworthy Heating recommendations.
- Circulating system is full of water, vented and pressurised appropriately.
- Circulation pump is fitted, working and interlocked where required.
- Pipework connections to boiler are fitted correctly.
- All necessary isolation valves are open.
- Heat load is available.
- Safety valves are correctly rated and located.

6.4 Flue - Ensure that;

- Flue system is correctly designed and installed to suit boilers.
- Flue passages to chimney are clear.

6.5 Electrical - Ensure that;

- Electrical connections are correct and isolatable.
- External controls are operational.

7.0 BOILER CHECKS PRIOR TO LIGHTING

7.1 BEFORE starting the boiler, check the following:

- Check that fuel supply is turned off.
- Check that electrical supply is isolated.
- Check that electrical installation conforms to the requirements of these Instructions, the IEE Wiring Regulations for electrical installations, and any other local Regulations which apply.
- Check boiler casings are undamaged Open boiler door to check that the flue tubulators are fitted.
- Check all thermostat bulbs are correctly inserted in the appropriate pockets.
- Check for water leaks and ensure that both boiler and heating system is full of water and properly vented.
- Check that all drain cocks are closed, and that all isolating valves in flow and return pipework are open.
- **For OIL**; check that tank/s have been filled and oil supply pipework has been primed.
- **For GAS**; Check that gas meter has been checked by the local gas supplier. If a gas booster has been installed, ensure that it has been commissioned in accordance with the manufacturer's instructions.

  Check that gas meter and supply pipework meets the input rating of the burner/boiler - Refer to Appendix A
- Check that burner output is correct for size of boiler in question, referring to Figure B.1, and the manufacturer's technical information supplied with the burner.
- **For GAS**; Check that gas meter is operational and has been checked by the local gas supplier.
- Check that gas meter and supply pipework is of sufficient size to meet the input rating of the burner/boiler. Refer to Appendix A.
- Check that burner output is correct for size of boiler in question, referring to Appendix A and figures 11.1 ..... 11.7, and the manufacturer's technical information supplied with the burner.

NOTE: - ALL FUELS. Refer to the commissioning procedure in the burner manufacturers literature, before firing the boiler.

Always adjust the fuel supply upwards from a low position to ensure that a fuel rich mixture is not achieved.

7.2 Commissioning Oil fired Boilers

- Check flexible oil lines are tightly jointed and are not twisted or kinked to form an obstruction.
- Check correct nozzles are fitted to burner (See Fig. B.4, B.5 & B.6) and that they are tight.

NOTE:- Some burners are despatched with test nozzle/s fitted. In these cases, the correct nozzle/s is despatched in a separate package with the boiler and **MUST** be fitted to the burner before attempting to fire the boiler.

- Check electrodes and ensure porcelain insulation is not cracked.
- Check electrodes are correctly positioned and gap is correctly set, as specified in the manufacturer's technical information supplied with the burner.
- Check blast tube is correctly located and securely fastened in place.
- Check burner seats correctly onto burner mounting plate and is securely fastened in place.
- Set the burner for the required fuel and air, as specified in the manufacturer's technical information.
- Fit a pressure gauge on burner oil pump to check pump pressure is correctly set.
- Check that temperature limiter manual reset button is pushed in, and that boiler control thermostat and control system are set to call for heat. Switch the boiler on and start the burner.
- The burner control will first operate the fan to pre-purge the boiler, then produce an ignition spark and finally open the oil solenoid valve and the flame should ignite.
- Purge air from oil pump through pressure gauge port.

IF BURNER LOCKS OUT WAIT 45 SECONDS BEFORE PRESSING RESET BUTTON ON BURNER CONTROL BOX.

- With burner firing, check the atomising pressure on gauge and adjust as necessary using the pressure regulator on burner oil pump. Refer to technical information supplied with burner.
- Allow the burner to reach stable firing conditions for approximately 15 min., before combustion gas check.

  Measure CO_2, CO, smoke number, flue gas temperature and circulating water temperature rise across the boiler. The readings obtained should be as indicated in Figure B.7, target appliance readings.

  Readings should be taken at both High and Low settings .
- Switch off boiler. Remove oil pressure gauge and replace sealing plug complete with gasket.
- Restart boiler and cycle it on and off several times to ensure reliable burner ignition and boiler operation. Check for oil, water and flue gas leakage. Tighten all access flue box and burner mounting bolts and nuts.
- Set boiler control thermostats to required setting, and check operation of heating control system.
- Instruct the user on operation of the boiler controls, the main component functions and the safety features.

THESE INSTALLATION AND SERVICING INSTRUCTIONS SHOULD BE LEFT WITH THE USERS OF THE BOILER FOR THEIR FUTURE REFERENCE.

7.3 Commissioning Gas fired Boilers

- Check that ignition electrode and rectification probe are correctly positioned. Refer to manufacturer's technical information supplied with the burner.
- Check that ignition electrode and rectification probe leads are connected.
- Check blast tube is correctly located, and securely fastened in place.
- Check burner seats correctly onto burner mounting plate and is securely fastened in place.
- With firing head separate from burner adjust air and gas settings, as specified in the manufacturer's technical information supplied with the burner.
- Determine minimum burner gas pressure which corresponds to required burner output (boiler input), as follows: - From the manufacturer's technical information (supplied with the burner) take burner pressure corresponding to required burner output.
  Add combustion resistance (in mbar), given in Appendix A for the boiler in question, to obtain gas pressure value to be measured at burner test point.
- Open main isolating valve and check for leaks throughout gas train and pipework to burner.

- Adjust gas supply governor to achieve at least 17.5 mbar (7.0 in.wg.) at inlet to boiler gas train. Ensure that maximum pressure of gas train governor is not exceeded. If a gas booster is to be fitted, commission in accordance with the manufacturer's instructions.
- Adjust start and main output gas rates as detailed in the manufacturer's technical information supplied with the gas burner.
- Check that temperature limiter manual reset button is pushed in, and that boiler control thermostat and control system are set to call for heat.
- Close main isolating valve in gas supply, switch the boiler on and start the burner. The burner control will first operate the fan to pre-purge the boiler, then produce an ignition spark and attempt to ignite the burner. The flame should fail to ignite and the burner should go to lockout.
- Open main isolating valve in gas supply. If gas train has separate pilot gas line, open pilot gas isolating valve and close main gas isolating valve. Restart boiler/burner. The burner control will pre-purge, produce an ignition spark and ignite pilot flame. The main flame should fail to light, and burner will continue running on ignition flame only. The pilot gas rate can be checked and adjusted as detailed in the manufacturer's technical information supplied with the gas burner.

IF BURNER FAILS TO LIGHT, BOILER MUST BE PRE-PURGED BEFORE ATTEMPTING TO RESTART BURNER. IF BURNER REPEATEDLY FAILS TO LIGHT, A FULL INVESTIGATION TO FIND CAUSE SHOULD BE MADE.

- Stop boiler/burner. Open main gas isolating valve and restart burner. The burner will pre-purge, ignite pilot flame and, after a short delay of several seconds, the main flame will light. Adjust the main gas rate as detailed in the manufacturer's technical information supplied with the gas burner.
- After allowing burner to reach stable firing conditions for approximately 15 minutes, carry out combustion gas check.

  Measure CO_2, CO, flue gas temperature, and circulating water temperature rise across the boiler. The readings obtained for the appropriate gas should be as indicated in Figure B.7, target appliance readings. Readings should be taken at both High and Low settings. A switch is provided on the burner to hold the burner on low fire.
- After all other adjustments have been made, set burner air pressure switch as instructed in manufacturer's technical information supplied with burner.
- Check gas pressure at burner head corresponds with value determined from burner manufacturer's technical information - as detailed in (f) above.
- Check gas flow rate at meter. Ensure that all other appliances served by the meter are isolated whilst flow rate is checked.
- Cycle boiler on and off several times to ensure reliable burner ignition and boiler operation. Check for gas, water and flue gas leakage. Tighten all access, flue box and burner mounting bolts and nuts.
- Set boiler control thermostats to required setting, and check operation of heating control system.
- Fully familiarise the user with the boiler operating controls, the main component functions and the safety features.

THESE INSTALLATION AND SERVICING INSTRUCTIONS SHOULD BE LEFT WITH THE USER OF THE BOILER FOR FUTURE REFERENCE.

7.4 External Controls

The external controls used in typical boiler installations, for both vented and unvented systems, are shown in Figure 3.3. If different systems or controls are to be used and there are any doubts as to the suitability, contact Hamworthy Heating Technical Department for advice.

7.5 Installation Noise

In order to avoid the possibility of noise from the installation, care should be taken to follow the manufacturer's instructions. If acoustic insulation is added to the boiler, care must be taken not to impede combustion or ventilation air flow. If in doubt contact the manufacturer.

7.6 User Instructions

When the above is complete, the boiler owner or their representative should be made aware of the lighting and operating instructions. A practical demonstration should be given describing each functional step. This Installer's Guide and burner Operating Instructions and booster instructions (where fitted) should then be handed over and kept in a safe place for easy reference.

8.0 CONTROLS AND OPERATION

8.1 Temperatures

An adjustable control thermostat is supplied with each boiler and should be set to operate within the range 35-90°C for standard applications.
For high / low applications a second control thermostat is supplied that should be set around 5°C lower than the main control thermostat. This will enable the burner to switch to a lower firing rate as the water temperature approaches the set point.

A temperature limiter, (hand reset limit thermostat) is also fitted to the boiler and must be set at 100°C.

If a modulating burner is fitted, an additional temperature sensor must be fitted in the flow pipework and wired back to the modulating control on the burner, following the manufacturer's instructions. In this case, the high / low thermostat is superfluous and the appropriate 4 pin plug and flying lead can be disconnected from the boiler control panel. The thermostat sensor can be withdrawn from the pocket in the boiler flow pipe and the modulating temperature sensor can be inserted in the pocket. The 7 pin plug must remain connected in an unmodified condition in order to ensure that the temperature limiter remains in circuit. Set the boiler control thermostat to maximum. The boiler temperature control is carried out directly by the modulating controller on the burner to the temperature set point adjusted within the controller.

NOTE:- The minimum difference between control thermostat and temperature limiter **MUST NEVER** be less than 10°C.

Where the system is operating on a low temperature circuit care should be taken to ensure that the flow temperature set point does not fall below 60°C for gas or 50°C for oil.

8.2 Water Flow Controls

Due to the design of the Melbury boiler, it is not necessary to maintain a minimum flow through the boiler, as the water content and thermal mass of the boiler allow for the control of residual heat, without the operation of the high limit thermostat. This allows for more flexibility and tolerance in heating system design and eliminates the requirement for primary circuit pumps or boiler shunt pumps, hence reducing energy consumption.
However correctly sized circulating pumps and valves must be used in the system to provide the necessary performance.

8.3 Frost Protection

Consideration should be given to fitting a frost thermostat set at approximately 4°C.

8.4 Unvented Systems

See Figure E.3 for typical layout of a Unvented (Pressurised) Hot Water System.
For system design refer to **BS 7074-2**.
In order to correctly size a pressurisation unit for any heating system certain parameters are required :-

1) Static height of highest component in system (metres).

2) System volume - if it is not known a general rule of thumb of 10 litres/kW of installed boiler power can be used.

3) Maximum flow temperature (°C).

4) Maximum system hot working pressure, generally given in bar g.

From the above information Hamworthy Heating can size the pressurisation unit and also the expansion vessel required. Care must be taken in sizing expansion vessels to ensure maximum acceptance factors are not exceeded. Normally manufacturers of vessels impose a limit of 0.5. This value must not be exceeded at any time during the operation of the boiler: this includes the over pressure condition should a safety valve lift.

Consideration should also be given to sizing of the safety valve/s in the system.

See **BS EN ISO 4126-1**, for information.

See also **BS 6880-1**, for design considerations.

8.5 Multiple Boiler Control Schemes

For multiple boiler installations, Hamworthy Heating can supply a unique boiler management control system called the 'Marshall HE'. This system comprises a wall mounted master control unit, which houses the main interface processor that will control up to 8 stages from a flow temperature sensor. Outside and room temperature sensors are optional. For further information, contact Hamworthy Heating for details.

8.6 Hours Run Meters

All Melbury boilers are fitted as standard with hours run meters, to enable the duty at both low and high fire to be monitored. If the boiler is set up for Modulation, both counters will register the same cyclic duty.

8.7 Modulating Burners

The modulating burners from Riello are available as standard temperature control or optional 0-10v signal control.

IMPORTANT; the specification must be identified prior to delivery.

The temperature control version comes with a dedicated PT100 probe for insertion into the boiler flow pipe plus a bolt on control module, to influence the modulation rate of the burner as it approaches the desired set-point. To achieve this, the boiler control panel thermostats must be set to maximum.

The 0-10v signal version comes with a plug in module to convert a 0-10vdc control signal (input) to vary the position of the air damper servo motor and corresponding gas rate.

For detailed information on fitting and wiring, refer to the manufacturers instructions.

8.8 Operation

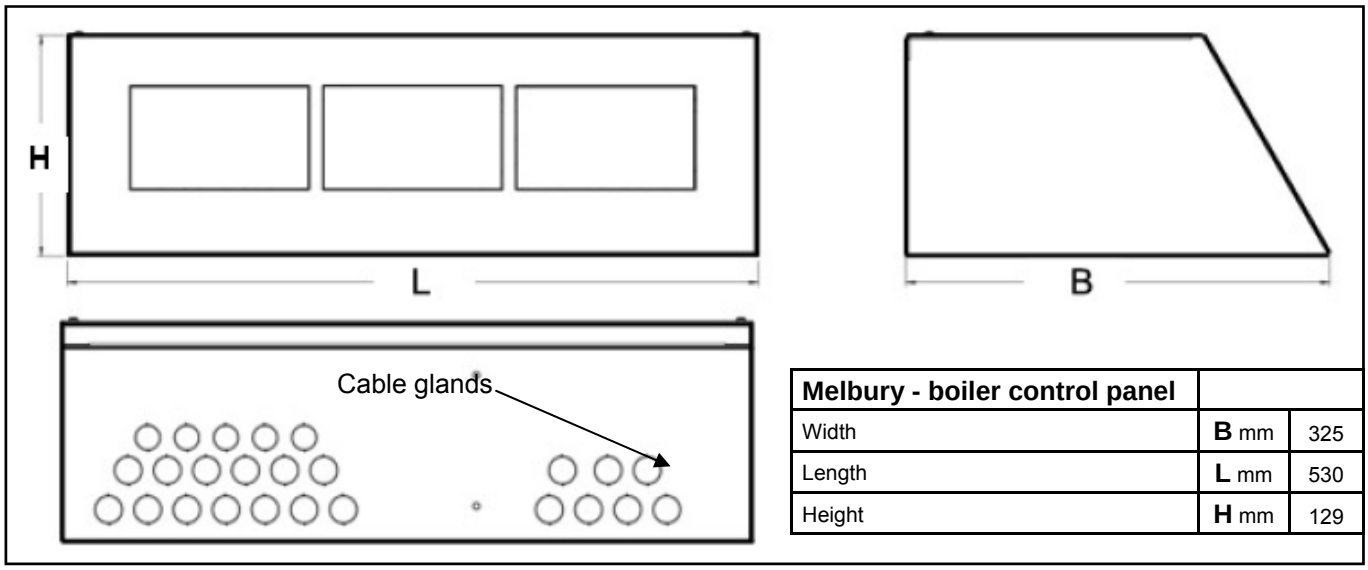
1 - Thermometer provides the temperature within the boiler body

2 - Burner On/Off switch allows the burner to be switched, without affecting any other devices or functionality.

3 - Safety cut out test button allows the testing of the Limit thermostat. By pressing the button, the boiler temperature will increase and shut down on the Limit thermostat, switching off the burner and registering an overheat alarm lamp.

9 - Limit thermostat is activated if the boiler temperature exceeds the setting. Once activated, the manual reset cannot function until the boiler temperature has dropped by approximately 20°C. Once this has occurred, insert a thin screw driver into the hole and depress the button. The lamp will switch off immediately.

Always investigate the cause of overheat.



Melbury - boiler control panel		
Width	**B** mm	325
Length	**L** mm	530
Height	**H** mm	129

Figure 8.1 - Control panel dimensions

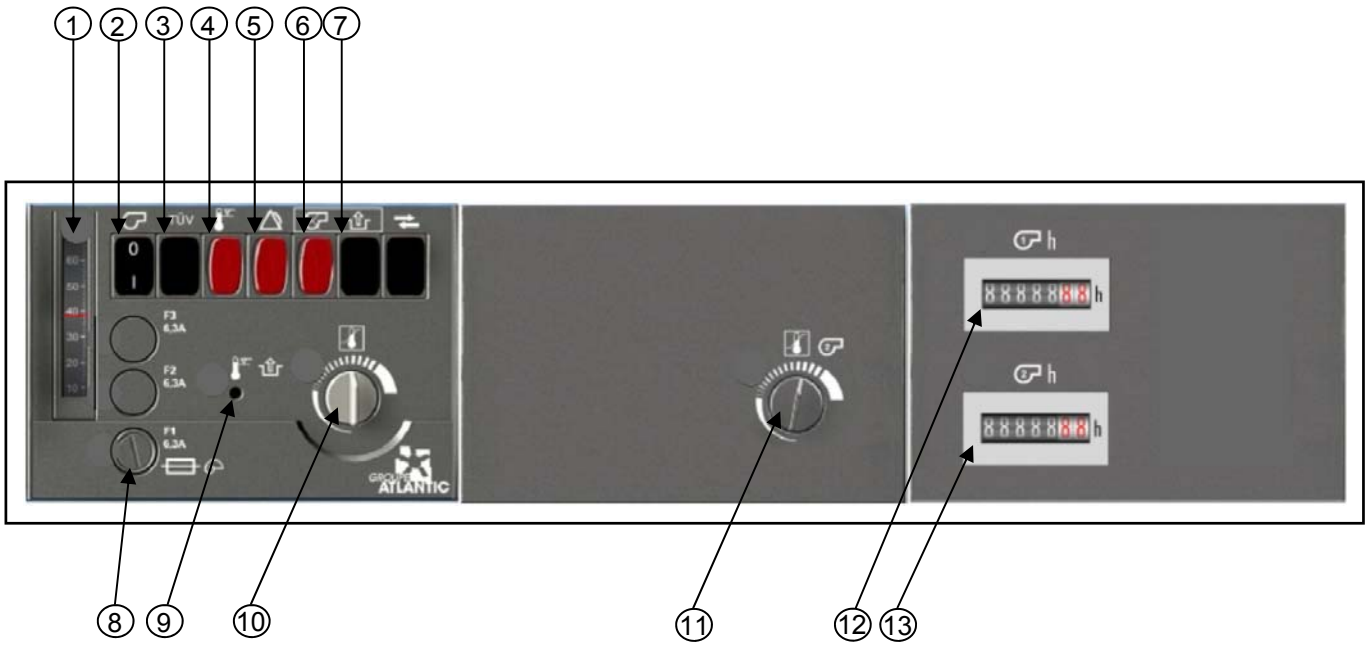


Figure 8.2 - Control identification

1 - Thermometer - water temperature
2 - Burner On/Off switch
3 - Safety cut out test button
4 - Alarm lamp - boiler overheat
5 - Alarm lamp - external safety interlock
6 - Alarm lamp - burner lockout
7 - Remote reset for burner - optional
8 - Fuse 6.3AT
9 - Limit thermostat - manual reset
10 - Stage 1 Thermostat (On/Off)
11 - Stage 2 Thermostat (High/Low)
12 - Hours Run meter - High fire
13 - Hours Run meter - Low fire

9.0 FAULT FINDING

9.1 Fault Finding

Fault finding on the burner control system is detailed in the burner manufacturers instructions. If the boiler still cannot be operated satisfactorily after following these instructions, consult Hamworthy Heating for assistance.

10.0 SERVICING

A qualified engineer registered for working on non domestic gas or oil appliances should check and ensure that the flue, its support and terminal, the ventilation to the boiler house, safety valve, drain, water filter if fitted, pressure gauge, etc.; are in a serviceable and working condition and still comply with the relevant standards and codes of practice - see **Section 3.1**
The boiler should be serviced at regular intervals, not exceeding SIX months for oil fired boilers, or TWELVE months for gas fired boilers.

When carrying out boiler servicing always consider both your own safety and that of others. The use of protective equipment (e.g. eye protection, face mask, protective gloves, etc.) is recommended where necessary.

10.1 Initial Inspection

a. Operate boiler and check for any signs of unsatisfactory operation, water leaks, gas leaks, oil leaks or unusual noise from burner oil pump or motor.
b. After allowing burner to reach stable firing conditions for approximately 15 minutes, carry out combustion gas check.
Measure CO_2, CO, flue gas temperature, smoke number (for oil) and water temperature rise across the boiler. The readings obtained should be noted for reference upon completion of the servicing procedure.
c. Measure either gas pressure at burner head, or oil pressure at burner pump, as applicable, and check value is correct for size of boiler in question.
d. Check operation of both boiler and heating system controls, then set boiler control thermostat to OFF.
Allow the boiler/burner to cool.

10.2 Burner Service Procedure.

SWITCH OFF ELECTRICAL SUPPLY TO BOILER AT ISOLATOR AND SHUT OFF FUEL SUPPLY TO BOILER.
Clean and service the burner in accordance with the burner manufacturers instructions.

a. Disconnect electrical and fuel connections to burner, as necessary.
b. Due to the design of the hinged door, it is preferable to leave the burner attached to the door for servicing, so as not to interfere with the blast tube seal between the burner and the door. If for any reason the burner has to be removed, take great care so as not to damage the burner door insulation.
c. Loosen and remove the two nuts securing the burner door to the front of the boiler. Carefully hinge open the door with the burner attached to gain access to front of the combustion chamber and flue ways.

10.3 Boiler Service Procedure

a. With the burner door hinged open access to the burner head is provided and the burner should be cleaned and serviced in accordance with the burner manufacturers instructions.
b. Carefully remove and store the turbulators. The boiler combustion chamber and heat exchanger flueways are now accessible for cleaning with suitable brushes and a vacuum cleaner.
c. An access panel is provided in the rear flue collector, to enable removal of any debris resultant from cleaning the heat exchanger tubes.
d. Carefully replace all turbulators as described in section 5.2
e. Replace all access/cover plates, ensuring that all gaskets and insulation panels are correctly fitted.
Refit securing studs/nuts and tighten evenly.
f. Refit burner if removed—taking care to replace the blast tube seal. Reconnect fuel and electrical supplies.
g. Turn on fuel supply and check soundness of fuel supply pipework.
h. Check all flue joints for integrity.
i. Check ventilation ducts/grilles to boiler room and ensure they are clear.
j. Re-commission boiler as detailed in relevant parts of **Section 7.0: COMMISSIONING & TESTING**

11.0 BURNER SELECTION

Only matched burners must be used with the Melbury boiler range. Refer to figures 11.1…..11.6

Burner maintenance must be carried out by a competent person, in accordance with the manufacturer's instructions

Figure 11.1 – Matched Burners (Natural Gas) Melbury HE

MELBURY HE MODEL	BURNER DETAILS						BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
							NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
	MAKE	MODEL	MODE	GAS TRAIN SIZE (in)	SUPPLY VOLTAGE 1Ph 230V - 3Ph 400V		HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH – REFER DIM. A FIG 11.9	BLAST TUBE PENETRATION REFER TO DIM. B FIGURE 11.9
							(kW)	(kW)	GAS RATE m^3/hr	(kW)	GAS RATE m^3/hr	(mm)	(mm)	(mm)
530	RIELLO RIELLO	RS70 RS70M	HI/LO MODULATING	2.0	-	✓	530	581	61.5	95	10	516	1517	83
580	RIELLO RIELLO	RS70 RS70M	HI/LO MODULATING	2.0		✓	580	628	66.5	121	12.8	549	1623	83
630	RIELLO RIELLO	RS70 RS70M	HI/LO MODULATING	2.0	-	✓	630	686	72.6	121	12.8	549	1623	83
700	RIELLO RIELLO	RS100 RS100M	HI/LO MODULATING	2.0	-	✓	700	755	79.9	175	18.5	614	1794	83
800	RIELLO RIELLO	RS100 RS100M	HI/LO MODULATING	2.0	-	✓	800	870	92.1	175	18.5	614	1794	83
895	REILLO REILLO	RS130 RS130M	HI/LO MODULATING	2.0	-	✓	895	962	101.8	269	28.5	640	1889	83
1150	RIELLO REILLO	RS130 RS130M	HI/LO MODULATING	2.0	-	✓	1150	1240	131.3	311	32.9	675	2225	112
1300	RIELLO REILLO	RS190 RS190M	HI/LO MODULATING	2.0	-	✓	1300	1414	149.7	314	33.0	675	2225	204
1650	RIELLO	RS190 RS190M	HI/LO MODULATING	2.0	-	✓	1650	1805	191	367	38.8	712	2559	136
1900	RIELLO	RS250M	MODULATING	2.5	-	✓	1900	2067	218.8	459	48.5	750	2745	136
2500	RIELLO	GAS 9P/M	MODULATING	2.0	-	✓	2500	2711	286.9	713	75.4	811	2985	242
3000	RIELLO	GAS 10P/M	MODULATING	3.0	-	✓	3000	3282	347.3	714	75.5	870	3265	242
3800	RIELLO	RS500M	MODULATING	3.0	-	✓	3800	4139	438	880	93.1	1020	3765	280
4500	RIELLO	RS800M	MODULATING	On Application		✓	4500	4902	518.7	1160	122.7	1110	3980	-
5400	RIELLO	RS800M	MODULATING	On Application		✓	5400	5863	620.4	1473	155.8	1220	4360	-
6300	RIELLO	MB8 SM	MODULATING	On Application		✓	6300	6825	722.2	1582	167.4	1270	4690	-
7400	RIELLO	MB10 SM	MODULATING	On Application		✓	7400	8008	847.4	1935	204.7	1350	5090	-
8600	RIELLO	DB9	MODULATING	On Application		✓	8600	9276	981.6	2332	246.7	1430	5550	-
10000	RIELLO	DB12	MODULATING	On Application		✓	10000	10740	1136.5	2907	307.5	1500	6120	-

Note To comply with the requirements of the Gas Appliance Directive, only the combinations listed below may be utilised for natural gas applications. Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m^3 @ 1013mbar and 15^0C.

Figure 11.2 – Matched Burners (Natural Gas) Melbury C

MELBURY C MODEL	BURNER DETAILS						BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
							NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
	MAKE	MODEL	MODE	GAS TRAIN SIZE (in)	SUPPLY VOLTAGE 1Ph 230V - 3Ph 400V		HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH – REFER DIM. A FIG 11.9	BLAST TUBE PENETRATION REFER TO DIM. B FIGURE 11.9
							(kW)	(kW)	GAS RATE m^3/hr	(kW)	GAS RATE m^3/hr	(mm)	(mm)	(mm)
530	RIELLO RIELLO	RS70 RS70M	HI/LO MODULATING	2.0	-	✓	530	581	61.5	95	10	516	1517	83
580	RIELLO RIELLO	RS70 RS70M	HI/LO MODULATING	2.0		✓	580	628	66.5	121	12.8	549	1623	83
630	RIELLO RIELLO	RS70 RS70M	HI/LO MODULATING	2.0	-	✓	630	686	72.6	121	12.8	549	1623	83
700	RIELLO RIELLO	RS100 RS100M	HI/LO MODULATING	2.0	-	✓	700	755	79.9	175	18.5	614	1794	83
800	RIELLO RIELLO	RS100 RS120M	HI/LO MODULATING	1.5	-	✓	800	870	92.1	175	18.5	614	1794	83
895	REILLO REILLO	RS100 RS100M	HI/LO MODULATING	1.5	-	✓	895	962	101.8	269	28.5	640	1889	83
1150	RIELLO REILLO	RS130 RS130M	HI/LO MODULATING	2.0	-	✓	1150	1240	131.3	311	32.9	675	2225	112
1300	RIELLO REILLO	RS190 RS190M	HI/LO MODULATING	2.0	-	✓	1300	1414	149.7	314	33.0	675	2225	204
1650	RIELLO	RS250M	MODULATING	2.0	-	✓	1650	1805	191	367	38.8	712	2559	136
1900	RIELLO	RS250M	MODULATING	2.5	-	✓	1900	2067	218.8	459	48.5	750	2745	136
2500	RIELLO	GAS 10P/M	MODULATING	3.0	-	✓	2500	2711	286.9	713	75.4	811	2985	242
3000	RIELLO	GAS 10P/M	MODULATING	3.0	-	✓	3000	3282	347.3	714	75.5	870	3265	242

Note To comply with the requirements of the Gas Appliance Directive, only the combinations listed below may be utilised for natural gas applications. Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m^3 @ 1013mbar and 15^0C.

Figure 11.3 – Matched Burners (Class D Oil) Melbury HE

MELBURY HE MODEL	BURNER DETAILS					BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
						NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
	MAKE	MODEL	MODE	SUPPLY VOLTAGE 1Ph 230V - 3Ph 400V		HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH – REFER DIM. A FIG 11.9	BLAST TUBE PENETRATION REFER TO DIM. B FIGURE 11.9
						(kW)	(kW)	OILRATE l/hr	(kW)	OIL RATE l/hr	(mm)	(mm)	(mm)
530	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING	-	✓	530	601.8	61.0	211	21.4	516	1517	105
580	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING		✓	580	658.5	66.0	272	27.6	549	1623	105
630	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING	-	✓	630	715.3	72.0	272	27.6	549	1623	105
700	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING	-	✓	700	794.8	79.3	355	36	614	1794	105
800	RIELLO RIELLO	RL100 RL100M	HI/LO MODULATING	-	✓	800	908.3	91.4	355	36	614	1794	105
895	REILLO REILLO	RL100 RL100M	HI/LO MODULATING	-	✓	895	1016.2	101.0	494	50.1	640	1889	105
1150	RIELLO REILLO	RL130 RL130M	HI/LO MODULATING	-	✓	1150	1305.7	130.2	582	59	675	2225	105
1300	RIELLO REILLO	RL130 RL130M	HI/LO MODULATING	-	✓	1300	1476.1	148.5	582	59	675	2225	105
1650	RIELLO RIELLO	RL190 RL190M	HI/LO MODULATING	-	✓	1650	1873.5	189.5	680	69	712	2559	170
1900	RIELLO RIELLO	RL250MZ RL190M	HI/LO MODULATING	-	✓	1900	2157.3	217.0	847	86	750	2745	178
2500	RIELLO	RL300BMZ P300PG	HI/LO MODULATING	-	✓	2500	2838.6	284.6	1217	123.5	811	2985	114
3000	RIELLO	RL400BMZ P450PG	HI/LO MODULATING	-	✓	3000	3406.3	344.6	1272	129.1	870	3265	114
3800	RIELLO	P450PG	MODULATING	-	✓	3800	4314.6	434.6	2012	204.2	1020	3765	176
4500	RIELLO	MB6LE	MODULATING	-	✓	4500	5109.4	514.6	2518	255.5	1110	3980	341
5400	RIELLO	MB6LE	MODULATING	-	✓	5400	6131.3	615.5	2930	297.4	1220	4360	341
6300	RIELLO	MB8LE	MODULATING	-	✓	6300	7153.2	716.5	3442	349.4	1270	4690	318
7400	RIELLO	MB10 LE	MODULATING	-	✓	7400	8402.1	840.7	3442	349.4	1350	5090	318
8600	RIELLO	DB9	MODULATING	On Application		8600	9764.7	973.9	4163	422.5	1430	5550	-
10000	RIELLO	DB12	MODULATING	On Application		10000	11354.2	1127.5	5127	520.4	1500	6120	-

NOTE! Heat input values quoted above are based on class D Fuel Oil with a net CV of 35.47 MJ/litre @ 15^0C
Operation on Class C2 Kerosene is achieved by setting the burner nozzle pressure to the appropriate level.
In the case of blended liquid Bio Fuel (RME or FAME), please consult with Hamworthy Heating Ltd, to confirm the specification of the fuel, and the necessary settings to achieve optimum performance
The bio fuel **MUST** be manufactured in accordance with EN14213 .

Figure 11.4 – Matched Burners (Class D Oil) Melbury C

MELBURY C MODEL	BURNER DETAILS					BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
						NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
	MAKE	MODEL	MODE	SUPPLY VOLTAGE 1Ph 230V - 3Ph 400V		HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH – REFER DIM. A FIG 11.9	BLAST TUBE PENETRATION REFER TO DIM. B FIGURE 11.9
						(kW)	(kW)	OILRATE l/hr	(kW)	OIL RATE l/hr	(mm)	(mm)	(mm)
530	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING	-	✓	530	601.8	61.0	211	21.4	516	1517	105
580	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING		✓	580	658.5	66.0	272	27.6	549	1623	105
630	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING	-	✓	630	715.3	72.0	272	27.6	549	1623	105
700	RIELLO RIELLO	RL70 RL70M	HI/LO MODULATING	-	✓	700	794.8	79.3	355	36	614	1794	105
800	RIELLO RIELLO	RL100 RL100M	HI/LO MODULATING	-	✓	800	908.3	91.4	355	36	614	1794	105
895	REILLO REILLO	RL100 RL100M	HI/LO MODULATING	-	✓	895	1016.2	101.0	494	50.1	640	1889	105
1150	RIELLO REILLO	RL130 RL130M	HI/LO MODULATING	-	✓	1150	1305.7	130.2	582	59	675	2225	105
1300	RIELLO REILLO	RL190 P200P/G	HI/LO MODULATING	-	✓	1300	1476.1	148.5	582	59	675	2225	105 114
1650	RIELLO RIELLO	RL250MZ RL190M	HI/LO MODULATING	-	✓	1650	1873.5	189.5	680	69	712	2559	208 170
1900	RIELLO RIELLO	RL250MZ P300P/G	HI/LO MODULATING	-	✓	1900	2157.3	217.0	847	86	750	2745	178 114
2500	RIELLO RIELLO	RL300BMZ P450P/G	HI/LO MODULATING	-	✓	2500	2838.6	284.6	1217	123.5	811	2985	310 114
3000	RIELLO RIELLO	RL400BMZ P450P/G	HI/LO MODULATING	-	✓	3000	3406.3	344.6	1272	129.1	870	3265	310 114

NOTE! Heat input values quoted above are based on class D Fuel Oil with a net CV of 35.47 MJ/litre @ 15^0C
Operation on Class C2 Kerosene is achieved by setting the burner nozzle pressure to the appropriate level.
In the case of blended liquid Bio Fuel (RME or FAME), please consult with Hamworthy Heating Ltd, to confirm the specification of the fuel, and the necessary settings to achieve optimum performance
The bio fuel **MUST** be manufactured in accordance with EN14213 .

Figure 11.5 – Matched Burners (Dual Fuel Nat Gas (modulating) /Oil (Hi/Lo or modulating)) - Melbury HE

MELBURY HE MODEL	BURNER DETAILS						BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
							NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
	MAKE	MODEL	MODE	GAS TRAIN SIZE (in)	SUPPLY VOLTAGE 1Ph 230V - 3Ph 400V		HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH – REFER DIM. A FIG 11.9	BLAST TUBE PENETRATION REFER TO DIM. B FIGURE 11.9
							(kW)	(kW)	GAS RATE m^3/hr	(kW)	GAS RATE m^3/hr	(mm)	(mm)	(mm)
530	RIELLO	RLS70	HI/LO	2.0	-	✓	530	581	61.5	95	10	516	1517	105
580	RIELLO	RLS70	HI/LO	2.0	-	✓	580	628	66.5	121	12.8	549	1623	105
630	RIELLO	RLS70	HI/LO	2.5	-	✓	630	686	72.6	121	12.8	549	1623	105
700	RIELLO	RLS70	HI/LO	2.5	-	✓	700	755	79.9	175	18.5	614	1794	105
800	RIELLO	RLS100	HI/LO	2.0	-	✓	800	870	92.1	175	18.5	614	1794	105
895	REILLO	RLS100	HI/LO	2.0	-	✓	895	962	101.8	269	28.5	640	1889	105
1150	RIELLO	RLS130	HI/LO	2.0	-	✓	1150	1240	131.3	311	32.9	675	2225	105
1300	RIELLO	RLS190MMZ	MODULATING	2.0	-	✓	1300	1414	149.7	314	33.0	675	2225	267
1650	RIELLO	RLS250MMZ	MODULATING	2.0	-	✓	1650	1805	191	367	38.8	712	2559	267
1900	RIELLO	RLS300BPMX	MODULATING	2.5	-	✓	1900	2067	218.8	459	48.5	750	2745	365
2500	RIELLO	RLS300BPMX	MODULATING	3.0	-	✓	2500	2711	286.9	713	75.4	811	2985	365
3000	RIELLO	RLS400BPMX	MODULATING	3.0	-	✓	3000	3282	347.3	714	75.5	870	3265	365
3800	RIELLO	RLS800MMX	MODULATING	On Application		✓	3800	4139	438	880	93.1	1020	3765	-
4500	RIELLO	RLS800MMX	MODULATING	On Application		✓	4500	4902	518.7	1160	122.7	1110	3980	-
5400	RIELLO	MB8LSE	MODULATING	On Application		✓	5400	5863	620.4	1473	155.8	1220	4360	-
6300	RIELLO	MB8LSE	MODULATING	On Application		✓	6300	6825	722.2	1582	167.4	1270	4690	-
7400	RIELLO	MB10LSE	MODULATING	On Application		✓	7400	8008	847.4	1935	204.7	1350	5090	-
8600	RIELLO	DB9	MODULATING	On Application		✓	8600	9276	981.6	2332	246.7	1430	5550	-
10000	RIELLO	DB12	MODULATING	On Application		✓	10000	10740	1136.5	2907	307.5	1500	6120	-

Note To comply with the requirements of the Gas Appliance Directive, only the combinations listed below may be utilised for natural gas applications. Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m^3 @ 1013mbar and 15^{0}C.

MELBURY HE MODEL	BURNER DETAILS						BOILER DETAILS					COMBUSTION CHAMBER DETAILS		
							NOMINAL HEAT INPUTS/OUTPUTS					DIMENSIONS		
	MAKE	MODEL	MODE	GAS TRAIN SIZE (in)	SUPPLY VOLTAGE 1Ph 230V -	3Ph 400V	HEAT OUTPUT	HIGH FIRE HEAT INPUT (NETT)		MINIMUM HEAT INPUT BELOW WHICH A BURNER MUST NOT OPERATE (NETT)		DIAMETER	LENGTH – REFER DIM. A FIG 11.9	BLAST TUBE PENETRATION REFER TO DIM. B FIGURE 11.9
							(kW)	(kW)	GAS RATE m^3/hr	(kW)	GAS RATE m^3/hr	(mm)	(mm)	(mm)
530	RIELLO	RLS68MMX	MODULATING	1.5	-	✓	530	581	61.5	95	10	516	1517	115
580	RIELLO	RLS70	HI/LO	2.5	-	✓	580	628	66.5	121	12.8	549	1623	105
630	RIELLO	RLS70	HI/LO	2.5	-	✓	630	686	72.6	121	12.8	549	1623	105
700	RIELLO	RLS100	HI/LO	2.0	-	✓	700	755	79.9	175	18.5	614	1794	105
800	RIELLO	RLS100	HI/LO	1.5	-	✓	800	870	92.1	175	18.5	614	1794	105
895	REILLO	RLS100	HI/LO	2.0	-	✓	895	962	101.8	269	28.5	640	1889	105
1150	RIELLO	RLS160MMX	MODULATING	2.0	-	✓	1150	1240	131.3	311	32.9	675	2225	228
1300	RIELLO	RLS190MMX	MODULATING	2.0	-	✓	1300	1414	149.7	314	33.0	675	2225	267
1650	RIELLO	RLS300BPMX	MODULATING	2.5	-	✓	1650	1805	191	367	38.8	712	2559	310
1900	RIELLO	RLS300BPMX	MODULATING	2.5	-	✓	1900	2067	218.8	459	48.5	750	2745	310
2500	RIELLO	RLS300BPMX	MODULATING	2.5	-	✓	2500	2711	286.9	713	75.4	811	2985	310
3000	RIELLO	RLS400BPMX	MODULATING	3.0	-	✓	3000	3282	347.3	714	75.5	870	3265	310

Note To comply with the requirements of the Gas Appliance Directive, only the combinations listed below may be utilised for natural gas applications. Heat input values quoted above are based on Natural Gas (G20) with a net CV of 34.06 MJ/m^3 @ 1013mbar and 15^0C.

Figure 11.6 – Matched Burners (Dual Fuel Nat Gas (modulating) /Oil (Hi/Lo or modulating)) - Melbury C

MAKE (type)	MODEL	MODE	PART No.	NOZZLE
RIELLO (Danfoss/ Delavan)	530	HI/LO	532904020 + 532904015	7.0 + 5.0 x 60°
		MODULATING	532904103	50 kg/hr
	580	HI/LO	532904049 + 532904015	8.0 + 5.0 x 60°
		MODULATING	532904104	60 kg/hr
	630	HI/LO	5329040050 + 532904016	8.5 + 5.5 x 60°
		MODULATING	532904104	60 kg/hr
	700	HI/LO	532904053 + 532904017	9.5 + 6.0 x 60°
		MODULATING	532904105	70 kg/hr
	800	HI/LO	532904026 + 532904020	11.0 + 7.0 x 60°
		MODULATING	532904106	80 kg/hr
	895	HI/LO	532904027 + 532904049	12.0 + 8.0 x 60°
		MODULATING	532904107	90 kg/hr
	1150	HI/LO	532904067 + 532904024	15.0 + 10.0 x 60°
		MODULATING	532904109	110 kg/hr
	1300	HI/LO	532904112 + 532904027	17.0 + 12.0 x 60°
		MODULATING	532904130	120 kg/hr
	1650	HI/LO	532904113 + 532904067	22.0 + 15.0 x 60°
		MODULATING	532904131	160 kg/hr
	1900	HI/LO	532904114 + 532904111	26.0 + 16.0 x 60°
		MODULATING	532904132	180 kg/hr
	2500	HI/LO	532904115 + 532904115	28.0 + 28.0 x 60°
		MODULATING	532904133	250 kg/hr
	3000	HI/LO	532904117 + 532904116	35.0 + 32.5 x 60°
		MODULATING	532904134	300 kg/hr
	3800	MODULATING	532904135	375 kg/hr
	4500	MODULATING	532904136	425 kg/hr
	5400	MODULATING	532904137	500 kg/hr
	6300	MODULATING	532904138	600 kg/hr
	7400	MODULATING	532904139	700 kg/hr
	8600	MODULATING	-	On Application
	10000	MODULATING	-	On Application

Figure 11.7 – Oil Nozzle Selection

Fuel Type	BOILER MODEL (HE & C)	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000	3800	4500	5400	6300	7400	8600	10000
Nat. Gas G20	CO_2 (DRY)	9 - 10%																		
	CO	Less than 100 ppm (air free)																		
	Flue Gas Temp Rise ^{O}C	160 - 180 ^{O}C																		
Class D Fuel Oil	CO_2 (DRY)	11 - 12%																		
	CO	Less than 100 ppm (air free)																		
	Flue Gas Temp Rise ^{O}C	160 - 180^{O}C																		
	Smoke No	Less than 1																		

Figure 11.8 – Target Appliance Readings.
Note ! The above target values provide an approximate guide with which to attain nominal operation of the appliance so as to satisfy the requirements of the Boiler Efficiency Directive

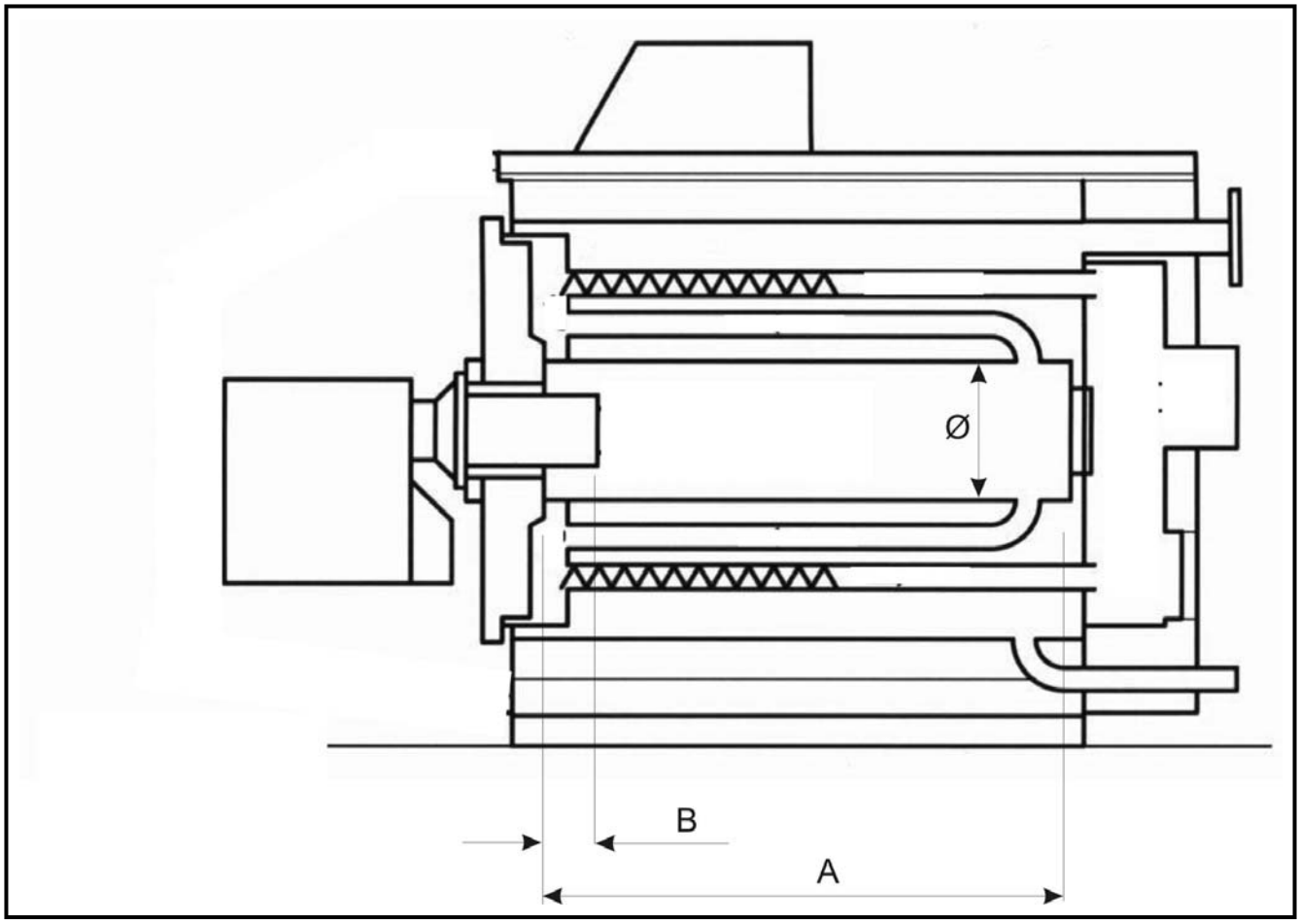


Figure 11.9 – Combustion Chamber and Burner Data - refer to figures 11.1 .....11.6

12.0 REPLACEMENT OF PARTS

There are a number of components listed below which can be replaced simply and quickly by following the given procedure. In each case the operation of each replaced component must be checked by carrying out the appropriate part of the commissioning procedure. See **Section 11.0: COMMISSIONING & TESTING.**

NOTE: Isolate all electrical supplies to the boiler and turn off the gas supply before removing controls cover and commencing any servicing or component exchange procedure.

Note : -For replacement of burner components refer to the burner manufacturers instructions.

12.1 Control and High/Low Thermostat(s)

Record the existing temperature setting of the thermostat for reference before removal.
NOTE: before attempting to hinge the fascia down, the thermostat knobs must be pulled off and the temperature limiter (high limit) cover knob unscrewed and removed.
Remove the upper front casing panel. Turn the two latches a quarter turn using a screwdriver or coin and lift off. The fascia can then be hinged downwards by unlatching the catch on the top right hand using a screwdriver.
Withdraw the appropriate thermostat bulb from the thermostat pocket and disconnect the electrical connections noting the terminal identifications.
Remove the two screws securing the thermostat to its mounting bracket and withdraw the thermostat body whilst feeding the capillary through the hole in the control panel mounting plate.
Fit the new thermostat and ensure the capillary is correctly located within the thermostat pocket. Close the fascia and run the boiler to check for correct operation. Set the thermostat to the previously noted setting.

12.2 Temperature Limiter (Limit Thermostat)

The temperature limiter replacement procedure follows that of the control thermostat with some minor differences as detailed below:
With the plastic cover removed, unscrew the holding nut and carefully withdraw the thermostat body
Prior to fitting the replacement thermostat, set to 100°C and check the operation of the device by carefully applying a heat source to the bulb.

12.3 Boiler Spares

Boiler spares are available on request. Please quote the boiler model and serial number from the data plate located on the rear panel of the boiler.

Secondary heat exchanger limit thermostat.....573410285
Differential pressure flow switch. - type A -15-60 mbar.....573410282
Differential pressure flow switch. - type B –40-200 mbar.....573410283
Differential pressure flow switch. - type C -150-1000 mbar.....573410284

Figure 12.2 Control Panel Spares - refer to figure 8.2

ITEM	DESCRIPTION	PART NO.
1	Thermometer	573410251
2	Burner On/Off switch	573410241
3 & 7	Safety cut out test or remote reset button	573410242
4,5 & 6	Alarm lamp (red)	573410243
8.	Fuse 6.3AT	573410245
9.	Limit thermostat	573410247
10 & 11.	Control thermostat	573410249
12	Hours run meter	573410252
	Fuse holder	573410244
	Auxiliary relay 11 pole	573410248

APPENDIX A - PERFORMANCE DATA

BOILER MODEL - MELBURY HE		530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
GENERAL DATA													
BOILER INPUT (net) - maximum	**kW**	581	628	686	755	870	962	1240	1414	1805	2067	2711	3282
BOILER INPUT (gross) - maximum	**kW**	645	697	762	838	966	1068	1377	1570	2004	2294	3009	3643
BOILER OUTPUT - maximum	**kW**	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
BOILER OUTPUT 80/60°C- minimum gas	**kW**	95	121	121	175	175	269	311	314	367	459	713	714
BOILER OUTPUT 80/60°C- minimum oil	**kW**	211	272	272	355	355	494	582	582	680	847	1217	1272
FLUE DATA													
NOMINAL FLUE DIA.	**mm**	200	250				300	350			400	450	500
COMBUSTION CHAMBER RESISTANCE	**mbar**	5.97	4.22	5.06	5.03	6.74	5.33	6.41	8.39	9.67	9.43	10.35	9.50
APPROX. FLUE GAS TEMP - (gross)	**°C**	209	187	197	179	196	172	179	194	205	195	188	205
APPROX. FLUE GAS VOLUME @ NTP 15°C 9% CO_2 - NTP	**m^3/h**	738	799	892	984	1137	1230	1599	1814	2336	2675	3505	4243
GAS DATA													
NOMINAL GAS INLET PRESSURE	**mbar**	20											
MAX. GAS INLET PRESSURE FOR BOOSTED SUPPLIES	**mbar**	50											
GAS FLOW RATE	**m^3/h**	61.5	66.5	72.6	79.9	92.1	101.8	131.3	149.7	191.0	218.8	286.9	347.3
GAS INLET CONNECTION	**in**	2.0									2.5	2.0	3.0
		Performance and General Data Information (Natural Gas) Net CV 34.02 MJ/m^3 - Gross CV 37.8 MJ/m^3											
OIL DATA													
OIL FLOW RATE (35 sec)	**l/h**	61.0	66.0	72.0	79.3	91.4	101.0	130.2	148.5	189.5	217.0	284.6	344.6
		Performance and General Data Information (Fuel Oil – class D 35 sec) Net CV 42.66 MJ/ kg - Gross CV 45.36 MJ/kg											

BOILER MODEL - MELBURY HE		3800	4500	5400	6300	7400	8600	10000
GENERAL DATA								
BOILER INPUT (net) - maximum	**kW**	4139	4902	5863	6825	8008	9276	10740
BOILER INPUT (gross) - maximum	**kW**	4594	5440	6507	7575	8888	10296	11920
BOILER OUTPUT - maximum	**kW**	3800	4500	5400	6300	7400	8600	10000
BOILER OUTPUT 80/60°C- minimum gas	**kW**	880	1160	1473	1582	1935	2332	2907
BOILER OUTPUT 80/60°C- minimum oil	**kW**	2012	2158	2930	3442	3442	4163	5127
FLUE DATA								
NOMINAL FLUE DIA.	**mm**	550	600	650	700	750	850	900
COMBUSTION CHAMBER RESISTANCE	**mbar**	11.01	10.18	10.91	12.46	14.40	16.03	17.48
APPROX. FLUE GAS TEMP - (gross)	**°C**	198	196	190	185	185	178	169
APPROX. FLUE GAS VOLUME @ NTP 15°C 9% CO_2 - NTP	**m^3/h**	5503	6518	7809	9070	10668	12328	14265
GAS DATA								
NOMINAL GAS INLET PRESSURE	**mbar**	20						
MAX. GAS INLET PRESSURE FOR BOOSTED SUPPLIES	**mbar**	50						
GAS FLOW RATE	**m^3/h**	438.0	518.7	620.4	722.2	847.4	981.6	1136.5
GAS INLET CONNECTION	in	3.0	On Application					
		Performance and General Data Information (Natural Gas) Net CV 34.02 MJ/m^3 - Gross CV 37.8 MJ/m^3						
OIL DATA								
OIL FLOW RATE (35 sec)	**l/h**	434.6	514.6	615.5	716.5	847.4	981.6	1136.5
		Performance and General Data Information (Fuel Oil – class D 35 sec) Net CV 42.66 MJ/ kg - Gross CV 45.36 MJ/kg						

Figure A.1 – Performance and General Data Information Melbury HE

Note: For matched burner/boiler combinations, refer to Figures 11.1 ..... 11.6

BOILER MODEL - MELBURY C		530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
GENERAL DATA													
BOILER INPUT (net) - maximum	kW	581	628	686	755	870	962	1240	1414	1805	2067	2711	3282
BOILER INPUT (gross) - maximum	kW	645	697	762	838	966	1068	1377	1570	2004	2294	3009	3643
BOILER OUTPUT - maximum	kW	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
BOILER OUTPUT 80/60°C- minimum gas	kW	95	121	121	175	175	269	311	314	367	459	713	714
BOILER OUTPUT 80/60°C- minimum oil	kW	211	272	272	355	355	494	582	582	680	847	1217	1272
FLUE DATA													
NOMINAL FLUE DIA.	mm	200	250				300	350			400	450	500
COMBUSTION CHAMBER RESISTANCE	mbar	5.97	4.22	5.06	5.03	6.74	5.33	6.41	8.39	9.67	9.43	10.35	9.50
APPROX. FLUE GAS TEMP - (gross)	°C	209	187	197	179	196	172	179	194	205	195	188	205
APPROX. FLUE GAS VOLUME @ NTP 15°C 9% CO_2 - NTP	m^3/h	738	799	892	984	1137	1230	1599	1814	2336	2675	3505	4243
GAS DATA													
NOMINAL GAS INLET PRESSURE	mbar	20											
MAX. GAS INLET PRESSURE FOR BOOSTED SUPPLIES	mbar	50											
GAS FLOW RATE	m^3/h	61.5	66.5	72.6	79.9	92.1	101.8	131.3	149.7	191.0	218.8	286.9	347.3
GAS INLET CONNECTION	in	2.0									2.5	2.0	3.0
		Performance and General Data Information (Natural Gas) Net CV 34.02 MJ/m^3 - Gross CV 37.8 MJ/m^3											
OIL DATA													
OIL FLOW RATE (35 sec)	l/h	61.0	66.0	72.0	79.3	91.4	101.0	130.2	148.5	189.5	217.0	284.6	344.6
		Performance and General Data Information (Fuel Oil – class D 35 sec) Net CV 42.66 MJ/ kg - Gross CV 45.36 MJ/kg											

Figure A.2 – Performance and General Data Melbury C

MELBURY C SECONDARY HEAT EXCHANGER		530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
GENERAL DATA													
FLUE													
FLUE GAS TEMPERATURE @ 35/30 °C	°C	33	33	32	33	49	47	47	49	50	49	48	50
FLUE GAS LOSSES @35/30 °C	%	1.5	1.4	1.4	1.3	1.5	1.4	1.5	1.6	1.6	1.6	1.6	1.6
**COMBUSTION PATH RESISTANCE	mbar	2.81	1.32	1.6	1.89	2.57	1.44	1.29	1.71	2.83	2.13	2.25	2.2
ENERGY DATA - Natural Gas													
OUTPUT MAXIMUM @ 35/30°C	kW	67	72	79	87	101	110	143	163	208	239	313	378
OUTPUT MINIMUM @ 35/30°C	kW	12	15	15	22	22	33	38	39	45	57	90	109
STANDBY LOSS @ 70°C	W	824	926	926	1073	12073	1239	1447	1447	1645	1831	2166	2427
ENERGY DATA - Oil													
OUTPUT MAXIMUM @ 35/30°C	kW	42	42	47	50	59	64	82	96	130	141	179	237
OUTPUT MINIMUM @ 35/30°C	kW	18	22	22	29	29	39	48	48	55	69	96	106
STANDBY LOSS @ 70°C	W	824	926	926	1073	12073	1239	1447	1447	1645	1831	2166	2427

** - In considering burner options, the resistance of both the primary and secondary heat exchangers combined must be considered.

Figure A.3 – General Data Melbury C - Secondary Heat Exchanger

IMPORTANT ; Specific attention must be made to the integration of the secondary heat exchanger into the hydraulic circuit so as to maintain minimum flow conditions through the heat exchanger - refer to Appendix E

APPENDIX B - ELECTRICAL CONNECTIONS AND CONTROLS

B.1. Electrical Connections:

The following electrical connections are provided on each boiler panel.

- Supply: Live, Neutral and Earth. (230V ~50Hz) See Section 4.5 for details.
- Burner Lockout Alarm Signal Output
  - volt free
- Burner Low Fire Signal Output - volt free
- Burner High Fire Signal Output - volt free
- Boiler Overheat Lockout Alarm Signal Output - volt free
- External Interlock Alarm Signal Output
  - volt free
- Remote on/off Control Input
- Safety Interlock Circuit Input - **Melbury C** this **must** be used to connect the flow switch & limit thermostat.
- Emergency On/Off Button

Note: All wiring and electrical connections must be completed by a competent person in accordance with current IEE regulations.
Power supply required is 400V 50 Hz three phase, 4 wire. An isolator correctly fused should be sited close to the boiler. Refer to the burner instructions.

It should be noted the 3 phase supply should be wired direct to the burner and a separate 240V single phase supply derived from the burner should be wired to the panel.

Note: If a modulating burner is fitted to the boiler, some alterations to the wiring will be necessary. The burner manufacturer's instructions must be followed. It is likely that the second stage wiring (flying lead with four pin plug, hi/lo thermostat etc.) will become redundant and additional temperature sensor(s) will need to be added.

Warning: On no account must the route of the cables allow them to contact any unprotected or un-insulated surface. For example; the burner mounting plate

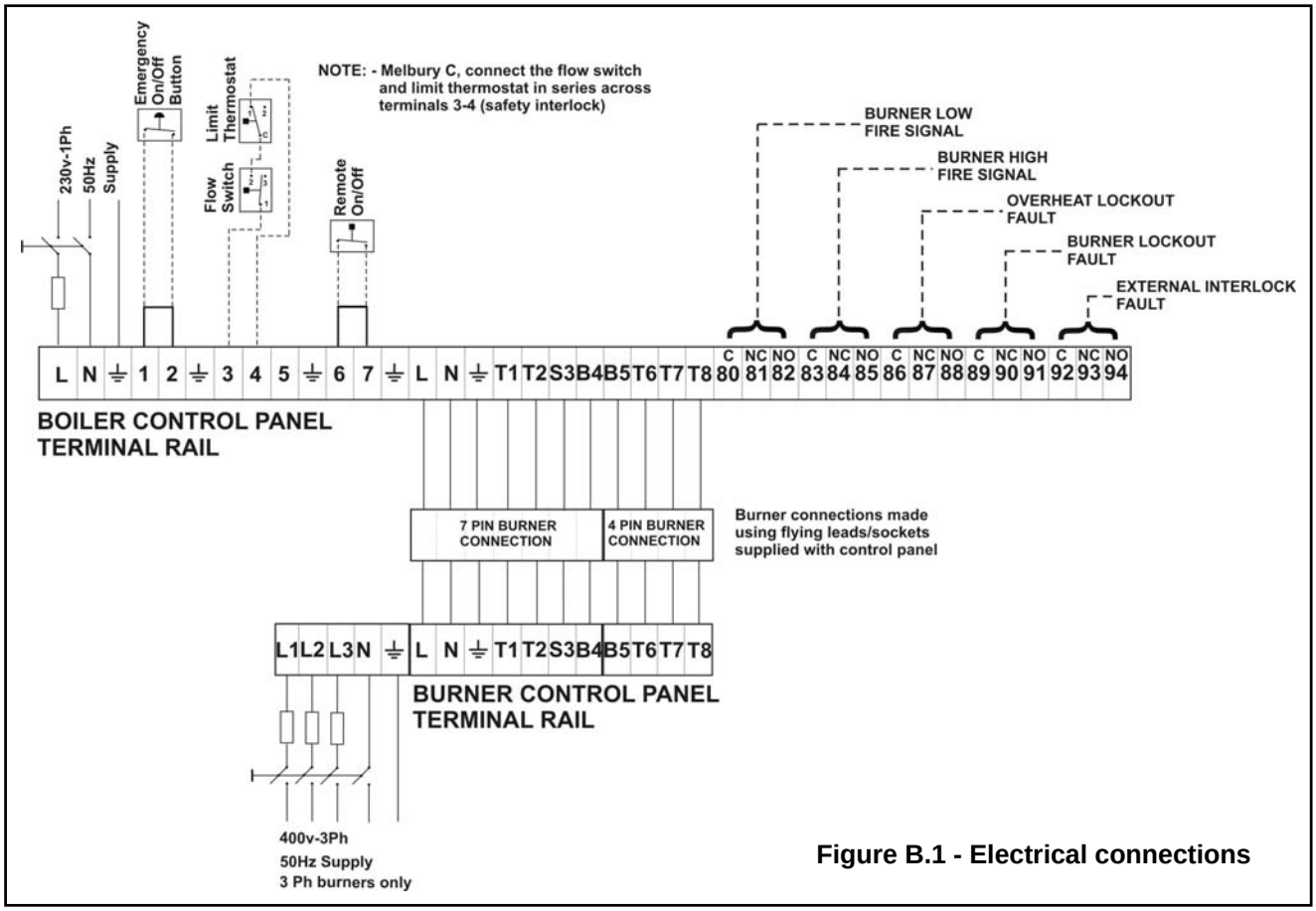


Figure B.1 - Electrical connections

APPENDIX C - FLUE DATA

C 1 General Requirments

Detailed recommendations for flue systems are given in **BS 6644**, **IGE/UP/10,** "Flues for Commercial and Industrial Gas-Fired Boilers and Air Heaters."
The following notes are intended for guidance only.

The flue passages within the Melbury operate under pressurised conditions and in order to eliminate any additional resistance, it is recommended that the flue system shall be adapted to its design diameter as soon as possible, after leaving the boiler.
The boiler should be connected to a single flue system in the case of a single boiler, or a common flue header in the case of a multiple boiler installation. Flue systems must be self supporting, contain access for cleaning and contain a maintenance joint near the boiler outlet to allow for removal of the flue box during servicing.
Melbury boilers are suitable for installation in a balanced compartment in accordance with the requirements of **BS 6644.** Consult Hamworthy Heating Technical Department for help or assistance if in doubt.

C.2 Design Waste Gas Volume and Temperature

It is recommended that the volume and temperature of the waste gases used for design of the flue system are as shown in Figures A1, A2 & A3

C.3 Materials

Materials used for the flue system must be mechanically robust, resistant to internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be subjected.
Consideration should be given to possible freezing of condense water traps and pipework. This must be avoided at all times. Insulate condense pipes if freezing temperatures are likely to be encountered.
Chimneys should be lined with a non-porous acid-resistant material in accordance with BS.5854, e.g. a flexible flue liner or similar British Gas Approved material. The internal diameter of the liner must not be less than the recommended flue size and the number of joints should be kept to a minimum.
Any joint between the flexible liner and the flue pipe from the boiler should be made using a purpose made connector. Existing chimneys should be thoroughly swept before use and any register plates, dampers, or restrictions removed.
If the boiler(s) is not connected to a chimney system, but is connected directly to outside by a standard stainless steel flue (either single or twin wall) it is particularly important to ensure that the point at which it exits the building is fully weatherproofed.

C.4 Suction

The flue system should be designed to maintain atmospheric pressure or a slight suction at the boiler flue connection at all times (0.1 - 0.3mbar).

It is recommended that a draught stabiliser is fitted to the flue system where the suction is likely to exceed 0.3mbar.

C.5 Disconnection

Provisions should be made for disconnection of the flue pipe for servicing. It is advisable that bends are fitted with removable covers for inspection and cleaning as appropriate. **NOTE!** The flue system must be self supporting and not present a risk to people in or around the building.
See **Section 13: SERVICING** for further information**.**

C.6 Flue Discharge

The flue system must ensure safe and efficient operation of the boiler to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to the external air.
The flue must terminate in a freely exposed position and be situated so as to prevent the products of combustion entering any opening in a building. Consideration should be given to the fitting of a flue discharge terminal or grille to stop the ingress of birds etc.
The flue system should be designed such that the flue terminates at least 1 metre above the roof surface, or above the level of any nearby structure which is within 2.5 metres of the flue.

C.7 Surface Temperatures

Combustible materials in the vicinity of the boiler and flue shall not exceed 65 °C during boiler operation. The flue shall not be closer than 50mm to any combustible material, except where it passes through such material with a non-combustible sleeve when the air gap may not be less than 25mm.

C.8 Flue System Location

The flue system must not be placed or fitted where there is undue risk of accidental damage to the flue pipe or undue danger to persons in the vicinity. **NOTE!** The flue **MUST** be self supporting. Check that the flue and chimney are clear from any obstruction.

C.9 Condensate Discharge

When designing the flue system, care must be taken to ensure that any condensate which may form within the system, can be safely drained to a suitable waste point and, that the flue material used is resistant to the corrosive effects of that condensate.

C.10 Combustion Chamber Resistance

Due to the secondary heat exchanger within Melbury C models, in considering burner options, the resistance of both the primary and secondary heat exchangers combined must be considered -
Refer to figures A.1, A.2 & A.3.

APPENDIX D - VENTILATION

D1.1 Air Supply

Detailed recommendations for air supply are given in BS 6644 and BS5440 Pt 2. The following notes are intended to give general guidance. In all cases there must be provision for an adequate supply of air for both combustion and general ventilation, in addition to that required for any other appliance.

D1.2 Air Supply by Natural Ventilation - Open Flue applications

The boiler room must have, or be provided with, permanent air vents directly to the outside air, at high level and at low level. For an exposed boiler house, air vents should be fitted, preferably on all four sides, but at the least on two sides. Air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour. Grilles or louvres must be so designed that high velocity air streams do not occur within the space housing the boiler.

Boiler house ventilation

Low level (inlet) - 4cm² per kW of total rated input (Net)
High level (output) - 2cm² per kW of total rated input (Net)

Compartment ventilation

Where the boiler is to be installed in a compartment, permanent high and low level ventilation is required which must communicate direct to outside, for cooling purposes.

Low level (inlet) - 10cm² per kW of total rated input (Net)
High level (output) - 5cm² per kW of total rated input (Net)

D1.3. Air Supply by Mechanical Ventilation

Air supplied to the boiler room by Mechanical means should be as follows:

1) Mechanical ventilation must be interlocked with the boilers to prevent operation in the event of ventilation fan failure
2) Mechanical inlet and mechanical extract can be utilised providing the design extraction rate does not exceed one third of the design inlet rate.
3) Mechanical extract ventilation with natural inlet ventilation **MUST NOT** be used.

For Mechanical ventilation systems an automatic control should be provided to cut off the gas supply to the boiler, in the event of failure of air flow in either inlet or extract fans.

D 1.4. Boiler House Temperatures

The air supplied for boiler house ventilation shall be such that the maximum temperatures within the boiler house shall be as follows:

At floor (or 100mm above floor) level = 25°C.

At mid-level (1.5m above floor level) = 32°C.

At ceiling (or 100mm below ceiling) level = 40°C.

D 1.5. General Requirements

The air supply should be free from contamination such as building dust and insulation fibres from lagging. To avoid unnecessary cleaning and servicing of the boiler modules, the boilers should not be fired whilst building work is being undertaken.
High and low level ventilation grilles shall be positioned as high and as low as practicably possible. Low level grilles should be located within 1 metre of the floor for Natural Gas and within 250mm of the floor for LPG. High level grilles should be positioned within 15% of the boiler room height from the ceiling. High and low level grilles shall communicate with the same room or space where compartment ventilation is used. Where grilles communicate directly with outside air, they shall be positioned on the same wall.

	Flow rate per kW total rated heat input (Net)	
	Inlet air (Combustion ventilation)	Difference between Inlet & Extract air *
	m³/h.	m³/h.
Volume	2.6	1.35

Figure D1 Mechanical Ventilation Flow Rates

Note * : Where the associated air extraction is also by means of a fan, this shall be selected such as not to cause a negative pressure to develop in the boiler house and to maintain the difference between inlet and extract flow rates shown above.
The calculated extract flow rate is the actual inlet flow rate minus the appropriate figure in the table above.

APPENDIX E - WATER DATA

Melbury HE		530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
Hydraulic resistance @ ΔT 10°C –	mbar	42	50	59	73	96	120	81	103	167	106	184	84
Hydraulic resistance @ ΔT 20°C –	mbar	11	13	15	18	24	30	20	26	42	27	46	21
Design flow rate @ ΔT 10°C	l/s	12.7	13.9	15.1	16.7	19.1	21.4	27.5	31.1	39.5	45.4	59.8	71.8
Design flow rate @ ΔT 20°C	l/s	6.3	6.9	7.5	8.4	9.6	10.7	13.8	15.6	19.7	22.7	29.9	35.9
Water flow rate minimum		No minimum flow rate											
Water pressure - maximum	barg	6											
Water pressure - minimum	barg	0.55	0.55	0.65	0.5	0.7	0.75	0.85	1.1	1.25	1.3	1.6	1.7
Water flow temperature - maximum	°C	90											
Water flow temperature - minimum (gas)	°C	70											
Water flow temperature - minimum (oil)	°C	60											
Water return temperature-minimum gas(oil)	°C	60 (50)											
Water connections - flow & return (flange)		PN6 - 100						DN125			DN150		DN200
Drain connection		R 1¼"											
Water content -	litres	530	650	650	790	790	960	1360	1360	1760	2060	2610	3070

Melbury HE		3800	4500	5400	6300	7400	8600	10,000
Hydraulic resistance @ ΔT 10°C –	mbar	176	248	356	188	260	180	244
Hydraulic resistance @ ΔT 20°C –	mbar	44	62	89	47	65	45	61
Design flow rate @ ΔT 10°C	l/s	90.9	107.7	129.2	150.7	177	205.7	239.2
Design flow rate @ ΔT 20°C	l/s	45.5	53.8	64.6	75.4	88.5	102.9	119.6
Water flow rate minimum		No minimum flow rate						
Water pressure - maximum	barg	6						
Water pressure - minimum	barg	1.8	1.8	1.8	2.2	2.2	2.2	2.2
Water flow temperature - maximum	°C	90						
Water flow temperature - minimum (gas)	°C	70						
Water flow temperature - minimum (oil)	°C	60						
Water return temperature-minimum gas(oil)	°C	60 (50)						
Water connections - flow & return (flange)		DN200			DN250		DN300	
Safety valve connection	PN16	80	80	100	100	100	125	125
Drain connection		R 1¼"				R2"		
Water content -	litres	3805	5385	6060	9300	11400	13300	15120

Figure E.1. - Water data for Melbury HE

E 1 Water circulation system

Recommendations for the water circulation system are given in **BS 6644** for gas fired boilers but the same principals can be used for those using fuel oil. The following notes are of particular importance:-

E1.1 In a combined central heating and hot water system, the hot water storage vessel must be of the indirect cylinder or calorifier type. The hot water storage vessel should be insulated preferably with not less than 75mm (3 in) thick mineral fibre, or its thermal equivalent.

E1.2 Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated cavities. Cisterns situated in areas, which may be exposed to freezing conditions, should also be insulated. Insulation exposed to the weather should be rendered waterproof.

E1.3 Each boiler has flanged flow and return connections - **refer to section 3**

E1.4 Multiple boilers should be connected by flow and return headers. Headers should be connected to the system in a "reverse return" arrangement (the water flow in each header is in the same direction) to ensure equal flow in each boiler.

E1.5 A coarse filter and dirt separator MUST be fitted in the return to both primary and secondary heat exchangers

E.2 Pressure Relief Valve (Safety Valve)

The most important single safety device fitted to a boiler is its safety valve and each boiler, or in the case of a multiple installation, each bank of boilers, must be fitted with a pressure relief valve to **BS EN ISO 4126-1** and sized as shown in **BS 6644**.

Melbury C - Primary Heat Exchanger	530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
Hydraulic resistance @ ΔT 10°C – mbar	42	50	59	73	96	120	81	103	167	106	184	84
Hydraulic resistance @ ΔT 20°C – mbar	11	13	15	18	24	30	20	26	42	27	46	21
Design flow rate @ ΔT 10°C l/s	12.7	13.9	15.1	16.7	19.1	21.4	27.5	31.1	39.5	45.4	59.8	71.8
Design flow rate @ ΔT 20°C l/s	6.3	6.9	7.5	8.4	9.6	10.7	13.8	15.6	19.7	22.7	29.9	35.9
Water flow rate minimum	No minimum flow rate											
Water pressure - maximum barg	6											
Water pressure - minimum barg	0.55	0.55	0.65	0.5	0.7	0.75	0.85	1.1	1.25	1.3	1.6	1.7
Water flow temperature - maximum °C	95											
Water flow temperature - minimum (gas) °C	70											
Water flow temperature - minimum (oil) °C	60											
Water return temperature-minimum gas(oil) °C	60 (50)											
Water connections - flow & return (flange)	PN6 - 100						DN125			DN150		DN200
Drain connection	R 1¼"											
Water content - litres	530	650	650	790	790	960	1360	1360	1760	2060	2610	3070

MELBURY C SECONDARY HEAT EXCHANGER		530	580	630	700	800	895	1150	1300	1650	1900	2500	3000
GENERAL WATER DATA													
WATER CONTENT (excluding headers)	litres	35	40	40	50	50	60	70	70	95	110	145	170
MAXIMUM WATER PRESSURE	barg	6											
MINIMUM WATER PRESSUE	barg	0.55	0.55	0.65	0.5	0.7	0.75	0.85	1.1	1.25	1.3	1.6	1.7
MAXIMUM WATER TEMPERATURE	°C	95											
MINIMUM RETURN TEMPERATURE	°C	No Minimum Return Temperature											
CONNECTIONS													
FLOW CONNECTION	DN	65	80				100			125		150	
RETURN CONNECTION	DN	65	80				100			125		150	
NOMINAL FLUE DIAMETER	mm	200	250				300	350			400	450	500
CONDENSATE CONNECTION		1½"											
WATER DATA - Natural Gas													
SYSTEM DESIGN FLOW RATE @ 10°C ΔT	l/s	1.6	1.72	1.89	2.08	2.42	2.63	3.42	3.9	4.98	5.72	7.49	9.04
HYDRAULIC RESISTANCE @ 10°C ΔT	mbar	13	22	27	22	29	25	30	39	41	37	40	42
SYSTEM DESIGN FLOW RATE @ 5°C ΔT	l/s	3.21	3.45	3.78	4.16	4.83	5.26	6.81	7.75	9.91	11.4	14.9	18.0
HYDRAULIC RESISTANCE @ 5°C ΔT	mbar	53	89	107	89	117	100	40	54	64	52	53	66
MINIMUM WATER FLOW RATE	l/s	0.47	0.47	0.56	0.56	0.69	0.75	0.89	1.11	1.53	1.67	2.08	2.69
MAXIMUM WATER FLOW RATE	l/s	3.21	3.45	3.78	4.16	4.83	5.26	6.84	7.80	9.95	11.4	15.0	18.1
MAXIMUM CONDENSATE FLOW RATE	l/h	38.0	48.0	49.0	61.0	64.0	81.0	98.0	102	124	151	199	242
WATER DATA - Oil													
SYSTEM DESIGN FLOW RATE @ 10°C ΔT	l/s	1.0	1.0	1.12	1.2	1.41	1.53	1.96	2.3	3.11	3.37	4.28	5.67
HYDRAULIC RESISTANCE @ 10°C ΔT	mbar	6	7	10	7	10	8	10	14	16	13	13	17
SYSTEM DESIGN FLOW RATE @ 5°C ΔT	l/s	2.0	2.0	2.25	2.4	2.81	3.05	3.92	4.58	6.22	6.72	8.56	11.3
HYDRAULIC RESISTANCE @ 5°C ΔT	mbar	22	29	38	29	41	33	40	54	64	52	53	66
MINIMUM WATER FLOW RATE	l/s	0.47	0.47	0.56	0.56	0.69	0.75	0.89	1.11	1.53	1.67	2.08	2.69
MAXIMUM WATER FLOW RATE	l/s	2.01	2.01	2.25	2.39	2.82	2.94	3.92	4.59	6.22	6.74	8.56	11.3
MAXIMUM CONDENSATE FLOW RATE	l/h	13.5	16.0	17.5	21.5	22.5	29.5	34.5	37.0	45.0	55.0	73.0	84.0

Note: - the correct flow switch must be selected based upon the design flow rate and resultant pressure drop
Type A - 15 - 60mbar
Type B - 40 - 200mbar

Figure E.2 - Water data Melbury C

Each Melbury boiler has a connection on the boiler body for the fitting of a safety valve to the boiler.

BS 6644 provides comprehensive information for the selection and location of safety valves and attention is drawn to the higher capacity requirements of safety valves for pressurised hot water systems.

E.3 Open Vent and Cold Feed Pipe

(See **BS 6644** for further information.)
Every boiler or group of boilers should have an open vent pipe and cold feed pipe installed between the boiler and the first water isolating valve. The minimum bore (mm) of these pipes per installation is shown in figure E.3.

The vent pipe must rise continually, must not be valved except by a design which when closed for maintenance the boiler is open to atmosphere. The pipe shall be protected against freezing where this might occur.

E.4 Altitude Gauge (Water Pressure Gauge)

Every boiler or group of boilers should be provided with a gauge complete with isolating valve. See Figure E.8 for typical position.

E.5 Thermometer

A thermometer complete with pocket should be fitted in the pipework to indicate water flow temperature. See Figure E.8 for typical position.

E.6 Drain Valves

Each boiler should have a drain valve fitted (not H.H.L. supply), to drain the boiler only. See figures E.1 & E.2 for sizes.
The heating system in total should have drain valves as recommended by **BS 6644** which permit the draining of the whole system, including the boiler and any hot water storage vessel.

E.7 Circulating Pump

One or more circulating pumps will be required to circulate water around the boilers and heating system. The pump should be sited to facilitate servicing.
Note - the Melbury C boiler requires a dedicated pump for the secondary heat exchanger circuit.
The Melbury C boiler MUST be fitted with the flow switch (HHL supply) to ensure that minimum flow rates are achieved in the secondary heat exchanger - refer to figure E.2 for specification.

E.9 Waterside Pressure Drop

The waterside hydraulic resistance (Pressure drop) is shown in Figure E1.

E.10 System Design

Refer to figures E.3 & E.4 for typical system designs using the Melbury C boiler.
E10.1 So as to gain the maximum benefit from the secondary heat exchanger, hydraulic separation of the heating circuits must be implemented using a mixing header.
The purpose of the separation is to provide heat to a variable temperature heating circuit, allowing for low circulation temperatures within the heating circuit and economiser section of the boiler, increasing opportunity for efficiency gains and condensing operation. Minimum flow rate requirements must be managed to ensure adequate circulation in the secondary heat exchanger (economiser), regardless of flow rates and conditions within other areas of the heating system. Accordingly the economiser must be fitted with a dedicated pump.

E10.2 On the primary heat exchanger circuit, for both Melbury HE & C models, suitable controls must be provided (not HHL supply) to provide back end protection by managing the return temperature into the primary heat exchanger above the lower limits detailed in **Figure E.2.**
For back-end boiler protection, a 3 port mixing valve system is recommended to blend the return water until the main system return water temperature is above dew point.
Control of the mixing valve and pump is not included with the boiler controls and must be provided by others.
Mixing valve control should be facilitated via a temperature sensor installed in the return pipe between the boiler and the mixing valve, to measure return water temperature entering the boiler. Minimum return water temperatures for high efficiency boilers and condensing boilers primary heat exchanger are 60°C for gas and 50°C for oil.

Figure E.3 shows a typical system design incorporating the secondary heat exchanger and back end protection on the primary heat exchanger.

E 10.3 In multiple boiler solutions, it is possible to mix HE & C models of Melbury, so as to maximise the higher efficiencies to be gained from low temperature operation. A typical mixed installation of condensing boilers and high efficiency boilers with multiple heating circuits having a mix of constant flow and variable flow with constant and variable temperature is shown in **Figure E.4.**
The purpose of this circuit is to provide heat to a mix of variable temperature and constant temperature heating circuits with differing flow and temperature requirements allowing for directing low temperature circulation via the economiser section of the condensing boiler increasing opportunity for efficiency gains and condensing operation.
The condensing boiler should be set as the lead boiler.
Again, the varying flow requirements of the boiler economiser and boiler primary heat exchanger are satisfied by separating the circuit hydraulically using a mixing header.
Back-end protection is provided to the boiler primary heat exchanger satisfying minimum return temperature requirements.

Boiler Output	Feed	Vent
300kW - 600kW	38	50
600 - 1000kW	50	65
>1000kW	**See note!**	

Figure E.3 - Cold Feed and Vent Pipe Sizes (mm)

Note: - The size of the open vent and cold feed must be in accordance with the nominal rated output of the boiler rounding up to the nearest pipe size using the formula -

Open Vent
$d_v = 15 + (1.397) * \sqrt{Q}$

d_v = vent Ø (mm) & Q = output (kW)

Cold Feed
$d_f = 15 + (0.927 * \sqrt{Q})$

d_f = feed Ø (mm)

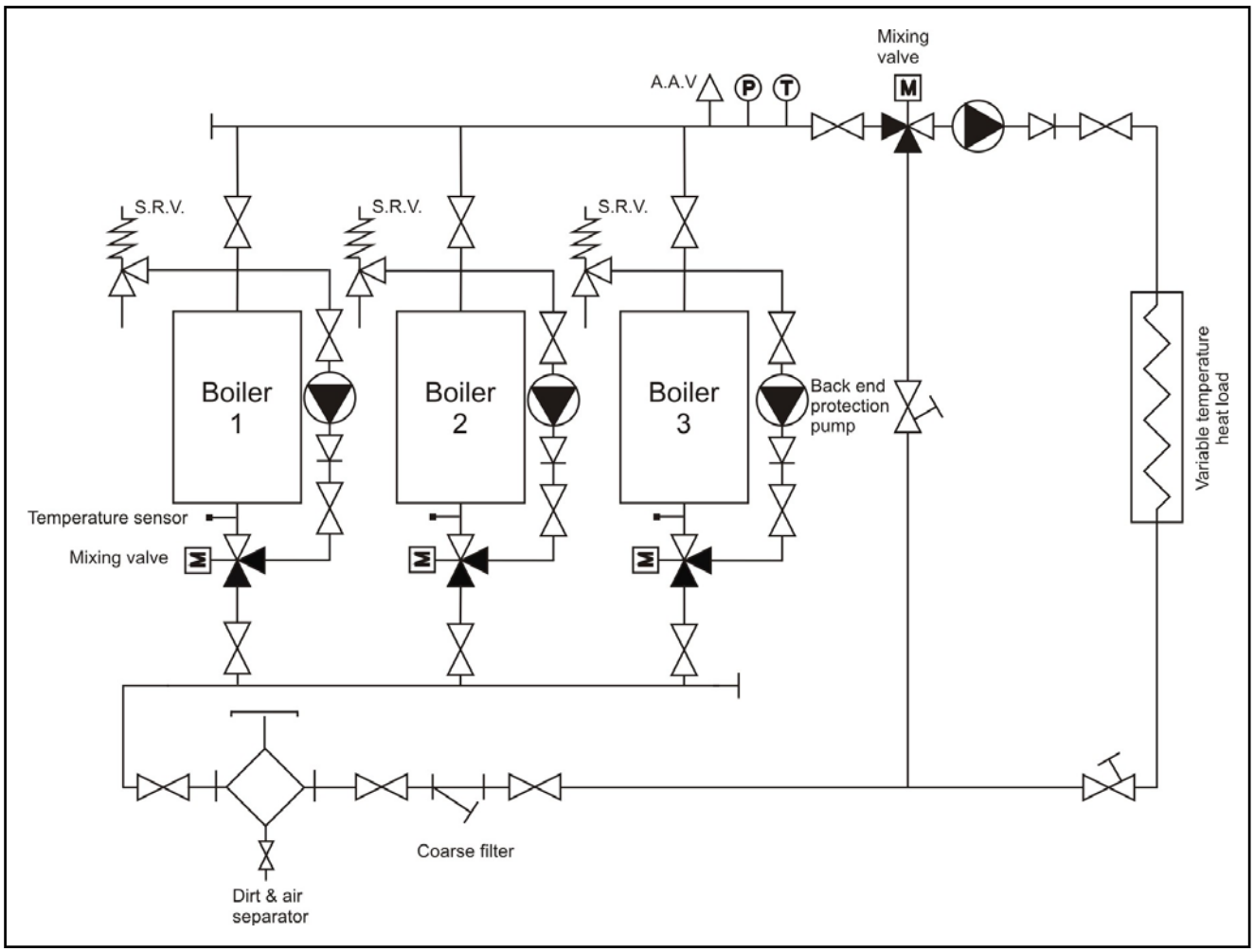


Figure E.4 - Variable Temperature Heating Circuit - Melbury HE

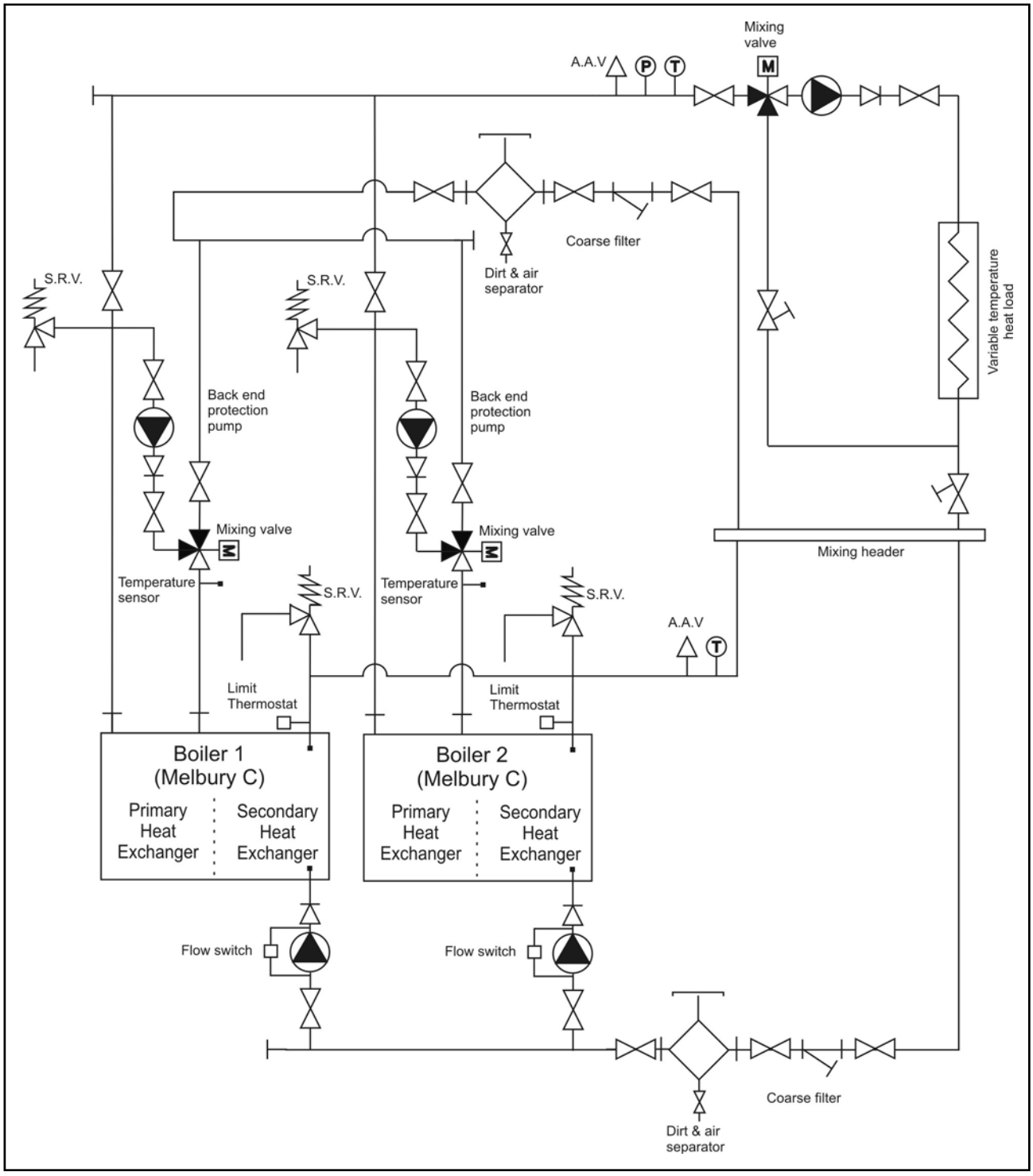


Figure E.5 - Variable Temperature Heating Circuit - Melbury C

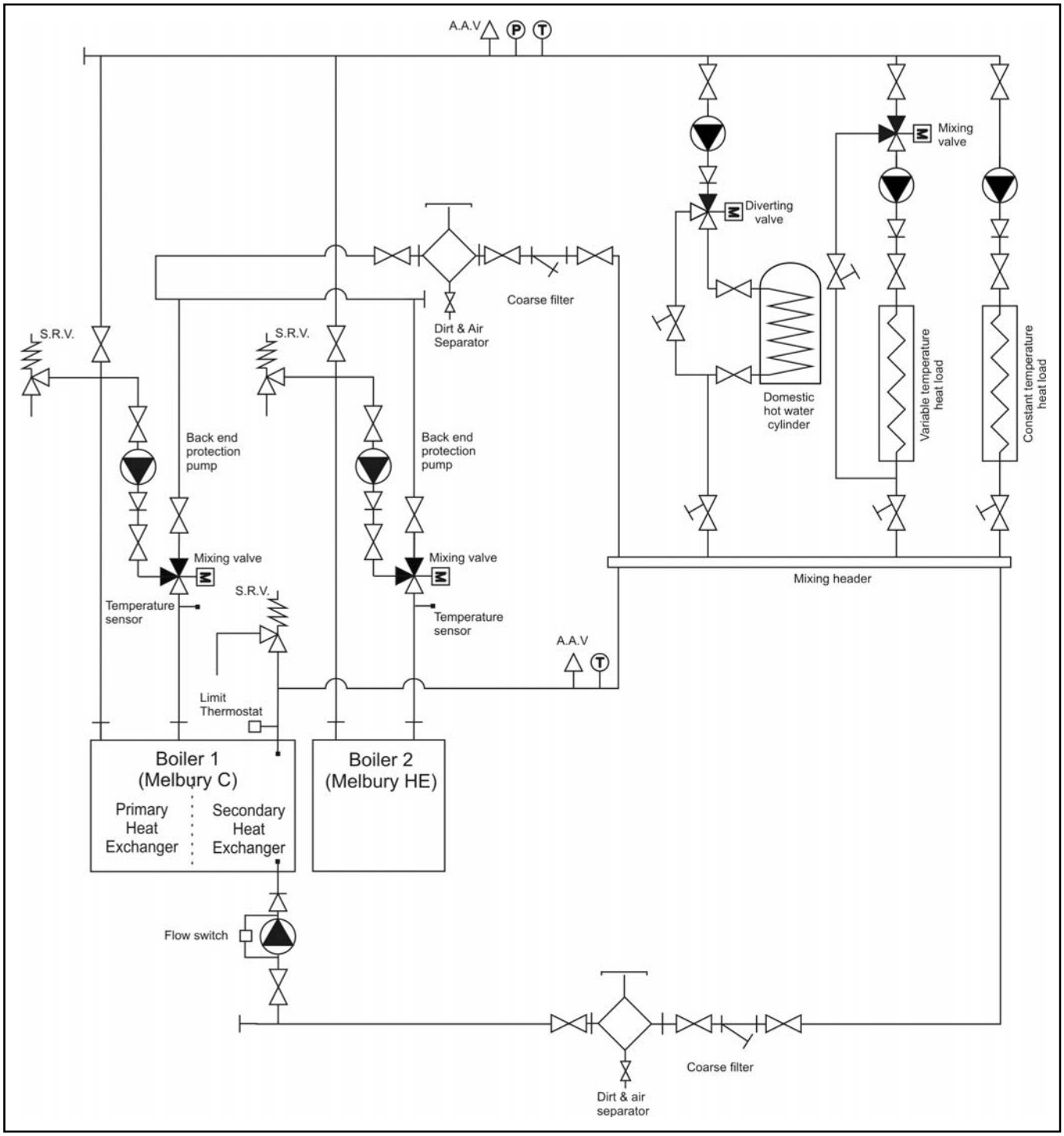


Figure E.6 - Constant and Variable Temperature Heating Circuits with Domestic Hot Water Combined Melbury HE & Melbury C

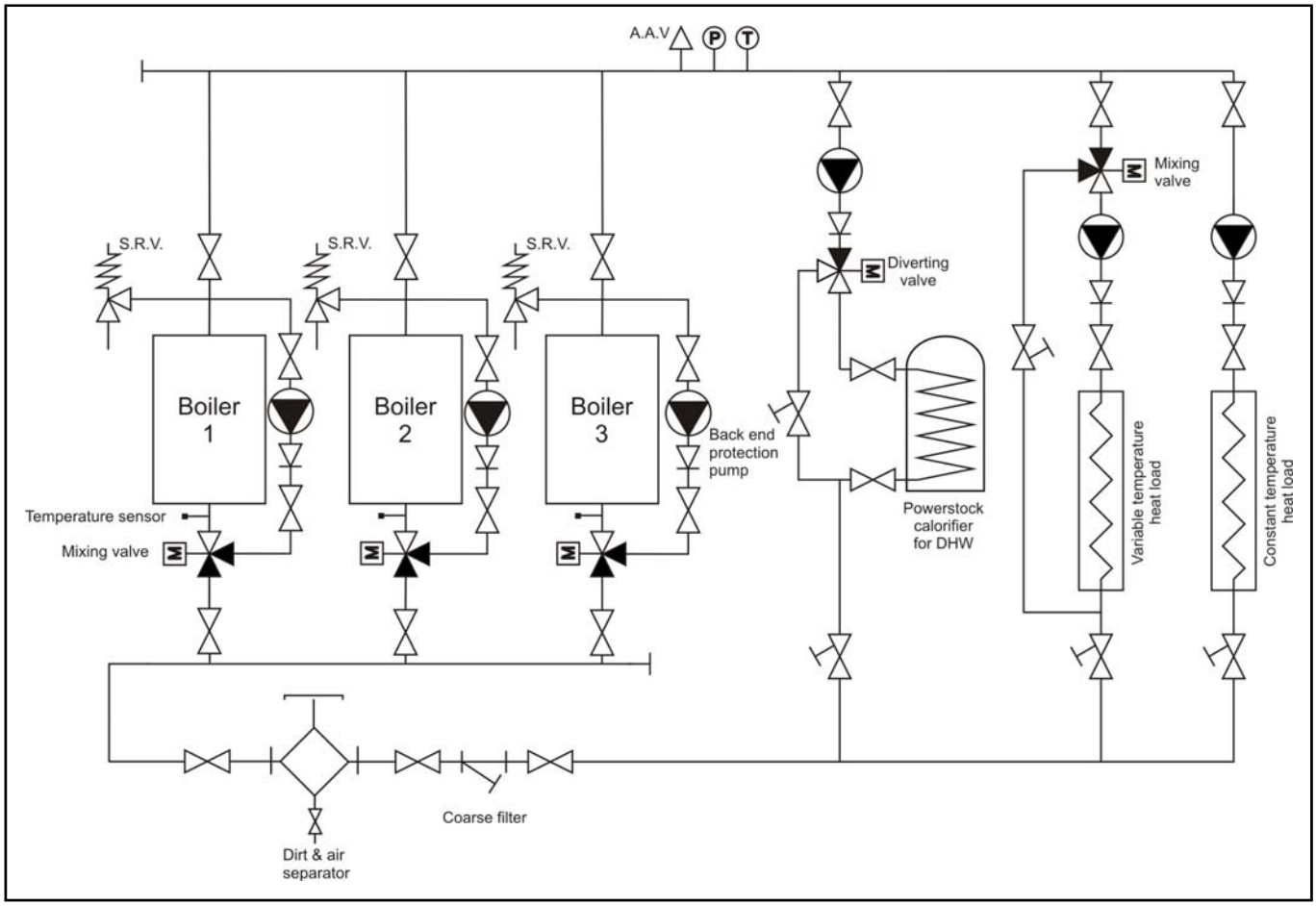


Figure E.7 - Constant and Variable Temperature Heating Circuits with Domestic Hot Water - Melbury HE

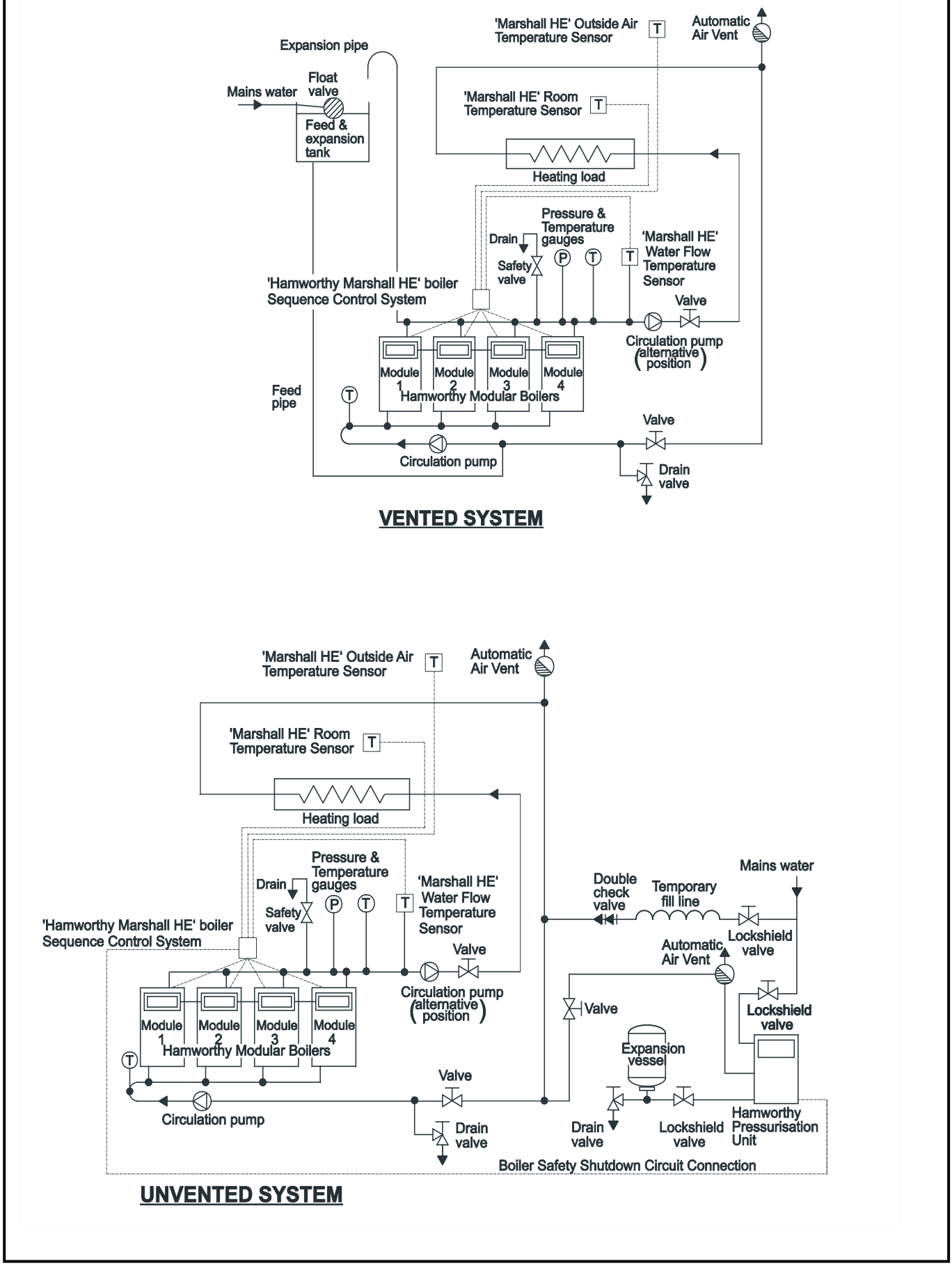


Figure E.8. Typical Boiler Installation

USEFUL USER INFORMATION

INSTALLER	SITE ADDRESS

BOILER TYPE	BOILER SIZE(S)	UNIT NO(S).	SERIAL NO(S).	FLUE

Notes

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